The relationship between food insecurity and health among Palestinians in the West Bank and Gaza Strip

(Subjective health, chronic diseases, and food insecurity among Palestinians adults in the West Bank and Gaza Strip)

العلاقة بين انعدام الامن الغذائي و الصحة بين الفلسطينين في الضفة الغربية و قطاع غزة

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Date of the thesis 13-6-2019

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Contents

Abstract:

Aims: this study examines the effect of food insecurity on health among Palestinians in the West Bank and Gaza Strip. More specifically, this study focuses on two aspects of health: the relationship between food security and subjective health, and the relationship between food security and chronic diseases that Palestinians may suffer from including diabetes, hypertension, and cardiovascular diseases in the West Bank and Gaza Strip.

Methodology: this study consisted of secondary data analysis of the cross sectional study from the Socio-Economic & Food Security Survey 2014 conducted by the Palestinian Central Bureau of Statistics in the West Bank and Gaza Strip. The analytic sample consists of 7841 participants that are representative of refugee status, locality type, governorates, and area A, B, C in the West Bank. There are two outcome variables subjective health and chronic diseases in the West Bank and Gaza Strip. due to the different circumstances and living conditions in the West Bank and Gaza Strip that we split the analysis by region to get better comparison between them. In

addition, we divided the analysis for chronic diseases by age-group (18-34 and 35 and over). The main independent variable of interest is food insecurity. We also controlled for distress, education, employment, age, sex, receiving assistance, deprivation, political suffering, subjective economic status, income, wealth, current living standards, shocks, location of the house, loss of the residence, and injury.

Results: Food insecurity was associated with subjective health in the West Bank; moderate food insecure and food secure people are 75%, (OR 1.754, 1.404-2.190), 52.6% (OR 1.526, 1.171-1.990) more likely to report good health compared to food insecure people. But not in the Gaza Strip, because of the different circumstances and political issues between the two regions. The most important factors that affected subjective health in the Gaza Strip are political suffering, injury, and distress. People with political suffering are 43.7% (OR 0.563, 0.415-0.763) less likely to report good health compared with people who never suffered from political issues. People who had someone died in 2014 aggression are 69% (OR 0.310, 0.174-0.553) less likely to report good health compared to people did not have someone died in the 20114 aggression. When distress increases one unit, people are 2.7% (OR 0.973, 0.961-0.985) less likely to report good health ($p<0.001$). And there was an association between food insecurity and chronic diseases for people whose age is from 18-34 years in the West Bank; people with moderate food insecurity and food security are 79.5% (OR 0.205, 0.089-0.469), 74.1% (OR 0.259, 0.077-0.877) less likely to have chronic diseases compared to people with food insecurity.

Conclusion: food insecurity affects health negatively; it can lead to mental health and affect the perception of health in people. As the results showed food insecurity affect subjective health in

the West Bank more than in the Gaza Strip, because of the different condition that people suffer from and due to the varieties in the West bank, however in the Gaza Strip political issues affected subjective health more. In Addition, it has been shown that food insecurity is a risk factor for chronic diseases such as diabetes, hypertension, and cardiovascular diseases. However, in our study it only appeared in younger adults and not older adults, may be because the effect of other risk factors for chronic diseases will appear more with aging because chronic diseases happen in a cumulative status.

ملخص:

الهدف: تهدف هذه الرسالة الى دراسة العلاقة بين انعدام الامن الغذائي و تأثيرها على الصحة بين الفلسطينين في الضفة الغربية و قطاع غزة. خاصة العلاقة بين انعدامم الامن و الغذائي و تأثيره على الصحة الشخصية، و أيضا العلاقة بين انهدام الامن الغذائي و تأثيره على الامراض المزمنة مثل مرض السكري، ارتفاع ضغط الدم، و أمراض القلب.

منهجية الدراسة: تم اجراء تحليل ثانوي لبيانات من دراسة المستوى الاقتصادي و الاجتماعي و الامن الغذائي، التي اجريت في عام 2014 من قبل مركز الاحصاء الفلسطيني. العينة التي استخدمت في التحليل تحتوي على 7841 شخص من الضفة الغربية و قطاع غزة. هذه العينة ممثل لوضع اللاجئين، نوع المكان، المحافظات، و مناطق أ و ب و ج في الضفة الغربية. تم التحليل على ثلاثة مستويات ، تحليل احادي المتغيرات، تحليل ثنائي المتغيرات، و تحليل ذو المتغيرات المتعددة. تم اجراء التحليل على قسمين، قسم للضفة الغربية و قسم لقطاع غزة بسبب اختلاف الظروف الساسية التي يعيشهاالفلسطينيون في الضفة الغربيو و قطاع غزة. الامراض المزمنة ايضا تم اتحليلها على قسمين، امرضى الذين يعانون من الامراض المزمنة اذين اعمارهم تتراوح بين 18-34 سنة، و المرضى الذين اعمارعم 35 سة فما فوق.

نتائج الدراسة: أشارت النتائج الى أن هناك علاقة بين انعدام الامن الغذائي و الصحة الشخصية في الضفة الغربية. الاشخاص الذين يعانون من انعدام الامن الغذائي بشكل معتدل و الاشخاص ذو امن غذائي 75%، و52.6% احتمالية اكبر ان يعتبروا صحتهم جيدة. المتغيرات المهمة التي أثرت على الصحة الشخصية في قطاع غزة هي المعاناة السياسية، الاصابة، و الضغط النفسي. حيث أن الأشخاص الذين يعانون بسبب السياسة و الاحتلال 43.7% احتمالية أقل ان يعتبروا صحتهم جيدة مقارنة بالاشخاص الذين لا يعانون بسبب السياسة . والاشخاص الذين أصيبوا بسبب الاحتلال 69% احتمالية اقل أن يعتبروا صحتهم جيدة من الاشخاص الذين لم يعنوا من اي اصابة. و الأشخاص الذين يعانون من الضغط النفسي احتمالية ان يعتبروا صحتهم جيدة تقل بنسبة 2.7% من الاشخاص الذين لايعانون من الضغط النفسي. و أشارت النتائج أيضا الى وجود علاقة بين انعدام الامن الغذائي والامراض المزمنة للمرضى الذين تتراوح اعمارهم بين 18-34 سنة. حيث أن المرضى ذو امن غذائي و الذين يعانون من انعدام الامن الغذائي بشكل معتدل هم74.1% و 79.5% لهم احتمالية اقل ان يصابوا بالامراض المزمنة من الناس الذين يعانون من انعدام الامن الغذائي.

الخلاصة: انعدام الامن الغذائي له تاثير سلبي على الصحة، قد يؤثر على الصحة الشخصية و الصحة النفسية و على تصور الناس للصحة. كما أوضحت وجود علاقة بين انعدام الامن الغذائي و الصحة الشخصية في الضفة الغربية وليس في قطاع غزة، بسبب اختلاف الظروف المعيشية و السياسية. و أيضا قد يؤدي الى حصول الامراض المزمنة مثل مرض السكري، ارتفاع ضغط الدم، و امراض القلب. ولكن حسب دراستنا قد ظهرت هذه العلاقة للاشخاص الذين اعمارهم تتراوح بين 18-34 سنة و يمكن تفسير هذه الظاهرة ان الاشخاص ذو عمر أكبر من ذلك يتم التأثير عليهم بعدة عوامل التي يتضاعف تأثيرها مع العمر ولكن هذه العوامل يكون تأثيرها أقل في الاشخاص البالغين اليافعين.

Introduction:

Food security has an important role in sustaining life, and in living a healthy and active life. Food insecurity and hunger is a global problem. According to the FAO in 2016 around 815 million people in the world do not have enough food (FAO 2018). Around 12.7% of population is malnourished (FAO 2018). Sustainable Development Goals called for collaboration between different stakeholders to have zero hunger, achieve food security, improve nutrition and enhance agriculture by 2030 (SDG 2018). Some of the countries are meeting these goals and some of them are still trying to achieve the goals (SDG 2018).

Food insecurity affects our health and how we are able to live our lives. Studies have shown that food insecurity has negative effects on health (Stuff et al. 2004; Cloninger and Zohar 2011; Hampton 2007). Food insecurity may lead to micronutrient and macronutrient deficiency, which contributes to physical wellbeing and health status (Laraia 2013). Food insecurity can also lead to under-nutrition and protein-energy malnutrition (PEM) if people have deficiency in macronutrients such as fat, protein, and carbohydrates. In addition, it can lead to malnutrition and deficiency of micronutrients such as iron, iodine, vitamin D, and vitamin A (Laraia 2013).

Chronic food insecurity, which can include reducing the quantity and the quality of food consumed, skipping meals, or decreasing the size of a meal per person, or lack of nutritional diversity, may increase the risk of overweight and obesity, which are risk factors for many chronic diseases (Friel 2010; Hampton 2007). In sum, research is increasingly showing the links between food insecurity and poor health outcomes.

The prevalence of food insecurity in Palestine is 27% (FSC and PCBS 2016). Whereby the circumstances that Palestinians live under because of the Israeli occupation (siege, blockage, restriction of movement, control over water resources, and land confiscation whether agricultural or not) have an impact on the living conditions and the food security of Palestinians. It is important to examine how these circumstances may affect health.

In this study, we examine the effects of food insecurity on health among Palestinians in the West Bank and Gaza Strip. More specifically, this study focuses on two aspects of health: the relationship between food insecurity and chronic diseases that Palestinians may suffer from including diabetes, hypertension, and cardiovascular diseases, and the relationship between food insecurity and subjective health in the West Bank and Gaza Strip.

Significance of the study:

This study focuses on the links between food insecurity and health in Palestine, which has not been a central focus of study to date. Furthermore, the measures used for health include chronic diseases and subjective health status in order to maintain a holistic view of the health of Palestinians.

This study specifically seeks to answer the following questions:

1. What is the effect of food security/insecurity on subjective health?

2. What is the effect of food security/ insecurity on chronic diseases?

Literature review:

Defining and measuring food security:

Food security as defined by the Food and Agriculture Organization of the United Nations (FAO) is " all people at all times have physical, social and economic access to sufficient, safe, nutritious food to meet their dietary needs and personal preferences for an active and healthy life" (Napoli, Muro, and Mazziotta 2011). This definition shows that food security is not only the availability of food or the quantity of food consumed but also takes into account the quality of food and the preferences of people. The definition shows that there are other factors that affect food security such as behaviors of people, sanitation, clean water availability, and socially and culturally acceptable food (Yu, Liangzhi You, and Fan 2010; Campbell 1991).

Food security consists of four important dimensions: access, availability, utilization, and stability. They are all interrelated and connected to each other, each pillar focuses on a side of food security that helps in maintaining food supply and decreasing hunger (Napoli, Muro, and Mazziotta 2011). Availability of food is a pillar that food security depends on; which means to have sufficient and high-quality food through local production or imports (Napoli, Muro, and Mazziotta 2011). To be food secure, people should have the ability to obtain food that they prefer at all times without having any risk of losing the access to food because of climate changes, or disasters, political issues, or cyclic events such as seasonal changes. This is called food stability (Napoli, Muro, and Mazziotta 2011). Economic and political issues affect food stability a lot. Poor people are the ones who suffer from food instability in abnormal situations the most because they spend higher proportions of their wages on food and are generally more

vulnerable to shocks (Otero, Pechlaner, and Gürcan 2013). Food utilization is the fourth pillar of food security, which means having a nutritious, adequate and balanced diet, sanitation, clean water, and access to health care to reach a state of nutritional wellbeing where all the need whether physical or psychological are met (Napoli, Muro, and Mazziotta 2011). This means that food security can be affected by determinants other than food. When there is good infrastructure in countries, such as clean and safe water, sanitation, good housing, good health care and the access to health care whenever people want (Prüss et al. 2002).

It is very hard to estimate global food security with these four pillars (accessibility, availability, stability, and utilization) because they are very broad concepts (Godfray et al. 2010). Many people are suffering from hunger because of the lack of one or more pillars of food security as was defined by FAO (Godfray et al. 2010). People who are malnourished or suffer from hunger are estimated roughly because it is hard to precisely estimate access, availability, stability, and utilization of food (Napoli, Muro, and Mazziotta 2011). In addition, there is geographical variation in the prevalence of hunger around the world, therefore every country should address their food security and find the best way to deal with hunger with the contribution of global institutions (Napoli, Muro, and Mazziotta 2011).

There is a debate on the right measurement of food insecurity, mainly because of the difficulties in defining it (Wolfe and Frongillo 2001). Because its definition goes beyond the four pillars (access, availability, stability, and utilization), it also focuses on people's perception such as food insufficiency or inadequacy (Wolfe and Frongillo 2001). Food consumption is the mainly indicator of food security, it focuses on the amount of food that has been consumed and the

diversity of food (Carletto, Zezza, and Banerjee 2013). It may be converted to kilocalories in order to address the macronutrients and the micronutrients (Carletto, Zezza, and Banerjee 2013). Some people may have an adequate food intake however they are food insecure because of their concern of the future and have some issues that affect their dietary intake (Wolfe and Frongillo 2001). Or some people may have inadequate food because they protect their supply for the future, thus they have a temporal food insecurity (Wolfe and Frongillo 2001). Some studies showed that the best way to measure food insecurity is by addressing caloric intake, food diversity, poverty, and subjective indicators such stress, and anxiety (D. Headey and Ecker 2013; D. D. Headey and Ecker 2012).

Coping strategies focus on people's behavior when they are food insecure. Coping strategies are good in addressing vulnerable people in crisis situations (Carletto, Zezza, and Banerjee 2013), and they result from food insecurity and a good indicator for future food insecurity (Wolfe and Frongillo 2001).

Food insecurity measurement can be addressed by the insufficiency of food. For example, the Households Food Insecurity Access Scale (HFIAS) was conducted by the United States, and focuses on people predicted reaction to food insecurity. It measures the access to food and the anxiety of not having food.

All the measurements of food insecurity have some issues, although food consumption reflects part of food insecurity because the lack of macronutrient and micronutrient intake affect growth of people negatively, however poor growth can be affected by other factors such as infection (Weaver and Hadley 2009). In addition, the socioeconomic status of people can reflect

the purchasing power of food but may not conclude that this person is food insecure or not (Weaver and Hadley 2009). All of the indicators give a proxy estimation of food insecurity (Weaver and Hadley 2009).

Macro determinants of food security:

Global political economy and food insecurity:

Liberalization of the economy and globalization made huge changes in the world; opening trade and foreign investments deregulation on some of the markets and the elimination of restrictions on the movement of goods (entry, exit) and pricing. However, liberalization affects two factors the most: employment and wages (Daoud and Sayre 2009). In developing countries, liberalization leads to employment insecurity and wages inflexibility (Daoud and Sayre 2009). Increasing production in order to stay competitive in the world market has pushed transnational and domestic industries to decrease the number of employees and they use machines instead to do the work faster. This increases the rate of unemployment and increases frustration among young people especially the educated ones (Daoud and Sayre 2009). According to the World Bank, the rate of unemployment in 2017 worldwide is 5.52%, and 21% in the Middle East which has the highest unemployment rate in the world (The World Bank 2017). This makes unemployed people unable to buy food that meets their daily needs and increases reliance on aid.

Globalization has led foods being seen as commodities especially after the agreement of World Trade Organization (WTO) and the multilateral trade negotiations of the General Agreement on

Trade and Tariffs (GATT), which has three main aims to achieve: easier market access through imports, less domestic support for agriculture, and export subsidies. These aims affect food security at the global and national level (Menezes 2001), by involving small farmers in commercialized agricultural food globally and nationally, and not in stable food, the production of domestic food is decreasing because farmers are investing more in non-traditional exports food that will increase their income (Drabo 2017), and the consumers in the industrialized countries are the driving force of food systems globally (von Braun and Diaz-Bonilla 2008). In addition the high prices put a lot of burden on the farmer's productivity.

Globalization leads to greater diversity and availability of food. The quality of food is determined by the powerful multinational companies including fast food chains, and where small local business and traditional food are at disadvantages, this leads to transition in dietary consumption patterns and nutritional content. It also leads to changes in agricultural and food system; farmers would use more chemicals, hormones, and genetically modified plants in order to have more diverse food and to insure the availability of food (FAO 2004).

Urbanization is a consequence of socioeconomic development. Urban poverty increases in developing countries because of crowding and population growth, economic recession and the reduction in government spending (Daoud and Sayre 2009). These affect food security in developing countries. It affects food production and increases of dependence on the market rather than domestic agriculture sectors (Daoud and Sayre 2009). It also depends on local investments, production, food prices, and trade. Institution, firms, households, and individual are the main contributors to food security (FSC and PCBS 2016). Urbanization affects agriculture

negatively; it decreases the amount of agricultural land worldwide. According to the World Bank Group in 2015, around 37.3% of land was used for agriculture globally. The percentage of agricultural land is decreasing every year (The World Bank 2015). Climate change is another reason that affect agriculture, over the last three decades, the climate has become warmer and drier affecting oceans and water levels, and subsequently agricultural lands and forestry (Qadir et al. 2007).

Furthermore water is unevenly distributed around the world whereby countries that have more than 40% of the world's population are water deficient (Hanjra and Qureshi 2010). Water is the base of agriculture, when there is adequate water the agriculture production increases, and the revenue of agriculture also increases (Alcamo et al. 2007). However, the continued demand for water by industry and urbanization, and with population growth, leads to a decrease in irrigated water for agriculture. This is of great concern for the production of food and feeding the population (Alcamo et al. 2007). Half a billion people are living in a water scarce country, and the number will be around 3 billion in 2025 (Alcamo et al. 2007). People that don't have enough water most of the time are food insecure. For example, a study that was conducted in Russia in 2007 predicted that food production shortfalls will be doubled in 2020 and tripled in 2070, which will affect food security (Feleke, Kilmer, and Gladwin 2005).

Globally there is plenty of food that is sufficient for everyone. However, at the national level food may be insufficient for low-income countries that have deficiency in food (Tvedt 2006).

Many countries rely heavily on international aid to ensure food security. It can help in increasing the amount of income per capita which contribute with increasing access to food, or

it can improve nutritional education, sanitation, and food utilization (Petrikova 2015). However, over-reliance on aid makes populations more susceptible to changes in donor policies.

While the purported aims of international aid are to improve the economic conditions of developing countries, it often does not meet these goals due to political agendas pushed by powerful countries. It has been shown that foreign aid in developing countries is given to achieve the political aims of the donors (Dreher, Sturm, and Vreeland 2009). Thus, international aid is a coin with two faces.

Many institutions globally try to decrease hunger and increase food security in the world (Clover 2003). But without local contribution to have an equal and equitable access, the goal of decrease hunger and to provide food security for all people will not be met. If food had been distributed in an equal and equitable way to all people whether in developed or industrialized countries or whether in urban and rural areas, food will be more than enough for all people in the world (FSC and PCBS 2016). There are some food assistance programs that called food stamps that address food insecurity and health of low income people who do not have enough food by giving them food or giving them some money that can only buy food. Thus it will affect their health positively (Twersky 2019; Gundersen and Ziliak 2015).

Food security in emergency situations and war:

Emergency situations result from natural disasters (droughts, and flooding), wars, and collapse of the food distribution system, HIV/AIDS epidemics, and extreme poverty of marginalized people such as elderly. They have negative effects on food security because for example natural disaster such as flooding that will affect the crops and agriculture which leads to decrease in

food production and increase unemployment, this will affect the socioeconomic status of the households and affect the distribution of food in the country which will affect food security negatively (Douglas 2009).

Wars can lead to severe under-nutrition and starvation for many people with different age groups. In addition, it affects the socioeconomic status and generally decreases the quality of life because many people are forced to abandon their homes to go somewhere safer (Malmros 2009). Generally during war agriculture decreases and many people leave their rural agricultural land. Thus, the production of food in a country that is under war will decrease, and the transportation of food will be decreased due to restriction of movement, thus the overall local production will be decreased (Maconachie, Binns, and Tengbe 2012). In addition the daily activities will be interrupted and marketing will be more difficult. For example a study that was conducted in Sub-Saharan Africa to address the food security after civil war showed that war affects food security negatively, because most of people would abandon their lands and there were some obstacles that affect the agriculture and the transportation of food from rural areas to urban areas (Maconachie, Binns, and Tengbe 2012). It also showed that after war people will move to cities rather than returning to their urban agricultural land, not only because of economic motivation but also because some young people may find opportunities for coexistence and empowerment. Other people declared that they are afraid to return to their lands. This lead to increase population growth in cities and this will affect agriculture and food production (Maconachie, Binns, and Tengbe 2012).

Other study that was conducted in 2005 showed that war affect food security negatively, because it affects access to land and changes in farming system and herding strategies, it also disturbs trade and the market access, and diversion of resources to the war effort. It also focused on international aid, and showed that international aid plays an important role in sustaining food, it showed that international aid was insufficient and the donors weren't meeting the need of the population (White 2005). Another study showed that the level of agriculture and food production per capita is ten times lower during war and within five years after war than five years before war. And this will affect the poor people the most (Pingali, Alinovi, and Sutton 2005).

By the time of war or emergencies people have difficulties to generate income, so they will rely on their savings, and they will depend on coping strategies to provide food for the households such as selling their assets, dropping children from school, and changing their diet (Verwimp and Muñoz-Mora 2013). Much of the literature focuses on acute conflict, rather than chronic conflict which are not relevant to the Palestinians context.

Meso-level determinants (within country):

While there are many global determinants that affect food insecurity, but, national level and within country characteristics play an important role in affecting food security. The socioeconomic and the policies of the country affect food insecurity.

Sociocultural determinants:

Gender and Patriarchy:

Patriarchy describes the power domination of men over women and children, and older people over young people in public and private spheres (Sultana 2010). Patriarchy showed that younger people should obey older people that affect their freedom, and that they should follow the instruction of older people without having any autonomy in making any decision (Ahmad 2013). Gender relations are articulated by patriarchy that is found in the culture of the country. Women are the giver of food in the households, they are food to infants and fetus, as the nutrient of the mother goes to the fetus while pregnancy then mothers supply infants with breast milk (Belachew et al. 2011). In addition, most of the food work is the women's responsibility to prepare, cook, shop, meal planning, and monitoring the supply of food to the households (Belachew et al. 2011). Generally, females have little decision making and little freedom in comparison to males. Thus males are more dominant in households. Study has showed that females are more prone to food insecurity because of the gender inequality in consumption of food. Taking into consideration that food insecurity can affect health negatively, thus females may have bad health, although genetically females have better health and longer life survival because of the sex hormones that increase immunity and modulating lipid levels (Belachew et al. 2011).

Most women when they do not have enough food in the house prefer to feed their children instead of themselves. That is why these women are more prone to food insecurity. Mothers who are food insecure are more prone to be overweight or obese than non-mothers (Martin

and Lippert 2012). This is more evident in poor families because they are more prone to food insecurity (Martin and Ferris 2007).

Socio-culture determinants:

With inflation, economic development, and globalization people beliefs and practices about food had been changed to consume unhealthy food that are high in added sugars, salts and high saturated fat, and low consumption of fruit and vegetables. Middle East countries are facing high rate of development and changes in lifestyle (Sibai et al. 2010). The epidemiological transition combined with high rate of physical inactivity affects people's health. The food system trials whether fast food restaurants or super markets dominate over the cultural food (Stuckler et al. 2012), led people to override or decrease the consumption of their cultural nutritious food and to accept the innutritious food in order to keep up with modernization. This led to obesity and under-nutrition at the same time (Stuckler et al. 2012).

In the past the rich people were suffering from obesity because they have high purchasing ability to buy more nutritionally dense food. Nowadays poor people are buying more fast and unhealthy food because it is cheaper and they can afford it in their households. In addition, the prices of healthy food (vegetables and fruits) are increasing that make it harder for the poor people to purchase (Stuckler et al. 2012).

Economy of the country:

With globalization and the increase of international prices, the economy of the middle and low income countries are the most affected badly. In some countries, they suffer from insufficient

food, and the lack of availability of food (Smith, El Obeid, and Jensen 2000). The root cause of food insecurity in developing counties is the inability of people to access food because of poverty (Smith, El Obeid, and Jensen 2000). The food production of the country, the imports and exports, and the food aid define the country's level of food insecurity. Many countries rely on imports to provide sufficient food for their people (Otero, Pechlaner, and Gürcan 2013). Countries that don't have enough agriculture and domestic food production rely on imports. The greater the reliance on imports, the more the country will pay, which leads to increase in the prices of food for the people who live in the same country and this will affect the vulnerable segments of the population because they will pay more money for food (Otero, Pechlaner, and Gürcan 2013).

There is a difference in dependence on imports between developing and developed countries. In developed countries they export basic food and import luxury foods and product. However, developing countries import basic food; this is called uneven independency, and makes developing countries more susceptible to fluctuations in food prices (Daoud and Sayre 2009). Thus the economy of the country is affected by the global determinants and it affects the availability of food to people whether from local production or by imports and exports.

The political and social contexts of the country affect food insecurity (Bartfeld and Dunifon 2006). It affects the unemployment rate, housing costs, and the residential mobility (Bartfeld and Dunifon 2006). Counties that have low employment rate are having more food insecure people. Furthermore, policies of the countries such as taxes policies are affecting the availability of food and the price of food in the country (Bartfeld and Dunifon 2006).

Policies that decrease the poverty rate such as providing education and health access for all the people in the country decreases food insecurity because it increases the opportunities for better employment thus less prone to food insecure.(Smith, El Obeid, and Jensen 2000)

Households and individual level of food insecurity:

While macro-level and meso-level determinants of food security are important to take into account, some people do not have economic access to food because of low wages or unemployment at the micro level (Arene and Anyaeji 2010). Food security at the household level: is the physical and economic access to adequate food for all the household members without having the risk of losing such access (Otero, Pechlaner, and Gürcan 2013). The household's food security is an important level that should be addressed. The economic conditions of households determine the quantity and quality of food consumption by the individuals (Otero, Pechlaner, and Gürcan 2013). Poor families spend between 50-70% of their wages on food (The World Bank 2012). Poor people may experience food insecurity more and they are affected by the macro determinants of food security, such as high food prices.

The causes of household food insecurity according to a study that was conducted in Nigeria are; low purchasing power, inefficient tax system for urban development, low supply of water and electricity to the households, and the seasonal change of food prices (Arene and Anyaeji 2010).

Education and employment are related to each other, people with higher education are expected to have better jobs than people with low education levels, and they will have greater access and availability of food. A study that was conducted in 2013 showed that an increase in

income and employment may make a significant change in people with severe food insecurity, making them less food insecure. Households with more members working full-time or part-time are less likely to be food insecure (Loopstra and Tarasuk 2013).

Food security in Palestine:

Around 27% of people in Palestine are food insecure; the percentages in the West Bank and Gaza Strip are 16%, 47%, respectively (FSC and PCBS 2016). These numbers are affected by the policies and the circumstances that Palestinians live under from the Israeli occupation and the Palestinians authority.

Food security in Palestine differs from other countries because of the circumstances that Palestinians face from Israeli occupation, which lead to fragmentation of Palestinian land in the West Bank and Gaza Strip, and the Israeli restrictions on access to land (Giacaman et al. 2009; Ghattas, Hrimat, and Dabouq 2015; Sela 2016). People in Gaza Strip face greater restrictions on movement, where the blockade and siege around Gaza Strip make it harder to move and transport from place to place, and the presence of checkpoints further impedes movement (Sela 2016). Furthermore, the agriculture lands that were taken by Israeli authorities, lead to decline in the number of lands that are available in Palestine (Ghattas, Hrimat, and Dabouq 2015; Batniji et al. 2009).

In addition, the various forms of violence that Israeli occupation employs (war, killing people, torture, and land confiscation), affect the Palestinian's health and their lifestyle. People are exposed to violence all the time by the Israeli occupation. Studies have shown that exposure to

violence affects mental health of people and affect quality of life (Eisenman et al. 2003). People may suffer from depression, anxiety that may affect their health negatively and decreases the survival, also can be a risk factor for chronic disease (Kohrt et al. 2012). A study has showed that people who are exposed to political violence reported poorer subjective health, and are prone to have asthma, diabetes, lung diseases, anemia, arthritis, and back pain more compared with people who did not expose to political violence (Hobfoll, Hall, and Canetti 2012).

Agriculture in Palestine is a very important sector because it helps in achieving food security and it provides opportunities for employment and work. According to (PCBS) in 2017, 6.7% of the population was working in agriculture (PCBS 2016). However, the agriculture sector is facing many challenges including land confiscation by Israeli authorities, and mobility restrictions on the farmers who have their land in areas C [1]. And in 2016, the percentage of money that the agriculture ministry of Palestine contributes around 1% on agriculture, which is a small percentage, and is not enough for supporting agriculture in Palestine (Al Marsad 2019).

Other reason that affects agriculture in Palestine is urbanization and population growth, especially after the Israeli occupation had removed the restriction on Area A and the establishment of the semi-autonomy of the Palestinian national authority on area A, result in accelerated population growth, development, and construction, which lead to the destruction of agricultural lands and other natural landscapes for expansion (al-Houdalieh and Sauders 2009). Taking into consideration that building is unplanned and unregulated, accompanied by the absence of full control by Palestinian national authority, and the lack of legal infrastructures

[1] Area C is fully controlled by Israeli authority in the West Bank, it includes agricultural area, Jordan Valley and areas with low density of the population, and the presence of settlements

(al-Houdalieh and Sauders 2009). That's because of the fragmentation of areas that was done by Israeli occupation; let area A is the only area that Palestinians can build on compared to area B, and C, which decreases the amount of lands that are available. In addition the wall construction along in the West Bank has a negative effect on lands and urbanization, also the lands that were taken for the purpose of separation wall, let people abandon their lands because they cannot reach it, and use it (al-Houdalieh and Sauders 2009; Nassar et al. 2017). Other reasons that affect agricultural land are increased marginalization of the family work in the farm because most of the family members are working outside the farm, the fragmentation of land because of inheritance (Tamari 1981).

The control of water by Israeli authorities, and weak agriculture scientific research pose challenges as well (Batniji et al. 2009; Ghattas, Hrimat, and Dabouq 2015). The water shortage plays an important role in decreasing and challenging agriculture (Batniji et al. 2009).

Palestinians get their food from two main places, domestic agriculture and imports (WFP and ARIJ 2010). Palestinians rely a lot on imports to provide their daily food products, around 40% of the main food and 95% of cereal and pulses (WFP and ARIJ 2010). At the composite national level, Palestine (West Bank and Gaza Strip) is relatively food secure. According to the definition of food security by FAO which relies on four pillars (access, availability, stability and utilization), in general, the West Bank has good access to food and the availability of nutritious, sufficient food, the food is stable by the imports and the domestic agriculture and most of the Palestinians in the West Bank have clean water, sanitation, and access to health care (FSC and PCBS 2016). However, the Gaza Strip has different

circumstances, where the unavailability of clean water and sanitation are major concern; around 97% of water is undrinkable, and the high cost of clean water (Martin et al. 2018). In 2017, the restrictions on movement and blockade increased in the Gaza Strip, where imports are forbidden (Martin et al. 2018). These circumstances affect their income and wages which will affect their food accessibility (Martin et al. 2018). Sometimes food is not available at certain times for people because of the blockade or the siege on Gaza Strip, they are forbidden from imports and domestic food production, and in West Bank, there are restrictions on movement (Sela 2016). These circumstances restrict the physical access of Palestinians to sufficient and nutritious food. Thus eliminating one pillar of food security as was defined by FAO which is the access to food. The physical access to food can be affected by the socioeconomic status of the households (Loopstra and Tarasuk 2013). On the household or individual level, economic status may affect or interrupt the ability to access food that is nutritious, sufficient, and in accordance with their preferences. Poverty in Palestine according to Palestine Central Bureau of Statistics in 2017 is 29%, 13.9% in the West Bank, and 52% in Gaza Strip (PCBS 2017). That means that a quarter of the population would not have economic access to adequate food, and over half of the population of the Gaza Strip.

The availability of food contributes to access to food. If there is enough food for people, then more people will have access to food. However, sometimes the availability of food does not mean access, because food prices may be high, which will affect part of the people who are the poor, and decreases the ability to purchase the food (Otero, Pechlaner, and Gürcan 2013). Also, the stability of food may be altered at the household level, because of the unstable context in which Palestinians live (occupation, blockade..) (Sadeq and Lubrano 2018). Access to

health care, sanitation, and availability of clean water depend in large part on the socioeconomic situation of the households.

With inflation, vulnerable workers may have a higher risk for food insecurity, because they can't buy food (Daoud and Sayre 2009). Moreover, with the increase in unemployment, access to food will be decreased; according to PCBS in 2018 around 30.2% of the population is unemployed, the unemployment rate in Gaza Strip and West Bank is 49.1%, 18.3% respectively (PCBS 2018). The high unemployment rates coupled with increasing prices make the population increasingly vulnerable to food insecurity.

Palestinians rely heavily on international aid, while it has helped in securing some basic needs, has not been able to respond to all needs (Merz 2012; Barsalou 2003). It has helped in some re-construction, and decreasing the chronic malnutrition that happened because of the occupation. The unemployment that rose after Intifada because of the restrictions on movement, and closing the Israeli market from the Palestinian one, has left Palestinians more dependent on international aid (Barsalou 2003). International aid expenditures are divided into education, building health centers and services, food distribution systems, and camps for refugees (UNRWA 2017).

Around 40% of Palestinians rely on assistance, around 17% in the West Bank, and 84% in the Gaza Strip, including cash assistance or in-kind assistance for food or healthcare (FSC and PCBS 2016). However, according to a study conducted in 2018, international assistance for Palestinians is decreasing, and this will affect Palestinian economy, health, and survival in the face of occupation (Zureik 2018).

While food insecurity does not appear to be very high, it is important to explore in the Palestinian context, especially as it may affect health.

Food insecurity and health:

Food insecurity affects health in a negative way; it can lead to chronic diseases and affect mental health, life satisfaction, depression and anxiety (Friel 2010; Molcho et al. 2007).

Food insecurity and subjective health:

The importance of subjective health

Health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 2018). The definition of health shows that health is not whether you have a disease or not, the meaning extends to the positive and the negative feelings about one's health, social interaction, and physical wellness (Friedman, Kern, and Reynolds 2010). Satisfaction with life and the way they live and think about themselves affect their own health and shows that diseases do not control the lives of people, instead their own feelings influence their own health and how they see themselves (Friedman, Kern, and Reynolds 2010; Jylhä 2009). Psychological wellbeing arises when people have a combination of strength, positive thoughts and feelings, and to be satisfied (Friedman, Kern, and Reynolds 2010).

People may perceive their health to be good even when they have diseases; on the contrary people may have self-perception of bad health even if they do not have any diseases especially

elderly people. People may feel lonely and this contributes to bad health (Friedman, Kern, and Reynolds 2010). Self-perception contributes to morbidity and mortality (Goodwin and Engstrom 2002). Perception of health may be a strong determinant of mortality rather than physical illness, however the mechanism is not well known (Goodwin and Engstrom 2002; Jylhä 2009). Personality has an influence on positive perception of health. For example; people who are caring, warm, and helpful are having a positive perception of health. In contrast, people who are neurotic (moody, nervous, worry) may have a negative or bad perception of health (Friedman, Kern, and Reynolds 2010; Xu and Roberts 2010). Negative perception of health may lead to not doing any preventive actions or self-care to protect themselves from diseases (Xu and Roberts 2010).

Subjective health and how people feel about their health is a more sensitive measure of health status and health risk factors, because subjective health and self-perception of health gives the full picture of aches and illnesses that a person suffers from, and sometimes it describes symptoms of undiagnosed diseases that are in early stage (Idler and Benyamini 1997). In addition, it does not only describe the current state of health; it describes the health through their life and predicts longevity of life (Xu and Roberts 2010). Studies have shown that happy people or people who have a positive perception of their lives, have low mortality risk and low progression of cardiovascular diseases (Strik et al. 2003). Because how we think about ourselves affects our biological system and changes hormones or hardens our artery walls, or increases our blood pressure (Strik et al. 2003). For instance, depression is associated with increasing the risk of cardiovascular diseases, and hypertension (Diener and Chan 2011; Jylhä 2009; Strik et al. 2003). In population studies, subjective health represents the most informative and inclusive

measure of health status. In cultural studies, subjective health is very powerful in predicting future health and utilization of health services (Jylhä 2009). In clinical trials, subjective health is considered a sensitive measure of a patient's perception (Jylhä 2009). For patients with advanced cancer diseases, subjective health is a stronger predictor of mortality rather than symptoms, and clinical indicators. In general subjective health can be used as comprehensive screening tool for patient's health status (Jylhä 2009). Subjective health may reflect internal resources. When people have negative feelings about themselves, this will affect the neurological system that then compromises the immune system, and makes people more susceptible to diseases (Strik et al. 2003; Jylhä 2009).

The effect of food insecurity on subjective health

The context that people live within and the presence of resources, such as education, income, and social networks affect their subjective health (Xu and Roberts 2010). If people do not have access to food or health care or if they live under poor conditions, their perception of health will be negatively affected. Self-perception of health may reflect how people deal with diseases or bad conditions, and cope with future illnesses (Xu and Roberts 2010).

A study that was conducted in the USA showed that people who do not have enough food, or are food insecure reported that their health status is not good and suffers from physical and mental health issues. Women who were having more difficulty in finding food, were more likely to experience depression and less social support than others those who did not face difficulties in finding food (Stuff et al. 2004). In addition, women who are experiencing stress from food insecurity have poorer health and their infant's health was negatively affected (Bronte-Tinkew

et al. 2007). Many studies showed that food insecurity affects subjective health, which may in turn affect mental, social, and physical health (Maes et al. 2010; Tarasuk 2001).

Food security and health throughout the life course:

Food insecurity affects our health and how we are able to live our lives. Studies have shown that food insecurity has negative effects on health (Stuff et al. 2004; Cloninger and Zohar 2011; Hampton 2007). Food insecurity can affect health in various ways. Food insecurity may lead to micronutrient and macronutrient deficiency, it can lead many diseases, also it can also affect health throughout the life time (children's, maternal, adult's, and elderly health) negatively. Food insecurity can increases the double burden of diseases, it can lead to chronic and infectious diseases and it can lead to obesity, and underweight according to people's consumption of food. If people consume high frequency of unhealthy food this will increase the risk of obesity, at the same time it can lead to starvation, malnutrition, and underweight (Kolčić 2012), study have shown that food insecurity it can lead to obesity in adults and underweight in children (Brown 2018) .

Maternal and fetus health:

There are critical periods in the development of humans that should be taken into consideration in food security because they may contribute in developing metabolic syndrome and chronic diseases. Exposure to food insecurity at critical points of time such as pregnancy periods that are important for fetus development, may affect health later in life; the effect depends on the duration and the severity of food insecurity, the interaction with food environment, and the stress that mothers were exposed to because of food insecurity

(Cloninger and Zohar 2011; Matheson et al. 2002). In addition, breastfeeding and the type of food that has been given to the fetus is very important in affecting chronic diseases development later in life (Langley-Evans 2014). For example, experiencing food insecurity during pregnancy negatively affects the mother's and the fetus health, and increases the risk of developing micronutrient deficiency or developing obesity, which is a risk factor for many chronic diseases (Bronte-Tinkew et al. 2007). It also decreases the immunity of fetuses, thus they become more prone to infectious diseases and vitamin deficiencies especially iron deficiency. They are more likely to be hospitalized compared with other people (Bronte-Tinkew et al. 2007). In addition, mothers who experience food insecurity in pregnancy phase are more prone to develop maternal depression that will affect the child's and the mother's health, the children will be more prone to develop chronic diseases, morbidity, and they have problems in learning abilities and behaviors (Casey et al. 2004). Another study showed that mothers are twice as likely to have mental issues and three times as likely to have oral problems in comparison to foods secure mothers (Gundersen and Ziliak 2015). A study showed that maternal malnutrition early in pregnancy lead to structural and functional abnormalities of endocrine system of the fetus which increase the risk of obesity.

Children's health:

Children who live in a food insecure family may experience low confidence, emotional distress, learning disabilities, and bad performance in school (Friel 2010; McLaughlin et al. 2012; Matheson et al. 2002). Children are more prone to stunting, wasting, and underweight. They

also may suffer from iron deficiency anemia, asthma, and bad oral health (Gundersen and Ziliak 2015).

Adult's health:

In adults, chronic food insecurity may increase the risk of overweight and obesity which is a risk factor for many chronic diseases (Friel 2010; Hampton 2007). The reason for this is that poor people are more likely to buy cheap food that is high in calories and low in essential nutrients. Also, people with food insecurity may overeat when the food becomes available on certain days (Friel 2010; Hampton 2007). The quantity and the quality of food are very important in food security when people are skipping meals, or decrease the meal portion per person, or they eat the same food for periods of time (Tarasuk 2001).

Food insecurity also affects mental health. People who are food insecure may experience stress, anxiety, social isolation, depression, and low self-esteem (Friel 2010; Weigel et al. 2007; McLaughlin et al. 2012). Food insecurity may lead to common mental disorders (CMD), which are connected with disabilities and loss of function whether personal function such as keeping themselves clean or social function such as not attending to social events (Weaver and Hadley 2009).

Food insecurity may lead to chronic diseases through two mechanisms; Stress may lead to visceral fat accumulation; the hypothalamus increases the release of cortisol and epinephrine which increases the feeling of eating more energy dense food that alters the metabolism (Weaver and Hadley 2009). And increase the risk of hypertension, insulin resistance, and weight gain (Laraia 2013). Or food insecurity can lead to chronic diseases by increasing the risk of

obesity which is a risk factor for chronic diseases (Friel 2010). It also leads to cardiovascular diseases because of the transition of food to dense calories, saturated fat, added sugars, and refined grains (Schneider et al. 2004).

Cardiovascular diseases can happen from under-nutrition, which can lead to wasting, stunting, and underweight, which can be a result of food insecurity if people were experiencing starvation and hunger. This will increase the possibilities of abnormalities in heart muscles, and the irregular rhythm of heart, which can lead to heart failure (Castillo et al. 2012).

Food insecurity also lead to type 2 diabetes and some types of cancer such as colorectal cancer (Weaver and Hadley 2009; Schneider et al. 2004). The management of chronic diseases is affected by food security and should be done in a careful way. Many patients with diabetes may experience hypoglycemia because of the lack of food to eat, or they do not have enough money to buy medicine (Nishida et al. 2004).

A study that was conducted in the USA in 2007 showed that severe food insecurity was associated with diabetes mellitus in both men and women, where mild food insecurity was associated with obesity in women and men. Because most people who do not have much money change their own diets and food by buying cheaper and innutritious food, people will be more prone to obesity and type 2 diabetes mellitus (Seligman et al. 2007).

Hypertension is a prevalent problem worldwide, study that was done in 2014 in 12 states in the USA including different ethnic groups; (Hispanic, black, and white people) showed that in all groups, food insecurity is associated with hypertension (Irving, Njai, and Siegel 2014).

Acute infectious diseases:

In addition, food insecurity can lead to acute infectious diseases such as respiratory, gastrointestinal, and urinary infections (Friel 2010; Weigel et al. 2007). In children, it also increases the probability of catching a cold, sore throats, and ear infection (Friel 2010; Weigel et al. 2007). The cause of this infection may be the low immunity because they do not consume nutritious food, or because of the poor living conditions (Friel 2010). A cohort study showed that children who experience food insecurity in kindergarten are more prone to have diseases in eighth grade. (Ryu and Bartfeld 2012)

Elderly:

Elderly people are considered a marginalized group that does not have enough attention form society. Elderly people may be more prone to obesity, chronic diseases such as diabetes, hypertension, and chronic diseases. They also may have functional impairments that will affect their access, and utilization of food. Elderly being a minority in the community make them more prone to food insecurity. Elderly people who have social support are less food insecure than who do not have social support (Lee and Frongillo Jr. 2001). There are many factors that affect food security among elderly people such as low income and low physical mobility and disabilities, high medical costs, unexpected expenses such as medical emergencies, and the availability of children or other family members affect food security among elderly people. Also the characteristics of the community such as the availability of proper transportation and grocery stores affect food security among elderly. Low physical mobility and disabilities affect

the supply and preparation of food, that's why it increases the dependence on other people and increase anxiety because they cannot do it themselves (Lee and Frongillo Jr. 2001).

Poor health of elderly increases the risk of food insecurity, because if they have some chronic diseases they have the burden of high medical cost that will compete with purchasing food, some of the elderly prefer providing medicine over food, and some of them prefer food over medicine, it depend on their perception, and priorities. In addition poor health decreases the ability to prepare food (Wolfe et al. 1996).

Elderly people are more prone to nutritional deficiencies because of their inability to access to nutritious food. Most of their deficiencies are micronutrient such as calcium, manganese, zinc, magnesium, and vitamins A, B12, B6, C, and E, which will increase the risk of osteoporosis and hip fracture, anemia which may increase fatigue and decrease activity in older people. (Afulani et al. 2015)Also psychological, social, and health status factors are associated with low financial power and decreased ability to access to food. Thus most of older people who do not have enough money and access to food are more prone to depression and anxiety (Klesges et al. 2001; Afulani et al. 2015).

Methodology:

This study consists of quantitative analysis of secondary data from the Socio-Economic & Food Security Survey 2014 conducted by the Palestinian Central Bureau of Statistics in the West Bank and Gaza Strip. This survey was done to address the socioeconomic status of the Palestinians households, it gives timely information on key socio-economic and food related indicators, and

the political issues that Palestinians may suffer from, it also showed the resilience and coping strategies that people use (FSC and PCBS 2016). Quantitative analysis is appropriate for large sample data. It is appropriate for doing systematic standardized comparisons, and most of the time statistical methods are reliable (Brannen 2005).

Data and sample:

Data collection was divided into two phases during the first quarter of 2014-2015, with a reference period covering the six months preceding the interview, corresponding to the second half of 2013, and 2014 respectively. The survey questionnaire was completed through a structured interview. The baseline sample consists of 7503 households (4,949 in the West Bank and 2,554 in the Gaza Strip). In 2014, the number of household sample increased to reach 8177 households (5,047 in the West Bank and 3,130 in the Gaza Strip). The final sample that will be used in the analysis consists of 7841 participants. Food insecurity and subjective health were collected in the 2014 round of data collection. The sample is representative of gender, refugee status, governorate, locality type, and for the West Bank areas A, B, C.

Dependent variables:

Health assessment:

In order to assess health, we took into consideration two factors, chronic diseases that people suffer from, and subjective health. The two factors were self-reported by participants, and we studied them in two sets. Subjective health will be measured by the question: “how do you describe your health?” The responses were recoded into good health and bad health, where

good health will include responses indicating that respondents thought their health was good or very good. For chronic diseases, respondents reporting having diabetes, hypertension, and/ or cardiovascular diseases, were classified as having at least one chronic disease. The responses were categorized into having at least one chronic disease and not having any chronic diseases.

Independent variables:

Food security assessment:

In order to assess food security we used two factors: food consumption, and food adequacy. Food consumption can be assessed by food group type, the relative weight of food that has been consumed, and the number of days of consumption according to guidelines from the World Food Programme (WFP – World Food Programme 2008).

Food group	Number of days of consumption of this group and the amount of food
Wheat, Frekeh, burghul	
Rice	
Bread	
Fish	
Eggs	
Red meat (lamb, beef, veal)	
White meat (poultry)	
Canned meat/ fish	
Milk and dairy products	
Olive oil	
Vegetable oil	
Pickles (olives and other vegetables)	
Orange color fruits (Mango, papaya,	

peach, apricot, etc)	
Other types of fruit	
Orange color vegetables (carrot, pumpkin etc)	
Green leaves (spinach, broccoli, etc)	
Other vegetables	
Dried beans (lentils, chick beans)	
Liver, kidney, heart and other types of meat	
Potatoes and other similar vegetables	
Dried fruit and fruit paste	
Sugar, jam, sweets	
Thyme and dukka	
Other – drinks, tea, coffee, spices	

The food groups were gathered into 9 groups; cereal (wheat, rice, bread, potato, other grains), vegetables (all types of vegetables), pulses (dried beans, lentils), fruits (all types of fruits), meats (red and white meats, eggs), dairy products (milk and yogurt), sugars (dried fruits, sugar, jam, sweets), oil (olive oil, vegetable oil), and other (thyme, tea, coffee, spices, dukka).

Each of these groups was multiplied by the weight that has been consumed (cereal*2, vegetables*1, fruits*1, pulses*3, meats*4, dairy*4, sugar*0.5, oil*0.5, and other*0) then they will be added together, and the scores that resulted were categorized to:

- Low food consumption if the scores are less than 45
- Moderate food consumption if the scores are between 46-61
- High food consumption if the score is more than 61.

For food sufficiency we used Household Food Insecurity Access Scale (HFIAS) to assess quantitative dimension of food consumption. The questions that we used to know if the food is sufficient are:

During the past 30 days,

1. How many times has your family encountered the anxiety that household will not have sufficient food (food insecurity)?
2. How many times has your family encountered the household members were not able to have preferred types of food due to lack of resources?
3. How many times has your family encountered the household members had to eat limited types of food due to lack of resources?
4. How many times has your family encountered the household members had to eat to un-preferred food due to lack of resources?
5. How many times has your family encountered the household members had to eat food less than what they need because of it insufficiency?
6. How many times has your family encountered the household members had to eat less number of meals because of insufficient food?
7. How many times has your family encountered the absence/ insufficient food at home because of insufficient resources to purchase?
8. How many times has your family encountered the any of household members had to sleep at night hungry because there was insufficient food?
9. How many times has your family encountered the any household member had to abstain from eating all day long because of insufficient food? (Coates, Swindale, and Bilinsky 2007)

The questions were combined to a scale. The scale was assessed for overall fit using Chronbach's alpha. The Chronbach's alpha is 0.915.

The responses then were categorized based on the HFIA categorization] (Coates, Swindale, and Bilinsky 2007) :

- HFIA category = 1(foods secure) if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]
- HFIA category = 2 (mild food insecurity) if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]
- HFIA category = 3 (moderate food insecurity) if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0]
- HFIA category = 4 (severe food insecure) if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3

Food security categorization:

In order to decide whether people are food secure or not, we depend on food adequacy and food consumption (FSC and PCBS 2016).

- Food secure: if food consumption score is more than 61, and food insufficiency is in HFIA category 1, and 2.
- Moderate food insecurity:
  - If food consumption score is more than 61 and the food insufficiency is in the HFIA category 3, and 4
  - If food consumption score is between 46-61, and the food insufficiency is in HFIA category 1 and 2.

- ❖ If food consumption score is 45 and less, and the food sufficiency is in HFIA category 1and 2.

- Severe food insecurity:
  - ❖ If food consumption score is less than 45, and food insufficiency is in HFIA category 3 and 4.
  - ❖ If food consumption score is between 46-61, and the food insufficiency is in HFIA category 3and 4.

In chronic diseases depended variable food security was multiplied by household's employment to address the relationship, however it was not significant.

Other independent variables:

The other independent variables that will be included in the analysis are: distress, education, employment, age, sex, assistance, deprivation, political suffering, subjective economic status, income, wealth, current living standards, shocks, location of the house, loss of the residence, and injury. Their descriptions are in appendix A.

Analysis:

The analysis for this study focuses on two dependent variables: chronic diseases and subjective health (refer to below for description of variables). The analysis was done for the West Bank and Gaza Strip separately, because they have different circumstances, as discussed in detail above. Furthermore, some variations in the questions pertaining to food security exist in each place. We began with descriptive analysis of the dependent and independent variables (food

security, sex, age, education, employment, stress, assistance, debts/loans, deprivation, political suffering, subjective economic status, current living standards, wealth, and income).

For the bivariate analysis, diseases and subjective health variables are binary, so we used binary regression tests to examine the continuous variables such as age, wealth, and stress with the dependent variables. Chi square test was used to test for the categorical independent variables with chronic diseases and subjective health.

The multivariate analysis was conducted in two sets: logistic regression was done to analyze the relationship between food security and chronic diseases for individual. For this analysis, the analysis was split by age group, whereby one analysis be conducted for individuals under 35 years of age, and another for those 35 and over. This is because chronic diseases are more likely to appear with age, and they are very rare in young people. (Fried and Ferrucci 2016) Also, the percentage of people who have chronic diseases whose age is between 18-34 is 1.4% in the West Bank, and 1.9% in the Gaza strip. However, the percentage of people who have chronic diseases whose age is 35 and more is 29% in the West Bank and 15% in the Gaza Strip. The predictors for each age group may vary, and thus a stratified analysis may be more appropriate for the sample.

In the second analysis, logistic regression was conducted to analyze the relationship between food security and subjective health for the whole sample, accounting for the effects of other independent variables found to be important in the bivariate analysis.

Results:

Table 1 presents the univariate analysis describing the sample, split between the West Bank and Gaza Strip. In the West Bank around 49% of the sample is males, and 51% is female. In the Gaza strip 49% is males and around 51% is females. Education was distributed to below secondary, secondary, and post-secondary, in the West Bank around 60% of the sample is below secondary, around 21% is secondary, and around 19% is post-secondary. In the Gaza Strip around 49% is below secondary, around 26% is secondary, and around 26% is post-secondary. In the West Bank 78% has a good health. In the Gaza Strip 68% has a good health. In the West Bank, around 29% of people whose age is more than 35 years have chronic diseases, however 1% of people whose age is from 18 to 34 have chronic diseases. In the Gaza Strip around 15% of people whose age is more than 35 years have chronic diseases, however around 2% of people whose age is from 18 to 34 years have chronic diseases. In the West Bank, around 68% of people are food secure, around 14% moderate food secure, and around 18% are food insecure, while in the Gaza Strip around 28% food secure, 21% moderate food secure, and 51% are food insecure. In the West Bank around 73% reported never feeling deprived, around 11% little, 6.8% moderately, and 9% has very much deprivation. In the Gaza Strip around 43% of people reported never feeling deprived, around 11% little, around 16% moderately, and around 31% has very much deprivation. In the West Bank around 58% has never suffered from political issues, around 18% has little, around 14% moderately, and around 10% has suffered from political issues very much. In the Gaza Strip around 21% has never suffered from political determinants, around 16% has little, around 28% moderately, and 35.5% has very much suffered from political issues. In the West Bank, around 15% of people had political shocks, while in the Gaza Strip, around 27%. The rest of the results are represented in table 1.

Table1: univariate analysis for dependent and independent variables			
Variable name			Statistical summary
West Bank			
	Sex (N=4886)	Males	2411(49%)
		Females	2510(51%)
	Education (N=4886)	Below secondary	2946(60%)
		Secondary	1039(21.1%)
		Post-secondary	928(18.9%)
	Subjective health (N= 4886)	Good	4031(79.8%)
		Bad	1021(20.2%)
	Chronic diseases >=35 (N= 2651)	Yes	776(29%)
		No	1898(71%)
	Chronic diseases 18-34 (N=2235)	Yes	31(1.4%)
		No	2216(98.6%)
	Food security (N=4886)	Food secure	3430(68.2%)
		Moderate food secure	705(14%)
		Food insecure	898(17.8%)
	Deprivation (N=4886)	Never	3605(73.3%)
		Little	523(10.6%)
		Moderately	336(6.8%)
		Very much	453(9.2%)
	Suffering(political determinant) (N=4886)	Never	1870(58.4%)
		Little	893(18.2%)
		Moderately	670(13.6%)
		Very much	484(9.8%)
	Shocks (N=4886)	No	4300(85.1%)
		Yes	752(14.9%)
	Location of the house (N=4877)	Inside the wall	531(10.5%)
		Outside the wall	4509(89.5%)
	Income (N=4885)	1500 or less	720(14.6%)
		1501-2500	997(20.3%)
		2501-3500	995(20.2%)
		3501-4500	721(14.7%)
		4501 and more	1485(30.2%)
	Household's Employment (N=4886)	No	890(16.5%)
		One person or more	4507(83.5%)
	Individual employment (N=2356)	No	299(12.6%)
		Yes	2073(87.4%)
	Subjective wealth (what do you consider yourself?) (N=4886)	Rich	197(4%)
		Moderate	4086(83%)
		Poor/very poor	637(12.9%)

	Current living standards compared to the pre 2014 aggression (N=4886)	Improved	608(12.4%)
		Remained the same	2876(58.5%)
		Deteriorated	1435(29.2%)
	Receive assistance (N= 4886)	Yes	817(16.6%)
		No	4104(83.4%)
	Refugee status (N= 4886)	Refugee	1438(26.6%)
		Not refugee	3959(73.4%)
	Locality type (N=4886)	Urban	3297(67%)
		Rural	1302(26.5%)
		Refugee camps	322(6.5%)
	Governorates (N= 4886)	Jenin	524(10.6%)
		Tubas	193(3.9%)
		Tulkarm	349(7.1%)
		Nablus	627(12.7%)
		Qalqiliya	213(4.3%)
		Salfit	211(4.3%)
		Ramallah	568(11.5%)
		Jericho	179(3.6%)
		Jerusalem	618(12.6%)
		Bethlehem	390(7.9%)
		Hebron	1049(21.3%)
Gaza strip			
	Sex(N=2911)	Males	1446(49.4%)
		Females	1479(50.6%)
	Education (N=2911)	Below secondary	1417(48.5%)
		Secondary	749(25.7%)
		Postsecondary	754(25.8%)
	Subjective health (N=2911)	Good	1912(69.6%)
		Bad	834(30.4%)
	Chronic diseases >= 35 (N=1395)	Yes	437(14.9%)
		No	2488(85.1%)
	Food security (N=2911)	Food secure	759(27.7%)
		Moderate food secure	573(20.9%)
		Food insecure	1409(51.4%)
	Chronic diseases 18-34 (N=1516)	Yes	29(1.9%)
		No	1490(98.1)
	Deprivation (N= 2911)	Never	1245(42.6%)
		Little	309(10.6%)
		Moderately	473(16.2%)
		Very much	897(30.7%)
	Suffering (political determinants) (N=2911)	Never	603(20.6%)
		Little	459(15.7%)
		Moderately	825(28.2%)

		Very much	1037(35.5%)
	Shocks (N=2911)	No	2004(73%)
		Yes	743(27%)
	Location of the house (N= 2911)	Less than 1000m form buffer zone	265(9.7%)
		More than 1000m from buffer zone	2479(90.3%)
	Injury (N=2911)	No	2685(97.8%)
		Yes	62(2.2%)
	Loss of residence (N=2911)	No	1194(43.5%)
		Yes	1553(56.5%)
	Income (N=2911)	1500 or less	1203(44.2%)
		1501-2500	733(26.9%)
		2500 and more	787(28.9%)
	Household's Employment (N=2911)	No	1103(40.5%)
		One person or more	1621(59.5%)
	Individual, employment (N=2911)	No	606(44.4%)
		Yes	760(55.6%)
	Subjective wealth (what do you consider yourself?) (N=2911)	Rich	69(2.4%)
		Moderate	1717(58.7%)
		Poor/very poor	1139(38.9%)
	Current living standards compared to the pre 2014 aggression (N=2910)	Improved	77(2.6%)
		Remained the same	890(30.4%)
		Deteriorated	1957(66.9%)
	Receive assistance (N=2911)	Yes	2490(85.1%)
		No	435(14.9%)
	Refugee status (N=2911)	Refugee	1783(65.5%)
		Not refugee	940(34.5%)
	Locality type (N=2911)	Urban	2261(77.3%)
		Rural	180(6.2%)
		Refugee camps	484(16.5%)
	Governorates (N=2911)	North Gaza	579(19.8%)
		Gaza	858(29.3%)
		Deir al balah	448(15.3%)
		Khan yunis	613(21%)
		Rafah	427(14%)

Table 2 includes descriptive analyses conducted for numerical or continuous variables. In West Bank the mean of age, stress and wealth are 38.7, 14.84, and 16.09, respectively. While in Gaza Strip the means are 36.5, 20.44, and 13.25, respectively.

Table2: descriptive analysis for numerical independent variables:						
	Number	Minimum	Maximum	Mean	Std. Error	Std. Deviation
West Bank						
Age	4886	18	98	38.7	0.203	14.93
Distress	4886	0	39	14.84	0.102	7.18
Wealth	4886	0	58	16.09	0.085	5.97
Gaza Strip						
Age	2911	18	90	36.51	0.27	13.93
Distress	2911	0	40	20.44	0.15	7.93
Wealth	2911	1	45	13.25	1.001	5.41

Table 3 shows the relationship between subjective health and categorical independent variables by using chi square analysis. In the West Bank, Chi square test showed that there is a statistically significant association between subjective health and age, education, food security, deprivation, political suffering, income, household's employment, individual employment, subjective health, current living standards, receiving assistance, refugee status, locality type, and governorate. However it showed that there is no statistically significant association between sex and subjective health. There is a statistically significant association with education and subjective health ($p<0.001$), where the higher the education the better the health, below secondary 72%, secondary 86%, and post-secondary 90%. There is a statistically significant association between subjective health and food security ($p<0.001$), around 85% of food secure people reported good health, around 74% moderate food secure and around 64% of food insecure people reported good health. There is a statistically significant association between

deprivation and subjective health ($p<0.001$), where the lower the deprivation the better the health, around 83% of people who never suffered from deprivation reported good health, little 75%, moderately around 65%, and very much around 55% reported good health. There is a statistically significant association between political suffering and good health ($p<0.001$), the lower the political suffering the better the health, as around 85% of people who never had political suffering reported good health compared to little, moderately, and very much 76%, 69%, 66%, respectively. There is a statistically significant association between income and subjective health ($p<0.001$), as around 86% of people whose income is 4501 and more reported good health compared to 3501-4500, 2501-3500, 1501-2500, 1500 or less, 84%, 80%, 76%, 58%, respectively. There is a statistically significant relationship between household's employment and subjective health ($p<0.001$), where the higher the number of people who work in the family the better the health, as around 82% of people who has one or more people who work in the household reported good health compared no employment around 58%. There is a statistically significant association between individual employment and subjective health($p<0.001$), as 84% of people who work reported good health compared to people who do not work 73%. There is a statistically significant association between subjective wealth and subjective health ($p<0.001$), the richer the people consider themselves the better the health, as around 92% of people who consider themselves rich reported good health compared to moderate or poor people, around 82%, 52%, respectively. There is a statistically significant association between current living standards and subjective health ($p<0.001$), as people with improved living standards reported good health compared to people whose living standards stay the same or deteriorated, around 86%, 81%, 70%, respectively. There is a statistically significant association between receiving

assistance and subjective health (p<0.001), people who do not receive assistance reported good health around 82%, compared to people who receive assistance around 58%. There is a statistically significant association between refugee status and subjective health (p<0.001), people who are not refugee reported good health compared to refugee, around 81%, 73%, respectively. There is a statistically significant association between locality type and subjective health (P<0.001), people who live in urban areas reported good health compared to rural and refugee camps, around 80%, 78%, 61% respectively. There is a statistically significant association between governorates and subjective health (p<0.001).

There is a statistically significant association between age, stress and subjective health, when age increases one year the odds that subjective health is good decreases by 5.3%, when distress increases one unit the odds that subjective health is good decreases by 3.5%, and when wealth increases one unit, the odds that subjective health is good increases by 8.5%.

In Gaza Strip there is statistically significant association between subjective health and sex, age, education, food consumption, food insufficiency, deprivation, political suffering, shocks, injury, income, household's employment, individual employment, subjective wealth, living standards, receiving assistance, debts, food consumption, food insufficiency, stress, and wealth. There is a statistically significant association between sex and subjective health (p=0.041), around 70% of males reported good health compared to females 67%. There is a statistically significant association between education and subjective health (p<0.001), the higher the education the better the health, below secondary around 59%, secondary around 75%, and post-secondary 78%. There is a statistically significant association between subjective health and food security

(P<0.001), around 77% of food secure people reported good health, 68% moderately food secure, and around 66% of food insecure people reported good health. There is a statistically significant association between deprivation and subjective health (p<0.001), the lower the deprivation the better the health, around 77% of people who never suffer from deprivation reported good health, little 71%, moderately around 70%, and very much around 54% reported good health. There is a statistically significant association between political suffering and good health (p<0.001), where the lower the political suffering the better the health, as around 79% of people who never had political suffering reported good health compared to around little, moderately, and very much around 74%, 73%, 56%, respectively. There is a statistically significant association between shocks and good subjective health (P=0.014),around 66% of people who suffer from shocks reported good health, while 77% who do not suffer from shocks reported good health. There is a statistically significant association between injury and good subjective health (P<0.001), 41% of people who had someone died in the 2014 aggression reported good health, while around 70% of people who did not have anyone died in the 2014 aggression reported good health. There is a statistically significant association between income and subjective health (p<0.001), as around 74% of people whose income is 1501- 2500 reported good health compared to 1500 shekel and less 64% , and 2501 and more 70%. There is a statistically significant relationship between household's employment and subjective health (p<0.001), as around 72% of people who has one or more people who work in the household reported good health compared to no employment 63%. There is a statistically significant association between subjective wealth and subjective health (p<0.001), the richer the people consider themselves the better the health, as around 81% of people who consider themselves

rich reported good health compared to moderate or poor people, around 73%, 60%, respectively. There is a statistically significant association between subjective health and living standards, as people who have improved living standards reported good health compared to stay the same or deteriorated, 78%, 73%, 65%, respectively. There is a statistically significant association between receiving assistance and subjective health ($p<0.001$), people who do not receive assistance reported good health, around 67% compared to people who receive assistance around 76%.

Table 3: bivariate analysis for the dependent variable subjective health and independent variables

Variables		Subjective health		Chi 2 test	
		Good	Bad	Chi square	P value
West bank					
Sex	Males	2030 (79.9%)	511(20.1%)	0.031	0.859
	Females	2001(79.7%)	510 (20.3%)		
Education	Below secondary	2124(73.5%)	765(26.5%)	164.937	<0.001
	Secondary	1054(87.4%)	152(12.6%)		
	Post-secondary	845(89.1%)	103(10.9%)		
Food security	Food secure	2898(84.5%)	532(15.5%)	192.114	<0.001
	Moderate food secure	544(77.2%)	161(22.8%)		
	Food insecure	573(63.8%)	325(36.2%)		
Deprivation	Never	3092(83.9%)	592(16.1%)	207.229	<0.001
	Little	438(78.7%)	118(21.3%)		
	Moderate	233(64.7%)	127(35.3%)		
	Very much	269(59.4%)	184(40.6%)		
Political suffering	Never	2591(86.1%)	418(13.9%)	258.573	<0.001
	Little	703(77.6%)	203(22.4%)		
	Moderate	462(69.8%)	200(30.2%)		
	Very much	274(57.9%)	199(42.1%)		
Shocks	No	3430(79.8%)	870(20.2%)	0.009	0.923
	Yes	601(79.7%)	151(20.1%)		
Location of the house	Inside the wall	439(82.8%)	91(17.2%)	3.463	0.063
	Outside the wall	3580(79.4%)	929(20.6%)		
Income	1500 or less	352(61.3%)	222(38.7%)	176.729	<0.001
	1501-2500	674(76.2%)	211(23.8%)		
	2501-3500	764(79.6%)	196(20.4%)		
	3501-4500	639(83%)	131(17%)		
	4500 and more	1599(85.9%)	262(14.1%)		

Household's Employment	No employment	406(62.1%)	248(37.9%)	146.215	<0.001
	One person or more	3626(82.1%)	773(17.6%)		
Individual employment	No	281(77.6%)	81(22.4%)	9.341	<0.001
	Yes	1740(84.1%)	328(15.9%)		
Subjective wealth	Rich	154(92.2%)	13(7.8%)	235.618	<0.001
	Moderate	3507(82.7%)	736(17.3%)		
	Poor/very poor	369(57.5%)	273(42.5%)		
Living standards	Improved	557(87.7%)	78(12.3%)	98.789	<0.001
	Remained the same	2328(32.4%)	496(17.6%)		
	Deteriorated	1145(71.9%)	448(28.1%)		
Receiving assistance	Yes	559(64.1%)	313(35.9%)	160.784	<0.001
	No	3472(83.2%)	708(16.9%)		
Refugee status	Refugee	1030(74.9%)	345(25.1%)	27.912	<0.001
	Not refugee	3001(81.6%)	676(18.4%)		
Locality type	Urban	2782(80.8%)	659(19.2%)	52.703	<0.001
	Rural	1078(80.6%)	260(19.4%)		
	Refugee camps	171(62.6%)	102(37.4%)		
Governorate	Jenin	487(83.8%)	94(16.2%)	58.421	<0.001
	Tubas	103(97.2%)	27(20.8%)		
	Tulkarm	240(74.5%)	82(25.5%)		
	Nablus	532(78.6%)	145(21.4%)		
	Qalqiliya	153(77.7%)	44(22.3%)		
	Salfit	116(84.1%)	22(15.9%)		
	Ramallah	472(77.6%)	136(22.4%)		
	Jericho	54(61.4%)	34(38.6%)		
	Jerusalem (outside the wall)	203(81.2%)	47(18.8%)		
	Jerusalem (inside the wall)	384(87.1%)	57(12.9%)		
	Bethlehem	283(74.1%)	99(25.9%)		
	Hebron	1004(81.2%)	233(18.8%)		
Gaza Strip					
Sex	Males	993(70.1%)	423(29.9%)	0.329	0.567
	Females	920(69.1%)	411(30.9%)		
Education	Below secondary	801(61%)	512(39%)	91.259	<0.001
	Secondary	587(76.4%)	181(23.6%)		
	Post-secondary	523(79.1%)	138(20.9%)		
Food security	Food secure	586(77.2%)	173(22.8%)	28.973	<0.001
	Moderate food secure	389(67.9%)	184(32.1%)		
	Food insecure	933(66.3%)	475(33.7%)		
Deprivation	Never	941(78.4%)	259(21.6%)	141.111	<0.001
	Little	213(73.2%)	78(26.8%)		
	Moderate	303(73%)	112(27%)		
	Very much	455(54.3%)	383(45.7%)		
Suffering	Never	461(81.9%)	102(18.1%)	124.695	<0.001
	Little	339(75.5%)	110(24.5%)		
	Moderate	560(73.2%)	205(26.8%)		
	Very much	552(57%)	416(43%)		

Shocks	No	1421(70.9%)	582(29.1%)	6.054	0.014
	Yes	491(66.1%)	252(33.9%)		
Location of the house	Less than 1000m from buffer zone	186(70.2%)	79(29.8%)	0.047	0.828
	More than 1000m from buffer zone	1724(69.5%)	755(30.5%)		
Injury	No	1887(70.3%)	798(29.7%)	24.206	P<0.001
	Yes	25(41%)	36(59%)		
Loss of residence	No	838(70.2%)	356(29.8%)	0.296	0.586
	Yes	1075(69.2%)	478(30.8%)		
Income	1500 or less	731(65.6%)	383(34.4%)	18.378	<0.001
	1501-2500	573(74.8%)	193(25.2%)		
	2501 and more	609(70.3%)	257(29.7%)		
Household's Employment	No employment	641(65.6%)	336(34.4%)	11.587	<0.001
	One person or more	1271(71.8%)	498(28.2%)		
Individual's employment	No	430(71.7%)	170(28.3%)	0.006	0.938
	Yes	470(71.9%)	184(28.1%)		
Subjective wealth	Rich	50(83.3%)	10(16.7%)	32.010	<0.001
	Moderate	1158(73.2%)	425(26.8%)		
	Poor/very poor	705(63.9%)	399(36.1%)		
Living standards	Improved	53(75.7%)	17(24.3%)	14.652	<0.001
	Remained the same	610(74.4%)	210(25.6%)		
	Deteriorated	1249(67.3%)	606(32.7%)		
Receiving assistance	Yes	1626(68.3%)	753(31.7%)	14.011	<0.001
	No	187(78%)	81(22%)		
Refugee status	Registered	1248(69.8%)	539(30.2%)	0.106	0.745
	Not refugee	664(69.2%)	295(30.8%)		
Locality type	Urban	1550(70.1%)	660(29.9%)	1.418	0.429
	Rural	48(68.6%)	22(31.4%)		
	Refugee camps	314(67.4%)	15(232.6%)		
Governorate	North Gaza	297(70.5%)	166(29.5%)	1.328	0.857
	Gaza	620(68.5%)	285(31.5%)		
	Deir al balah	283(69%)	127(31%)		
	Khan yunis	365(69.8%)	158(30.2%)		
	Rafah	247(71.4%)	99(28.6%)		

In table 4, there is a statistically significant association between age and subjective health, when age increases one unit, the odds that subjective health is good decreases 3.8%, there is a statistically significant association between distress and subjective health, when distress increases one unit, the odds that subjective health is good decrease by 4%. There is a

statistically significant association between wealth and subjective health (p<0.001), when wealth increases one unit, the odds that subjective health is good increases by 4.1%.

Table 4: binary regression for subjective health and numerical independent variables:		
West Bank		
	OR(95%CI)	P value
Age	0.947(0.942-0.951)	<0.001
Stress	0.965(0.956-0.974)	<0.001
Wealth	1.085(1.071-1.099)	<0.001
Gaza Strip		
Age	0.962(0.956-0.967)	<0.001
Stress	0.960(0.950-0.971)	<0.001
Wealth	1.041(1.025-1.058)	<0.001

Table 5 shows that in West Bank there is a statistical significant association between age, distress wealth and chronic diseases for people whose age in 35 years and more, when age increases one year the odds of having chronic diseases increases by 9.6%. When distress increases one unit, the odds of having chronic diseases is decreased by 1.4%. And when wealth is increased one unit the odds of having chronic diseases is decreased by 2.4%. In Gaza Strip, there is a statistical significant association between age, distress, wealth and chronic diseases for people whose age is 35 years and more. When age increases on year, the odds of having chronic diseases increase by 9.3%. When distress increases one unit, the odds of having chronic diseases is decreased by 0.2%. And when wealth is increased one unit the probability of having chronic diseases is decreased by 1.5%.

Table 5: binary regression for chronic diseases > 35 and numerical independent variables:		
	OR(95%CI)	P value
West Bank		
Age	1.096(1.87-1.105)	P<0.001
Stress	0.986(0.975-0.986)	0.022

Wealth	0.976(0.963-0.990)	P <0.001
Gaza Strip		
Age	1.093(1.080-1.107)	P<0.001
Stress	0.998(0.984-1.012)	0.756
Wealth	0.985(0.965-1.005)	0.144

Table 6 shows the relationship between chronic diseases for people whose age is 35 years old or more and categorical independent variables by using chi square analysis. In the West Bank, Chi square test showed that there is a statistically significant association between chronic diseases and sex, education, political suffering, income, household's employment, subjective wealth, receiving assistance, refugee status, and locality type. However it showed that there is no statistically significant association between food security, deprivation, shocks, and location of the house, individual employment, living standards, and governorates in West Bank.

There is a statistically significant association between sex and chronic diseases for people whose age is 35 years and more (p<0.001) as females reported of having chronic diseases 33% compared to males 25%. There is a statistically significant association with education and chronic diseases (P=0.03), as below secondary around 30%, secondary 24%, and post-secondary 27% reported of having chronic diseases. There is a statistically significant association between political suffering and chronic diseases(P=0.024), as around 28% of people who never had political suffering reported of having more chronic diseases compared to around little, moderately, and very much 27%, 31%, 35%, respectively. There is a statistically significant association between income and chronic diseases (P<0.001), as around 24% of people whose income is 4501 and more reported of having more chronic diseases compared to 3501-4500, 2501-3500, 1501-2500, 1500 or less, 22%, 26%, 33%, 44%, respectively. There is a statistically significant relationship between household's employment and chronic diseases (P<0.001), as

around 22% of household's who has one or more people who work in the household reported of having less chronic diseases compared to no employment 42%. There is a statistically significant association between subjective wealth and chronic diseases (P<0.001), the poor people reported of having more chronic diseases compared to moderate and rich people, as around 29%, 27%, 31% respectively. There is a statistically significant association between receiving assistance and chronic diseases (P<0.001), people who receive assistance reported of having more chronic diseases compared to people who do not receive assistance ,37%, 27%, respectively. There is a statistically significant association between refugee status and chronic diseases (P=0.007), people who are not refugee reported of having less chronic diseases than refugee, around 25%, and 32%, respectively. There is a statistically significant association between locality type and chronic diseases (P<0.001), people who live in urban areas reported of having less chronic diseases compared to rural and refugee camps, around 28%, 30%, 42% respectively.

In Gaza Strip There is a statistically significant association between sex, education, income, household employment, subjective wealth, governorate and chronic diseases for people whose age is 35 years and more (p<0.001). There is a statistically significant association between sex and chronic diseases as females reported of having more chronic diseases around 34% compared to males 24%. There is a statistically significant association with education and chronic diseases (p=0.03), as below secondary around 34%, secondary 23%, and post-secondary 22% reported of having chronic diseases. There is a statistically significant association between income and chronic diseases (p<0.001), as people with income 1500 or less has more chronic diseases 34% compared to 1501- 2500 25%, and 2501 and more 20%. There is a statistically

significant relationship between household's employment and chronic diseases (p=0.009), as around 32% of household's who do not have any member who work reported of having more chronic diseases compared to one person who work or more around 24%. There is a statistically significant association between subjective wealth and chronic diseases (p<0.001), the poor people reported of having more chronic diseases compared to moderate and rich people, as around 35%, 26%, 25% respectively. There is a statistically significant association between governorates and chronic diseases (p=0.029), people in Deir Al Balah reported having more chronic diseases 35%, compared to north Gaza 34%, Gaza 28%, Rafah 26%, Khan Yunis 25%.

Table 6: bivariate analysis for the dependent variable non-communicable diseases >= 35 years and independent variables

Variables		Non-communicable diseases		Chi 2 test	
		Yes	No	Chi square	P value
West bank					
Sex	Males	343(25%)	1027(75%)	21.644	<0.001
	Females	433(33.2%)	871(66.8%)		
Education	Below secondary	577(30.4%)	1321(69.6%)	6.987	0.030
	Secondary	83(23.9%)	256(67.1%)		
	Post-secondary	114(27.1%)	306(72.9%)		
Food security	Food secure	444(27%)	1199(73%)	0.690	0.708
	Moderate food insecure	99(29%)	242(71%)		
	Food insecurity	111(26.6%)	307(73.4%)		
Deprivation	Never	546(28.1%)	1394(71.9%)	7.082	0.069
	Little	72(26.6%)	199(73.4%)		
	Moderate	64(33.3%)	128(66.7%)		
	Very much	92(34.5%)	175(65.5%)		
Suffering	Never	401(27.8%)	1040(72.2%)	9.415	0.024
	Little	135(26.7%)	371(73.3%)		
	Moderate	126(31%)	281(69%)		
	Very much	112(35.4%)	204(64.6%)		
Shocks	No	569(27.4%)	1511(72.6%)	0.241	0.632
	Yes	86(26.1%)	244(73.9%)		
Location of the house	Inside the wall	74(24.8%)	224(75.2%)	0.925	0.336
	Outside the wall	579(27.5%)	1528(72.5%)		
Income	1500 or less	209(43.7%)	269(56.3%)	75.944	<0.001

	1501-2500	152(32.5%)	316(67.5%)		
	2501-3500	130(26.1%)	368(73.9%)		
	3501-4500	84(21.9%)	300(78.1%)		
	4501 and more	200(23.7%)	643(76.3%)		
Household's Employment	No employment	265(41.7%)	371(58.3%)	96.997	P<0.001
	One person	501(22.2%)	1759(77.8%)		
Individual employment	No	16(13%)	107(87%)	2.141	0.143
	Yes	215(18.3%)	959(81.9%)		
Subjective wealth	Rich	34(30.9%)	76(69.1%)	22.365	<0.001
	Moderate	592(27.2%)	1588(72.8%)		
	Poor/very poor	149(39%)	233(61%)		
Living standards	Improved	70(24.2%)	219(75.8%)	4.219	0.121
	Remained the same	480(30.1%)	1114(69.9%)		
	Deteriorated	226(28.6%)	564(41.4%)		
Receiving assistance	Yes	189(37%)	322(63.1%)	19.462	<0.001
	No	587(27.1%)	1576(72.9%)		
	Yes	650(28.7%)	1613(71.3%)		
Refugee status	Refugee	238(31.5%)	517(68.5%)	13.459	<0.001
	Not refugee	238(24.7%)	1612(75.3%)		
Locality type	Urban	503(27.6%)	1319(72.4%)	14.875	<0.001
	Rural	202(29.7%)	479(70.3%)		
	Refugee camps	71(41.5%)	100(58.5%)		
Governorate	Jenin	85(31.2%)	187(68.8%)	16.802	0.079
	Tubas	33(28.9%)	81(71.1%)		
	Tulkarm	61(31%)	136(69%)		
	Nablus	120(33.1%)	242(66.9%)		
	Qalqiliya	35(33%)	71(67%)		
	Salfit	40(37%)	68(63%)		
	Ramallah	94(30.4%)	215(69.6%)		
	Jericho	25(24.5%)	77(75.5%)		
	Jerusalem	101(27.6%)	265(72.4%)		
	Bethlehem	57(25.6%)	166(74.4%)		
	Hebron	125(24.3%)	390(14.6%)		
Gaza Strip					
Sex	Males	171(24.2%)	537(75.8%)	16.394	<0.001
	Females	237(34%)	461(66%)		
Education	Below secondary	269(33.8%)	527(66.2%)	21.432	<0.001
	Secondary	61(22.8%)	207(77.2%)		
	Post-secondary	75(22.3%)	262(77.7%)		
Food security	Food secure	41(24.1%)	129(75.9%)	0.791	0.673
	Moderate food secure	78(27.6%)	205(72.4%)		
	Food insecurity	78(27.6%)	205(72.4%)		
Deprivation	Never	164(28.1%)	419(71.9%)	5.164	0.160
	Little	45(29.6%)	107(70.4%)		
	Moderate	55(24.3%)	171(75.7%)		
	Very much	144(32.4%)	300(67.6%)		

Suffering	Never	74(29.6%)	176(70.4%)	1.420	0.701
	Little	55(27%)	149(73%)		
	Moderate	109(27.7%)	285(72.3%)		
	Very much	170(30.5%)	387(69.5%)		
Shocks	No	213(26.5%)	590(73.5%)	2.979	0.084
	Yes	95(31.8%)	204(68.2%)		
Location of the house	Less than 1000m from buffer zone	30(29.1%)	73(70.9%)	0.078	0.780
	More than 1000m from buffer zone	278(27.8%)	721(72.2%)		
Injury	No	304(28.2%)	775(71.8%)	0.627	0.428
	Yes	5(20.8%)	19(79.2%)		
Loss of the house	No	130(26.2%)	367(73.8%)	1.444	0.229
	Yes	178(29.4%)	427(70.6%)		
Income	1500 or less	190(34.3%)	364(65.7%)	24.257	<0.001
	1501-2500	79(24.6%)	242(75.4%)		
	2501 and more	86(20.6%)	332(79.4%)		
Household's Employment	No employment	191(31.9%)	407(68.1%)	10.829	P<0.001
	One person or more	165(23.7%)	530(76.3%)		
Individual employment	No	46(16.5%)	233(83.5%)	0.762	0.092
	Yes	64(17.4%)	304(82.6%)		
subjective wealth	Rich	9(25%)	27(75%)	13.151	<0.001
	Moderate	215(25.6%)	624(74.4%)		
	Poor/very poor	184(34.7%)	247(65.3%)		
Living standards	Improved	9(32.1%)	19(67.9%)	1.260	0.532
	Remained the same	124(27.1%)	333(72.9%)		
	Deteriorated	275(29.9%)	645(70.1%)		
Receiving assistance	Yes	349(29%)	856(71%)	0.013	0.91
	No	59(29.4%)	142(70.6%)		
Refugee status	Refugee	246(28.9%)	606(71.1%)	2.070	0.355
	Not refugee	109(24.8%)	331(75.2%)		
Locality type	Rural	316(29.5%)	756(70.5%)	1.551	0.461
	Urban	22(23.4%)	72(76.6%)		
	Refugee camps	70(29.2%)	170(70.8%)		
Governorate	North Gaza	87(34.3%)	167(65.7%)	10.820	0.029
	Gaza	115(27.6%)	302(72.4%)		
	Deir al Balah	77(34.5%)	146(65.5%)		
	Khan Yunis	76(24.7%)	232(75.3%)		
	Rafah	53(26%)	151(74%)		

Table 7 represents the relationship between chronic diseases for people whose age is from 18 to 34 years and other independent variables by using chi square analysis. In West Bank, there is

a statistically significant association between chronic diseases for people whose age between 18-34 years and food security (P=0.001), as 0.9% of food secure people reported of having chronic diseases, 0.8% moderate food security, and around 2.9% of people with food insecurity. In Gaza Strip, there is a statistically significant association between chronic diseases and suffering from political issues, as people who never suffer 2%, little 0.4%, moderate 1.2%, and very 3.3% are reported having chronic diseases.

Table 7: bivariate analysis for the dependent variable non-communicable diseases < 35 years and independent variables

Variables		Chronic diseases < 35 years		Chi 2 test	
		Yes	No	Chi square	P value
West bank					
Sex	Males	14(1.3%)	1027(98.7%)	0.017	0.896
	Females	17 (1.7%)	1189(98.6%)		
Education	Below secondary	16(1.5%)	1032(98.5%)	0.344	0.842
	Secondary	9(1.3%)	682(98.7%)		
	Post-secondary	6(1.2%)	502(98.8%)		
Food security	Food secure	16(0.9%)	1770(99.1%)	13.038	0.001
	Moderate food secure	3(0.8%)	360(99.2%)		
	Food insecurity	14(2.9%)	467(97.1%)		
Deprivation	Never	20(1.2%)	1645(98.8%)	1.665	0.645
	Little	5(2%)	247(98%)		
	Moderate	3(2.1%)	141(97.9%)		
	Very much	3(1.6%)	183(98.4%)		
Suffering	Never	19(1.3%)	1410(98.7%)	0.618	0.892
	Little	5(1.3%)	382(98.7%)		
	Moderate	5(1.9%)	258(98.1%)		
	Very much	2(1.2%)	166(98.8%)		
Shocks	No	26(1.2%)	215(98.8%)	1.468	0.226
	Yes	8(1.9%)	414(98.1%)		
Location of the households	Inside the wall	4(1.7%)	229(98.3%)	0.365	0.546
	Outside the wall	30(1.2%)	2372(98.8%)		
Income	1500 or less	6(2.5%)	236(97.5%)	5.290	0.259
	1501-2500	10(1.9%)	519(98.1%)		
	2501-3500	5(1%)	492(99%)		
	3501-4500	2(0.6%)	335(99.4%)		
	4501 and more	8(1.2%)	634(98.8%)		

Household's Employment	No employment	7(2.8%)	247(97.2%)	3.454	0.063
	One person or more	29(1.3%)	2218(98.7%)		
Individual employment	No	1(0.6%)	175(99.4%)	0.724	0.395
	Yes	12(1.3%)	887(98.7%)		
Subjective wealth	Rich	0(0%)	87(100%)	1.853	0.396
	Moderate	26(1.4%)	1879(98.6%)		
	Poor/very poor	5(2%)	250(98%)		
Living standards	Improved	7(2.2%)	312(97.8%)	2.473	0.290
	Remained the same	14(1.1%)	1268(98.9%)		
	Deteriorated	10(1.6%)	635(98.4%)		
Receiving assistance	Yes	7 (2.3%)	299(97.7%)	2.146	0.143
	No	24 (1.2%)	1917(98.8%)		
	Yes	31(1.8%)	1683(98.2%)		
Refugee status	Refugee	15(2.2%)	667(97.8%)	3.811	0.051
	Not refugee	21(1.2%)	1797(98.8%)		
Locality type	Urban	22(1.5%)	1453(98.5%)	0.745	0.689
	Rural	8(1.3%)	613(98.7%)		
	Refugee camps	1(0.7%)	150(99.3%)		
Governorate	Jenin	2(0.8%)	250(99.2%)	14.065	0.170
	Tubas	1(1.3%)	78(98.7%)		
	Tulkarm	6(1.9%)	146(96.1%)		
	Nablus	6(2.3%)	259(97.7%)		
	Qalqiliya	2(1.9%)	105(98.1%)		
	Salfit	0(0%)	103(100%)		
	Ramallah	2(0.8%)	157(99.2%)		
	Jericho	1(1.3%)	76(98.7%)		
	Jerusalem	5(2%)	247(98%)		
	Bethlehem	1(0.6%)	166(99.4%)		
	Hebron	5(0.9%)	529(99.1%)		
Gaza Strip					
Sex	Males	16(2.2%)	722(97.8%)	0.514	0.474
	Females	13 (1.7%)	768(98.3%)		
Education	Below secondary	14(2.3%)	607(97.7%)	1.658	0.436
	Secondary	6(1.2%)	475(98.8%)		
	Post-secondary	9(2.2%)	408(97.8%)		
Food security	Food secure	7(1.6%)	425(98.4%)	5.612	0.060
	Moderate food secure	1(0.3%)	363(99.7%)		
	Food insecure	18(2.1%)	828(97.9%)		
Deprivation	Never	13(2%)	649(98%)	0.078	0.994
	Little	3(1.9%)	154(98.1%)		
	Moderate	5(2%)	242(98%)		
	Very much	8(1.8%)	445(98.8%)		
Suffering	Never	7(2%)	346(98%)	9.634	0.022
	Little	1(0.4%)	254(99.6%)		

	Moderate	5(1.2%)	426(98.8%)		
	Very much	16(3.3%)	464(96.7%)		
Shocks	No	21(1.8%)	1179(98.2%)	0.810	0.368
	Yes	5(1.1%)	439(98.9%)		
Location of the house	Less than 1000m from buffer zone	1(0.6%)	161(99.4%)	1.078	0.299
	More than 1000m from buffer zone	25(1.7%)	1454(98.3%)		
Injury	No	25(1.6%)	1581(98.4%)	0.276	0.600
	Yes	1(2.6%)	37(97.4%)		
Loss of residence	No	15(2.2%)	681(97.8%)	3.235	0.072
	Yes	10(1.1%)	937(98.9%)		
Income	1500 or less	11(1.7%)	638(98.3%)	0.320	0.852
	1501-2500	9(2.2%)	404(97.8%)		
	2501 and more	7(1.9%)	362(98.1%)		
Household's Employment	No employment	17(1.8%)	909(98.2%)	0.037	0.848
	One person or more	10(2%)	495(98%)		
Individual's employment	No	11(3.4%)	316(96.6%)	1.819	0.177
	Yes	7(1.8%)	385(98.2%)		
subjective wealth	Rich	1(3%)	32(97%)	0.542	0.763
	Moderate	18(2.1%)	860(97.9%)		
	Poor/very poor	10(1.6%)	598(98.4%)		
Living standards	Improved	1(2%)	48(98%)	0.888	0.642
	Remained the same	6(1.4%)	427(98.6%)		
	Deteriorated	22(2.1%)	1015(97.9%)		
Receiving assistance	Yes	25(1.9%)	1260(98.6%)	0.059	0.808
	No	4(1.7%)	230(98.3%)		
	Yes	25(1.9%)	1299(98.1%)		
Refugee status	Refugee	20(2.1%)	911(97.9%)	0.984	0.321
	Not refugee	7(1.4%)	493(98.6%)		
Locality type	Urban	22(1.9%)	1167(98.1%)	0.127	0.938
	Rural	2(2.3%)	84(97.7%)		
	Refugee camps	5(2%)	239(98%)		
Governorate	North Gaza	7(2.2%)	318(97.8%)	1.863	0.761
	Gaza	10(2.3%)	431(97.7%)		
	Deir al balah	5(2.2%)	220(97.8%)		
	Khan yunis	5(1.6%)	300(98.4%)		
	Rafah	2(0.9%)	221(99.1%)		

Table 8 shows the relationship between chronic diseases for people whose age from 18-34 years and continues variables. There is statistically significant association between age and

chronic diseases for people whose age is from 18 to 34 (p<0.001). In West Bank, when age increases one year, the probability of having chronic diseases increases by 12.4%, and in Gaza Strip when age increases one year, the probability of having chronic diseases increases by 23.3%.

Table 8: binary regression for chronic diseases < 35 and numerical independent variables:		
	OR(95%CI)	P value
West Bank		
Age	1.124(1.042-1.213)	0.003
Stress	1.027(0.978-1.079)	0.289
Wealth	1.008(0.944-1.076)	0.822
Gaza Strip-		
Age	1.233(1.111-1.368)	P<0.001
Stress	1.031(0.981-1.082)	0.227
Wealth	0.943(0.867-1.025)	0.170

Table 9 presents the results of logistic regression between subjective health and the independent variables. In the West Bank, there is a statistically significant association between subjective health and age, when increases one year the odds of reporting good health decrease by 5.6% (OR 0.944, 0.939-0.949) People with secondary and post-secondary education are 32.8% (OR 1.328, 1.067-1.652), 6.7% (OR 1.838, 1.432-2.360), respectively more likely to report good health compared with below secondary (P<0.001).There is a statistically significant association between food security and subjective health, moderate food insecure and food secure people are 75%, (OR 1.754, 1.404-2.190), 52.6% (OR 1.526, 1.171-1.990) more likely to report good health compared to food insecure people. People with moderate deprivation are 28.8% (OR 0.712, 0.534-0.949) less likely to report good health compared with people who never have deprivation. People with little, moderate, and high suffering from political issues are 34% (OR 0.660, 0.528-0.825), 44.3% (OR 0.557, 0.439-0.707), 54.2% (OR 0.458, 0.348-0.603)

less likely to report good health compared with people who never suffered from political issues. People who consider themselves moderate or poor are 54.5% (OR 0.455, 0.241-0.861), 71.8% (OR 0.282, 0.143-0.557), respectively less likely to report good health compared with rich people. People who do not receive assistance are 59.3% (OR1.593, 1.305-1.946) more likely to report good health compared with people who receive assistance. People whose living standard is deteriorated are 38.7% (OR 0.613, 0.454-0.828) less likely to report good health. People who live in refugee camps are 51.1% (OR 0.489(0.359-0.668) less likely to report good health compared with people who live in urban areas.

In Gaza Strip, when age increases one year, the odds that subjective health is good decreased by 3.9% (OR 0.961, 0.953-0.970). People with secondary and post-secondary education are 43.1% (OR 1.431, 1.145-1.789), 77.2% (OR 1.772, 1.381-2.275) more likely to report good health compared with below secondary. People with high deprivation are 49.9% (OR 0.501(0.392-0.642) less likely to report good health compared with people who never had deprivation ($p<0.001$). People with high suffering from political issues is 43.7% (OR 0.563, 0.415-0.763) less likely to report good health compared with people who never suffered from political issues. People who had someone died in 2014 aggression are 69% (OR 0.310, 0.174-0.553) less likely to report good health compared to people did not have someone died in the 20114 aggression. When distress increases one unit, people are 2.7% (OR 0.973, 0.961-0.985) less likely to report good health ($p<0.001$). People whose income is from 1501 to 2500 shekels are 26% (OR 1.260, 1.003-1.583) more likely to report good health compared to people whose income is 1500 shekel and less.

Table 9: logistic regression for good subjective health and the independent variables:			
	Variables	OR(95%CI)	P value
West Bank			
Sex	Male		
	Female	0.947(0.807-1.112)	0.508
Age		0.944(0.939-0.949)	p<0.001
Education	Below secondary		P<0.001
	Secondary	1.328(1.067-1.652)	0.011
	Post-secondary	1.838(1.432-2.360)	P<0.001
Food security	Food insecure		P<0.001
	Moderately food security	1.754(1.404-2.190)	P<0.001
	food secure	1.526(1.171-1.990)	0.002
Deprivation	Never		0.027
	Little	1.102(0.846-1.436)	0.470
	Moderate	0.712(0.534-0.949)	0.020
	High	0.764(0.570-1.023)	0.070
Suffering	Never		P<0.001
	Little	0.660(0.528-0.825)	P<0.001
	Moderate	0.557(0.439-0.707)	P<0.001
	High	0.458(0.348-0.603)	P<0.001
Shocks	No		
	Yes	1.173(0.938-1.467)	0.161
Location of the house	Inside the wall		
	Outside the wall	0.913(0.685-1.216)	0.534
Stress		0.990(0.979-1.002)	0.119
Wealth		0.997(0.981-1.013)	0.725
Income	1500 or less		0.653
	1501-2500	0.950(0.717-1.260)	0.724
	2501-3500	1.001(0.746-1.341)	0.997
	3501-4500	1.115(0.810-1.534)	0.504
	4501 and more	1.139(0.838-1.547)	0.406
Household's Employment	No employment		
	One person or more	1.048(0.828-1.325)	0.697
Subjective wealth	Rich		P<0.001
	Moderate	0.455(0.241-0.861)	0.016
	Poor	0.282(0.143-0.557)	P<0.001
Assistance	No	1.593(1.305-1.946)	P<0.001
Living standards	Improved		P<0.001
	Stay the same	0.839(0.630-1.116)	0.228
	Deteriorated	0.613(0.454-0.828)	P<0.001
Locality type	Urban		P<0.001
	Rural	1.027(0.852-1.239)	0.782
	Refugee camps	0.489(0.359-0.668)	P<0.001
Gaza Strip			
Sex	Male		

	Female	0.876(0.729-1.051)	0.154
Age		0.962(0.956-0.968)	P<0.001
Education	Below secondary		P<0.001
	Secondary	1.431(1.145-1.789)	0.002
	Post- secondary	1.772(1.381-2.275)	P<0.001
Food security	Food insecure		0.031
	Moderately food secure	1.239(0.958-1.603)	0.103
	Food secure	0.853(0.673-1.082)	0.190
Deprivation	Never		P<0.001
	Little	0.833(0.605-1.148)	0.264
	Moderate	0.959(0.717-1.281)	0.776
	High	0.501(0.392-0.642)	P<0.001
Suffering	Never		P<0.001
	Little	0.740(0.532-1.028)	0.072
	Moderate	0.861(0.635-1.167)	0.333
	High	0.563(0.415-0.763)	P<0.001
Shocks	No		
	Yes	0.861(0.635-1.167)	0.155
Location of the house	Less than 1000m from buffer zone		
	More than 1000m from buffer zone	0.910(0.659-1.259)	0.570
Injury	Yes	0.31-(0.174-0.553)	P<0.001
Loss of residence	Yes	1.073(0.884-1.302)	0.478
Distress		0.973(0.961-0.985)	P<0.001
Wealth		1.003(0.983-1.022)	0.791
Income	1500 or less		0.002
	1501-2500	1.260(1.003-1.583)	0.048
	2501 and more	0.801(0.628-1.022)	0.074
Household's employment	No employment		
	One person or more	1.105(0.914-1.336)	0.304
Subjective wealth	Rich		0.962
	Moderate	0.895(0.407-1.967)	0.782
	Poor	0.893(0.394-2.024)	0.786
Assistance	No	1.153(0.858-1.548)	0.345
Living standards	Improved		0.188
	Stay the same	1.064(0.562-1.948)	0.887
	Deteriorated	0.862(0.469-1.586)	0.634
Locality type	Urban		0.151
	Rural	1.176(0.666-2.084)	0.572
	Refugee camps	0.797(0.625-1.016)	0.067

Table 10 shows the results of logistic regression between chronic diseases for people whose age is 35 years and more and the independent variables. In West Bank, females are 49.8% (OR

1.498, 1.213-1.850) more likely to have chronic disease compared to men (P=0.002). When age increases one year, the probability of having chronic diseases is increased by 10.2%. (OR 1.102, 1.091-1.113) People with post-secondary education are 46.1% (OR 1.461, 1.090-1.957) more likely to have chronic diseases, Households who have one person who work are 41.6% (OR 1.416, 1.051-1.907) more likely to have chronic diseases compared with households who had no one work in it (p=0.022). People who live in refugee camps are 1.729 times (OR 2.729, 1.796-4.149) more likely to have chronic diseases.

In Gaza Strip, females are 56.2% (OR 1.562(1.152-2.117) more likely to have chronic diseases compared to men. When age increases one year, the odds of having chronic diseases increase by 8.9% (OR 1.089(1.074-1.105) People who lost their residence are 51% (OR 1.510, 1.098-2.077) more likely to have chronic diseases.

Table 10: logistic regression for non-communicable diseases >=35 years and the independent variables:

	Variables	OR(95%CI)	P value
West Bank			
Sex	Male		
	Female	1.498(1.213-1.850)	P<0.001
Age		1.102(1.091-1.113)	P<0.001
Education	Below secondary		0.016
	Secondary	1.354(0.994-1.845)	0.054
	Post-secondary	1.461(1.090-1.957)	0.011
Food security	Food insecure		0.631
	Moderately food insecure	0.868(0.647-1.165)	0.346
	Food secure	0.926(0.641-1.337)	0.681
Shocks	No		
	Yes	1.153(0.854-1.556)	0.353
Location of the house	Inside the wall		
	Outside the wall	1.379(0.990-1.922)	0.057
Wealth		1.008(0.991-1.027)	0.353
Household's Employment	No employment		
	One person or more	1.416(1.051-1.907)	0.022
Assistance	Yes	0.891(0.674-1.179)	0.419

Locality type	Urban		P<0.001
	Rural	1.176(0.923-1.499)	0.190
	Refugee camps	2.729(1.796-4.149)	P<0.001
Gaza Strip			
Sex	Male		
	Female	1.562(1.152-2.117)	0.004
Age		1.089(1.074-1.105)	p<0.001
Education	Below secondary		0.164
	Secondary	0.692(0.458-1.046)	0.081
	Post- secondary	0.772(0.507-1.176)	0.229
Food security	Food insecure		0.224
	Moderately food secure	0.730(0.501-1.064)	0.102
	Food secure	0.995(0.663-1.492)	0.980
Shocks	No		
	Yes	1.071(0.763-1.502)	0.693
Location of the house	Less than 1000m from buffer zone		
	More than 1000m from buffer zone	0.953(0.564-1.608)	0.855
Injury	Yes	0.698(0.222-2.191)	0.538
Loss of residence	Yes	1.510(1.098-2.077)	0.011
Wealth		1.019(0.990-1.049)	0.197
Household's employment	No employment		
	One person	0.872(0.641-1.185)	0.381
Assistance		1.228(0.774-1.937)	0.388
Locality type	Urban		0.667
	Rural	0.768(0.297-1.984)	0.585
	Refugee camps	1.149(0.775-1.703)	0.489

Table 11 shows the results of logistic regression for chronic diseases for people whose age between 18-34 years and independent variables. in the West Bank, when age increases one year, the probability of having chronic diseases increase by 11.1% (OR 1.111, 1.032-1.197). People with moderate food insecurity and food security are 79.5% (OR 0.205, 0.089-0.469), 74.1% (OR 0.259, 0.077-0.877) less likely to have chronic diseases compared to people with food insecurity. In the Gaza Strip, when age increases one year, the probability of having chronic diseases increases by 18.8% (OR 1.188, 1.084-1.303).

Table 11: logistic regression for non-communicable diseases < 35 years and the independent variables:			
	Variables	OR(95%CI)	P value
West Bank			
Sex	Male		
	Female	1.020(0.510-2.038)	0.956
Age		1.111(1.032-1.197)	0.005
Education	Below secondary		0.894
	Secondary	1.185(0.522-2.690)	0.686
	Post-secondary	0.962(0.380-2.435)	0.935
Food security	Food insecure		P<0.001
	Moderately food secure	0.205(0.089-0.469)	P<0.001
	Food secure	0.259(0.077-0.877)	0.030
Shocks	Yes	1.566(0.685-3.578)	0.287
Location of the house	Outside the wall	0.735(0.232-2.329)	0.601
Wealth		1.059(0.998-1.124)	0.059
Household's Employment	No employment		
	One person or more	0.711(0.257-1.969)	0.512
Assistance	No	1.091(0.427-2.784)	0.856
Locality type	Urban		0.318
	Rural	0.708(0.304-1.651)	0.425
	Refugee camps	0.096(0.003-3.121)	0.187
Gaza Strip			
Sex	Male		
	Female	0.966(0.434-2.154)	0.933
Age		1.188(1.084-1.303)	P<0.001
Education	Below secondary		0.380
	Secondary	0.432(0.132-1.410)	0.164
	Post- secondary	0.800(0.302-2.122)	0.654
Food security	Food insecure		0.080
	Moderately food insecure	0.513(0.178-1.477)	0.216
	Food security	0.156(0.027-0.909)	0.039
Shocks	Yes	0.741(0.260-2.111)	0.574
Location of the house	More than 1000m from the buffering zone	3.949(0.301-51.871)	0.296
Injury	Yes	1.463(0.110-19.550)	0.774
Loss of residence	Yes	0.502(0.215-1.173)	0.111
Wealth		0.998(0.918-1.186)	0.964
Household's employment	No employment		
	One person	1.113(0.470-2.636)	0.808
Assistance	Yes	1.939(0.691-5.443)	0.208
Locality type	Urban		0.360
	Rural	1.980(0.188-20.892)	0.570
	Refugee camps	0.419(0.110-1.585)	0.199

Discussion:

The goal of the study is to examine the relationship between food security and health in the West Bank and Gaza Strip. Health was operationalized in two ways, subjective health and the most common non-communicable diseases in Palestine (diabetes, hypertension, and cardiovascular diseases). Each one describes health in different dimension, and they complement each other, thus together we can get a holistic approach to address health. It is very common to have disparities between subjective health and objective health (non-communicable diseases) because subjective health can be determined by many factors that differ from one person to another, according to their personalities, the circumstances that have been through, and their lifestyle (Bates et al. 2017; Strik et al. 2003). As it was mentioned in the literature people may have diseases but they consider themselves healthy and others may not suffer from any diseases but they consider themselves unhealthy (Strik et al. 2003).

Many studies showed that food insecurity affect health badly, studies showed that people who are food insecure are more prone to report bad health (Stuff et al. 2004; Tarasuk 2001; Maes et al. 2010; Bronte-Tinkew et al. 2007). Our results showed a strong relationship between food insecurity and subjective health in the West Bank and that food insecurity affect health more than socioeconomic factors such as income, and employment. This result is consistent with other study that was done to examine the effect of food insecurity on subjective health in Arab youth (Asfahani, Kadiyala, and Ghattas 2019). Especially because Palestine is considered a low political stability country, food insecurity affects subjective health more (Asfahani, Kadiyala, and Ghattas 2019).

In our study, food insecurity affects subjective health rather than non-communicable diseases. The analysis showed that people who are food insecure are more prone to report bad health than food secure people, and there was no association between food insecurity and chronic diseases. Studies have shown that food insecurity can lead to psychological and mental distress that will put people under pressure that affect the person perception of health. Also may be because subjective health reflects both dimensions subjective and objective health, it reflects the social, psychological, biological dimension of health and could predict the morbidity, mortality, health care inequalities and health care usage (Jebena et al. 2017; Tarasuk 2001). With chronic diseases, other determinants like age and gender have more significant impact based our analysis. Furthermore, because of the lack of life history data pertaining to food security and timing of chronic diseases, we are limited to examining the association at one point in time, when comes with considerable limitation.

Good subjective health:

Food insecurity was associated with subjective health in the West Bank but not in the Gaza Strip. It showed that moderate and severe food insecure people are more prone to report bad health, which is consistent with other studies that showed that food insecurity affect health mentally and physically, it leads people to distress which affect the body badly (Frongillo et al. 2017; Hadley et al. 2012; Reis 2012). However, in the Gaza Strip, food insecurity was not associated with health, although there is a study that showed that food insecurity affects mental health badly (Giacaman 2016). This could be explained by the effect of political issues that has major effect on the perception of health rather food insecurity. Many studies have

shown that political violence affects mental health in children and adults, and as a consequence it will affect their perception of health and how they see themselves (Shannon et al. 2015; Barber et al. 2016; Hobfoll, Hall, and Canetti 2012). Distress in the Gaza Strip was significantly associated with subjective health. People who suffer from distress are less likely to report good health. In addition, people who has someone died in their family are less likely to report good health. In addition, people who has high rate of political suffering are more prone to report bad health, all of these political and stress circumstances may affect health more than food insecurity, making into consideration that people in the Gaza strip suffer from food insecurity more than the West Bank that makes people consider it as normal or normalizing the abnormalities, and they may have coping strategies and resilience more often even in children (Rabaia et al. 2018). In addition, people who suffer from political violence are more likely to have a reduced appetite for food (Sousa 2013), thus this makes people who live under continuous political violence to not care about food that much that will define their health according to food (Sousa 2013; Martin-Shields and Stojetz 2019). In addition, around 51.4% in the Gaza Strip are food insecure, so the majority of people are food insecure.

In the West Bank, the results match with other studies where food insecurity negatively affects health. There is high variation in the percentages between food secure, moderately, and severe food insecure, which make the relationship appear in a better way than in the Gaza Strip (Stuff et al. 2004; Tarasuk 2001; Maes et al. 2010). In addition, people in the West Bank whose living standards deteriorated reported worse health than people whose condition improved which is make sensible. This relationship was not found in the Gaza Strip. Here it is very important to

note that around 67% of people reported that their living standards deteriorated, while in the West Bank there is more variation.

In the West Bank and Gaza Strip education was associated with subjective health; people with secondary and post-secondary education are more likely to report good health. People with high education improved their decision making skills which will affect their health positively, better social interaction, and life satisfaction (Yakovlev and Leguizamon 2012). Education and income are related to each other because high educated people are expected to have better jobs and better income, however income, employment, and wealth were not associated with subjective health in the West Bank, but in the Gaza Strip the people with income 1501-2500 are more likely to report good health rather people with income 1500 or less. Although income was not significant in the West Bank, subjective wealth was significant; people who consider themselves moderate and poor are less likely to report good health. This is consisted with other studies that showed that people who have high rating about their socioeconomic status have better health (Adler 2013; Präg, Mills, and Wittek 2016). That is because subjective wealth depends on people's perceptions, and the lifestyle and the surrounding environment, and how they would rank themselves in comparison to others. It has been proven that low subjective wealth perception may predict mortality, worsen health status and affect mental health badly (Glei, Goldman, and Weinstein 2018).

Assistance was associated with subjective health in the West Bank and was not in the Gaza Strip. Here again, it is important to keep in mind that around 85% of people in the Gaza Strip are receiving assistance compared with 16% in the West Bank, thus there is little variation in

the Gaza Strip in comparison to the West Bank. People who do not receive assistance reported better health in the West Bank, which may reflect economic conditions.

In the West Bank, people who live in refugee camps reported worse health because of lifestyle, crowding, lack of sanitation and clean water, waste water and sewage, all of these affect health negatively. (Al-Khatib et al. 2003; Bates et al. 2017)

Chronic diseases:

Food insecurity was not significantly associated with chronic diseases in the West Bank and the Gaza Strip for people whose age in 35 years and more, however in the West Bank which contradict many studies that show the opposite (Schneider et al. 2004; Laraia 2013; Friel 2010). May be because aging is the most important factor for people with age of 35 years and more, because of the changes that happen in their body such as decreasing immune systems, hormonal changes and decreased the efficacy of vaccination contribute to the development of chronic diseases (Gubbels Bupp 2015). Chronic diseases need years to be developed and multifactorial causes, thus their diet intake early in their life affect their development of chronic diseases (Langley-Evans 2014), that's why a cross sectional study we cannot address that relationship because of the temporality. This is a key limitation in our data.

However, food insecurity was associated with chronic diseases for people whose age is from 18 to 34, may be because the other factors such as age will affect the development of chronic diseases less than in older adults. Here it is important to keep in mind that the sample size for those who have chronic diseases among the younger group is very small, and this finding should be read with caution. It may be that these experiences are more acute at critical phases and

might have a stronger impact. In addition, fast food is contributing to their diet more frequently than older adults, which provide 30-40% of their total energy intake, where studies are increasingly finding risks for chronic diseases at younger ages. Fast food is high in saturated fat, added sugars, and high in cholesterol which will increase the risk of obesity and chronic diseases (Duffey et al. 2007; Pereira et al. 2005).

Our data suggests that females are more prone to have chronic disease rather than men in the West Bank and the Gaza Strip. It can be explained by the patriarchy that is found in Palestine, which explains how men dominate over women. Women health is affected by the multiple responsibilities, and the sociocultural norms that show women's health is less important than men's health, and women should not seek health care only if symptoms appear on them (Bates et al. 2017). This result differs from much of the literature, but is consistent with another study that was conducted in Ethiopia which is developing country (Hadley et al. 2008). In addition, parity increases the risk of obesity which is a risk factor for chronic diseases (Rizkallah-Khader 2009). In addition, females experience pregnancy and the some of them may have the disorders in their pregnancies such as diabetes, hypertension, and cardiovascular diseases rather than males (Appelman et al. 2015; Yahagi et al. 2015; Kautzky-Willer, Harreiter, and Pacini 2016). Another possibility is that women utilize health services more and are more aware of their diagnosis (Broder et al. 2015). Furthermore, females live longer than males, thus their risks to develop chronic diseases is higher than males (Appelman et al. 2015; Yahagi et al. 2015; Kautzky-Willer, Harreiter, and Pacini 2016). Thus, further research on this topic is needed to address the real explanation.

Age also is a risk factor of chronic diseases in the West Bank and Gaza Strip which matches many studies (Omodei and Fontana 2011). Aging decreases the function of the systems in our bodies, also decreases the immunity. Thus people will be more susceptible to infection, their vaccination efficiency will be decreases, and increased risk inflammation, which are risk factors for chronic diseases (Gubbels Bupp 2015).

Education and employment complement each other; people with high education are expected to have better jobs. In our data, surprisingly the households who have one or more members who work are expected to have more chronic diseases compared to the households that do not have any member who works which contradicts many studies (Sommer et al. 2015; Mendenhall et al. 2017; Lowry et al. 1996). Because the epidemiological transition is ongoing in Palestine (Husseini et al. 2009; Murray et al. 2015), it could be that households who have more members who work have more money , which can eat more dense foods more frequently than people who do not have any member who work, which increases the risk of having chronic diseases.

In the West Bank, people who live in refugee camps are more prone to have chronic diseases, because of the bad circumstances that people are living within, and the violence that had been through, also the large population density in refugee camps let the diseases spread and increase among people and increasing malnutrition which lead to chronic diseases (Pedersen 2002).

In the Gaza Strip loss of residence was associated with chronic diseases, which can be explained by the violence that people experiencing and the stress that they have increase the risk of chronic diseases, or because of the blockade that people are experiencing (Giacaman 2016).

Conclusions and recommendations:

Our study showed that food insecurity is associated with bad subjective health in the West Bank but not in the Gaza Strip, while it was associated with chronic diseases for young adults 18-34 years old. In order to get more detailed information we need to make new studies about this subject but with new instruments to get more detailed information to measure the severity of food insecurity, and there should be new cut off points that goes well with the Palestinians circumstances. In addition, future research should include life history or longitudinal methods to understand the effect of the relationship by using panel study design. Further research should be done to understand the relationship between females and chronic diseases because they have high prevalence of chronic diseases then men.

In addition, new policies should be done to address food insecurity such as, taxation on unhealthy imported food should be done which will increase the pries on imported food thus this will decrease the consumption of unhealthy food. Domestic agriculture should be supported more by the Palestinian authority. There must be inter-sectorial collaboration effort to decrease the dependence of imports and increase the support of domestic food production. Awareness campaign should be done in the schools and universities to acknowledge people about food insecurity and the importance of healthy food in our lives. Because the unemployment rate and poverty are considered high in Palestine, 30%, 29% respectively, more employment chances should be found in order to decrease these percentages. In addition, food assistance program should be given to vulnerable people and should be considered as healthy food.

Limitations of the study:

There are several limitations to our study. First, because it is a secondary data, we were limited to the survey questions. The questions did not address the severity and the time that food security happened, also the time that chronic diseases happen. Second, for food consumption questions, we have number of days but not the exact quantities and calories of food, thus we cannot address the severity of food consumption, and it reflects the households food security not the individual. Third, we don't know how long the household has been food insecure or if food insecurity predates chronic diseases or ill-health. Fourth, because this is cross-sectional data, we can look for associations between food insecurity and chronic disease/health status, but cannot draw causal links. We studied the timing and duration of food security and chronic diseases at the same time that are not accounted for. Fifth, chronic diseases were self-reported thus chronic diseases might be underestimated, and we have small sample size for people whose age 18-34 years old. Sixth there might be other determinants that affect health and chronic diseases that we do not address.

Appendix A:

Variable name	Variable description	The methods
Stress	To what extent does your family fear for your personal safety? To what extent do you fear for yourself in your daily life? To what extent do you fear for your family in your daily life? To what extent do you feel worry/ fear not being able to provide your family with daily life necessities? To what extent do you feel worry/ fear of losing your source of income or your family's source of income? To what extent do you feel worry/ fear losing your home? To what extent do you feel worry/ fear losing your land? To what extent do you feel	A scale was made for the selected variables, and the Cronbach's alpha is 0.809. Then the responses were recoded to never: 0, little: 1, moderate: 2, a lot: 3, and very much: 4. Then the variables were gathered together and summed up to yield scores.

	worry/ fear about displacement and migration? To what extent do you feel worry/ fear about the chaos in the Palestinian society? To what extent do you feel worry/ fear about your future and the future of your family?	
Household's employment	Employed, self-employed, employed with regular payments, employed with irregular payments, working with family with no payments.	In order to know the number of people who work in the family with payments, aggregation was used. Then recode was used to categorize variables into no employment, one person works in the family or more. The categories were divided according to the percentages. For chronic diseases depended variable analysis: Household's employment was multiplied by the income in order to address the relationship between them and it was significant, thus employment represent the increasing of income.
Individual employment	Employed or not employed	
Education	What is the education status? ; Illiterate, reads and writes, elementary, preparatory, intermediate level diploma, BA, higher diploma, MA, PHD)	Education will be recoded into three categories illiterate or primary education (illiterate, reads and writes, and elementary, and preparatory), secondary education (secondary) high education intermediate level diploma, BA, higher diploma, MA, PHD)

Assistance	Have your family get any assistance from any agency.	The answers were yes, or no.
Deprivation	Do you feel deprived?	The responses were recoded to never, little, moderately, and a lot/very much.
Age	18-90	Age was described in scores
Sex	Males and females.	
Suffering (Political determinants)	Is suffering part of your daily life?	The responses were never, little, moderately, very much.
Subjective economic status	What do you consider yourself? Rich, moderate, poor, very poor.	The responses were recoded to rich, moderate, poor/very poor.
Current living standard	Do you think that the household's current living standards compared to the pre 2014 aggression has improved, remained the same, or deteriorated?	The responses stayed the same.
Income	What is the average monthly income of sources?	The responses were categorized as: 1500 shekel or less, 1501-2500, 2501-3500, 3501-4500. And 4501 and more in West Bank. In Gaza Strip the responsed were categorized as 1500 or less, 1501-2500, 2501 and more
Wealth	How many of the following durables are available to the house hold? Home library, smart mobile phones, Palestinian mobile line, regular TV, LC, Vacuum cleaner. VCR/DVD, electric fan, satellite dish, IPAD/Tablet, gas/ electric cooker, phone line, radio, microwave, Israeli mobile phone line, Tb/LCD/LED/S-D screen, gas/electric oven, computer(PC), central heating, laptop, heater, water filter, others	The variables were added together by summing the number of properties a family own. Then the responses were represented as scores.

Refugee status	Registered refugee, unregistered refugee, and not refugee.	The registered and unregistered refugee variables were added together as refugee.
Locality type	Rural, urban, refugee camps	Variables stay the same
Governorates	In West Bank: Jenin, Tubas, Tulkarm, Nablus, Qalqiliya, Salfit, Ramallah, Jericho, Jerusalem, Bethlehem, Hebron. In Gaza Strip: North Gaza, Gaza, Deir al balah, Khan yunis, Rafah	

Variable name	Variable description	The method
Gaza strip		
If people has left the original residence in the aggression of 2014?	Responses were no, yes, and did not reside with family during 2014 aggression	The responses were recoded to yes and no.
If you have been injured during the 2014 aggression and to what extent the injury?	Responses were no, injured with no or minor effect on performance, injured with moderate effect on the moderate effect on performance, injured and unable to perform daily activity.	The responses were recoded to yes and no.
In West Bank and Gaza Strip		
Location of housing unit regard the annexation wall/ buffer zone	The responses were inside the wall in WB and less than 1000 yards in GS, and outside the wall in WB and more than 1000 yards in GS.	
Traumatic shocks due to occupation.	The questions were if you or your family loss in assets due to Israeli occupation or restriction on access to land, or lack of permits.	The question were recoded, and then added together to yield yes or no.

Content of tables:

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