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Nutritional Risk Factors among Stroke Survivors in Gaza Governorates: A case-control study

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Nutritional Risk Factors among Stroke Survivors in Gaza Governorates: A case-control study

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Dedication

This thesis is dedicated

To the great father who devoted this life for us.

To my dear mother that gave me the road of my success.

To my patient wife, who was beside me in every moment and

my son "Omar" who are the pleasure of my life.

To my brothers, my sister and my family,

To my friends and colleagues and of course

To all my relatives who encouraged me to complete this work.

To the Palestinian people especially for martyrs who

sacrificed their lives for Palestine and Al-Aqsa.

Thank you and may Allah bless you

Mohammed Omar Al-Kahlout

12/01/2016

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 of its parts) has not been submitted for higher degree to any other university or institution.

Signed

Mohammed Omar Al-Kahlout

Date: 12 January 2016

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Abstract

Background Stroke globally is the second leading cause of death for people above the age of 60 years, and the fifth leading cause in people aged 20 to 59 years old; and this is also the situation in Palestine. There are many risk factors know to be linked and related to stroke. Nutritional pattern is one of them. The past fifty year there has been remarkable changes in the nutritional habits. This study aimed to assess nutritional risk factors for development of stroke among stroke survivors and their adult control.

Methods This study, a case-control, consisted of 450 participants aged ≥45 years, (150 cases with first stroke and 300 controls with no history of stroke). Twice the numbers of control matched for age, gender, and place of residency. Cases selected from all large governmental hospital, while control selected from 7 Primary health care centers. who were studied between March 2015 to November 2015 in Gaza Strip. For data collection, a self-designed questionnaire was used to interview the participants.

Results We have directly interviewed 450 participants, of them 150 complain from first stroke (126 patient with ischemic stroke "84%"; 24 patients with hemorrhagic stroke "16 %") and 300 controls. Significant common risk factors for all strokes were: history of HTN (OR 2.22, 95% CI 1.44-3.47); DM (OR 2.25, 95% CI 1.51-3.36); Cardiac disorder (OR 1.67, 95% CI 1.09-2.55); obesity (OR 1.611, 95% C.I. 1.058–2.445). Among nutritional factors those increased stroke risks were: consumption of Rice (Z=2.222, P-value=0.026), Red meat (Z=2.748, P-value= 0.006), Eggs (Z=2.045, P-value= 0.041), Fried foods (Z=1.939, P-value=0.039), Salts, spices and pickles (Z=2.054, P-value=0.040). According to the type of stroke: HTN (Z=2.80, P-value =0.005); age ≤ 50 years ($\chi 2$= 34.30, P-value =0.001) were associated with hemorrhagic stroke; and DM (Z=3.21, P-value =0.001); age ≥ 60 years and Current smoking ($\chi 2$= 9.936, P-value=0.002) were associated with hemorrhagic stroke. Other factor that can decrease stroke risk were: high physical activity (OR 0.631, 95% CI 0.400–0.967); increase consumption of non-leafy vegetables (Z=2.664, P-value=0.008); coffee (Z= 2.096, P-value= 0.036); and ketchup or tomato sauce (Z=2.586, P-value=0.010).

Recommends Proper nutritional counseling and nutritional recommendation should be integrated in the care of patients who are at risk of developing stroke especially obese patients with hypertension or diabetes in hospital and PHCC to increase and promote the patient's awareness about the stroke risk factors and encourage the intake of a healthy diet.

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List of abbreviations

BMI	Body Mass Index
BP	Blood Pressure
CBR	Crud Birth Rate
CDC	Centers for Disease Control and Prevention
CDR	Crud Death Rate
CI	Confidence Interval
CT	Computed Tomography
CVD	Cerebrovascular Disease
DM	Diabetes Mellitus
EGH	European Gaza Hospital
ENT	Ear, Nose & Throat
GDP	Gross Domestic Product
GS	Gaza Strip
HC	Hip Circumference
HTN	Hypertension
IMR	Infant Mortality Rate
ICCU	Intensive Cardio Care Unit
ICH	Intracerebral Hemorrhage
ICP	Intracranial Pressure
ICU	Intensive Care Unit
IHD	Ischemic Heart Disease
IVH	Interventricular Hemorrhage
LDL	Low Density Lipoprotein
MOH	Ministry of Health

MRI	Magnetic Resonance Imaging
NGOs	Non-Governmental Organizations
OR	Odds Ratio
PA	Physical Activity
PCBS	Palestinian Central Bureau of Statistics
PHC	Primary Health Care
PHCC	Primary Health Care Center
SBP	Systolic Blood Pressure
TIA	Transient Ischemic Attack
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
WB	West Bank
WC	Waist Circumference
WHO	World Health Organization
WHR	Waist to Hip Ratio

Chapter (1): Introduction

1.1 Research background

Stroke or Cerebrovascular Disease (CVD) is a clinical syndrome with rapid onset and focal neurological deficits that persists for at least 24 hours unless death occurs. It is mainly due to disruption of blood circuit to a portion of the brain, thereby depriving cells from oxygen and glucose leading to impairment and loss of cells. Stroke is a generic term referring to a group of disorders that include cerebral infarction, cerebral hemorrhage, and subarachnoid hemorrhage, and that describes the abrupt and sudden nature of onset (Strong et al, 2007).

There are 15 million people worldwide who suffer a stroke each year. According to the World Health Organization (WHO, 2012). Globally, stroke is the second leading cause of death for people above the age of 60 years, and the fifth leading cause in people aged 15 to 59 years old (World Heart Federation, 2015). Each year, nearly six million people worldwide die from stroke. One in six people worldwide will have a stroke in their lifetime. Every six seconds, stroke kills someone (World Stroke Organization, 2012). Stroke is the leading cause of gait impairment in rehabilitation facilities (Mant & Walker, 2011), in the US; stroke is the number one cause of long-term disability (American Heart Association, 2015). Overall, in 2010, an estimated 16.9 million cases of incident stroke took place worldwide (69% in low-income and middle-income countries), 33 million prevalent stroke cases (52% in low-income and middle-income countries), 5.9 million stroke deaths (71% in low-income and middle-income countries) (Feigin et al., 2014).

According to the annual report of the Palestinian Ministry of Health (MOH, 2014_A), it is stated stroke are the third leading cause of death in general population (8.8%), with a rate of 25.6/100,000. It was shown that it is the fifth leading cause of death in male (7.5%), and third leading cause of death in female (10.2%).

The major factors that may increase the risk for stroke is hypertension, diabetes, hyperlipidemia, smoking, cardio-embolic disease, especially in the aged peoples. Further, many of the common risk factors for stroke can also be influence by preserved diet and nutritional habits (Mbbs et al., 2007).

This global increase in stroke rates could be related to unhealthy diet & sedentary lifestyle arising from industrialization & urbanization (Dans et al., 2011). Over consumption of calories and increased prevalence of chronic disease pose a threat to further increase stroke incidence in high-income countries and even accelerate the increase in stroke incidence in low & middle-income countries (Wang et al., 2011).

Diet and nutritional pattern is not static, and in the past fifty years. There has been a remarkable change in the nutritional pattern. The increase of stroke rates in developing countries has been ascribed both to population aging, change in lifestyle and poor diet. It was also noticed that as national income rise, dietary animal fat and protein have increased whilst carbohydrate and fiber have decreased the risk for stroke also increase (Popkin, 2008). Several indicators are used to assess the nutritional status of adults including: Body Mass Index (BMI) and fat distribution (mainly Waist to Hip Ratio "WHR") as anthropometric, biochemical analysis (mainly serum lipids and glucose levels), clinical picture and usual dietary habits.

It is well known that food-related behavior is complex and is determined by the interplay of many factors, including physiological factors, sociodemographic factors such as income, education, occupation, behavioral and lifestyle factors such as physical activity, smoking, knowledge and attitudes related to diet and health (Konzalez et al., 1998). Moreover, a high intake of energy-dense macronutrient-poor foods, heavy marketing of energy dense foods, fast food outlets, sugar sweetened soft drinks, fruit juices, adverse social and

economic conditions, all are considered to be risk factors for obesity and stroke (Swinburn et al., 2004).

Limited studies were conducted in Gaza Strip (GS) to investigate risk factors for stroke but no study has investigated yet the nutritional risk factor for stroke. So, this study is hoped to promote evidence-based prevention, diagnosis and management of stroke that is suitable for our local situation which will help primary & secondary health providers in the prevention and early detection of stroke risks.

1.2 Research problem:

Stroke or CVD is the third leading cause of death among the Palestinians in 2013. Unfortunately, the assessment of nutritional risk factors for stroke are not adequately investigated in Palestine, therefore, this study could answer important questions related to the nutritional impact on risk factors to develop stroke in GS. The study could provide valid and credible information about the nutritional advices, and provide some awareness for stroke patients towards adopting healthy diets.

1.3 Justification of the study:

During recent years and based on many observation, hospitals records and annual report, stroke is a becoming serious problem in Palestine, and it needs a special and comprehensive care. According to the Palestinian Annual Report 2013, the mortality rate among CVD between (20-59) years old is high in comparison with other diseases, and it accounts for 5.1% of all deaths. Also the mortality rate among CVD over 60 years old is higher in comparison with other diseases, it accounts 14.1% of total death (MOH, 2014_A).

The status of health in Palestine in 2013 showed that the mortality rate among CVD in males is high in comparison with other diseases and it accounts 7.5%. The mortality rate in females also is high, and it accounts for 10.2% for all deaths. The mortality rate among

cerebrovascular diseases in both males and females between (60-75) years old are high and they account 14.1% (MOH. 2014_A). No previous studies have been located in the literature about nutritional risk factor, awareness, and dietary habits and stroke diseases in GS. In addition, there are no previous studies that tackled nutritional risk factor and stroke diseases in Palestine. Assessing nutritional habits in people living in GS is very important, because our people are at highly stressful risk situation such as political instability, malnutrition, poverty, and low health resources.

On other hand socioeconomic changes in our regions lead to major changes in life style toward sedentary life style and increase the incidence and morbidity of chronic diseases, that all will lead to increase the costs of treatment and rehabilitation. So, this study can be considered as an initial step to start nutritional data base necessary for improving health status, increasing life expectancy, preventing complications, providing health prevention, promotion, curative, and restoration of health for stroke in Palestine.

1.4 Study objectives

1.4.1 General objective:

To assess nutritional risk factors for development of stroke among stroke survivors and adult in Gaza Governorates.

1.4.2 Specific objectives:

- To study the relationship between dietary habits and the nutritional status of patients with stroke.
- To assess whether there is an awareness and commitment from stroke patients towards following healthy diet recommendations or not.
- To assess the relationship between obesity (BMI, WC and WHR) and the development of stroke.

- To examine the association between certain personal and behavioral characteristics (Education level, Employment, smoking and physical activity) and the occurrence of stroke.
- To provide suggestions and recommendations that might decrease mortality and morbidity resulted from stroke.

1.5 Research questions:

- Is there a relationship between socio-economic conditions and stroke?
- What is the relationship between dietary habits and stroke?
- What is a significant relationship between stroke and BMI?
- What is the effect of WC and WHR on stroke?
- Is there any possible association of lifestyle (education level and smoking) and occurrence stroke?
- Is there a significant relationship between family history and stroke?
- Is there a significant relationship between physical activity and stroke?
- What are the recommendations that could be provided to stakeholders and ward help in prevention of stroke in Gaza Governorates?

1.6 Context of the study

1.6.1 Gaza Governorate demographic characteristics

Palestine is a relatively small country, the total area of the historical Palestine is about 27.000 Km², it has been occupied in1948 by Israel and the two remaining parts West Bank (WB) and GS are separated geographically after the war in 1967. The total area of the WB 5655 Km² with population living in is about 2.754.722 individuals. Population density 488 capita/Km^2. GS is a narrow piece of land lying in the coast of Mediterranean Sea. The total area of GS is about 365 Km² with population living in is about 1.730.737 individuals. GS

is overcrowded area with population density of 4742 capita/Km^2 & about 65.3% of them are refugees as estimated by the year 2013 (PCBS, 2014 ; MOH, 2014_C).

GS is divided into five governorates: North Governorate, Gaza Governorate, Mid-zone Governorate, Khan-Younis Governorate, and Rafah Governorate (MOH, 2014^E). According to the annual report of Ministry of Health in 2014, the Crude Birth Rate (CBR) in the Palestinian territory estimated about 32.6/1000 of population in 2013, distributed as 29.4/1000 in the WB and 37.1/1000 in GS, in the other hand the Crude Death Rate (CDR) was about 2.5/1000 of population, distributed as 2.9/1000 of population in GS and 2.5/1000 in WB (MOH, 2014^B), also the Infant Mortality Rate (IMR) in 2013 in GS was 20.1/1000 per live births (PCBC, 2013).

1.6.2 Socio-economical context

Preliminary estimates indicated a decrease in Gross Domestic Product (GDP) in Palestine by 2.5% during 2014 compared with 2013; GDP per capita has decreased by more than 5% during 2014 compared with 2013. The decrease in 2014 was concentrated in the major economic activities that are the biggest contributors to GDP: the agriculture activity, construction activity, services and other items activity and industrial activity.

Unemployment is critical problem in the Palestinian situation, since it has a rate of 29.3% in the year 2014, unemployment rates in GS is higher than WB, 40.8 % and 18.2% respectively; this situation resulted from restrictions on Palestinian movement due to unilateral activities from Israel, and the siege on the GS, in addition to the Palestinian split between the WB and GS. Paid employment is the main source of income in the Palestinian territories (PCBS, 2014).

1.6.3 Palestinian Health Care system

Health care system in Palestine is complex, because health service delivery in Palestine is divided into five major health care providers: two public providers (Ministry of Health and the Ministry of Interior – Military health services), multiple private providers (hospitals, clinics) and numerous Non- Governmental Organizations (NGOs) providers (the United Nations Relief and Works Agency-UNRWA and other local NGOs). In GS main provider MOH is operating 13 hospitals, 14 hospitals for NGOs, and 3 hospitals for Military health services (PCBS, 2014; MOH, 2014_E).

The main roles and responsibilities of the MOH according to the Palestinian Public Health Law are: providing, regulating and supervising the provision of health care in Palestine. Also, MOH is responsible about planning the health care services in coordination with different stakeholders, enhancing health promotion to improve the health status, developing human resources in health sector, managing and disseminating health information, and others (MOH, 2014^E).

1.6.4 Primary Health Care Centers

Primary Health Care Centers (PHCC) is a major component of Palestinian health care system. PHC provides preventive, promotional, curative and rehabilitative health care to all Palestinian people especially for children and other vulnerable groups through MOH, UNRWA, non-governmental and private centers. At the end of 2014, the total number of PHCC centers in GS was 54 centers guided by MOH, 21 centers guided by UNRWA and 81 centers guided by NGOs (MOH, 2014_F).

1.6.5 Governmental Hospital Services

MOH is the main provider of secondary care in the GS. It is responsible for 13 hospitals across the five governorates and the number of hospital beds in GS is about 2037 and

percent of hospital bed /1000 capita is about 1.2 (MOH, 2014^{E}). The average occupancy rate at hospitals in the GS is about 88%. The unstable Palestinian political situation increases the load on the health care services in GS and WB.

In north GS established in 2002 Kamal Odwan hospital, locating in Beit Lahia project square seven and providing medical, surgical, and pediatric, ICCU, ICU services, and emergency services (MOH, 2013_{E}).

In Gaza city have Al-Shifa Hospital is the biggest medical institution in the Palestinian MOH that considers secondary health care delivery system and provides some tertiary care services for population. The hospital was established in 1946 on an area of over 45.000 m^2.

In mid zone governorate, Shohda Al-Aqsa hospital establish at 2001, the only hospital in the mid zone region that provides clinical treatment services. The hospital has 261 beds and the number of doctors (108) and nursing (110) and total hospital staff (474) employees (MOH, 2014_{D}).

In Khan Younis Governorate European Gaza hospital (EGH) is considered as one of the advanced medical centers in Palestine. The hospital project contains facilities for a full range of secondary, primary and planned tertiary patient care services for both inpatients and outpatients. The hospital has 261 beds and the number of doctors (160) and nursing (204) and total hospital staff (691) employees (MOH, 2014_{D}).

In 1960 established Nasser hospital in in Khan Younis Governorate. The hospital has 330 beds and the number of doctors (169) and nursing (252) and total hospital staff (880) employees (MOH, 2014_{E}).

1.7 Operational definition

This part will contain the definition of terms included in this study

Stroke: A clinical syndrome characterized by an acute loss of focal cerebral function with symptoms lasting more than 24 hours or leading to death, and which is thought to be due to either spontaneous hemorrhage into the brain substance (hemorrhagic stroke) or inadequate cerebral blood supply to a part of the brain (ischemic stroke) as a result of low blood flow, thrombosis or embolism associated with diseases of the blood vessels (arteries or veins), heart or blood (Warlow et al, 2008).

Nutritional status: The Condition of the body in those respects is influenced by the diet, which are levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity (Mugenyo, 2011).

The researcher defines Nutritional risk factors operationally as those factors that may lead to increased incidence of stroke, these factors include; BMI, WC, WHR and Nutritional status.

A balanced diet: A diet containing proportionate amounts of those food groups which are considered to be optimal for good health. A properly balanced diet should: be highest in fruits and vegetables; have a moderate amount of refined carbohydrates (e.g., breads and cereals), fish and dairy products; lesser amounts of meat; and minimal amounts of fats (e.g., butter) and refined sugars (Medical Dictionary, 2012).

Body mass index: Is a number calculated from a person's weight and height. BMI is a fairly reliable indicator of body fatness for most people. Calculated by weight in Kilograms (Kg) divided by the square of height in meter (CDC, 2015).

Waist circumference (WC): Is a simple practical measure that is commonly used for assessing central obesity; therefore, it is a good predictor for obesity related diseases (Janiszewski et al., 2007).

Hip Circumference (HC): Is measured by applying the tape in a horizontal plane at the level of the maximal extension of the buttocks when viewed from the side, and parallel to the floor (Welborn et al., 2003).

Waist to Hip Ratio (WHR): Is defined as the circumference of the waist divided by that of the hips. Central obesity is well defined by WHR. Men whose WHR is > 0.90 and women whose WHR is > 0.85 are considered at risk for obesity-related diseases such as stroke and CVD (Villegas et al., 2004).

Interpreting the BMI, WC and WHR measurements:

Table 1.1 Combined recommendations of BMI and WC cut-off points made for overweight or obesity, and association with disease risk

	Body mass index		**Disease risk (relative to normal weight and waist circumference)**	
	Range	**Obesity class**	**Men < 102 cm Women < 88 cm**	**Men >102 cm Women >88 cm**
Underweight	<18.5			
Normal	18.5–24.9			
Overweight	25.0–29.9		Increased	High
Obesity	30.0–34.9 35.0–39.9	I II	High Very high	Very high Very high
Extreme obesity	> 40.0	III	Extremely high	Extremely high

According to the CDC (2015), BMI < 18.5 kg/m² is considered underweight, from 18.5-24.9 kg/m² is considered normal weight, from 25-29.9 kg/m² is considered overweight (pre-obesity) and ≥ 30 kg/m² is considered obese (CDC, 2015).

According to the WHO (2011) health is at risk the waist circumference greater than 94 cm for men and 80 cm for women, but health is at high risk the waist circumference greater

than 102 cm for men and 88 cm for women. For WHR, higher indicates health risk the upper limit and more is considered to be 0.90 for men and 0.85 for women.

Physical Activity (PA): Is defined by the WHO as "any bodily movement produced by skeletal muscles that require energy expenditure" (WHO, 2009). Aerobic PA is classified into four categories: Inactive/ sedentary refers to no PA beyond baseline activities of daily living. Low activity refers to less than 150 minutes/week of moderate-intensity PA. Medium activity refers to 150 to 300 minutes/week of moderate-intensity activity. High activity is more than 300 minutes/week of PA (CDC, 2015).

Smoker: Anyone who smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day or someday (CDC, 2010).

Current Smoker: Any person who smokes tobacco both daily and occasionally at the time of the study or the survey (CDC, 2010).

Chapter (2) literature review

In this chapter the researcher reviews the critical points of the study variables that are related to developing stroke among adults. As well as, the researcher reviews relevant previous studies and experience of other researchers in this field.

2.1 Conceptual framework

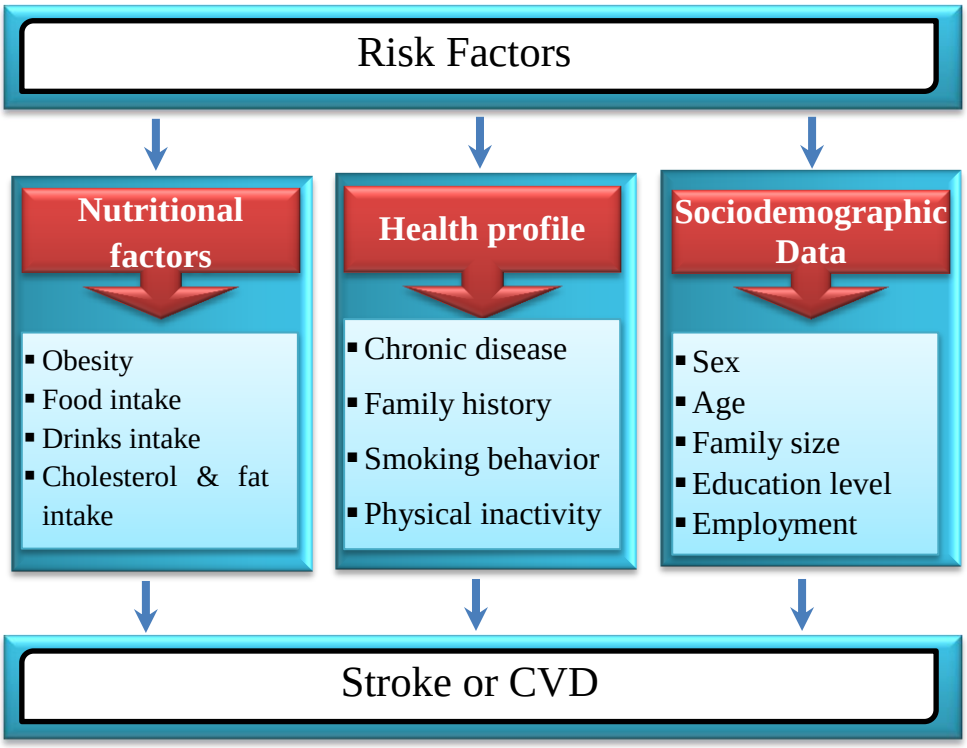

Figure 2.1: Conceptual framework diagram "self-developed"

The researcher has developed the conceptual framework to address the major concepts and variables included in this study after reviewing the available literatures about stroke. Also the researcher has classified the common nutritional risk factors as:

2.1.1 Nutritional factors

It includes habits and behavior occurred during daily nutritional status and difference of type foods. These habits include food intake, drinks intake, or food rich in cholesterol and fat. These healthy or unhealthy behaviors overconsumption of food lead to obesity or

weight gain. Even if the food is healthy and harmless, the human body needs fewer calories are limited. If take more than needs calories they turn to fat. Measures of nutritional status include indicators of body fat content is estimated by BMI, WC, and WHR.

2.1.2 Health profile factors

Health Profiles provide summary information on health (and factors affecting health). Several factors may contribute to familial stroke such as history of chronic disease (hypertension (HTN), Diabetes and cardiac disease). Members of a family might have a genetic tendency for stroke risk factors. The influence of a common lifestyle among family members may also contribute to familial stroke.

2.1.3 Sociodemographic Factors

It includes gender and age of the participant when stroke occur, family size may effects and decrease or increased stress, also education level of the participant may contribute to enable the participant to choose healthy foods and appropriate type of food or drinking to maintain a healthy state in optimal condition. Employment and work condition may play importance factors to occurred stroke, employments can give chance to increase activity and best economic situation.

2.2 Literature review

2.2.1 Definition of stroke

A stroke is a sudden onset of neurological impairment that is caused by a disruption of the blood supply to the brain, which may be either ischemic or hemorrhagic in origin (Mant & Walker, 2011). The term “stroke” usually refers either to a cerebral infarction or to non-traumatic cerebral hemorrhage. Depending on the population you are seeing (ethnicity, age, comorbidities) the ratio of infarcts to hemorrhages is about 4:1 (Uchino et al, 2011).

Ischemic stroke is caused by obstruction of a blood vessel supplying the brain, either due to in-situ thrombus or embolus from a distant site (most commonly the carotid arteries or the heart). Hemorrhagic stroke is caused by bleeding of a blood vessel supplying the brain (Warlow et al, 2008). As a result the affected area of the brain cannot function, which might result in an inability to move one or more limbs on one side of the body, inability to understand or formulate speech, or an inability to see one side of the visual field (Donnan et al, 2008).

Stroke is defined by the WHO as a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin (Hatano, 1976).

2.2.2 Epidemiological background

Nearly 20 million people worldwide suffer a stroke each year; of these, 5 million will not survive. According to the WHO, stroke is the second leading cause of death for people above the age of 60 years, and the fifth leading cause in people aged 15 to 59 years old (World Stroke Organization, 2012). Each year, nearly six million people worldwide die from stroke. One in six people worldwide will have a stroke in their lifetime. Every six seconds, stroke kills some. In fact, stroke continues to be responsible for more deaths annually (World Heart Federation, 2015).

According WHO, estimated 17.5 million people died from CVD in 2012, representing 31% of all global deaths. Stroke is the fourth leading cause of death in low-income countries, approximately 52/100.000 population, second leading cause of death in lower-middle income countries, approximately 78/ 100,000 population, first leading cause of death in

upper middle countries, approximately 126/ 100,000 population, and second leading cause of death in high income countries, approximately 95/ 100,000 population (WHO, 2012).

In Arab countries, incidence rates for all strokes ranged from 11.7 / 100,000 in Qatar to 63 / 100,000 in Libya. Incidence rates for hemorrhagic stroke were 2.7 / 100,000 in Qatar, 1.9 / 100,000 in Saudi Arabia and 10.4 / 100,000 in Iran (Tran et al, 2010).

Stroke mortality is affected by stroke incidence, the mortality rate of stroke subtypes and the level of stroke care. Cerebral hemorrhage have a much higher mortality rate than ischemic stroke, and therefore better control of HTN is likely to lead to decrease in its incidence, and result in a fall in stroke mortality (Mbbs et al, 2007).

In Palestine and according MOH, stroke is the second leading cause of death for people above the age of 60 years, approximately 14.1/100,000 population and the fifth leading cause in people aged 20 to 59 years old, approximately 5.1/100,000 population. Total stroke is the third leading cause of death with a rate 8.8% and approximately 25.6/100,000 population (MOH, 2014_A).

2.2.3 Classification of stroke

There are different approaches to classification of acute stroke. International classification of diseases and problems made by the WHO regarding health (tenth audit- -ICD 10) includes diseases and signs, symptoms, abnormal test results, complaints, social circumstances and external causes of injuries and illnesses. This classification classifies stroke under codes from I 60 to I 69 into following subgroups: subarachnoid hemorrhage, intracerebral hemorrhage, other non-traumatic hemorrhages, cerebral infarct caused by extracerebral or intracerebral occlusion, as well as non-specific stroke (Kadoji et al, 2012).

2.2.3.1 Ischemic stroke

An ischemic stroke is death of brain tissue due to interruption of blood flow to a region of the brain, this deprives the brain cells of oxygen and nutrients, and cells may begin to die within minutes. Cause by occlusion of a cerebral or cervical artery or less likely, a cerebral vein (Uchino et al, 2011). About 80–90% of strokes are ischemic in origin (Mant & Walker, 2011).

There are three main subtypes of brain ischemia (Caplan, 2009):

Thrombotic stroke

Generally refers to local in situ obstruction of an artery. The obstruction may be due to disease of the arterial wall, such as arteriosclerosis, dissection, or fibromuscular dysplasia; there may or may not be superimposed thrombosis (Caplan & Manning, 2006).

This type of stroke occurs when a blood clot (thrombus) forms in one of the arteries that supply blood to the brain. A clot usually forms in areas damaged by atherosclerosis. Usually occurs during sleep (patient often awakens unaware of deficits), with intermittent progression of neurological deficits or be slowly progressive (over 24–48 hours), the neurological deficit varies according to cerebral territory affected. Profound loss of consciousness rare, except when area of infarction is large or when brainstem involved. Perfusion failure distal to site of severe stenosis or occlusion of major vessels (Cuccurullo, 2004).

Embolic stroke

A blood clot that forms in one area of the body and travels through the bloodstream to another where it may lodge is called an embolus. In the case of embolic stroke, the clot forms outside of the brain (usually in the heart or large arteries of the upper chest and

neck) and is transported through the bloodstream to the brain. There it eventually reaches a blood vessel small enough to block its passage (Uchino et al, 2011).

Emboli can be fat globules, air bubbles or, most commonly, bits and pieces of atherosclerotic plaque, such as lipid debris, that have detached from an artery wall. Many emboli are caused by a cardiac condition called atrial fibrillation—an abnormal, rapid heartbeat in which the two small upper chambers of the heart (called the atria) quiver instead of beating. Quivers cause the blood to pool, forming clots that can travel to the brain and cause a stroke. Cardiac sources of embolism account for 80 percent of embolic ischemic strokes (Goldstein, 2009).

Lacunar infarction

Lacunas are small (less than 15 mm) infarcts seen in the putamen, pons, thalamus, caudate, and internal capsule. Lacunar infarction cased due to occlusive arteriolar or small artery disease (occlusion of deep penetrating branches of large vessels), this occlusion occurs in small arteries of 50—200 μm in diameter, and it is with strong correlation with HTN (up to 81%); also associated with microatheroma, microembolism or rarely arteritis.

Onset may be abrupt or gradual; up to 30% develop slowly over or up to 36 hours. Computed Tomography (CT) shows lesion in about 2/3 of cases (Magnetic Resonance Imaging (MRI) may be more sensitive). Syndromes are relatively pure often (motor, sensory), and absence of higher cortical function involvement (language, praxis, non-dominant hemisphere syndrome, vision) (Cuccurullo, 2004).

2.2.3.2 Transient Ischemic Attack (TIA)

A transient ischemic attack (TIA) is traditionally defined as an acute loss of focal cerebral or ocular function with symptoms lasting less than 24 hours, which is caused by embolic or thrombotic vascular disease. The distinction between TIA and stroke is one of duration of

symptoms, with 24 hours representing a watershed between the two (Easton et al, 2009). This distinction is arbitrary–some patients with symptoms lasting less than 24 hours have evidence of infarction on brain imaging, and others with more protracted symptoms have no such evidence. Clinically, the distinction does not matter since the management of TIA and minor stroke is essentially the same. The incidence of TIA and minor stroke that presents like a TIA is of the order of 1/ 1000 people/ year (Mant & Walker, 2011).

About a quarter of patients with ischemic stroke have a TIA first, and over 40% of these occur in the week preceding the stroke. In the past, the risks of stroke following TIA were under-estimated. The true risk of stroke following an untreated TIA is around 8% after 7 days and 17% after 90 days, with the risks following a minor stroke a little higher. The individual risk following a TIA varies considerably, depending on simple clinical features (how long the TIA lasts, and whether or not it leads to unilateral weakness or speech disturbance) and age, Blood Pressure (BP) and diabetes mellitus (Uchino et al, 2011). These risk factors have been operationalized into a simple clinical score, the ABCD2 score, whereby people with TIA are assigned a score varying between 0 and 7, depending on the presence or absence of these features. The higher the ABCD2 score, the higher the risk of stroke. About two-thirds of patients with TIA would be expected to have an ABCD2 score ≥4, and over 90% of strokes that occur in the week following a TIA occur in patients with an ABCD2 score ≥4 (Johnston et al, 2007).

2.2.3.3 Hemorrhagic strokes

Hemorrhagic stroke represents 15% of all strokes, but they are responsible for about 40 % of all stroke deaths. It occurs when a blood vessel in the brain leaks or ruptures. Hemorrhages can result from a number of conditions that affect blood vessels, including uncontrolled high BP (hypertension) and weak spots in blood vessel walls (aneurysms). A less common cause of hemorrhage is the rupture of an arteriovenous malformation, blood

dyscrasias/ bleeding disorders, anticoagulants, bleeding into tumors, angiopathies (Goldstein, 2009).

Intracerebral hemorrhage

Intracranial hemorrhage (i.e, the pathological accumulation of blood within the cranial vault) may occur within brain parenchyma or the surrounding meningeal spaces. Intracerebral hemorrhage (ICH) and extension of parenchymal bleeding into the ventricles (i.e, interventricular hemorrhage "IVH") (Caplan & Manning, 2006).

Intracerebral hemorrhage accounts for 8-13% of all strokes and results from a wide spectrum of disorders. Intracerebral hemorrhage is more likely to result in death or major disability than ischemic stroke or subarachnoid hemorrhage. Intracerebral hemorrhage and accompanying edema may disrupt or compress adjacent brain tissue, leading to neurological dysfunction. Substantial displacement of brain parenchyma may cause elevation of Intracranial Pressure (ICP) and potentially fatal herniation syndromes (Uchino et al, 2011).

Subarachnoid hemorrhage

Spontaneous (i.e, atraumatic) intracranial hemorrhage into the subarachnoid space is a neurological emergency and an important form of hemorrhagic stroke that results in significant morbidity and mortality. Although the most common cause (80%) of non-traumatic subarachnoid hemorrhageis rupture of a cerebral aneurysm, other etiologies such as ruptured arteriovenous malformation, vasculitis, dural arteriovenous fistula, hemorrhagic brain tumors, and hemorrhagic transformation of ischemic stroke exist and need to be considered (Goldstein, 2009).

The most frequent cause of subarachnoid hemorrhage is abnormalities in the arteries located at the base of the brain. Called cerebral aneurysms, there are small areas of either

rounded or irregular swellings in the arteries. As the swelling continues the arteries weaken, and become prone to breaking. While subarachnoid hemorrhages can occur in people of any age and any gender, they are slightly more common in women than in men (Uchino et al, 2011).

2.2.4 Burden of stroke

Each year 16 million people experience a stroke and 5.7 million die from it. 87% of global stroke mortality occurs in low- and middle-income countries. Unless there are population-wide interventions, by 2030 there will be 23 million strokes and 7.8 million deaths each year (Smith, 2011). The global burden of stroke continues to increase, with 16·9 million of people being affected by stroke annually, resulting in over 100 million disability-adjusted life years lost (Feigin & Norrving, 2014).

Estimates from the global burden of diseases, injuries, and risk factors study ranked stroke as the second most common cause of death and the third most common cause of Disability-Adjusted Life-Years (DALYs) worldwide in 2010 (Feigin et al, 2014). Over 80% of CVD deaths occur in low- and middle-income countries with a percentage of premature death (before the age of 60) exceeding 40% in low-income countries, nearly three times the proportion in high-income countries (13%) (Boutayeb et al, 2014).

The number of stroke cases decreased by 10% in developed world but increased by 10% in the developing world between 1990 and 2010 (Feigin et al, 2014). This has serious repercussions for the least developed and the developing nations. The estimated cost of stroke related healthcare is about 68.9 billion dollars both in terms of health care as well as lost productivity. South Asia comprising of eight countries including India constitutes 22% of the world's population and accounts for about 40% of global stroke deaths (Jan et al, 2015).

2.2.5 Risk factor of stroke

Given the devastating deficits often associated with a stroke, the need for prevention is obvious. Many of the risk factors for stroke can be treated or modified. Doing so may prevent an initial stroke or recurrent strokes, as well as decrease the risk of premature death, which is most often the result of coronary disease. A number of stroke risk factors are the same as those for heart disease, although their relative importance varies.

2.2.5.1 Nutritional risk factors

2.2.5.1.1 Dietary habits

Diet and nutritional pattern is however not static, and in the past fifty years, there has been remarkable changes in the nutritional pattern. The increase of stroke in developing countries has been ascribed both to population aging, and change in lifestyle and diet which increases the risk of stroke. As national income rise, dietary animal fat and protein have increased whilst carbohydrate and fiber have decreased (Mbbs et al, 2007).

The relationship between dietary change and stroke is however complex. Many observational studies have been based on stroke mortality. However, mortality is affected by both changes in incidence, subtype of stroke, and level of stroke care (Gariballa, 2000).

2.2.5.1.2 Carbohydrate intake

Carbohydrate intake in quantities that exceed energy requirements (positive energy imbalance) is a major determinant of weight gain, adiposity, and the quality of carbohydrate intake also affects metabolic health. Consumption of refined sugars in liquid form promotes weight gain (Mozaff et al, 2011) .

The glycemic index is a measure of how much a standard quantity of food raises blood glucose levels compared with a standard quantity of glucose or white bread. The glycemic

load is a measure of the product of the glycemic index of a food item and the available carbohydrate content (Hankey, 2011).

Foods with a high glycemic index, such as sugar sweetened beverages and refined carbohydrates and starches, increase fasting blood glucose. Glycated proteins, and beverages and foods with high glycemic load, including added sugars, increase body weight (Livesey et al, 2008).

High carbohydrate intake from foods with a high glycemic index, added sugars, and high dietary glycemic load also leads to reduced intake of essential nutrients and has been associated with an increased risk of stroke mortality in women (Oba et al, 2010).

In the Nurses' Health Study, total carbohydrate intake was associated with elevated risk of hemorrhagic stroke (Oh et al, 2005).

2.2.5.1.3 Vegetables and fruits intake

There are several reasons why an increased consumption of fruits and vegetables is desirable in the national diet. They are a rich source of Non-Starch Polysaccharides and vitamins and minerals. Several of these micronutrients have antioxidant properties and they may have a role in protecting against free radical-induced oxidative stress which has been linked with the pathogenesis of IHD and ischemic stroke and other diseases (Gariballa, 2000).

Epidemiology studies suggest that intake of green yellow vegetables, fruits, fiber or whole grain but not refined grain is protective against ischemic stroke.

The protective effect of vegetables and fruits occur irrespective of the background of fat or protein consumption. Daily consumption of green-yellow vegetables and fruits is associated with a lower risk of mortality from total stroke, intracerebral hemorrhage, and cerebral infarction amongst Japanese who have a lower animal protein and fat intake. The

protective effects are similar in both men and women. Adjustment for animal product attenuated but did not invalidate the findings (Sauvaget et al, 2003).

Fung et al. (2004) reported also that in American women, a diet higher in fruits and vegetables, fish, and whole grains may protect against ischemic stroke whereas a dietary pattern typified by higher intakes of red and processed meats, refined grains, and sweets and desserts may increase ischemic stroke risk, especially in those with a history of HTN, There was no observed effect on cerebral hemorrhage. However, 17% of all cases had only a probable diagnosis of stroke, creating a huge uncertainty as to the effect on stroke subtype.

Also, increased fruit and vegetable consumption(more than five servings/ day) was associated with a lower risk of stroke than was intake of fewer than three servings/ day and three to five servings/ day in 257551 individuals followed up for 13 years (He et al, 2006). However, vegetable intake alone was not associated with a reduced risk of stroke in the INTERSTROKE study (O'Donnell, 2010).

Different mechanisms have been postulated to explain the association between intake of fruit, vegetables and stroke. The effect of vegetable and fruit may be partly due at least to effect on the BP. Meta-analysis of randomized controlled trials show that increased intake of dietary fiber may reduce BP in patients with HTN, so that is decrease incidence rate of stroke (Streppel et al, 2005; Whelton et al, 2005).

That finding that vegetables and fruits may have a protective effect against stroke is however on a background of continuous animal product consumption. It is also unclear how much of this effect is due to the dietary intake and how much is attributable to the lifestyle and other risk profile of such person, The observed effect of vegetable and fruit intake must be tempered with the possibility of confounding factors associated with diet.

2.2.5.1.3 Protein intake

A diet high in protein, compared is calorically with one high in carbohydrate, lowers BP, a major risk factor for stroke, and improves plasma lipids (Appel et al, 2005). Foods that are major protein sources vary greatly in their non-protein constituents and thus may have different relationships to risk of stroke, but these relationships have not been closely examined. In a recent meta-analysis of 2 observational studies, red meat intake was not significantly associated with incident stroke, and the paucity of data was noted (Micha et al, 2010). Higher fish intake has been associated with a lower risk of ischemic stroke in men (He et al, 2002) and thrombotic stroke in women (Iso et al, 2001_A). No significant associations were seen between intakes of eggs, nuts, or whole-fat dairy products and stroke risk (He et al, 1999; He et al, 2003).

Animal products such as eggs, dairy products, and fish have been found to decrease mortality due to cerebral hemorrhage but not cerebral infarction, amongst Japanese and adjustment for vegetables and fruits did not alter the finding(Sauvaget et al, 2005). This finding has been confirmed in another study which showed that low intake of saturated fat and animal protein is associated with increased cerebral hemorrhage among Japanese man, irrespective of whether HTN or Non-hypertensive (Iso et al, 2003). Consistent with this finding, even amongst Americans who have a higher protein intake, a low intake of saturated fat and animal protein has been reported to be associated with an increased risk of cerebral hemorrhage in women with history of HTN (Iso et al, 2001_B).

The PB in these studies was however based on baseline values, and therefore would have underestimated the impact if any of HTN. Furthermore, the ascertainment rate of the diagnosis of cerebral hemorrhage, by CT/MRI or autopsy was not reported.

Protein intake has been associated with lowering of BP (Liu et al, 2002). It is possible therefore, that if confirmed by more rigorous studies, the observed association is due to BP changes.

In a randomized trial also, 40 g of isolated soybean protein supplements / day for 12 weeks also resulted in a reduction in systolic and diastolic blood pressure. The trial did not examine whether the BP reduction was due to protein or isoflavones in soybean (He et al, 2005).

2.2.5.1.4 Cholesterol and fat intake

High cholesterol is a risk factor for ischemic stroke. Asian study found that for people in the highest categories of both total cholesterol and Systolic Blood Pressure (SBP) (i.e, with measured total cholesterol 6.25 mmol/L and measured SBP 160 mm Hg), ischemic stroke risk 8 times higher than among people in the lowest categories of both (i.e, measured values of total cholesterol and SBP of <4.75 mmol/L and 130 mm Hg, respectively) (Rodgers et al, 2005).

Dietary fat can affect the blood cholesterol level; it can be expected to contribute towards a high cholesterol level and thereby increased stroke risk. Consistent with this is the adverse effect of dietary fat on stroke mortality, reported by Sasaki et al (1995) who examined population dietary and mortality data. The intake levels of dietary saturated fatty acid correlated independently, significantly, and positively with log-stroke mortality rates except in both sexes in the age class 45-54 years.

In contrast, this effect has not been noted with specific prospective studies. No relationship between dietary fat and ischemic or hemorrhagic stroke was found in 40000 men followed up for 4 years. Intakes of red meats, high fat dairy products, nuts, and eggs were also not appreciably related to risk of stroke (He et al, 2005).

On the other hand, as part of the Framingham Heart Study, Gillman et al (1997) found instead that intakes of fat, saturated fat, and monounsaturated fat were associated with reduced risk of ischemic stroke in men. Adjustment for cigarette smoking, glucose intolerance, body mass index, BP, blood cholesterol level, physical activity, and intake of vegetables and fruits and alcohol did not materially change the results.

There are many confounding variables that may obscure any relationship between cholesterol and certain stroke subtypes. Further evidence of an association between stroke and cholesterol has more convincingly been demonstrated by the recent intervention trials using statins. How much of the benefit of statins is independent of cholesterol lowering is unclear but their use would seem justified in certain persons at high risk of IHD and/or stroke, particularly those with existing evidence of IHD (Gariballa, 2000).

2.2.5.1.5 Drinks of coffee, tea and sugar-sweetened beverages

Coffee is one of the most widely consumed beverages worldwide. Because of the high coffee consumption, even small effects in persons could have a large impact on public health. Coffee consumption could plausibly influence the risk of cardiovascular disease because coffee has antioxidant properties and may improve insulin sensitivity (Bonita et al, 2007). In addition, a recent study found that coffee consumption was inversely related to markers of inflammation and endothelial dysfunction in women with type 2 diabetes. Whereas the relation between coffee consumption and risk of coronary heart disease has been studied extensively, few studies have examined the association of coffee drinking with stroke risk and the studies that do exist were based on a small number of cases (Larsson et al, 2008).

Tea is another widely consumed beverage with potential health benefits. Tea contains high amounts of polyphenols, which have antioxidant activities and prevent oxidation of Low Density Lipoprotein (LDL). Oxidization of LDL particles promotes the formation of

atherosclerotic lesions, leading to increased risk of cardiovascular disease. Prospective studies on tea consumption in relation to stroke incidence or mortality have produced inconsistent results (Bidel et al, 2006).

Consumption of sugar-sweetened beverages, including sodas, vitamin water, and energy drinks, has increased in the worldwide the past 3 decades. Sodas, or carbonated soft drinks, are consumed more than any other sugar-sweetened beverage sugar-sweetened beverages have been linked with weight gain, diabetes, HTN, hyperlipidemia, gout, and coronary artery disease (Malik et al, 2010). The associations with cardio-metabolic disease appear to be independent of BMI and energy intake, which suggests that other mechanisms, such as hyperglycemia, dyslipidemia, inflammation, or endothelial dysfunction, underlie the association (Fung et al, 2009). Low-calorie sodas are less-well studied than are sugar-sweetened sodas. Although intake of these beverages was recently linked with the metabolic syndrome, reverse causality or residual confounding could explain the association. Study by Bernstein et al. (2012) found greater consumption of sugar-sweetened and low calorie sodas was associated with a significantly higher risk of stroke.

2.2.5.1.6 Obesity

Obesity has become one of the most prevalent conditions making a significant impact on public health worldwide (Winter et al, 2008). Obesity is associated with an increased risk of stroke, whether measured by BMI, WC, or WHR (Bodenant et al, 2011). The association between obesity and stroke remains controversial, with published studies showing positive or negative association. While systematic differences in the risk factors for stroke subtypes and the proposed biological mediators influencing the causal pathway between obesity and stroke may occur, previous studies have seldom characterized stroke subtypes or adequately examined the influence of such biological mediators. Most studies

have been too small to adequately describe the nature of any BMI and stroke relationship (Song et al, 2004).

Individuals with a BMI of 30 kg/m^2 or more have double the incidence of ischemic and hemorrhagic stroke compared with individuals with a BMI of less than 23 kg/m^2. Each unit increase in BMI is associated with an increase in the adjusted risk of stroke by about 6% (Kurth et al, 2002). Among adults who are overweight or obese (BMI 25–50 kg/m^2), each 5 kg/m^2 increase in BMI is associated with about 40% higher mortality from stroke. Individuals with a waist-to-hip ratio in the highest tertile (>0.96 in men and >0.93 in women) have a 65% increased risk of stroke compared with individuals in the lowest tertile (<0.91 in men and <0.86 in women). The population attributable risk of stroke associated with an increased WHR is 26.5% (O'Donnell et al, 2010).

There are other studies showing that increasing BMI is associated with a graded elevated risk of stroke (Rexrode et al, 1997; Kurth et al, 2002; Abu-Odah et al, 2014). In other studies, however, no relation was found between BMI and stroke risk (Lu et al, 2006). Possibly, BMI is not an appropriate indicator to assess the risk of stroke (Suk et al, 2003). Markers of abdominal obesity have rarely been studied in cerebrovascular disease. In 2 of those studies, WHR was more strongly associated with the risk of ischemic stroke than BMI, but the strength of this association was attenuated after adjustment for cardiovascular risk factors (Hu et al, 2007; Winter et al, 2008). Zhang X et al (2009) demonstrated that increasing levels of general or abdominal adiposity consistently predict risk of stroke in predominantly non-obese Chinese women. In other large scale studies showed that BMI is not a good indicator of stroke. So we've chosen abdominal obesity and to find out its relation with ischemic stroke (Tanne et al, 2005; Warlow et al, 2003). Abdominal or visceral obesity emerging as a risk factor for stroke according to various large scale studies worldwide but not the BMI (Winter et al, 2008).

2.2.5.2 Health profile factors

2.2.5.2.1 Hypertension (HTN)

A major risk factor to stroke, high blood pressure is present in 50 to 70 % of stroke cases, depending primarily on the type of stroke (Abu-Odah et al, 2014). The long-term effects of the increased pressure damage the walls of the arteries, making them more vulnerable to thickening or narrowing (atherosclerosis) or rupture (Lawrence & Brass, 2002).

There is no specific BP reading that is considered normal, but rather a range. Most experts agree, however, that a reading greater than 140/90 mmHg is abnormal, and anyone with such a reading should see a physician. But even mild elevations in BP are associated with an increased risk for stroke. Sometimes mildly elevated blood pressure can be controlled by life-style modification, but medication is often needed. Although the patient may feel no different, control of blood pressure is associated with a marked decrease in the occurrence of stroke (Cuccurullo, 2004). Control of high BP contributes towards the reduction of stroke. A dose response relationship with a 10 mmHg reduction in systolic BP is associated with a 31% reduction in stroke risk (Mbbs et al, 2007).

Recent data from the study as inter heart and inter stroke studies conducted in 22 countries by O'Donnell et al. (2010) identified major risk factors for stroke that contribute to 90% of stroke in these countries. The research found HTN was the strongest risk factor for stroke, and was stronger for intracerebral hemorrhagic stroke than for ischemic stroke. HTN was more strongly associated with stroke in individuals younger than 45 years than in those aged 45 years or older.

2.2.5.2.2 Diabetes mellitus (DM)

A fasting plasma glucose level over 100 mg/dl is strongly linked with ischemic stroke events in patients with preexisting atherothrombotic disease and stress hyperglycemia following a primary stroke increases the probability of a poor outcome (Tanne et al, 2004). Chronic hyperglycemia, as indicated by elevated HbA1c levels, is associated with a 17% increase in the risk of stroke with each 1% rise of HbA1c. More recently, post-challenge glucose levels in non-diabetic individuals have been found to have a significant association with stroke mortality during 38 years of follow-up (Capes et al, 2001). Studies on glucose lowering using oral antidiabetic agents are often confounded by other factors such as duration of diabetes, age of patient and diabetes severity (Selvin et al, 2004). In the UKPDS, however, the use of metformin as first-line therapy in obese patients with type 2 diabetes reduced stroke risk by 42% compared with the conventionally treated group. Sulphonylurea treatment over 10 years was found to reduce the development of microvascular complications in subjects with diabetes, but the risk of stroke was raised (Sander et al, 2008). Other study by Abu-Odah et al. (2014) found risk of stroke associated with diabetes mellitus was high and significant.

2.2.5.2.3 Heart Disease

Just as strokes area strong risk factor for heart disease, heart disease is a strong risk factor for stroke, although only for one type of stroke, ischemic strokes. Heart disease is associated with stroke in two ways. First, damage to the heart may make it more likely that clots will form within the heart. These clots can break loose and travel to the brain, causing a cardio embolic stroke. Heart disease and stroke are also associated because they are both manifestations of atherosclerotic disease in the blood vessels. If the blood vessels feeding the heart (the coronary arteries) are diseased, it is likely that arteries to the brain are also affected (lawrence & brass, 2002).

Patients with evidence of coronary artery disease, congestive heart failure, left ventricular hypertrophy (enlargement of the left side of the heart), disease of the heart valves, or arrhythmias (irregular heart rhythms) have a several-fold increase in the risk of stroke (Uchino et al, 2011).

Several recent studies suggest that people with atrial fibrillation who take daily doses of either aspirin or warfarin (Coumadin) have a reduction of up to 80 % in their risk of stroke. These findings suggest that an estimated 20,000 to 50,000 strokes might be prevented each year if all people with this condition had prophylactic drug treatment (Goldstein, 2009).

2.2.5.2.4 Heredity and family history

There are several rare familial conditions that may be complicated by ischemic stroke and TIA. There is also increasing interest in complex genetic disorders thought to be caused by multiple gene interactions, presumably influenced by environmental factors (Flossmann & Rothwell, 2004). However, family history of stroke is only a modest risk factor for ischemic stroke. Moreover, much of the association appears to be secondary to hereditability of risk factors for stroke such as HTN and diabetes (Schulz et al, 2004).

Just how easy it will be to separate out shared genes from shared environment in a disease as common as stroke remains to be seen. Disentangling the interactions and working out the pathway from genotype to phenotype will be a monumental task. Whatever the mechanism, one can at least reassure patients with TIA or stroke that a family history of stroke is associated with little or no increase in the risk of a future stroke (Giles, Flossmann & Rothwell, 2006)**.**

2.2.5.2.5 Smoking habits

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing around 6 million people a year. More than 5 million of those deaths are the result of

direct tobacco use while more than 600 000 are the result of non-smokers being exposed to second-hand smoke. Nearly 80% of the more than 1 billion smokers worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest (WHO, 2015).

Smoking is known to promote atherosclerosis and a procoagulant state. It has been established in older adults that the stroke risk associated with cigarette smoking falls to the lowest levels within 5 years of smoking cessation, (Wannamethee et al, 2005) suggesting that induction of a procoagulant state is the primary mechanism. Cigarette smoking causes vascular endothelial dysfunction with associated alteration in hemostatic and inflammatory markers. Smoking also increases fibrinogen concentration, reduces fibrinolytic activity, increases platelet agreeability, and causes polycythemia (Arquizan et al, 2005).

The evidence linking smoking to stroke is extremely convincing. The results of numerous globally based studies evaluating the association between stroke and cigarette smoking. In short, these studies performed across various ethnicities and populations demonstrate a strong association between smoking and stroke risk, with current smokers having at least a two- to fourfold increased risk of stroke compared with lifelong nonsmokers or individuals who had quit smoking more than 10 years prior. In one study, the risk increased to six fold when this population was compared with nonsmokers who had never been exposed to environmental tobacco smoke (i.e, second-hand smoke) (Shah& Cole, 2010). In a separate study, this six fold increase in risk persisted when cigarette-smoking women with smoking spouses were compared with smoking women with nonsmoking spouses, further demonstrating the effect of second-hand smoke on stroke risk (Qureshi et al, 2005).

2.2.5.2.6 Physical activity

Physical inactivity is recognized as an important risk factor for multiple causes of death and chronic morbidity and disability. Physical activity was chosen rather than physical fitness as the measure of exposure because it is through increases in the behavior (physical activity) that health benefits accrue and improvements in cardiorespiratory fitness can be achieved. Moreover, there were insufficient data available worldwide to consider fitness as the exposure. Exposure was assessed as a trichotomies variable to avoid limiting the assessment of total burden to only that associated with the highest risk, namely the most inactive (Bull et al, 2004).

Physical activities have an increasing evidence base in the primary and secondary prevention of stroke and in stroke rehabilitation. The interface between physical activity and cerebrovascular disease is complex and of broad interest to clinicians, therapists, and epidemiologists. The importance of the relationship is becoming clearer: physical inactivity has been implicated by the INTERSTROKE study as one of the 5 key risk factors which account for more than 80% of the global burden of stroke (O'Donnell et al, 2010). Physical fitness training is increasingly being recommended as a component of stroke rehabilitation programmers due to the emerging body of evidence surrounding the benefits in improving the function after stroke (Gordon et al, 2004).

2.2.5.3 Sociodemographic Factors

The risk of stroke rises significantly with age. After 55 years, it more than doubles with each passing decade. Each year, about 1 % of people between ages 65 to 74 have a stroke and 5 to 8 % of people in that age group who have had a TIA go on to stroke. Although risk associated with advancing age cannot be changed, it is an important factor in assessing stroke risk and planning preventive therapies.

2.2.5.3.1 Age and Sex

Age is the most single important risk factor for stroke worldwide; the risk of stroke rises significantly with age. Incidence increases for males and females. Risk more than doubles each decade after age 55 males more than females. Each year, about 1 % of people between ages 65 to 74 years have a stroke - risk associated with advancing age cannot be changed, it is an important factor in assessing stroke risk and planning preventive therapies (Cuccurullo, 2004).

The rate of stroke related disabilities was found to be strongly age dependent, although not generally dependent upon sex. Males were found to have a higher rate of stroke related disabilities in the age range between ages 45 to 59 years, but it appears that age is a strong determining factor in the potential of both men and women to have stroke related disabilities. 87.8% of stroke related disabilities were found in men above 50 years in age, and 87.5% of stroke related disabilities were found in women above 50 years (Luzon, 2008).

2.2.5.3.2 Income and Education

Educational attainment is a strong factor in the formation of social consciousness regarding social stratification between any people (Kikkawa, 2006), and differences in educational levels contribute to health inequalities. A low educational level has been associated with cognitive impairment, unhealthy behaviors, and history of chronic disease (Honjo et al, 2008).

The different risk of stroke incidence by education level could be one of the possible mechanisms for unequal prevalence of functional limitations by education level. There is some evidence to suggest that people with low socioeconomic status were likely to develop severer stroke (Weir et al, 2005), to have dependency for activities of daily living at 28

days after stroke's onset and longer-term disability, compared to those with high socioeconomic status (Arrich et al, 2008).

Moreover, education level may not be an equally-precise measure as an indicator of social stratification for men and women; household income or husband's educational level could be more appropriate indicator for social stratification for women (Honjo et al, 2006). Other study show Low education level was associated with the higher prevalence of physical functional limitations for both genders (Honjo et al, 2009).

Chapter (3) Methodology

This chapter presents the method used in this study to answer the research questions. In this chapter different items were explained: study design, place of the study, study population, sample size, sampling process, period of the study, inclusion and exclusion criteria, ethical and administrative consideration, study tools, reliability, validity, pilot study, data collection, data management, and limitation of the study.

3.1 Study design

The design used study is quantitative retrospective case-control study, this design gives the researcher the opportunity to compare the history of past exposure to risk factor or the presence of certain a characteristic among cases and controls. The investigator is looking backward from the disease to a possible case. A case control study has the advantage of being relatively inexpensive and enables the researcher to meet the study objectives in a short time and in the same it studies several risk factors for a single disease.

3.2 Setting of the study

This study was conducted at the five main governmental hospitals in GS for cases selection, selected case from medical department in Kamal Odwan Hospital, Shifa hospital, Shohda Al-Aqsa hospital, European Gaza hospital and Nasser hospital in each different geographical area to reflect representative result.

Twice the numbers of control matched from attendees of the primary health care centers (PHCC) are (Shohda Jabalia, Shohda El-Rimal, Sorane, Deir-El-balah, El-Magazie, Shohda khan-younis, and Shohda Rafah health centers). They are follow up for any illnesses other than metabolic diseases, they also have same characteristics as cases except that they free from metabolic disease and any past history of stroke.

3.3 Study population

The study population according to statistics hospitals of ministry of health (2014) consisted to 1,500 stroke patients (MOH, 2014). A study sample include of adults from both genders whose ages were 40 years and more, cases should be newly diagnosed as having stroke by physician or computed tomography (CT) scan, and selected based on a non-probability purposive sample from inpatient medical dependent governmental hospital in Gaza governorates. Additionally, twice these numbers were selected from governmental PHCC in same geographical areas of the cases, will serve as our control sample, controls matched for age, gender, and place of residency.

3.4 Sampling

3.4.1 Sample calculation

The researcher used Epidemiological information program (Epi-info, Ver. 7), statistical calculator for case control study to calculate the sample size at 95% CI with power 80%, with percentage of error ±5% and based on 2 controls for every one case. Based on local study by Abu-Odah et al., (2014) prevalence of obesity among over 45 years 50%, and among stroke patients 70%. So, the total number of the proportion sample is composed of 450 participants, divided into 150 cases and 300 controls from different location to keep 1:2, case control ratio. The cases sample represents 10% of stroke patients according to MOH statistics hospitals (MOH, 2014).

3.4.2 Sampling process

According to MOH, hospitals are either small or major hospitals (depending on the capacity), the major hospitals with capacity of 101 or more bed, as there is in the GS, five large government hospitals offering adult health service (MOH_C, 2014). GS is divided into five governmental as follow: North Gaza, Gaza city, Mid-Zone, Khanyounis and Rafah.

The researcher selected all large governmental hospital to cases, while we selected 7 PHCC from 54 centres to select control (This clinic considered central clinic "Level four" in every province).

A non-probability purposive sample of adult patients was used to select cases diagnosis with stroke was selected from governmental hospital from each different geographical area in Gaza governorates and their aged was 45 years and more. Number of control who is attended the PHCC for illness other than past history of stroke and metabolic disease. Their age range ±5 years old compare to case. After choose the sample interviews were performing with pretest and validate questionnaire, which contain issue about socio-demographic factor, health profile and nutritional factors.

3.5 Study Period

The study was conducted at the beginning of year 2015. After obtaining approval for the study proposal from Al-Quds University at the School of Public Health, an administrative letter was sent to the department of human resource development at MOH in July, 2015 to offer facilitation for conducting the study in MOH hospitals and PHCC.

Data collection started in Jul. 2015 till Sep. 2015. Data analysis and discussion were completed at Oct. 2015. Writing the final research report was completed at the mid of Nov. 2015.

3.6 Eligibility criteria

Participants who were eligible to participate in the study after matched for age, gender, and place of residency were those who met the following criteria.

3.6.1 Inclusion criteria

Cases

- Males and females ≥ 45 years old.

- Newly diagnosed as having stroke for the first time by physician or CT scan.
- Accept to sign the consent form to become part of the study before interviewing participants.

Controls

- Males and females ± 45 years old. Compared to the age of the counterpart cases.
- Following up at PHCC any health services.
- Judged to be clinically free from stroke and thyroid disorder.
- Accept to sign the consent form to become part of the study before interviewing participants.

3.6.2 Exclusion criteria

Cases

- Cases whose aged < 45 years old.
- Pregnant women.
- Participants with history of cancer.
- Patients who take hormone replacement therapy or corticosteroid therapy
- Patients with history of thyroid disease or recurrent stroke.
- Patients with problems of memory or cognition.

Controls

- Pregnant women.
- Patients with history of cancer.
- Patients with history of stroke and thyroid disorder.
- Any person not matching the age criteria compared to cases.
- Patients with problems of memory or cognition.

3.7 Ethical Considerations

An academic approval obtained from School of Public health at Al-Quds University (Annex 4), and an administrative approval obtained from MOH (Annex 5). Additionally, an ethical approval obtained from Helsinki committee to carry out the study (Annex 6).

Every participant was provided with full explanatory form attach to questionnaire both verbally and written (Annex 8). This form includes the purpose of the study, assurance about the confidentiality of their information, and instruction to respond to the questionnaire. In additional, it includes statement indicating that participation is voluntary. Honest maintained during reporting and analysis of data with respect to confidentiality and respecting of result.

3.8 Data collection procedures

Data were collected using a self-constructed questionnaire during face to face interview, and has recorded measurement of weight, height, WC, and HC. Data collected by the researcher to interview the participants and fill the questionnaire.

3.8.1 The study instrument: Questionnaire

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

- Demographic variables including: age, gender, marital status, and place of residency.
- Socioeconomic factors including: education level, occupation and family income.
- Health profile including: history of any metabolic disease, take any medication, and family history of any disease.
- Dietary habits and type of food and drinks intake.
- Anthropometric measurement including: weight, height, BMI, WC, HC, and WHR (Annex 8).

The study instrument were built to take information from the participants and or spouse, the develop questionnaire were reviewed by 10 experts. This process is to increase both content and criterion validity of information.

3.8.2 Anthropometric measurement (Study tools)

- Weight of participants
- Height of participants
- Waist circumference
- Hip circumference

3.9 Reliability of instrument

Reliability signifies the issue of consistency of measures, that is, the ability of a measurement instrument to measure the same thing each time it is used (Singh, 2007). The following steps will be done to assure instruments reliability:

- Standardization of the method of data collection was guarantee.
- Then, the data entry in the same day of data collection would allow possible interventions to check the data quality or to re-fill the questionnaire when required
- Re-entry of 5% of the data after finishing data entry will assure correct entry procedure and decrease entry errors.

3.10 Validity of instruments

Validity tries to assess whether a measure of a concept really measures that concept, that is, the extent to which the concept measures the thing it was designed to measure (Singh, 2007).

The researcher administered 2 type of validity testing for the questionnaire as follow:

1. Face validity: The researcher constructed the questionnaire in an appealing design and Arabic language. The researcher asked the participants in the pilot study about their opinions about the structure, shape, clarity and format; comments received were considered.

2. Content validity index

The researcher design the study questionnaire for the purpose of the study, after reviewing many studied related to the subject. The validity of questionnaire has been examine by sending the constructed questionnaire with the enclose covering latter about the object of the study to 10 expert working in the different health field in order to give their views on the questionnaire (Annex 10). The researcher is recommending modification on the questionnaire according to their suggestions and advice. Standardization of the procedures of the measurement also was done as follows:

3.10.1 Standardization of BMI measurement (CDC, 2011)

- Calibration the scale (Zero points) with empty scale every day before starting measurement and immediately afterward.
- Aske the participant to remove shoes and heavy clothes and stand on the scale without support.
- Read the weight and register it to the nearest 0.1 Kg.
- Use standard measurement non-stretchable tape on standing position and register the height to the nearest 0.1 Kg.
- BMI was computed as the ratio of weight (Kg) per height square (m^2), and classified according to the CDC classification.

3.10.2 Standardization of WHR

Standardization measuring of abdomen and hip circumference (WHO, 2011)

- Clothing and other items that might interfere with or change the measurement should first be cleared from the waist and hip area.
- The participants is then asked to stand upright with arms relaxed at the side, feet evenly spread apart at approximately shoulder width, and body weight evenly distributed.
- The waist measurement should be made at the midpoint between the top of the iliac crest (cupper edge of the main pelvic bone) and the lower margin of the last palpable rib in the mid axillary line (lowest point of the ribcage that can be locate by touch alongside of body).
- Once the location of the waist has been determined, a stretch resistant tape is passed around the subject.
- It should be wrapped snugly around the body, but not to the point of depressing or pinching the underlying skin.
- In order to ensure that the abdominal muscles are relaxed, the subject is asked to take two or three consecutive natural breaths and the measurement is made at the end of the last natural expiration (outward breath).
- Hip circumference is measured in a similar manner, with the tape being passed around the hips at the widest circumference of the buttocks. In both cases it is important that the tape measure be kept level and parallel to the floor whilst the measurement is made.
- Take the measure of the waist and hip to the nearest 0.5 cm (1/4 inch).

3.11 Pilot study

To test the appropriateness of study instrument, to standardize the suitable way for data collection, and to improve the validity and reliability of the study; the researcher will conduct a pilot study in Shifa hospital for cases and Rimal clinic for control before starting the actual data collection. Obtain data will analyse use SPSS program to predict the desire result. The pilot sample of 10 cases and 20 control and will excluded from the study population.

3.12 Data Management & Analysis

The researcher used Statistical Package of Social Science (SPSS ver. 20) program for data entry and analysis. The analyses of data to be conducted were:

- Reviewing the filled questionnaire.
- Coding the questionnaire
- Data entry model.
- Defining and recoding the continuous variable.
- Data cleaning.
- Frequency tables of all variables.
- Cross tabulation of the results.
- OR and 95% CI are the statistical tools of measurement use to check the statistical relationship between the risk factor (independent variables) and the occurrence of stroke (dependent variable) and to assess the statistical significant of difference.
- The independent variables branch into categorical variables as (gender, family size, education, employment, HTN, DM, cardiac disease, family history, nutritional awareness, smoking, physical activity, BMI, WHR, WC) and the continuous variable which are (age, height, weight, food frequency).

- Bivariate analysis of matching pairs carried out. OR, their 95% CI, Chi square test was calculated for all the risk factors to examine the relationship between stroke and categorical variables.
- Logistic regression used to compare cases and control of stroke when dependent is a dichotomy and independents are of any type, to determine which independent variables affect the probability of an outcome of the stroke.

3.13 Limitation of the study

- Data that depend on participant memory about past events and history, so, may result in a recall bias.
- Limited time available to conduct the study.
- Unstable political situation.
- Unstable economics situation.
- Dietary exposures are more difficult to remember.
- Continuous electrical current cutting.

Chapter (4) Results and Discussion

In this chapter, the researcher presents the main results of the study variables that were attained the study objectives. The study was conducted to identify the common stroke risk factors and the most common nutritional risk factors among Palestinian adult patients. The identification of risk factors was done using comparative method by comparing a case samples with control samples using a statistical tools measurement such as bivariate analyses of matching pairs, Odds Ratio, their 95% (CI), Chi square test as well as Mann–Whitney test was also calculated for all risk factors, and continuous data (age, duration of chronic disease, BMI, WC, WHR, and frequencies of nutritional habits).

Participate in the study was personally interviewed convening a wide range of nutritional issues related to stroke, variables of socio-economic-demographic, health and nutritional habits.

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

4.1 Socio-demographic characteristics of the study population

A Socio-demographic characteristic of the study participants has shown in Table 4.1. It compares the 150 cases with the 300 controls matched by gender, age and place of residency. The table shows that characteristics were one-third of the two-thirds because of matching, so there is no difference between them.

Table 4.1 Summary table of Socio-demographic characteristics of study population

Variable		Type of Participant				χ^2	P-Value
		Case (150)		Control (300)			
		No	%	No	%		
Gender	**Male**	84	56	168	56	0.00	1.00
	Female	66	44	132	44		
Age	**≤ 50 years**	20	13	39	13	2.621	0.623
	50 to 59	33	22	82	27.3		
	60 to 69	50	33.3	90	30		
	70 to 79	27	18	59	19.7		
	≥ 80 years	20	13	30	10		
Family size	**≤ 3 person**	32	21.3	60	20	0.368	0.941
	4 to 6	44	29.4	96	32		
	7 to 9	41	27.3	81	27		
	≥ 10 person	33	22	63	21		
Education	**Not Educated**	11	32	79	26.3	4.973	0.174
	Primary Educated	31	20.7	51	17		
	Secondary Educated	52	34.7	111	37		
	University Educated	19	12.7	59	19.7		
Employment	**Working**	18	12	73	24.3	9.429	0.002 *
	Not Working	132	88	227	75.7		

Likelihood ratio was used ***statistically significant (P-value < 0.05)**

Table 4.1 shows the distribution of both cases and controls regarding the socio-demographic variables. Among cases and controls 56% of participants were males and 44% were females. Gender was one of the matching variables. The ratio of male to female in the study was 1.2:1.

According to age, the samples were distributed into multiple groups; the most prominent age group was the age group between 60 to 69 years. The test showed no relationship between the age of the individual and the incidence of the stroke [$\chi 2$=2.621, P-value = 0.623]. This result shows discrepancy with another study, Greenberg et al (2010) that

reported high incidence of stroke in the 50–65 year age group among all patients in Israel. In other study in Saudi Arabia by Al-Eithan and Amin (2010) the researcher found stroke occurrence was the highest among the 61-70 age group, and lowest in the 30-40 age group. A study in Cuba, Llibre et al (2010) found Stroke prevalence increased with age, with the exception of the group aged 75–79 years, which was slightly lower than the group aged 70–74 years. Prevalence was greater in men (9.5%) than in women (7.0%); the overall male/female prevalence ratio was 1.36 and was much higher in the group aged ≥80 years.

Regarding housing conditions, the table clarifies the number of family members living in the house. The results showed that (21.3%) of the cases and (20%) of the controls were living in houses with ≤ 3 persons, while (29.4%) of the cases and (32%) of controls were living in houses with 4 to 6 persons, while (27.3%) of cases and (27%) of control living in houses with 7 to 9 persons as well as (22%) of samples and (21%) of cases living in houses with ≥ 10 person persons. The results showed no relationship between age and the incidence of stroke [χ^2=0.368, P-value = 0.941].

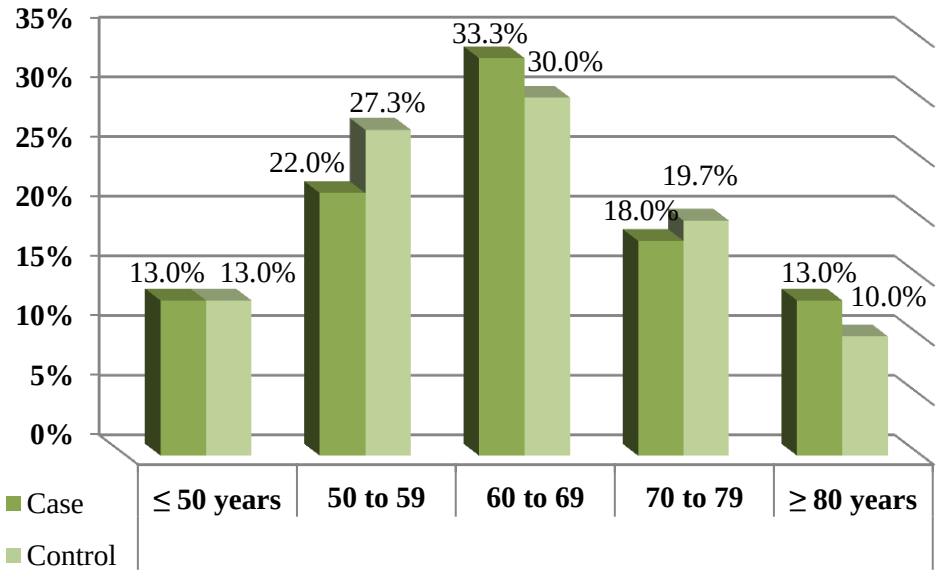

Figure 4.2 Distribution of participant by age group

According to educational level, the table shows that the majority (34.7%) of cases, (37%) of controls had a secondary education, (12%) of cases and (19.7%) of controls had a university degree. while (52.7%) of cases and (43.3%) of controls had primary educational level and less. The test showed no relationship between education and the incidence of stroke [χ^2= 4.973, P-value = 0.174].

Regarding employment status, the table explain that the majority (88%) among cases and (75.7%) among controls have not working and participants who are working represent 12% of cases and 24.3% of the controls. We found that non employed people high risk with stroke ($\chi^{2=}$ 9.429, P-value=0.02). We can explain this results that work gives the employed people with activity opportunity. In addition, the person who works has better economic situation comparing with the unemployed and can regulate his/her diet & can maintain health for the better.

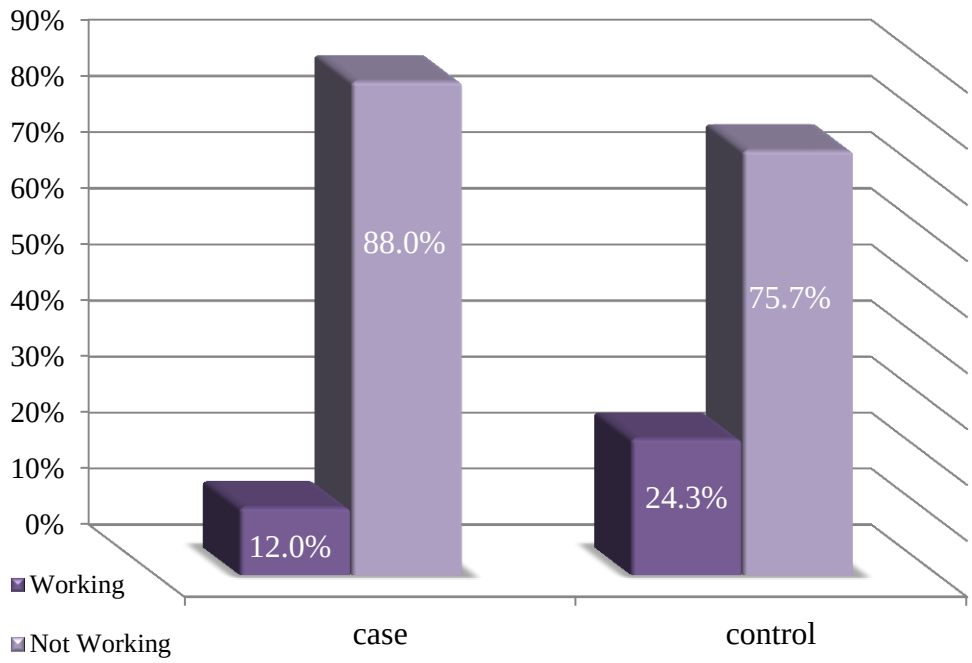

Figure 4.3: Distribution of participant by Employment

4.2 Health profile:

Given the devastating deficits often associated with a stroke, the need for prevention is essential. Many of the risk factors for stroke can be treated or modified. Doing so may prevent an initial stroke or recurrent strokes, as well as decrease the risk of premature death. The health profile of an individual is directly linked to the occurrence of stroke and this has been confirmed by this study and by other previous studies. Therefore, patients who suffer from a turbulent health status, they must continue following-up to protect themselves from the occurrence of stroke.

4.2.1 Hypertension (HTN)

Previous studies have shown that HTN is a significant and independent risk factor for stroke. Treatment of HTN has been demonstrated to be the most important factor in reducing the incidence of stroke (Haverbusch et al, 2004). This study confirmed that HTN is a risk factor for stroke, here as it appears in the table (4.2) that HTN among cases 68.7% and 49.4% among control, the difference was statistically significant ($P<0.001$). So, HTN was found to be significantly associated with stroke (OR= 2.22, 95% C.I. [1.44 – 3.47]). This result was consistent with the results of a study by Sweileh et al (2008) that showed that the HTN was the most common risk factor of the stroke. Our results are also consistent with a study showed that the people who have a history of HTN develop stroke four times than people without HTN (Abedelaal, 2015). As well as agreed with the results of another study by (Abu-Odah et al, 2014) at which HTN was found to be significantly associated with stroke.

Table 4.2 Distribution of study participant according to their history of HTN

Variable		Type of Participant				OR 95% CI	P-Value
		Case (150)		Control (300)			
		No	%	No	%		
HTN	Present	103	68.7	149	49.4	2.22 (1.44–3.47)	0.001*
	Absent	47	31.3	151	50.3		
HTN Management	Controlled	59	57.3	113	75.8	0.43 (0.25–0.74)	0.001*
	Uncontrolled	44	42.7	36	24.2		

Regarding HTN Management, the table clarifies that there is a significant relationship between controlled and uncontrolled HTN. The difference between cases and controls is statistically significant (P-value=0.001), which means that the subject who has uncontrolled HTN has the chance of getting stroke more than the controlled BP, which is compatible with many other studies, for example, a study (Sweileh et al. 2008) found BP is poorly controlled among individuals who have experienced a previous stroke.

4.2.2 Diabetes Mellitus (DM)

DM has been independently associated with some forms of large artery disease and with small artery infarctions detected by neuroimaging studies (Antonios & Silliman, 2005). DM significantly increases the risk of stroke, but it is not clear how DM affects the clinical and functional outcomes. In some studies, stroke patients with DM were reported to be associated with reduced survival after stroke, worse clinical and functional outcomes, and more healthcare utilization (Sun et al, 2009).

Table 4.3 Distribution of study participant according to their history of DM

Variables		Type of Participant				Odds Ratio 95% CI	P-Value
		Case (150)		Control (300)			
		No	%	No	%		
DM	Present	80	53.3	101	33.4	2.25 (1.51–3.36)	0.000 *
	Absent	70	46.7	199	66.3		
DM Medication	Tablet	41	51.3	57	56.4	0.81 (0.45–1.47)	0.612
	Insulin	28	35	30	29.7	1.58 (0.83–3.00)	
	Tablet & Insulin	11	13.7	14	13.9	1.22 (0.51–2.86)	
DM Management	Controlled	53	66.3	71	70.2	0.83 (0.44–1.57)	0.338
	Uncontrolled	27	33.8	30	29.8		

Table 4.3 illustrates the relationship between the study population and history of DM, it was noted that the prevalence of DM among cases 53.3% and controls 33.4%. The difference was found statistically significant (P-value= 0.001). The risk of stroke associated with DM was high and significant (OR= 2.52, 95% C.I 1.51–3.36). This means that there is a positive association between person's history of DM and stroke. The researcher concluded that the person with DM has more risk to develop stroke two times more than subject without DM. The medication and management of DM did not reach statistically significant level, meaning that the DM medication & control level of glucose don’t effect to incidence to stroke.

This result is consistent with previous study Tuttolomondo et al. (2015), which found that DM was the strongest risk factor for stroke among both men and women, also the association between stroke and DM is bidirectional and not limited to stroke since DM may contribute to a more insidious brain damage. Another study by Abedelaal (2015) and Abu-Odah et al (2014) in Palestine found a high and significant relationship between DM and stroke. Another published study in 2010 by O' Donnell et al. reported history of DM was associated with an increased risk of stroke.

4.2.3 Cardiac disease

Heart disease is a strong risk factor for stroke, although it is a risk factor for only one type of stroke, Heart disease is associated with stroke by causing damage to the heart and may make clots more likely to form within the heart. These clots can loosely break and travel to the brain, causing a cardio embolic stroke. Heart diseases and stroke are also linked because they are both manifestations of atherosclerotic disease in the blood vessels. Patients with evidence of coronary artery disease, congestive heart failure, left ventricular hypertrophy, disease of the heart valves, or arrhythmias have a several-fold increase in the risk of stroke.

Table 4.4 Distribution of study participant according to their history of Cardiac disease

Variables		Type of Participant				Odds Ratio 95% CI	P-Value
		Case (150)		Control			
		No	%	No	%		
Cardiac Disease	Present	55	36.7	77	25.7	1.67 (1.09–2.55)	0.010 *
	Absent	95	63.3	223	74.3		
Type Of Cardiac Disease	Angina	4	7.2	2	2.6	2.94 (0.45–23.49)	0.053
	Myocardial Infarction	28	51	28	36.4	1.81 (0.89–3.89)	
	Heart Failure	14	25.4	27	35	0.96 (0.42–2.14)	
	Arrhythmia	6	11	19	24.7	0.38 (0.13–1.00)	
	Valvular disease	3	5.4	1	1.3	4.33 (0.45–116.83)	

Table 4.4 clarifies that there is a significant difference between cases and controls regarding the history of cardiac disorder and the risk of developing stroke, the difference between cases and controls were statistically significant (OR= 1.67, P- value= 0.010) which means that the incidence of developing stroke was higher two times among people with history of cardiac disease. Findings also show that there were no significant association between stroke and other type of cardiac disorder.

This result was consistent with the results of a study by Llibre et al. (2010) which showed that the heart disease is the most important risk factor for stroke. Atrial fibrillation is a prime cardiac risk factor, since it quadruples the risk of stroke in the general population, followed by heart failure, which doubles or triples the risk. Another published study in 2010 by O'Donnell et al. that showed that atrial fibrillation was the most common cardiac source of thromboembolism in cases with ischemic stroke. Cardiac problem was associated with an increased risk of ischemic, but not hemorrhagic stroke.

4.2.4 Chronic disease and type of stroke

The relationship between DM and stroke most ischemic strokes in diabetic patients are due to occlusion of small paramedical penetrating arteries. The occlusions cause small infarcts within the white matter of the brain. Diabetic autonomic neuropathy may contribute to the development of cerebrovascular disease in people with DM (Tuttolomondo et al, 2015), O'Donnell et al. (2010) found that History of HTN was the strongest risk factor for stroke, and was stronger for intracerebral haemorrhagic stroke than for ischaemic stroke.

4.2.4.1 Hypertension, Diabetes Mellitus and Type of Stroke

Table 4.5: Association between HTN & DM and Type of Stroke

Type of Participant		N	Mean	SD	Z	Sig
HTN	**Ischemic**	126	3.92	10.89	2.80	0.005*
	Hemorrhagic	24	6.59	5.99		
DM	**Ischemic**	126	4.59	9.46	3.21	0.001*
	Hemorrhagic	24	1.63	3.77		

***statistically significant (P-value < 0.05)**

Table 4.5 shows that there is a statistically significant difference between the prevalence of ischemic stroke among DM [Mean 4.59] than hemorrhagic [Mean: 1.36] by using the Mann-Whitney test in patients with history of DM and the difference between two groups reached a statistically significant level [Z=3.21, P-value=0.001]. Additionally, the

prevalence of hemorrhagic stroke among HTN [Mean 6.59] than ischemic [Mean 3,92] in patients with history of HTN and the difference between two groups reach statistically significant level [Z=2.80, P-value =0.005], meaning that the hemorrhagic stroke associated with HTN, and ischemic stroke could be related to DM.

4.2.4.2 Age and Type of Stroke

The risk of stroke rises significantly with age. After age 55 years, it is more than double with each passing decade. Each year, about 1% of people between ages 65 and 74 have a stroke and 5% to 8 % of people in that age group who have had a TIA go on to ischemic stroke (Lawrence & Brass, 2002). Stroke occurs at all ages, about 25%, are under age 65 years and Between 40% & 50% of strokes in younger adults are hemorrhagic (Love & Biller, 2009).

Table 4.6: Association between Age and Type of Stroke

Variable		Type of Participant				χ^2	P-Value
		Ischemic (126)		Hemorrhagic (24)			
		No	%	No	%		
Age	≤ 50 years	8	6.3	12	50	34.30	0.001*
	50 to 59	26	20.7	7	29		
	≥ 60 years	92	73	5	21		

Likelihood ratio was used ***statistically significant (P-value < 0.05)**

According to age, table 4.6 shows that 50% of hemorrhagic stroke patients are less than 50 years and 92% from ischemic stroke more than 60 years. The differences between Ischemic and hemorrhagic reach to statistical significant level [χ^2= 34.30, P-value =0.001]. Meaning that the people less than 50 years and have HTN are more likely at risk of developing hemorrhagic stroke. So, researchers believe that psychological pressures, economic pressures facing the people in this age are risk of increasing the incidence of hemorrhagic stroke.

4.2.5 Family history of chronic disease

Many things influence overall health and likelihood of developing a disease. Sometimes, it's not clear what causes a disease. Many diseases are thought to be caused by a combination of genetic, lifestyle, and environmental factors. The importance of any particular factor varies from person to person. So, Family members share genes, behaviors, lifestyles, and environments that can influence their health and their risk for disease. Some families have a more predisposition to develop stroke than others, and the risk of stroke can increase based on your age, sex, and race or ethnicity (CDC, 2014).

Table 4.7 Distribution of study participants according to their family history of chronic disease

Variable		Type of Participant				χ^2	P-Value
		Case (150)		Control (300)			
		No	%	No	%		
Father history	Present	56	37.3	111	37	1.819	(0.945)
	Absent	94	62.7	189	63		
Mother history	Present	76	50.7	166	55.3	0.876	(0.349)
	Absent	74	49.3	134	44.7		
Brother history	Present	98	56.3	180	60	1.205	0.304
	Absent	52	34.7	120	40		

Likelihood ratio was used ***Statistically significant (P-value < 0.05)**

Familial aggregation of stroke suggested that genetic factors may play an important role in the occurrence of ischemic stroke (Wang et al, 2013). The significance of family history in predicting the occurrence of strokes is still controversial. Nevertheless, mass screening programs worldwide include questions about an individual's family history of diseases (Kayaba, 2008).

Table 4.7 shows that there was not statistical significant difference between the chronic disease such as HTN, DM, cardiac disease, stroke and family history with incidence of stroke. This result was inconsistent with a study by Kadota et al. (2008) HTN examined the

relationship between stroke mortality and family history of HTN and stroke using a nationwide public health center study in Japan. For all strokes, a family history of HTN significantly increased the risk among men aged ≥ 60 years and women aged <60 years after adjustment of blood pressure. Another congruent study by Mvundura et al. (2010), the association between familial risk for stroke and prevalence of the disease was examined and the use family history of stroke was assessed as a risk assessment tool for the disease. The result showed that people with a high familial risk for stroke were four time more likely to have had a stroke than people with moderate or low familial risk. But other study supported result by previous study conducted by Wang et al (2013) that found a significant and independent association between family history of stroke and ischemic stroke with onset younger than 70 years.

4.2.6 Smoking

Smoking doubles the risk of stroke when comparing smokers to a nonsmoker. Smoking increases clot formation, thickens blood, and increases the amount of plaque buildup in the arteries (National Stroke Association, 2015).

Table 4.8 Distribution of study participants according to their smoking habits

Variable		Type of Participant				χ^2	P-Value
		Case (150)		Control (300)			
		No	%	No	%		
Current smoking	Yes	40	26.7	57	19	3.427	0.062
	No	110	73.3	243	81		
Past Smoking	Yes	10	66.7	34	11.3	2.469	0.116
	No	140	93.3	266	88.7		

Likelihood ratio was used ***statistically significant (P-value < 0.05)**

Table 4.8 illustrates that there is a difference at smoking habits between cases 26.7% and controls 19% but the difference between cases and controls was not statistically significant (X^2= 3.427, P-value= 0.062). Meaning that the smoking habits are not considered as a risk

factors for developing stroke. This comes in line with a study conducted by Abedelaal (2015), in this study there were not a statistical significant between smoking and stroke in Palestine. In the other hand, another studies conducted by Abu-Odah et al. (2014); O'Donnell et al. (2010) were inconsistent with our study which they reported that smoking was associated with an increased risk of stroke.

Table 4.9 Distribution of smoking habits according to their stroke patients

Variable		Type of Participant				χ^2	P-Value
		Ischemic (126)		Hemorrhagic (24)			
		No	%	No	%		
Current smoking	**Yes**	27	21.4	13	54.2	9.936	0.002*
	No	99	78.6	11	45.8		
Duration of smoking	**≤ 20 years**	2	7.4	1	7.7	9.937	0.007*
	≥ 20 years	25	92.6	12	92.3		

Likelihood ratio was used ***statistically significant (P-value < 0.05)**

Smoking is an established risk factor for both cerebral ischemia and subarachnoid hemorrhage. There is supporting evidence for a causal relationship between smoking and stroke. This is supported by reports of a dose response relationship between smoking levels and these two types of stroke, as well as a return to never smoking risk levels with increased time since quitting smoking (Paul et al, 2004).

Concerning smoking among stroke patients, table 4.9 demonstrates that 54.2% of the current smokers with hemorrhagic stroke and 21.4% with ischemic stroke, the difference between ischemic and hemorrhagic reach to statistically significant level ($\chi2$= 9.936, P-value=0.002). Meaning that the smokers are more likely to develop hemorrhagic stroke than ischemic strokes, also the results showed that the duration of smoking associated with strokes. Duration of smoking is increased more than 20 years the chance of ischemic stroke increases. The difference between ischemic and hemorrhagic stroke reach to statistical significant level [$\chi2$= 9.937, P-value =0.007]. This result was consistent with a study

O'Donnell, et al. (2010) which showed that the current smoking status was associated with an increased risk of stroke, which seemed to be stronger for ischemic stroke than for intracerebral hemorrhagic stroke.

4.2.7 Physical activity (PA)

Physical activity has been identified as an important contributor to maintaining good overall health. Low levels of activity are identified as a risk factor for a range of health conditions, including CAD, stroke, DM and osteoporosis, as well as being a strong contributor to levels of obesity (Australian Institute of Health and Welfare, 2015).

Additionally, regular moderate PA, such as brisk walking or similar levels of exertion, is associated with a 30-50% reduction in the risk of CAD as well as reduction in obesity, DM and stroke. WHO guidelines recommended that at least 30 min of moderate activity on most days of the week, the more vigorous activity the more protection against HDL-C, Fischbacher et al, 2004. There is a negative association between PA and stroke mortality which could be explained by a deceleration of the atherosclerotic process, structural modification of the arteries, amelioration of endothelial dysfunction, enhancement of myocardial electric stability or attenuation of hypercoagulability. Furthermore, the protective effect of PA may be mediated, at least in part, by controlling various known risk factors for stroke such as HTN, cardiovascular disease, DM and body weight (Alevizos et al, 2005).

Table 4.10 Distribution of study participants according to their PA

Variables		Type of Participant				OR (95% CI)
		Case (150)		Control (300)		
		No	%	No	%	
Physical activity	Inactivity	15	10	19	6.3	0.869 (0.446–1.638)
	Low activity	67	44.7	118	39.3	1.245 (0.836–1.851)
	Moderate activity	27	18	51	17	1.072 (0.634–1.786)
	High activity	41	27.3	112	37.4	0.631 (0.400–0.967)

The relationship between stroke and physical activity among participants in table 4.10, we observed that the prevalence of high PA level among cases 27.3%, and controls 37.4%, when comparing high activity we found a statistically significant difference [OR 0.631, 95% CI 0.400-0.967]. This means that the increase risk of the stroke in participants that do not follow high PA recommendations is high. Therefore, follow low & moderate PA can't protect from incidence of stroke.

Another consistent study, Willey et al. 2009 which showed moderate- to heavy-intensive PA, but not energy expended, is protective against risk of ischemic stroke independent of other stroke risk factors in men. Engaging in moderate to heavy PA may be an important component of primary prevention strategies aimed at reducing stroke risk.

Regarding PA, O'Donnell et al. (2010) showed that PA is a powerful risk factor for stroke, with a large multinational case-control study demonstrating that inactivity is the second greatest risk factor for stroke following HTN.

Wendel-Vos et al. 2004 showed that Moderately intense PA compared with inactivity, a protective effect on total stroke for both occupational (RR = 0.64, 95% CI: 0.48–0.87) and leisure time PA (RR = 0.85, 95% CI: 0.78–0.93). High level occupational PA protects against ischemic stroke compared with both moderate (RR = 0.77, 95% CI: 0.60–0.98) and inactive occupational levels (RR = 0.57, 95% CI: 0.43–0.77). High level compared with

low level leisure time PA protects against total stroke (RR = 0.78, 95% CI: 0.71–0.85), hemorrhagic stroke (RR = 0.74, 95% CI: 0.57–0.96) as well as ischemic stroke (RR = 0.79, 95% CI: 0.69–0.91).

4.2.8 Obesity

Overweight and obesity have become a major public health problem in both developing and developed countries as they are causally related to a wide spectrum of chronic diseases including DM, cardiovascular diseases & stroke (Huxley et al, 2010). However, uncertainty regarding the most appropriate means by which to define excess body weight remains. Traditionally, BMI has been the most widely used method by which to determine the prevalence of overweight in, and across, populations as well as an individual's level of risk (Bodenant et al, 2011). However, in recent years, measures of central obesity, principally WC and WHR which more accurately describe the distribution of body fat compared with BMI, have been suggested to be more closely associated with subsequent morbidity and mortality (Hankey, 2011).

Table 4.11 Distribution of study participants according to BMI, WC and WHR

Variables		Type of Participant				OR	95% CI
		Case (150)		Control (300)			
		No	%	No	%		
BMI	Normal weight	21	14	52	17.3	1.117	(0.628–1.951)
	Over weight	32	21.3	88	29.3	0.847	(0.54–1.313)
	Obesity (Class I)	52	34.7	81	27	1.611	(1.058–2.445)
	Obesity (Class II)	25	16.7	42	14	2.149	(1.274–3.610)
	Extreme obesity (Class III)	20	13.3	37	12.3	1.883	(1.346–4.245)
WC	Healthy	52	34.7	121	40.3	1.189	(0.711-1.981)
	Risky	98	65.3	179	59.7		
WHR	Healthy weight	6	4	11	3.7	1.094	(0.325–3.306)
	Risk for obesity-related diseases	144	96	289	96.3		

Table 4.11 indicates that there is a significant difference between the study population and obesity. We noted according to BMI that 64.7% of cases were obese, and 53.3% of the controls were with obesity. This reflects the increase of obesity among the Palestinian people. These differences were statistically significant according class of obesity [OR= 1.611, 95% C.I. 1.058–2.445; OR= 2.149, 95% C.I. 1.274–3.610; OR= 1.883, 95% C.I. 1.346–4.245] respectively. The risk of stroke associated with obesity according BMI measurement, so, obesity is a high and significant risk factor of stroke.

Several studies have shown an association of obesity, as defined by BMI, with the risk of stroke. Kurth et al. (2002) reported that individuals with a BMI of 30 kg/m2 or more have double the incidence of stroke compared with individuals with a BMI of less than 23 kg/m2. Each unit increase in BMI is associated with an increase in the adjusted risk of stroke by about 6% (relative risk 6%, 95% CI 4–8). Among adults who are overweight or obese (BMI 25–50 kg/m2), each 5 kg/m2 increase in BMI is associated with about 40% higher mortality from stroke (HR1.39, 95% CI 1.31–1.48), Whitlock et al, 2009. Another published study reported that BMI was a strong risk factor for stroke (Abedelaal, 2015; Abu-Odah et al, 2014).

According WC and WHR, the table 4.9 shows there was not a statistically significant difference between participants. The researcher thought that there is absent the relationship between WC, and WHR back to that the percentage of WC & WHR between the cases and controls was equal. So it did not reach statistical significance. This result was inconsistent with the results of a study Suk et al. 2003 which showed that the abdominal obesity is an independent, potent risk factor for ischemic stroke. It is a stronger risk factor than BMI and has a greater effect among younger persons.

Individuals with a WHR in the highest tertile (>0.96 in men and >0.93 in women) have a 65% increased risk of stroke (Odds Ratio 1.65, 99% CI 1.36–1.99) compared with

individuals in the lowest tertile (<0.91 in men and <0.86 in women). The population attributable risk of stroke associated with an increased WHR is 26.5% (99% CI 18·8–36.0) (O'Donnell et al, 2010).

Although BMI, WC and WHR do not meaningfully improve prediction of stroke risk when added to causal risk factors such as SBP and history of DM, excess adiposity remains a major modifiable determinate of these causal risk factors (Wormser et al, 2011).

4.3 Dietary Habits

Diet may influence stroke risk via several mechanisms, but the optimal dietary habits for stroke prevention are not clearly established (Hankey, 2011). The high complexity of nutritional studies makes it difficult to confer a pathophysiological role to isolated dietary components (Schulze & Hoffmann, 2006). Complex interactions between the different components of diet may exist, and any effects cannot be attributed to an individual component of the diet but rather to a combination of dietary factors (Ding& Mozaffarian, 2006). Healthy behaviors, especially dietary habits and physical activity, recommended for the primary prevention of stroke and HTN are quite similar (Goldstein et al, 2011). The recommended healthy lifestyle consists of PA, increased fruit and vegetable intake, reductions in weight, salt intake, and saturated and total fat intake, and moderation of alcohol consumption. Individuals with many of these health behaviors are reportedly at lower risk of stroke (Kokubo, 2012).

4.3.1 Cholesterol & Triglycerides

Cholesterol is a soft, waxy fat (lipid) in the blood stream that is found in all body's cells. Body naturally makes all the cholesterol it needs to form cell membranes, some hormones and vitamin D. Certain foods such as egg yolks, liver or foods fried in animal fat or tropical oils contain cholesterol and saturated fats that increase blood cholesterol levels (National Stroke Association,2009).

Table 4.12 Distribution of study participants according to their Cholesterol & Triglycerides

Variable		Type of Participant				χ^2	P-Value
		Case (150)		Control (300)			
		No		No			
Have high blood Cholesterol & Triglycerides	Yes	53	35.3	81	27	3.272	0.070
	No	97	64.3	219	73		
Drugs to control Cholesterol & Triglycerides	Yes	45	30	64	21.3	4.00	0.045
	No	105	70	236	78.6	OR = 1.58 (1.00 – 2.46)	
Prescribed to lower high Cholesterol & Triglycerides	Diet with low saturated fat	14	9.3	29	9.7	0.288	0.866
	Weight reduction	3	2	4	1.3		
	Non	133	88.7	267	89		

Likelihood ratio was used ***statistically significant (P-value < 0.05)**

Studies have found a link between high blood lipid levels and atherosclerosis in cerebral arteries, but it is still unclear whether high cholesterol levels significantly increase stroke risk (Lawrence & Brass, 2002).

Concerning cholesterol & triglycerides and disorders associated with incidence of stroke, table 4.12 demonstrates that 53% of cases say have high blood cholesterol & triglyceride, and 30% from them have taken drugs to control cholesterol and tri glycerides. 9.3% of the cases followed a diet with low saturated fat to reduce the level of cholesterol and triglycerides. Therefore, all these valuable differences are not statistically significant (P-value=0.070). These results were consistent with the results of a study by Jan et al. 2015, which showed that the association between stroke and blood cholesterol levels was statistically not significant. Other study by O'Donnell et al. 2010 found that the increased concentration of total cholesterol was not associated with risk of ischemic stroke, but was associated with reduced risk of intracerebral hemorrhagic stroke.

Additionally, the results in our study showed that people who are taking drugs to reduce cholesterol and triglycerides are more likely with high incidence to develop strokes. The

researcher illustrates this result that the patient's don't care to increase the cholesterol and triglycerides level. In addition, patients taking these drugs have high levels of cholesterol & triglycerides with insufficient therapeutic dose.

4.3.2 Nutritional pattern awareness and commitment

Nutrients are consumed through the food that we eat, and through metabolic processes in the digestive system, these nutrients are absorbed at a cellular level in the body. Optimum nutrition contributes to health, wellbeing, normal development, and high quality of life. However, under nutrition, over nutrition, and malnutrition are linked to suboptimal health outcomes. Such poor diets have been linked to the occurrence of chronic diseases, including cardiovascular disease, DM, cancer, osteoporosis and anemia (Plessis, 2011).

Table 4.13 illustrates the relationship between the study population and awareness attitudes and commitment towards nutritional pattern, as it shows from the results that 51.4% of cases compare 44.3% of control have been given a special advice prescribed by a health professional to control chronic diseases by control diet, weight reduction or exercise, 55.4% of them are compliant with these advise. Therefore researcher believes that people do not care about the diet to regulate chronic diseases, but are dependent on drugs. This indicates the lack of public awareness about the importance of diet in regulating chronic diseases. Even though 56% of participants have HTN, 40.2% DM and 29.3% have heart disease, the difference between cases and controls were not statistically significant except in food for DM the difference was statistically significant [OR=2.342, CI=1.37 – 4.00].

In other words, people who committed to food for DM have the chance of getting stroke 2.63 times more than the people with other food pattern. Therefore, the researcher concluded that DM and food for diabetic are considered as a risk factor for stroke. However, the researcher thought that food for DM is not risk factor for other chronic diseases, but the lack of awareness of DM patients about the nature of the right diet for

their disease lead to a statistically significant difference between food pattern for DM and incidence of strokes.

Table 4.13 Distribution of study participants according to their awareness Attitudes and commitment to words nutritional pattern

Variable		Type of Participant				χ^2	P-Value or
		Case (150)		Control (300)			
		No	%	No	%		
Prescribed by health professional to control chronic diseases	Control Diet	18	12	36	12	7.80	0.099
	Weight reduction	42	28	51	17		
	Exercise	7	4.7	21	7		
	All	10	6.7	25	8.3		
	Non	73	48.7	167	55.7		
Compliant with these advise	Yes	46	30.7	74	24.7	2.372	0.305
	No	31	20.7	75	25		
	Non	73	48.7	151	50.7		
Taken vitamins supplements	Yes	15	10	27	9	0.117	0.732
	No	135	90	273	91		
Nutritional pattern is a healthy	Yes	98	65.3	227	75.7	5.215	0.022
	No	52	34.7	73	24.3		
Weight is optimal for age	Yes	96	64	169	56.3	2.447	0.117
	No	54	36	131	43.7		
Weight is risky	Yes	52	34.7	121	40.3	1.367	0.242
	No	98	65.3	179	59.7		
Variable		Cases		Control		OR	95% CI
Follow any particular diet	Low fat	14	9.3	31	10.3	0.893	0.45 – 1.72
	Low salts	12	8	18	6	1.362	0.62 – 2.91
	Food for diabetes	33	22	32	10.7	2.342	1.37 – 4.00
	Food for weight loss	8	5.3	20	6.7	0.789	0.32 – 1.81
	Non	83	55.3	199	66.	0.940	0.64 –1.38

According participant awareness about nutritional pattern, table (4.13) shows that 65.3% of cases and 75.7% of controls believe that their nutritional pattern is a healthy and appropriate for their age and health status. In addition to the quantities and types of food in their diet is good and optimal. The difference between case and control reach to statistical significant level ($\chi 2$= 5.215, P-value= 0.022). Meaning that the misconception about diet is a risk factor for stroke, this shows the ignorance of the patients in the evaluation of their diet, and they need to teach patients for healthy diet to expect to incidence of stroke.

Another result emphasized the lack of awareness of participants about their Nutritional pattern. When about 64% of the cases and 56.3% of control believe that their weight is ideal and appropriate for their age and health status. While the obesity rate among participants was 57.1%, while 38.4 % of the participants believe that their weight is a risky for their health

4.3.3 Nutritional habits and incidence of stroke

Dietary habits are the habitual decisions an individual or culture makes when choosing what foods to eat. The word diet often implies the use of specific intake of nutrition for health or weight-management reasons, although each culture and person holds to some food preferences or some food taboos. This may be due to personal tastes or ethical reasons. Individual dietary choices may be more or less healthy (Plessis, 2011).

Complete nutrition requires ingestion and absorption of vitamins, minerals, and food energy in the form of carbohydrates, proteins, and fats. Dietary habits and choices play a significant role in the quality of life, health and longevity (Moaadeli et al, 2015).

By using Mann-Whitney test, table 4.14 found that there was a significant statistical difference between the some types of food and stroke, first: carbohydrate's found that rice was statistically significant among the cases [Mean=7.50], control [Mean=7.27]. The difference between two groups reach statistically significant level [Z=2.222, P-value=

0.026]. That means increasing the consumption of rice can increase the incidence of the stroke. This result was consistent with a study by Sieri et al (2010) that showed that the high carbohydrate intake from foods with a high glycemic index, added sugars, and high dietary glycemic load also lead to reduced intake of essential nutrients and has been associated with an increased risk of stroke. In the Nurses' Health Study, total carbohydrate intake was associated with elevated risk of hemorrhagic stroke when the extreme quintiles were compared (Oh et al, 2005).

Regarding proteins, results indicate that there is a difference at consumption protein diet especially in red meat and eggs. The difference in red meat between cases [Mean 6.70] and controls [Mean 5.57], [Z=2.748, P-value= 0.006]. In addition, in eggs difference between cases [Mean 11.51] and controls [Mean 9.14] [Z=2.045, P-value= 0.041] and the difference between two groups was statistically significant. Meaning the excessive intake of red meat and eggs is a risk factor for stroke, this result supported by a study conducted by O'Donnell et al. 2010 that showed that increase risk of stroke was associated with: increased consumption of red meat, organ meats, or eggs. In study by Bernstein et al. 2012 found the higher intake of red meat was associated with an elevated risk of stroke in both sexes.

Regarding fruits and vegetables, results found that there is a difference at consumption Non-leafy vegetables, the difference between cases [Mean 21.55] and controls [Mean 24.3], [Z=2.664, P-value=0.008]. The differences between two groups were statistically significant. Meaning the increased intake from Non-leafy vegetables can decrease incidence of stroke. However, in simple fruits the difference between cases mean 15.97 and controls mean 14.29, [Z= 2.401, P-value= 0.016]. Researcher thought that consuming large amounts of simple fruits or fruits juice is a risk factor for stroke. But eating moderate amounts of simple fruits does not lead to a stroke, and this has been confirmed by previous

studies by Sauvaget et al (2003) that showed that daily consumption of fruits is associated with a lower risk of mortality from total stroke, intracerebral hemorrhage, and cerebral infarction amongst Japanese who have a lower animal protein and fat intake.

Table 4.14 Distribution of study participants according to Nutritional Habits

Type of Food	Type of Participant				Z	Sig
	Case N=150		Control = 300			
	Mean	SD	Mean	SD		
Carbohydrate's						
White bread	67.80	27.462	65.40	29.149	0.711	0.477
Whole or mixed bread	7.79	20.883	7.93	20.182	0.526	0.599
Rice	7.50	4.716	7.27	7.410	2.222	0.026
French fries	7.43	8.754	8.01	9.362	0.732	0.464
Sugar	37.47	33.177	36.01	30.470	0.418	0.676
Sweets, Dessert & Cake	4.81	5.563	5.39	7.568	0.888	0.374
Protein						
Red meat	6.70	4.677	5.57	4.800	2.748	0.006
White meat	7.26	3.641	7.47	4.111	0.386	0.699
Fish	4.16	2.798	3.87	2.375	0.091	0.928
Eggs	11.51	10.986	9.14	9.304	2.045	0.041
Milk and Dairy	14.45	13.459	14.00	14.215	1.060	0.289
Fat and Oil						
Legumes	9.69	8.950	9.18	9.419	1.343	0.179
Nuts	4.48	7.064	4.66	7.132	0.761	0.447
Butter and margarine	1.86	4.737	1.55	3.567	0.273	0.785
Olive oil	20.97	16.788	20.72	14.895	0.245	0.807
Cooking oil	37.80	26.331	38.06	14.162	1.246	0.213
Vegetables and Fruit's						
Leafy vegetables	11.59	10.050	10.72	9.640	0.511	0.610
Non-leafy vegetables	21.55	11.949	24.31	10.222	2.664	0.008
Simple Fruits	15.97	10.919	14.29	12.068	2.401	0.016
Compound fruits	8.53	9.181	8.78	10.170	1.299	0.194

Follow Table 4.14

Type of Food	Type of Participant				Z	Sig
	Case N=150		Control = 300			
	Mean	SD	Mean	SD		
Drinks and Beverages						
Soda drinks	8.70	11.690	6.99	10.616	1.333	0.183
Fruits juice	7.24	9.396	4.93	8.163	3.653	0.000
Tea	50.54	34.525	49.56	31.893	0.345	0.730
Coffee	23.51	33.363	30.21	34.915	2.096	0.036
Traditional and Folklore Nutrition						
Kabsa and yellow rice	2.44	2.002	2.63	1.720	1.760	0.078
Maftool	0.95	0.548	0.92	0.561	0.829	0.407
Maqloba	1.97	1.774	1.54	1.252	2.143	0.032
Fattah	2.71	1.874	2.27	1.547	1.895	0.058
Grilled chicken	4.73	3.003	4.54	2.819	0.246	0.805
Fried foods	10.06	11.870	7.73	9.000	1.939	0.039
Appetizer						
Salts, spices and pickles	9.41	13.273	6.79	10.407	2.054	0.040
Red pepper	6.19	10.905	4.53	9.563	1.296	0.195
Green pepper	11.44	14.209	11.00	12.370	1.001	0.317
Ketchup or tomato sauce	6.51	2.511	7.09	2.624	2.586	0.010

Other result in table 4.14 found that there is a difference in Coffee drink. The difference between cases [Mean 23.51] and controls [Mean 30.21], [Z= 2.096, P-value= 0.036]. The difference between two groups was statistically significant. The researcher found drinking coffee reduces the risk of stroke; this result is consistent with a study conducted by Larsson & Orsini (2011) which showed that moderate consumption (3–4 cups / day) is associated with a 17% (95% CI 8–26) low risk of stroke. Other study by Larsson et al. 2011, which reported that consumption of at least one cup of coffee a day, was associated with a lower risk of ischaemic stroke and subarachnoid hemorrhage but not haemorrhagic stroke compared with consumption of less than one cup of coffee a day.

Other result found that there is a difference at consumption of traditional and folklore diet especially in maqloba diet, the difference between cases [Mean 1.97] and controls [Mean

1.45], [Z=2.143, P-value=0.032]. In addition, in fried foods difference between cases [Mean 10.06] and controls [Mean 7.73] [Z=1.939, P-value=0.039] and the difference between two groups was statistically significant. This result means increased consumption of maqloba (food contain rice, fried vegetable and spices) and fried foods that increases the incidence of stroke. This result was consistent with several previous studies reported that there is increased risk of stroke was associated with increased consumption of fried foods, O'Donnell et al, 2010.

Regarding appetizers consumption, results show that there is a difference at consumption of appetizers especially salts spices and pickles. The difference between cases [Mean 9.41] and controls [Mean 6.79], [Z=2.054, P-value=0.040]. The difference between two groups was statistically significant. Meaning the excessive intake of appetizers increases the risk of stroke. Most adult populations around the world have average daily salt intakes of higher than 6g, and many in Eastern Europe and Asia of more than 12 g, mostly from processed foods. Observational studies show that sustained high daily salt intake of 5 g on average (86 mmol) [one teaspoon] is associated with a 23% greater risk of stroke, Strazzullo et al, 2009. Other study found reduction in salt intake is not proven to reduce stroke (He & MacGregor, 2011). Reduction by 2 g per day reduces cardiovascular events by 20%, reduction also lowers blood pressure (Taylor et al, 2011).

4.4 Logistic Regression

To learn about the determinants of stroke entered the nutritional habits of the participants, physical activity and anthropometric measurements of participant. We used logistic regression test and variables introduced to the Stepwise: LR model, where the statistical significant level [χ^2= 88.411, $\alpha < 0.01$], and showing the value of Hosmer & Lemeshow Test. The quality of the model where the value of the test was 11.279, and the Sig = 0.186. Model classification accuracy was 67.6%. Where the initial classification of the model 33.6%.

Table 4.15 Logistic regression test

	Chi-square	df	Sig.
Model	88.411	7	0.000
Hosmer and Lemeshow Test	11.279	8	0.186

Table 4.16 Classification of the logistic regression

		Type of Participant		Percentage Correct
		Control	Case	
Type of Participant	**Control**	273	24	91.9
	Case	121	29	19.3
Overall Percentage				67.6

4.4.1 Results and Interpretation this model:

Results illustrate logistic regression analysis for the nutritional risk factor of stroke. Significant stroke predictor as revealed by multivariate logistic regression analysis include physical activity [high physical activity will decrease the risk of stroke], ketchup or tomato sauce and non-leafy vegetables [Increase consumption ketchup, tomato sauce and non-leafy vegetables can decreased incidence risk of stroke]. Where these is variables represents an inverse relation with stroke. Meaning the increased used that likely to decrease incidence stroke. However, other type of food can increased risk of stroke such as, fruit juice, eggs, fried food, salts, spices and pickles, respectively. Accounting for these varieties of food, positive relationship that meaning increased consumption lead to stroke.

Table 4.17 logistic regression of nutritional risk factor for stroke

Variables	B	S.E.	Wald	Sig.	Exp(B)
Physical activity	0.192	0.091	4.482	0.034	0.825
Ketchup or tomato sauce	0.066	0.034	3.830	0.049	0.936
Fruit Juice	0.037	0.012	9.707	0.002	1.037
Non-leafy vegetables	0.024	0.009	6.499	0.011	.976
Eggs	0.023	0.010	4.883	0.027	1.023
Fried Food	0.023	0.011	4.570	0.033	1.024
Salts, spices and pickles	0.021	0.009	4.885	0.027	1.021

Chapter (5) Conclusion and Recommendation

This chapter provides the main conclusion and the recommendation for the patients, health provider and decision makers to focus on its problem and to provide suggestion aiming to reduce incidence of stroke.

In order to improve the health of Palestinian population, it expected that we can reduce morbidity and mortality by changing life style through Improvement nutrition habits, introducing public "health policies", programs and regulations that reduce exposure to these risk factors. However, it is important how many illnesses and deaths caused by each risk factor before developing polices that aim to improve public health, reducing morbidity and mortality need cooperation and sharing responsibilities with different governmental and non-governmental effort to promote healthy habits, living and healthy person based multi-sector and multidisciplinary.

5.1 Conclusion

This study aimed to assess nutritional risk factor for development of stroke among stroke survivors and adult in Gaza Governorates. It was a case-control study; data was collected from the stroke patients admitted to medical department in main governmental hospital (Kamal Odwan Hospital, Al-Shifa Hospital, Shohda Al-Aqsa Hospital, Nasser Hospital and European Gaza Hospital) and diagnosed with acute stroke (cases); the non-stroke patients at the same age (≤45 years) were chosen from PHCC (controls). The risk factors categorized into socio-demographic, health profile and dietary habits that are associated with stroke. The study findings may contribute to decrease the occurrence of stroke and may assist decision-makers in taking actions and implementing interventions that aid in decreasing the nutritional risk factors as possible.

The target population classified into two groups: the first group was cases which consisted of 150 patients admitted to medical department, the control group consisted of 300 participants were chosen from anyone who visit PHCC for any reason. For each case of stroke, twice control was selected. The controls matched to cases in respect to their age (± 5 years), gender and locality.

For Socio-demographic variables, finding shows that 56% male and 44% female, ratio in the study was 1.2:1. The most prominent age group was the age group between 60 – 69 years. The majority of education level (52.7%) of cases and (43.3%) of controls had primary educational and less. The majority of employment (75.7%) among control and (88%) among cases have not working. All variables there is not statistically significant except in employment it found that not working people were significantly associated with stroke ($\chi^{2=}$ 9.429, P< 0.02).

For disease characteristic among stroke patients, finding shows that 84% of patient had ischemic and 16% had hemorrhagic, and according age and chronic disease, people less than 50 years and have HTN are more likely to risk of developing hemorrhagic stroke and more than 60 years and have DM more likely to risk of developing ischemic stroke.

Regarding chronic disease, prevalence of HTN, presence of DM and history of cardiac disorder among cases were higher than among control and for all these factors the difference was statistically significant. Other result about family history shows that there was not statistical significant difference between the chronic disease such as (HTN, DM, cardiac disease and stroke) and father, mother and brother have this disease with incidence of stroke.

For life habits, we noted that 26.7% from stroke patient have smoker and the smoker's people likely to hemorrhagic stroke more than ischemic strokes. For the relationship

between stroke and PA shows the people with high PA have low risk to stroke from moderate and low activity.

Regarding obesity, results clarifies that there is a significant difference between the study population and obesity. We noted according BMI the risk of stroke associated with obesity, but according WC and WHR was not significant statistical difference between participants**.**

For nutritional habits, Concerning cholesterol & triglycerides and disorders associated with incidence of stroke not statistically significant difference between participants. Other results, according to their awareness attitudes and commitment to words nutritional pattern researcher found lack in knowledge and perception between participant about disease, nutritional habits, medication and control diet**.**

Concerning dietary habits, there was a significant statistical difference between increase consumption of rice, red meat, eggs, fried foods, salts, spices and pickles and increased incidence of stroke. But in other type of food can decrease incidence of stroke such as; Non-leafy vegetables, Ketchup or tomato sauce and drinking Coffee.

5.3 Recommendations

The study findings gave the research a chance to highlight the problems to help provide a number of recommendation and suggestion for controlling and decreasing morbidity and mortality of stroke.

- Population monitoring programmer for obesity and certain nutrients are a vital part of a comprehensive strategy to reduce obesity.
- Preventive strategies should be established on the basis of community-wide health education programs and focus on children, the community, or the workplaces about stroke risk factors.

- Raising the public awareness toward healthier food choices, mainly toward reducing the high fat, protein, and simple carbohydrate food-intakes and encourages the intakes of vitamins, minerals and fiber foods (fruits, vegetables, whole bread, and legumes).
- Identification and implementation of programs and strategies to combat sedentary lifestyle and smoking habits among the population.
- Development of clinical nutrition department of the MOH to establish the priorities of its goals in control diet for patients in all age levels, and monitor patients compliance with these programs.
- Increase awareness of adult's people towards non-pharmacological treatment and life style modification through diet and exercise to control chronic diseases, as a most cost-effectiveness way.
- Counseling should be implemented from physicians, clinical nutritionists, and other health care providers in hospital, PHCC to increase and promote the patient's awareness about the stroke risk factors and encourage the intake of a healthy diet.
- Increase the awareness of patients with HTN and DM to control the disease to prevent its complications through a healthy diet, maintaining an ideal weight and commitment for medication.

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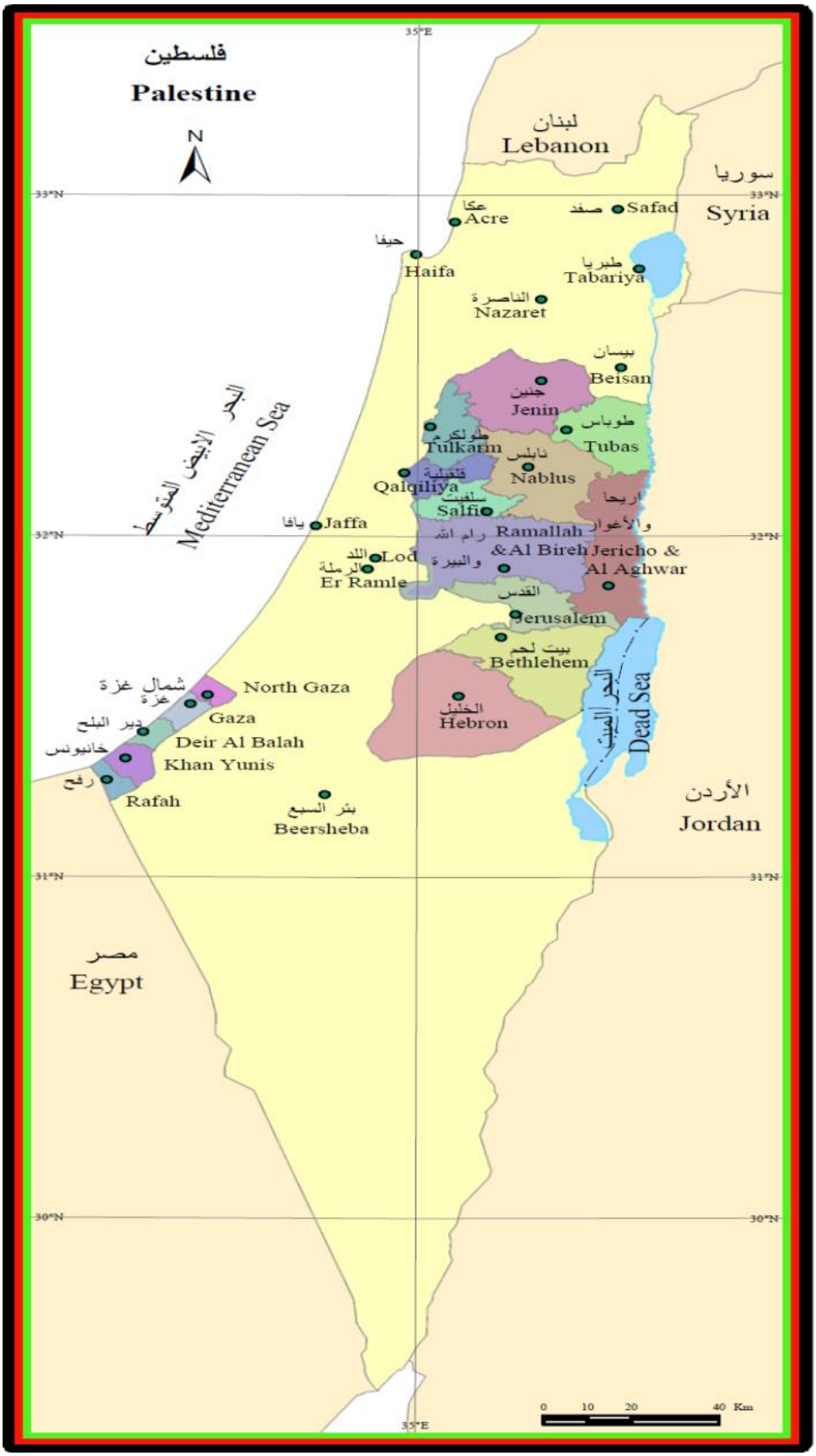
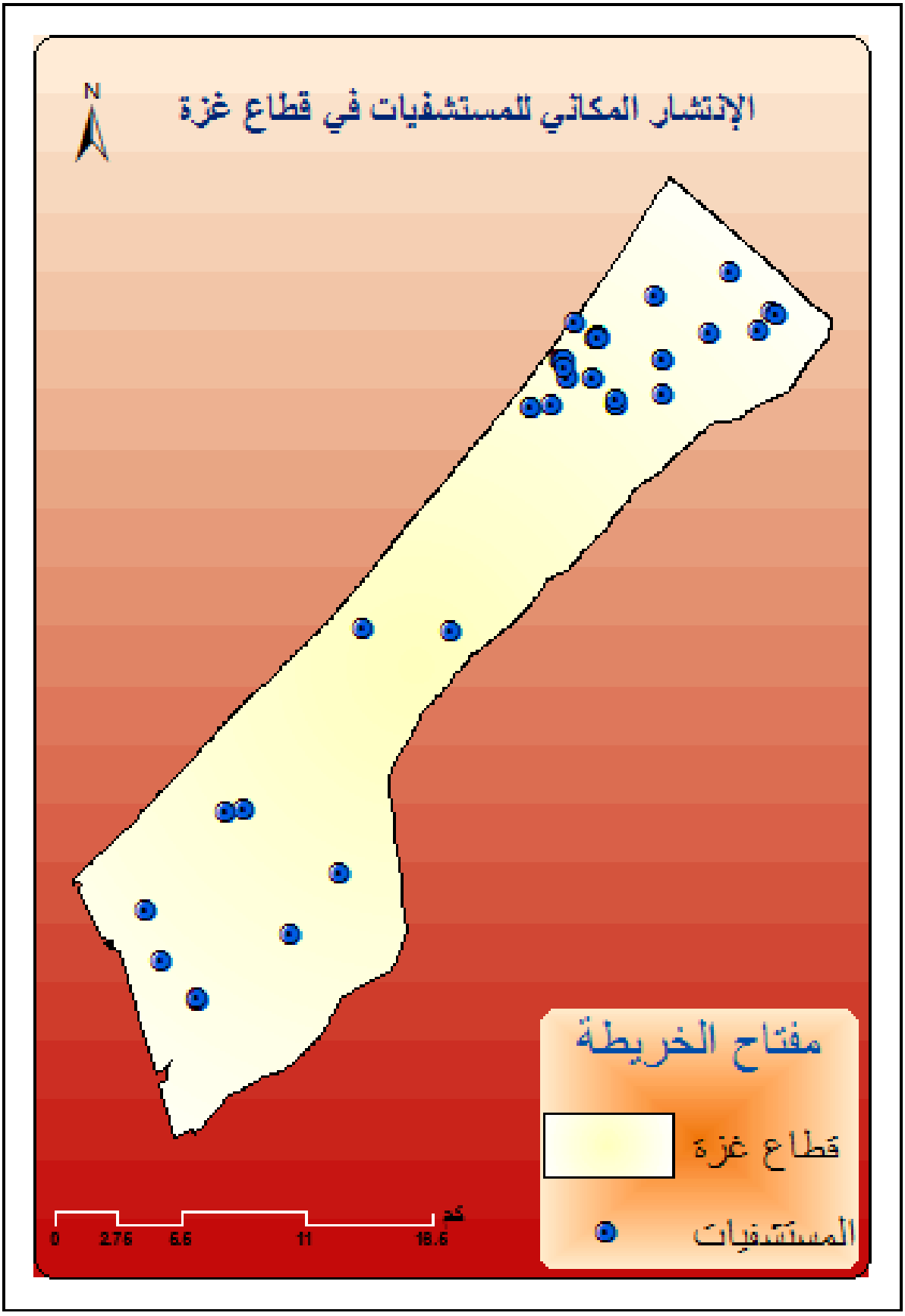
Annexes

Annex (1) Map of Palestine



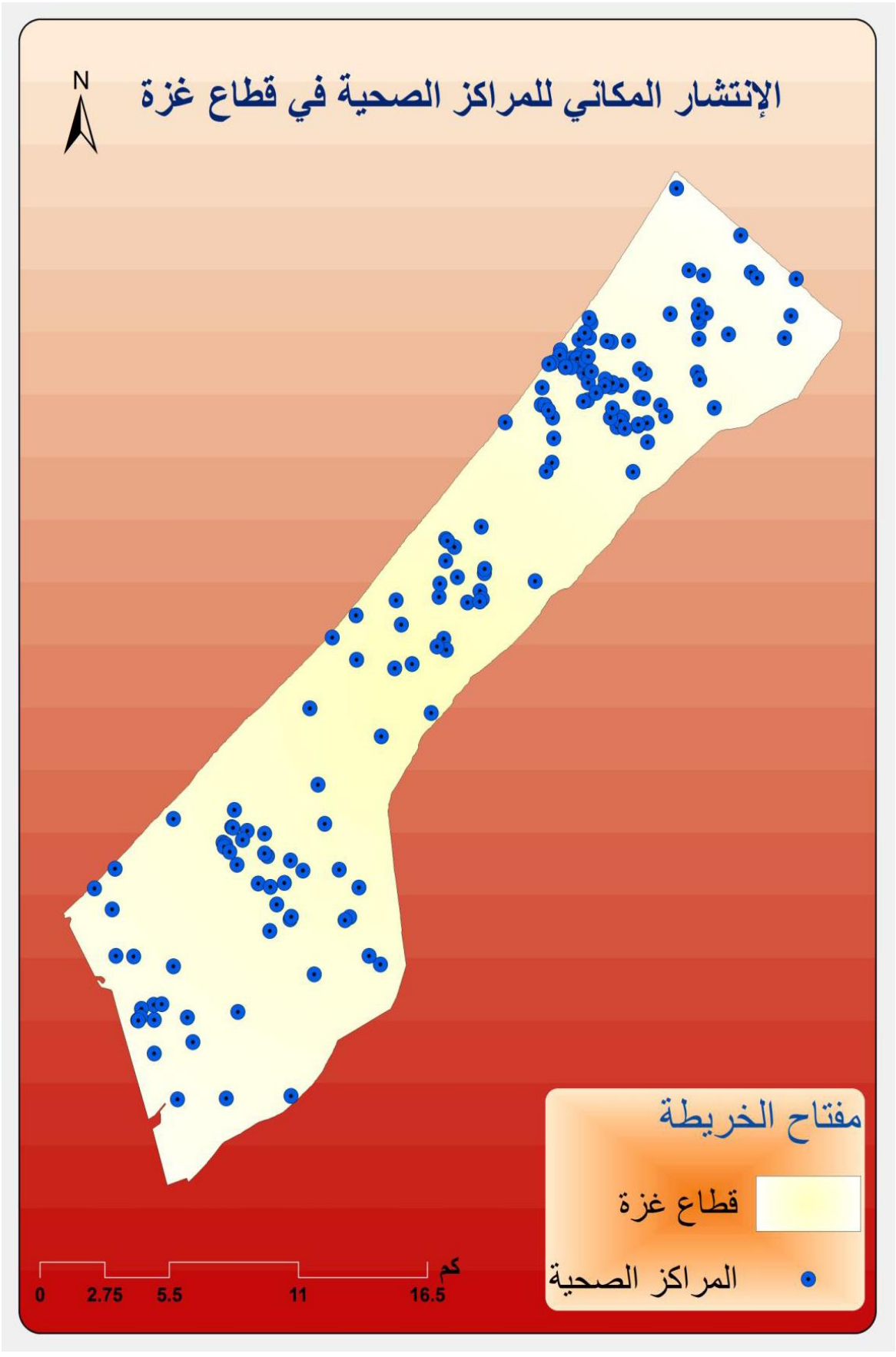
From (PCBS, 2015)

Annexes (2) Distribution of Hospital in Gaza Strip



From (MOH, 2014)

Annex (3) Distribution of Primary Health Care Centers in Gaza Strip



From (MOH, 2014)

Annexes (4) Al-Quds University Approval Latter

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ:2015/6/29
الرقم/: ك ص ع –غ/ت ع/2015

حضرة الدكتور ناصر أبو شعبان المحترم
مدير عام تنمية القوى البشرية–وزارة الصحة

تحية طيبة وبعد،،،

الموضوع:تسهيل مهمة للطالب محمد الكحلوت

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

Nutritional Risk Factors among Stroke Survivors in the Gaza Governorates: A case-control Study

كمتطلب للحصول على درجة الماجستير في الصحة العامة–مسار علم الأوبئة وعليه نرجو التكرم بالموافقة والايعاز لمن يلزم بتسهيل مهمة الطالب بجمع البيانات الخاصة ببحثه من المرضى المصابين بالجلطة الدماغية المستقبلين في أقسام الباطنة بمستشفيات وزارة الصحة وأيضاً من المرضى والمراجعيين لمركز الرعاية الأولية التابعة لوزارتكم الموقرة
علماً بأن المعلومات ستكون متوفرة لدى الباحث والجامعة فقط وسنطلعكم على النتائج في حينها .

و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة
فرع غزة

نسخة
- الملف

Jerusalem Branch/Telefax 02-2799234
Gaza Branch/Telefax 08-2644220 -2644210
P.O. box 51000 Jerusalem

فرع القدس / تلفاكس 02-2799234
فرع غزة / تلفاكس 08-2644220-2644210
ص.ب. 51000 القدس

Annexes (5) MOH Approval Latter

The Palestinian National Authority
Ministry of Health
Directorate General of Human Resources Development

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة لتنمية القوى البشرية

الرقم: ..... التاريخ: 2015/06/30م

الأخ / د. فؤاد العيسوي وكيل الوزارة المساعد المحترم،،،

الأخ / د. عبد اللطيف الحاج مدير عام المستشفيات المحترم،،،

السلام عليكم ورحمة الله وبركاته،،،

الموضوع/ تسهيل مهمة باحث

بخصوص الموضوع أعلاه، يرجى تسهيل مهمة الباحث/ محمد عبد اللطيف [illegible] الملتحق ببرنامج ماجستير الصحة العامة مسار علم الاوبئة- جامعة القدس ابو ديس في إجراء بحث بعنوان :-

"Nutritional Risk Factors Among Stroke Survivors in the Gaza Governorates: A case – Control Study "

حيث الباحث بحاجة لتعبئة استبانه وأخذ قياسات الطول والوزن لمرضى الجلطة الدماغية المنومين في أقسام الباطنه في مستشفيات غزه، وعينة ضابطة من المراجعين للعيادات الخارجية ومراكز الرعاية الأولية المستوى الرابع في قطاع غزه.

نأمل توجيهاتكم لذوي الاختصاص بضرورة الحصول على الموافقة المستبصرة من المرضى الذين هم على استعداد للمشاركة في البحث ومن ثم تمكين الباحث من التواصل معهم, بما لا يتعارض مع مصلحة العمل وضمن أخلاقيات البحث العلمي، و دون تحمل الوزارة أي أعباء أو مسئولية.

وتفضلوا بقبول التحية والتقدير،،،

الإدارة العامة للمستشفيات صادر رقم: 6191 التاريخ: 7/7

وزارة الصحة الإدارة العامة للمستشفيات وارد الرقم: 4375 التاريخ: 7/7

د. ناصر رأفت أبو شعبان
مدير عام تنمية القوى البشرية

صورة/
- الإدارة العامة للرقابة الداخلية
- صاحب/ـة العلاقة

Annexes (6) Helsinki Committee Approval Latter

المجلس الفلسطيني للبحث الصحي

Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee
For Ethical Approval

Date: 03\08\2015 **Number:** PHRC/HC/ 52/15

Name: **الاسم:** محمد عمر الكحلوت

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

Nutritional Risk Factors among Stroke Survivors in the Gaza Governorates: A case-control Study

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/52 /15 in its meeting on 03/08/2015

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Signature

Member **Chairman** **Member**

Genral Conditions:-

٤٠. Valid for 2 years from the date of approval.
٤١. It is necessary to notify the committee of any change in the approved study protocol.
٤٢. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

The subject was approved following the World Medical Association Declaration of Helsinki-Ethical principles for medical research involving human subjects, adopted by the 18th World Medical Association General Assembly, Helsinki, Finland, June 1964 and amended by the 59th WMA General Assembly, Seoul, Korea, October 2008.

E-Mail:pal.phrc@gmail.com

Gaza - Palestine غزة - فلسطين
شارع النصر - مفترق العيون

Annexes (7) Cover Letter and Consent Form

Nutritional Risk Factors among Stroke Survivors in Gaza Governorates

Dear participant:

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 nutritional risk factor for development of stroke among stroke survivors and adult in Gaza Governorates at governmental hospital. Moreover, you are chosen as a sample in this study, the study will be through patient's file of Acute CVA admitted to medical department in hospital and face-to-face interviews, answering of related questions at special form, the interview will take place in the medical department 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 question that will be filled. There is no right and/or wrong answer; just give your perspective. Please reflect carefully and answer all questions as honestly as possible. Your response will be kept confidential and will be aggregated with other response 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 be 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.

Annexes (8) Questionnaire

Nutritional Risk Factors among Stroke Survivors in Gaza Governorates

Questionnaire (Personal Interview)

Personal Data:				
Serial No: ☐☐☐	Date: …../..../….....	Case: ☐	Control: ☐	Hospital:……..……
Name: ……	Mobile: 059/ ……..			Tel: 08/ ……...

Socio-demographic characteristics:				
Age:	Years	Sex: ☐ M ☐ F	Living status: ☐ Alone ☐ With his family	☐ Other
Family size No (…….....) Including any one living at hom			Education in years (…….)	
Marital Status: ☐ Single	☐ Married	☐ Divorced	☐ Widowed	
Region: ☐ North Gaza	☐ Gaza City	☐ Mid-zone	☐ Khan-younis	☐ Rafah
Employment: ☐ Working	☐ Not working	Total household Income: (……..……NIS)		

Health status characteristics:				
Type of CVA: ☐ Ischemic	☐ Hemorrhagic	☐ TIA		
Hypertension	☐ Yes ☐ No	How many years? Since (……...Years)	Medication / ☐ Yes ☐ No	☐ Controlled ☐ Uncontrolled
Diabetes Mellitus	☐ Yes ☐ No	How many years? Since (……...Years)	Medication / ☐ Yes ☐ No ☐ Tablet ☐ Insulin ☐ Both	☐ Controlled ☐ Uncontrolled
Cardiac disorder	☐ Angina	☐ MI	☐ Heart Failure	☐ Arrhythmia ☐ Valvular disease
Other Diseases	1) ……..…...	2) ……..……...	3) ……..……...	
Did your Father Have :	☐ Hypertension	☐ Diabetes Mellitus	☐ Cardiac disease	☐ Stroke
Did your Mother Have :	☐ Hypertension	☐ Diabetes Mellitus	☐ Cardiac disease	☐ Stroke
Did your any brother Have :	☐ Hypertension	☐ Diabetes Mellitus	☐ Cardiac disease	☐ Stroke

Have you ever been given a special advice prescribed by a health professional to control chronic diseas:

☐ Control Diet ☐ Weight reduction ☐ Exercise ☐ Stoping smoking

☐ Proper (healthy) handling of stress ☐ Others (……...) ☐ None

Are you compliant with these advise?

☐ Yes ☐ No ☐ Don't know

If No, specify: …….

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

☐ Yes ☐ No ☐ Don't know

Are you under any medication for controlling blood cholestrol or Triglycerides?

☐ Yes ☐ No ☐ Don't know

If Yes, specify: ……..……..

Have you ever been on a special advice prescribed by a health professional to lower your high blood cholestrol or tryglesride?

☐ Diet with low saturated fat ☐ Weight reduction ☐ Exercise

☐ ↑ Eating fruits & vegetables ☐ Fluid intake ☐ None

Do you follow any particular diet?

☐ Yes ☐ No

If yes, specify the following:

☐ Low fat ☐ low salts ☐ Special food for diabetes

☐ Special food for weight loss ☐ Herbs ☐ Vegetarian only

Do you think your nutritional program is a healthy?

☐ Yes ☐ No ☐ Don't know

Do you think your weight is optimal for age?

☐ Yes ☐ No ☐ Don't know

Do you think your weight is risky or over weight?

☐ Yes ☐ No ☐ Don't know

Do you take any vitamins or supplements?

☐ Yes ☐ No ☐ Don't know

Smoking Habits					
Current Smoking	☐ Yes ☐ No	Duration in Years (……..…) Sigarites Daily No. (…….)	Past smoking	☐ Yes ☐ No	If yes, Duration of smoking(…..……Y)
Smoking Type	☐ Sigaretties ☐ Shisha	Daily Passive smoking (……..….hour)			

Physical Activity

Do you practice exercise at leisure time ?

☐ Yes ☐ No ☐ Don't know

What type and duraton of physical activity do you practice at leisure time?

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

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

☐ Yes ☐ No ☐ Don't know

If, Yes

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

☐ Maintain good health ☐ Weigt control

☐ Altarneative treatment for health problem ☐ other

Do you think that exercising regularly and continuously to maintain your health?

☐ Yes ☐ No ☐ Don't know

Anthropometric measurements of participant

Weight: …….(Kg)	**Hight:** …….(cm)	**BMI:** ……..
WC: ……(cm)	**HC:** …….....(cm)	**WHR:** ……

Food system of participants											
No	**How often do you eat the following foods**	**None**	**Once**	**Twice**	**3 times or more**	**Once**	**Twice**	**3-4 times**	**5-6 times**	**Less than once**	**1-3 times**
			Daily			**Weekly**				**Monthly**	
Group One: Carbohydrate's											
1.	White bread										
2.	Whole wheat bread or mixed										
3.	Rice										
4.	Potato a fried										
5.	Sugar										
6.	Sweets, Dessert and Cake										
Group Two: Protein											
7.	Red meat										
8.	White meat										
9.	Fish										
10.	Eggs										
11.	Milk and Dairy										
12.	Legumes (Lentils, beans, peas)										
Group Three: Fat and Oil											
13.	Nuts										
14.	Butter and margarine										
15.	Olive oil										
16.	Cooking oil										
Group Four: Vegetables and Fruit's											
17.	Leafy vegetables										
18.	Non-leafy vegetables										
19.	simple Fruits										
20.	Compound fruits										
Group Five: Drinks and Beverages											
21.	Soda drinks										
22.	Fruits juice										
23.	Tea										
24.	Coffee										
Group Six: Traditional and Folklore Nutrition											
25.	Kabsa and yellow rice										
26.	Maftool										
27.	Maqloba										
28.	Fattah										
29.	Grilled chicken										
30.	Fried foods										
Group Six: Appetizer											
31.	Salts, spices and pickles										
32.	Red pepper										
33.	Green pepper										
34.	Ketchup or tomato sauce										

Annexes (9) Questionnaire

الموافقة على إجراء بحث صحي

المشترك الفاضل:

أنا طالب في جامعة القدس– أبو ديس– كلية الصحة العامة، أقوم بإعداد بحث بعنوان (عوامل الخطر الغذائية بين الناجين من الجلطات الدماغية في محافظات غزة)، باعتباره متطلب للتخرج والحصول على درجة الماجستير، وقد تم اختياركم كعينة لهذه الدراسة، ستتم الدراسة من خلال جمع المعلومات من ملف المريض ومن خلال المقابلة الشخصية، والاجابة عن الأسئلة المتعلقة بذلك في نموذج خاص، ومن المقدر أن تستغرق المقابلة مدة خمسة عشر دقيقة تقريباً.

هذه الدراسة تهدف إلى تحديد عوامل الخطر الغذائية المؤدية إلى الجلطات الدماغية في قطاع غزة، مما يساعد على تحسين الجهود والوسائل الرامية لمنعه وتحصين الجمهور بالمعلومات اللازمة حوله.

مشاركتكم طوعية ويمكنكم رفض الإجابة على أي سؤال، وأؤكد لكم أن المعلومات التي سيدلى بها ستكون مصدر ثقة وسرية تامة وتستخدم فقط لأغراض البحث العلمي وبدون ذكر أسماء لذا أرجو أن تكون الإجابة دقيقة.

هذه الدراسة ليست ممولة من أي جهة كانت ولا تستهدف تحقيق أي مكاسب مادية ولن يترتب على مشاركتكم أي التزامات أو مزايا مادية معينة، ولن تكلف أكثر من الوقت اللازم لأجرائها معك.

تقبلوا التحية

شاكرين لكم تعاونكم معنا

الباحث

محمد عمر الكحلوت

0597794024

عوامل الخطر الغذائية بين الناجين من الجلطات الدماغية في محافظات غزة

الاستبـــــانة (استمارة المقابلة الشخصية)

البيانات الشخصية				
الرقم التسلسلي: ☐☐☐	☐ مصاب	☐ ضابطة	**التاريخ:**..../..../.....	**المستشفى:**.....
الاسم:	**رقم الجوال:**		**رقم الهاتف:**	

الخصائص الاجتماعية والديموغرافية				
العمر:	سنة	ذكر ☐	أنثى ☐	**الحالة المعيشية:** ☐ وحده ☐ مع عائلته ☐ أخرى
عدد أفراد الأسرة الذي يعيش معها المشارك: (.....)			**عدد سنوات الدراسة** (.....)	
الحالة الإجتماعية : ☐ أعزب	☐ متزوج	☐ مطلق	☐ أرمل	
المنطقة: ☐ شمال غزة	☐ مدينة غزة	☐ المنطقة الوسطى	☐ خانيونس	☐ رفح
الوظيفة: ☐ يعمل	☐ لا يعمل	**الدخل الشهري للأسرة التي يعيش معها المشارك:** (.....)		

الخصائص الصحية				
نوع الجلطة الدماغية: ☐ نقص تروية	☐ نزيفيه	☐ نقص تروية مؤقته (TIA)		
إرتفاع ضغط الدم	☐ نعم ☐ لا	متى تم إكتشاف المرض؟ عدد سنوات المرض (.....)	هل يتم تناول علاج الضغط ☐ نعم ☐ لا	☐ منتظم ☐ غير منتظم
السكري	☐ نعم ☐ لا	متى تم إكتشاف المرض؟ عدد سنوات المرض (.....)	هل يتم تناول علاج السكري ☐ نعم ☐ لا ☐ الأنسولين ☐ أقراص ☐ كلا هما	☐ منتظم ☐ غير منتظم
أمراض القلب	☐ ذبحة صدرية	☐ جلطة قلبية	☐ قصور عضلة القلب	☐ عدم انتظام ضربات القلب ☐ أمراض صمامات
أمراض أخرى	1).....	2).....	3)	
هل يعاني والدك (الأب) من:	☐ **إرتفاع ضغط**	☐ **السكري**	☐ **أمراض القلب**	☐ **الجلطة الدماغية**
هل تعاني والدتك (الأم) من:	☐ **إرتفاع ضغط**	☐ **السكري**	☐ **أمراض القلب**	☐ **الجلطة الدماغية**
هل يعاني أخيك أو أختك من:	☐ **إرتفاع ضغط**	☐ **السكري**	☐ **أمراض القلب**	☐ **الجلطة الدماغية**
هل سبق وأن نصحك طبيب أو أحد العاملين في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للتحكم بالأمراض المزمنة ؟				
☐ حمية غذائية	☐ إنقاص الوزن	☐ ممارسة تمارين رياضية	☐ وقف التدخين	
☐ أخرى (.....)		☐ التعامل الصحي مع التوتر والقلق	☐ لا	

هل يتم الإلتزام بالنظام ؟

☐ نعم ☐ لا ☐ لا أعــرف

إذا كانت الإجابة بـ لا، إذكر/ي السبب:

.....

هل سبق وأن أخبرك طبيب أو أحد العاملين في الحقل الصحي أن لديك إرتفاع في مستوى الكوليسترول أو الدهون الثلاثية في الدم؟

☐ نعـم ☐ لا ☐ لا أعرف

هل سبق وأن نصحك طبيب أو أحد العاملين في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للمحافظة على مستوى الكوليسترول أو الدهون الثلاثية في الدم؟ ؟

☐ إتباع نظام غذائي خالي من الدهون ☐ إنقاص الوزن ☐ ممارسة الرياضة بنظام

☐ زيادة تناول الفواكه والخضروات ☐ الإكثر من شرب السوائل ☐ لا شيء

هل يتم تناول أي أدوية لخفض مستوى الكوليسترول أو الدهون الثلاثية في الدم؟

☐ نعـم ☐ لا

إذا كانت الإجابة بـ نعم، إذكر/ي الدواء: .....

هل يتم أتباع نمط غذائي مُعَيّن؟

☐ نعم ☐ لا

إذا كانت الإجابة بـ نعم، ما هو النظام المتبع فيما يلي:

☐ دهون أقل ☐ ملح أقل ☐ غذاء خاص لمرضى السكر

☐ غذاء خاص لإنقاص الوزن ☐ أعشاب معينة ☐ أغذية نباتية فقط

هل تتناول أي فيتامينات أو مكملات غذائية؟

☐ نعم ☐ لا

إذا كانت الإجابة بـ نعم، إذكر/ي ما هي: .....

هل تعتقد أن النظام الغذائي الخاص بك صحي؟

☐ نعم ☐ لا ☐ لا أعرف

هل تعتقد أن وزنك مثالي ومناسب لعمرك ووضعك الصحي؟

☐ نعم ☐ لا ☐ لا أعرف

هل تعتقد أن وزنك يمثل عامل خطر على صحتك أو أنك تعاني من زيادة في الوزن أو من سمنة ؟

☐ نعم ☐ لا ☐ لا أعرف

العادات السلوكية					
التدخين حالياً	☐ نعم ☐ لا	عدد سنوات التدخين (.....سنة) عدد السجائر في اليوم الواحد (.....)	**التدخين سابقاً**	☐ نعم ☐ لا	أذا كانت الإجابة نعم؛ متى أقلعت عن التدخين (.....)

تدخين الشيشة	☐ نعم ☐ لا	عدد سنوات التدخين (.....سنة) العدد في اليوم الواحد (.....)	كم ساعة يومياً تتعرض بشكل مباشر للتدخين من قبل الأخرين؟ (.....ساعة)

النشـــاط البـــدنـــي

هل تمارس أي نوع من الرياضة في أوقات الفراغ؟

☐ نعم ☐ لا

إذا كانت الإجابة نعم :

ما هي نوع الرياضة وكم من الوقت تقضيه في ممارسة الرياضة أسبوعياً؟

نوع الرياضة	ساعة وأقل	ساعتين	ثلاث ساعات	أربع ساعات وأكثر
المشي				
ركوب الدراجة الهوائية				
تمارين (السويدي)، والسباحة، الركض، تمارين البطن، وألعاب القوى.				
الأعمال المنزلية، كالطهي، رعاية الأطفال، والتنظيف، والغسيل.				
أخرى (حدد)		.....		

هل سبق وأن نصحك طبيب أو أحد العاملين في الحقل الصحي بممارسة الرياضة؟

☐ نعم ☐ لا ☐ لا أعرف

إذا كانت الإجابة نعم؛

ما هو السبب الرئيسي الذي من أجله نصحك الطبيب بممارسة الرياضة؟

☐ المحافضة على الصحة العامة ☐ التحكم في الوزن

☐ علاج بديل لمشكلة صحية ☐ لأسباب أخرى

هل تعتقد أن ممارسة الرياضة بشكل منتظم ومستمر يحافظ على صحتك؟

☐ **نعم** ☐ **لا** ☐ **لا أعرف**

القياسات الجسدية للمشاركين

الوزن: ..... (كجم).	**الطول: ..... (سم)**
محيط البطن : ..... (سم)	**محيط الخصر:..... (سم)**

النظام الغذائي للمشاركين										
الرقم	كم عدد مرات تناول الأغذية والأطعمة التالية:	لا شيء	مرة واحدة	مرتين	3 مرات وأكثر	مرة واحدة	مرتين	من 3 إلى 4 مرات	من 5 إلى 6 مرات	أقل من مرة واحدة	من 1 إلى 3 مرات
		بشكل يومي			بشكل أسبوعي			بشكل شهري			
المجموعة الأولى: الكربوهيدرات											
1.	خبز ابيض										
2.	خبز القمح الكامل أو مختلطة										
-.	الأرز										
4.	البطاطا المقلية										
5.	سكر										
6.	الحلويات، الكيك والمعجنات										
المجموعة الثانية: البروتينات											
7.	اللحوم الحمراء										
8.	اللحوم البيضاء										
9.	الأسماك بأنواعها										
10.	البيض										
11.	الحليب ومشتقاته										
12.	البقوليات مثل(العدس، الفاصوليا، البازلاء)										
المجموعة الثالثة: الدهون والزيوت											
13.	المكسرات										
14.	الزبدة والسمن										
15.	زيت الزيتون										
16.	الزيوت النباتية (زيوت الطهي)										
المجموعة الرابعة: الخضروات والفواكه											
17.	الخضار الورقية (السبانخ، الملخية ..)										
18.	الخضار غير الورقية (البندورة، الخيار...)										
19.	الفواكه البسيطة (البرتقال، البطيخ، الخوخ)										
20.	الفواكه المعقدة كـ(التين، المانجا، التوت)										
المجموعة الخامسة: السوائل والمشروبات											
21.	المشروبات الغازية										
22.	عصير الفواكه الطبيعية										
23.	الشاي										
24.	القهوة										
المجموعة السادسة: الأطعمة الشعبية											
25.	الكبسة										
26.	المفتول										
27.	المقلوبة										
28.	الفته										
29.	الدجاج المشوي										
30.	الأطعمة المقلية كـ(الفلافل، الباذنجان، ....)										
المجموعة السابعة: المقبلات والمشهيات											
31.	الموالح والمخللات										
32.	الفلفل أحمر										
33.	الفلفل أخضر										
34.	الفلفل الحار (الشطة) والبهارات										
35.	كاتشب أو صلصة الطماطم										

Annex (10) List of expert's names who reviewed the study questionnaire:

	Name	Position
1.	Dr. Yehia Abed	Al-Quds University
2.	Dr. Ahmad Al-Lilly	Al- Azhar University
3.	Dr. Jehad El-Hissi	Al- Azhar University
4.	Dr. Emad Al-Kahlout	Al- Azhar University
5.	Dr. Jehad Ahmad	Al- Azhar University
6.	Dr. Yousef El-Jeessh	Islamic University
7.	Dr. Sanaa I. Abou-Dagga	Islamic University
8.	Dr. Nidal Abu Hadros	Ministry of Health
9.	Dr. Mazen Al-Hindi	Ministry of Health
10.	Dr. Hazim Issa	Al-Quds Open University

Annex (11) Arabic abstract

ملخص الدراسة

عوامل الخطر الغذائية بين الناجين من الجلطات الدماغية في محافظات غزة

الباحث: محمد عمر الكحلوت

إشراف: د. خميس عبدالكريم الإسي

مقدمة

الجلطات الدماغية عالمياً هي السبب الرئيسي الثاني للوفاة بالنسبة للأشخاص فوق سن 60 عاماً، والسبب الرئيسي الخامس في الناس الذين تتراوح أعمارهم بين 20–59 سنة. وكذلك الوضع في فلسطين هناك العديد من العوامل التي ارتبطت بشكلٍ مباشرٍ في حدوث الجلطات الدماغية، فالعادات الغذائية هي أحد هذه العوامل ما لم تكن أهمها، ففي السنوات الخمسين الماضية كانت هناك تغيرات ملحوظة في نمط التغذية، هذه التغييرات في نمط الحياة والسلوك الغذائي أدى إلى زيادة الإصابة بالجلطة الدماغية.

أهداف الدراسة

- معرفة عوامل الخطر الغذائية التي أدت إلى حدوث الجلطات الدماغية بين الناجين من الجلطات الدماغية.
- معرفة العلاقة بين العادات الغذائية ومستوى وعي المرضى الذين يعانون من الجلطات الدماغية.
- معرفة مدى وعي المرضى والتزامهم بإتباع نظام غذائي صحي للحد من الإصابة بالجلطات الدماغية.
- تحديد العلاقة بين السمنة من خلال المقاييس (معدل كتلة الجسم، محيط البطن، ومحيط البطن إلى الخصر) وحدوث الجلطات الدماغية.
- معرفة العلاقة بين الخصائص الشخصية والسلوكية (المستوى التعليمي، الوظيفة، التدخين والنشاط البدني) وحدوث الجلطة الدماغية.
- تقديم اقتراحات وتوصيات للحد من الإصابة بالجلطات الدماغية.

منهجية الدراسة

الدراسة هي دراسةٌ تحليليةٌ، درست الحالات المرضية مقارنة بعينةٍ (مجموعة) ضابطة.

عينة الدراسة

تكونت عينة الدراسة من 450 مشارك موزعين إلى مجموعتين، **المجموعة الأولى** تكونت من 150 حالة مرضية ممن تزيد أعمارهم عن 45 سنة وقد شخّصهم أطباء الأعصاب بالإضافة إلى الصورة المقطعية للدماغ (CT Scan) بأنّهم مصابون بجلطةٍ دماغيةٍ حادةٍ لأول مرة، وأُدخلوا إلى أقسام الباطنة في مستشفى كمال عدوان، مجمع الشفاء الطبي، مستشفى شهداء الأقصى، مجمع ناصر الطبي، ومستشفى غزة الأوروبي ، أمّا **المجموعة الثانية** فتكونت من 300 فرد

لم يعانوا من أي أمراض تتعلق بالجلطة الدماغية وتم اختيارهم بطريقةٍ عشوائيةٍ من مراكز الرعاية الصحية الأولية (المستوى الرابع)، وتم الأخذ بعَيْن الاعتبار تطابق الجنس والعمر والمنطقة السكنية حسب المجموعة المصابة.

كيفية جمع البيانات

جُمعت البيانات من خلال استبانة صُممت لهذا الغرض من إعداد الباحث، وشملت هذه الاستبانة عدة مجالات منها: المعلومات الشخصية، الاجتماعية، والخصائص الصحية والعادات السلوكية مثل: التدخين والنشاط البدني، والقياسات الجسدية كالطول والوزن ومحيط البطن ومحيط الخصر، بالإضافة إلى النظام الغذائي للمشاركين ،وقد تمّ فحص صدق وثبات الأداة من قبل محكّمين، بالإضافة لتطبيق الاستبانة على عينةٍ استطلاعيةٍ قبل البَدء في البحث، وكما التزم الباحث بالمعايير الأخلاقية البحثية كالحصول على موافقة لجنة هلسنكي والمشاركة الطوعية.

تحليل البيانات

تم استخدام برنامج الرزم الإحصائية للعلوم الاجتماعية "SPSS" لمعالجة البيانات إحصائياً، حيث تم اختبار النتائج باستخدام، Chi-square, P-value, Odds Ratio and Confidence Interval, Mann–Whitney test, Binary Logistic Regression,، لفحص العلاقة بين المتغيرات.

أهم النتائج

بينت هذه الدراسة العديد من عوامل الخطر الشائعة والتي يُعتقد بأن يكون لها الأثر المباشر في الإصابة بالجلطات الدماغية، والتي يمكن التحكم بها وكان لها دلالة إحصائية وهي:

- الأمراض المزمنة كارتفاع ضغط الدم والسكري وأمراض القلب والسمنة وقلة النشاط البدني ارتبطت ارتباطاً وثيقاً بالإصابة بالجلطات الدماغية.
- تناول كميات كبيرة من بعض الأصناف الغذائية مثل: الأرز، اللحوم الحمراء، البيض، الأطعمة المقلية، الأملاح والتوابل والمخللات كان لها علاقة ارتباطية موجبة بالإصابة بالجلطات الدماغية.
- ارتفاع ضغط الدم والعمر أقل من خمسين عاماً ارتبط بالنزيف الدماغي، بينما السكري والعمر أكثر من ستين عام والتدخين ارتبط بالجلطة الدماغية، وكانت علاقة الارتباط عالية وذو دلالة إحصائية بحدوث المرض.
- ارتفاع النشاط البدني، وزيادة تناول الخضروات الغير ورقية، وتناول القهوة، والكاتشب أو صلصة الطماطم ارتبطت ارتباطاً وثيقاً بخفض الإصابة بالجلطات الدماغية.
- أظهرت نتائج الدراسة قلة وعي والتزام المرضى بالغذاء الصحي، بالإضافة إلى عدم وعي المرضى بمخاطر السمنة وعدم الالتزام بالغذاء الصحي أو تنظيم الغذاء بما يتناسب مع وضعهم الصحي.
- كانت نتائج هذه الدراسة منسجمة مع الدراسات المماثلة التي أُجريت في بلدان أخرى.

التوصيات

من أهم التوصيات التي خرجت بها هذه الدراسة:

- وضع استراتيجيات وقائية تقوم على أساس برامج التثقيف الصحي والتعاون المجتمعي والتركيز على الأطفال والشباب في نشر الوعي لديهم حول مضاعفات الأمراض المزمنة وطرق الوقاية من الإصابة بهذه الأمراض وتأثيرها على الجلطات الدماغية.
- تعزيز التثقيف الصحي ورفع الوعي العام تجاه خيارات غذائية صحية، وذلك أساساً نحو الحد من تناول الأغذية ذات الدهون العالية والبروتينات والكربوهيدرات البسيطة، والتشجيع على تناول الأغذية الغنية بالفيتامينات والمعادن والألياف الغذائية (الفواكه والخضروات والبقوليات).
- زيادة وعي كبار السن ومَنْ يقومون برعايتهم تجاه تنظيم النظام الغذائي وممارسة الرياضة للسيطرة على الأمراض المزمنة ومنع مضاعفاته، باعتباره أكثر فعالية من حيث التكلفة.
- التركيز على إعطاء إرشادات كاملة وواضحة من الأطباء وأخصائي التغذية السريرية، وغيرهم من مقدمي الرعاية الصحية في المستشفيات، ومراكز الرعاية الصحية الأولية لدى المرضى المراجعين في تلك المؤسسات الصحية لتوعيتهم حول أهمية الالتزام بنظامٍ صحيٍّ جيّد يتناسب مع الوضع الصحي ويؤثر بالإيجاب في منع ظهور أمراض أخرى.
- تحديد وتنفيذ برامج واستراتيجيات لمكافحة العادات السلوكية السيئة مثل:الخمول البدني، التدخين، تناول الأطعمة ذات السعرات الحرارية المرتفعة المؤدية للسمنة وغيرها الكثير.