

# BIRZEIT UNIVERSITY

Incidence and determinants of catastrophic health expenditure among households with a focus on households with disability and non-communicable diseases in Palestine



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معدل حدوث الإنفاق الصحي الكارثي لدى الأسر ومحدداته مع التركيز على عاملي الأسر ذات الإعاقة والأمراض غير المعدية في فلسطين

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## Preface

As a medical doctor, I am blessed to join the master's program of Community and Public Health at Birzeit University where I could immerse myself in the equity-related issues. Stepping into the intersection between medicine and health economics has been thought challenging. Actually, it enables me to go beyond the clinical portion of the medical school and examine a new area as I could discuss the financial burden encountered by people especially the vulnerable who may suffer, financially, in silence.

This thesis is centered in health economics on an interesting area, that is financial risk protection. I think that putting this issue on the table aids in raising the awareness at all levels and may empower the drive towards poverty alleviation and economic welfare at the level of decision-makers.

## Acknowledgements

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Much appreciation to my mother, for believing in me, to my father, for the continuous support, and to my sunshine Taim, for showing me hope in the dark.

Thanks for the true people in my life, for showing me my strengths and weaknesses. Thanks for being you.

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## Abstract

## Background

Catastrophic health expenditure (CHE) is an indicator of financial risk protection, which is echoed in the Sustainable Developmental Goals; that is the Universal Health Coverage (UHC). Palestinian households' out-of-pocket (OOP) payments contribute the most to health payments.

### Objective

This study aims to measure CHE using fixed thresholds and rank-dependent thresholds and determine the incidence of CHE among households with members with NCDs and/or disabilities in addition to identifying the related-determinants of CHE in the West Bank and the Gaza Strip.

## Methods

This is a quantitative study consisting of statistical analysis of secondary data from the 2018 Socio-economic Monitoring of the Palestinian Households' Survey, which is conducted by the Palestinian Central Bureau of Statistics (PCBS) using SPSS version 26.0. CHE is calculated using Ataguba method relying on various rank-dependent thresholds (20%, 30% and 40%) of non-food expenditure and (5%, 10%, 15%, 20% and 25%) of total expenditure compared to the same corresponding fixed thresholds in the West Bank and the Gaza Strip. Multivariate logistic regression was conducted

relying on CHE at the 40% rank-dependent threshold of non-food expenditure and at 25% rank-dependent threshold of total expenditure in order to identify the determinants of CHE in the West Bank and the Gaza Strip.

#### Results

The incidence of CHE, using Ataguba method, varies from 11.9% to 3.1% and from 37.7% to 3.7% in the West Bank according to the initial threshold used ranging from 20% to 40% thresholds of non-food expenditure and from 5% to 25% threshold of total expenditure, respectively. In the Gaza Strip, the incidence ranges from 9.4% to 2% and from 34.7% to 2.6% at thresholds ranging from 20% to 40% of non-food expenditure and from 5% to 25% of total expenditure, respectively. The incidence of rankdependent CHE is higher than in fixed thresholds. Multivariate analysis of the data indicated statistically significant associations between the CHE and the households with members with NCDs and disabilities in the West Bank (p<0.001) and the Gaza Strip (p<0.01). Households with members with both NCDs and disability are 3.233 times and 2.906 times more likely to incur rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure, respectively, compared with households with no members with NCDs and/or disabilities. The larger household size is associated with reduction in CHE occurrence. In the West Bank, incidence of CHE is highest in the south West Bank with an increase in the likelihood of incurring rankdependent CHE by about 1.6 and 2.4 times compared to likelihood of CHE incurrence

in the North West Bank at both thresholds. Households residing in rural areas are 67.4% more likely to incur rank-dependent CHE at 40% of non-food expenditure compared with urban localities in the West Bank. Presence of at least one working member in the household decreases the incurrence of CHE by about 46%-62% compared to households which do not have working members.

#### Conclusion

Still financial risk protection is inadequate in both the West Bank and the Gaza Strip. The rank-dependent approach empowers formalizing of the noteworthy concept of equity related to financial risk protection. The presence of members with NCDs and/or disabilities are significant factors of CHE. Targeted interventions and further improvement in benefit packages of health services provided for several vulnerable groups are highly demanded to control healthcare payments. The priority of CHE reduction strategies should be targeted at households with multiple vulnerabilities. Health care financing system and the social protection system should collaborate and the strengthening the partnership should be a priority for decision-makers to establish the degree of cross-subsidization between both and other institutions towards UHC for more fair, consistent and sustainable benefits. Monitoring CHE trends over time is important to ensure protection from CHE in the West Bank and the Gaza Strip.

## الملخص

## المقدمة

يعد الإنفاق الصحي الكارثي من أهم المؤشرات على الحماية من المخاطر المالية، وهو يتجلى في أهداف التنمية المستدامة من خلال التغطية الصحية الشاملة، وإن المدفو عات الصحية من جيب الأسرة الفلسطينية تشكل أكبر نسبة من النفقات الصحية في فلسطين.

الأهداف

تهدف هذه الدراسة لقياس الإنفاق الصحي الكارثي باستخدام عتبات ثابتة وأخرى متغيرة تعتمد على الرتبة، وتهدف إلى تحديد معدل حدوث الإنفاق الصحي الكارثي بين الأسر التي لديها أفراد ممن يعانون من أمراض المزمنة و/أو إعاقات، بالإضافة إلى تحديد العوامل ذات الصلة بالإنفاق الصحي الكارثي في الضفة الغربية وقطاع غزة.

## منهجية الدراسة

هذه الدراسة هي دراسة كمية وتعتمد على التحليل الإحصائي للبيانات الثانوية الناتجة عن مسح الظروف الاقتصادية والاجتماعية للأسر الفلسطينية 2018، والذي أجراه الجهاز المركزي الفلسطيني للإحصاء الفلسطيني، وذلك باستخدام برنامج التحليل الإحصائي SPSS الاصدار 26، حيث يتم حسابة الإنفاق الصحي الكارثي بالاعتماد على عتبات مختلفة تعتمد على الرتبة (20% و 30% و40%) من الإنفاق غير الغذائي وعتبات (5% و10% و15% و20% و25%) من إجمالي إنفاق الأسرة مقارنة باللإنفاق الصحي الكارثي المعتمد على العتبات الثابتة في الضفة الغربية وقطاع غزة.

## نتائج الدراسة

إن معدل حدوث الإنفاق الصحي الكارثي باستخدام طريقة حساب أتاغوبا تتراوح من 11.9% إلى 3.1% ومن 37.7% إلى 3.7% في الضفة الغربية اعتماداً على العتبات المستخدمة التي تتراوح بين 20% إلى 37.0% من الإنفاق الكلي للأسر بين 20% إلى 40% من الإنفاق غير الغذائي ومن عتبة 5% إلى 25% من الإنفاق الكلي للأسر على التوالي، أما في قطاع غزة يتراح معدل الإنفاق الصحي الكارثي من 9.4% إلى 2.5% ومن 34.7% إلى 2.6% إلى 2.6% إلى 2.5% على نفس العتبات المذكورة على التوالي، كما أن معدل حدوث الإنفاق الصحي

الكارثي ذو العتبات المعتمدة على الرتبة أعلى مما هو عليه في حال استخدام العتبات الثابتة، وقد أشار التحليل متعدد المتغيرات للبيانات إلى وجود ارتباط ذو دلالة إحصائية بين الإنفاق الصحي الكارثي وبين الأسر التي لديها أفر اد ممن يعانون من أمر اض مزمنة وإعاقات في الضفة الغربية (قيمة P < 10.0)، حيث أن هذه الأسر أكثر عرضة للإنفاق الصحي الكارثي بمقدار 20.00 وقطاع غزة (قيمة P < 0.00)، حيث أن هذه الأسر أكثر عرضة للإنفاق الصحي الكارثي بمقدار 20.00 ولمقدار 20.00 على عتبة 40% من الإنفاق غير الغذائي و عتبة (قيمة P < 10.00) وقطاع غزة (قيمة P < 20.0)، حيث أن هذه الأسر أكثر عرضة للإنفاق الصحي الكارثي بمقدار 20.30 وبمقدار 20.00 على عتبة 40% من الإنفاق غير الغذائي و عتبة محك% من الإنفاق الكلي للأسر على التوالي مقارنة بالأسر التي لا يعاني أي من أفر ادها من أمراض مزمنة وإعاقات، وأنه كلما زاد عدد أفراد الأسرة المعيشية فإن هناك بانخفاض في معدل حدوث الإنفاق الصحي الكارثي، والجدير بالذكر أن جنوب الضفة الغربية يشهد أعلى معدل لحدوث الإنفاق الصحي الكارثي مقارنة بالأسر التي لا يعاني أي من أفرادها من أمراض المزمنة وإعاقات، وأنه كلما زاد عدد أفراد الأسرة المعيشية فإن هناك بانخفاض في معدل حدوث الإنفاق الصحي الكارثي مقارنة بشمال الضوة المعيشية فإن هناك بانخفاض في معدل حدوث الإنفاق الصحي الكارثي مقارنة بشمال الضفة الغربية بمقدار 1.6 و 2.4 مرات حسب العتبات المحي الكارثي مقارنة بأسر التي تعيش في المناطق الريفية هي أكثر عرضة للإنفاق الصحي الكارثي مقارنة بأسر التي تعيش في المناطق الريفية هي أكثر عرضة للإنفاق المحي الكارثي مقارنة بأسر التي تعيش في المناطق الريفية هي أكثر عرضة للإنفاق الصحي الكارثي مارنة بأسل التي تعيش في المناطق الريفية مي أكثر عرضة الإنفاق المحي الكارثي مقارنة بأسر التي تعيش في المناطق الريفية هي أكثر عرضة الإنفاق المحي المحي الكارثي مقار مالم ما من في معدار حدوث الإنفاق الصحي الكارثي مقارنة بأسل التي تعيش في المناطق الرديفية مي أكثر عرضة لابنفاق المحي المناي ألم ما بين 46%. مر من الإنفاق علي الغال في الغال في المر التي معيش ما على الأول في الأسرة يخفض معدل حدوث الإنفاق الصحي الكارثي ما بين 46%. فرد عامل على الأول لي ألمر التي يامين.

## الخلاصة

إن الحماية من المخاطر المالية لا تزال غير كافية في كل من الضفة الغربية وقطاع غزة، وإن الأسلوب المعتمد على الرتبة في حساب الإنفاق الصحي الكارثي يمكن أن يكون الإطار العام من أجل الوصول للعدالة فيما يتعلق بالحماية من المخاطر الصحية المالية، كما أن وجود أفراد ممن يعانون من الأمراض المزمنة و/أو إعاقات في الأسرة يعد من العوامل المؤثرة في حدوث الإنفاق الصحى الكارثي.

إن هناك حاجة ملحة للتدخلات ذات الأهداف المحددة، وأيضاً للمزيد من التطوير في سلة الخدمات الصحية المقدمة للعديد من الفئات المهمشة والضعيفة، ولابد أن تكون استر اتيجيات الحد من المخاطر الصحية المالية التي قد تصيب الأسر متعددة نقاط الضعف كأولوية. يجب أن يكون هناك تعاون بين نظام تمويل الرعاية الصحية ونظام الحماية الاجتماعية، إضافة إلى تعزيز الشراكة بين النظامين واعتبارها أولوية لصانعي القرار لتحديد مستوى الدعم المتبادل للوصول للتغطية الصحية الشاملة لتحقيق منافع أكثر إنصافاً وملاءمة واستدامة في فلسطين. كما أن متابعة ورصد تغيرات الإنفاق الصحي الكارثي عبر الزمن تعتبر أمر مهم لضمان الحماية من المخاطر الصحية المالية في الضفة الغربية وقطاع غزة.

## Introduction

Financial protection is considered a crucial target of health systems, and is echoed in target 3.8 of the Sustainable Development Goals (SDGs): to "achieve universal health coverage (UHC), including financial risk protection, access to quality essential health care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all" (1). Financial protection is indicated by the provision of demanded healthcare services, without exposure to any financial hardship, for all individuals regardless of their socioeconomic conditions (1). UHC incorporates financial risk protection with affordability and equity in accessing essential services (2), thus UHC paves the way to meet the SDG targets (3,4). Financial risk protection can be measured using catastrophic health expenditure (CHE), which represents the level of out-of-pocket (OOP) health payments that threatens the financial capacity and the capability of households to keep the basic sustenance (5). OOP health expenditures indicated as the payments incurred by the households in order to use any health-related service with spectrum including preventive to palliative dimensions (6). High levels of OOP health payments can lead to financial catastrophe (6). CHE can lead to greater disparities and inequities, leading to significant strains for people and families (7). Therefore, protecting people from financial hardship that they may encounter as a result of the OOP payments in health care should be a priority (6).

Governments are concerned with protecting people from financial hardship that they may encounter as a result of the out-of-pocket (OOP) payments on health care (6). Sometimes the households' payments for health care can affect the accessibility and the utilization of health services and this can be reflected adversely on the overall wellbeing of the households (8). Moreover, the unexpected health payments incurred by the households can worsen the daily living standards and can lead to poverty especially among the already poor households (7). The resultant adverse effect is predominantly seen in poor rather than non-poor households (7) as it affects their capacity to pay for the healthcare services (9).

Globally, it has been reported that about 150 million people exceed the financial catastrophic threshold annually due to the direct healthcare payments in relation to the household's capacity to pay (10). Additionally, a study that included 116 countries was conducted and found that annual healthcare spending could push 100 million of people into poverty (10).

Globally, non-communicable diseases (NCDs) are considered a global epidemic and the leading cause of disability and mortality worldwide (11). There is sufficient evidence to conclude that NCDs increase the financial burden incurred by households seeking care (12). The economic burden imposed by the NCDs epidemic affects household budgets adversely and drives people to pay for health care costs – through out-of-pocket (OOP) payments – and consequently can push households below the poverty line (11).

Households may incur CHE not only due to expensive medical procedures or experiencing one costly incident, but rather because of frequent small payments paid over time (13). For instance, continual payment of medical expenses can push those with NCDs and disabilities into poverty (14–16). A cross-sectional analysis, which included six middle-income countries, published in 2015 found that the number of NCDs is positively associated with outpatient OOP health payments (17). A systematic review published in 2018 showed that in due to OOP payments, there is an increase in the likelihood of experiencing CHE and impoverishment for the households with NCDS (18).

Moreover, the WHO considers disability to be one of the global public health issues (19). Households with members with disabilities have been found to encounter higher levels of total health expenditures, OOP payments and burden in comparison to households with non-disabled members (20–22).

In Palestine, health payments have risen noticeably in the last decade (23). OOP spending by Palestinian households contributes the most to health expenditures and has been found to adversely affect access to care, especially the most

impoverished (23). The Palestinian Central Bureau of Statistics (PCBS) has approximated that the OOP expenses contribute by about 41.7% of the healthcare financing in Palestine (24). In Palestine, the incidence of CHE was 1.16% in 1998 which doubled by 2007 to reach 2.15% based on threshold of 40% of nonsubsistence expenditure of the household (25), based on data collected by PCBS using a series of annual expenditure and consumption surveys for (1998 and 2004– 7) (25).

## **Problem statement:**

This problem may be particularly pronounced among households with members with patients with NCDs or who demand lifelong medicines on daily basis and households with members with disability which can over-burden the households especially those beyond the poverty line. Analyzing CHE aids in identifying vulnerable groups in communities (22).

Given that CHE is an important indicator of financial risk protection, it is necessary to measure CHE and its distribution, and identify its determinants in Palestine while highlighting factors such as households with members with NCDs and/or disabilities. This will assist the policy-making process towards adequate financial risk protection, which is necessary to achieving universal health coverage in Palestine.

## Significance of study

To our knowledge, no previous studies were conducted in Palestine to determine the level of CHE among households in the West Bank and Gaza Strip separately relying on rank-dependent thresholds compared to fixed thresholds. To our knowledge, this is the first study, in Palestine, to consider the incidence of CHE among households with disabled members and/or patients with NCDs. The main purpose of this study is to determine the incidence of CHE based on rankdependent thresholds among Palestinian households with/without members with NCDs and/or disabilities. Also, this study will identify the determinants that expose the households to CHE in order to identify vulnerable groups. Moreover, the existence of NCDs and disabilities among household members can intensify the inequalities between poor and non-poor (26,27), thus it is worthwhile to study further the disparities of households with non-communicable diseases and disabilities incurring catastrophic health expenditure using the rank-dependent methodology which takes into consideration the socioeconomic gradient, as explained in the following sections.

## **Research questions**

## **Primary research questions**

- What is the incidence of CHE among households in the West Bank and the Gaza Strip?
- 2. Does the incidence vary among households with members with NCDs and/or disabilities compared with households with no members with NCDs or disabilities?
- 3. What are the determinants of CHE among households in the West Bank and the Gaza Strip?

## **Secondary research questions**

- 1. What is the difference in incidence of CHE relying on various fixed thresholds and various rank-dependent thresholds in the West Bank and the Gaza Strip?
- 2. Is there any statistically significant association between CHE and the studied sociodemographic characteristics in the West Bank and the Gaza Strip?

## **Chapter 1: Literature review**

## **1.1 Catastrophic health expenditure**

OOP expenditures, which constitute of all kinds of health-related payments covered when household members utilize healthcare services, are paid directly by households (28). These expenses include doctors' visits, medicines, covered services' copayments and hospital admission costs (28). Financial protection indicators rely on individuals' OOP expenditures on health care and comparing OOP to a predefined threshold based on measures of living standards (7). Catastrophic health expenditure (CHE) is indicated by OOP expenditure exceeding a certain fraction of household's financial ability to pay (29). CHE occurs when the OOP payment more than 10% or 25% of the total household income (6). Another definition by WHO indicates OOP of 40% or more of the household's capacity to pay (29). There is no consensus regarding the financial catastrophic threshold but the majority agreed to measure the CHE relying on the household's capacity to pay rather than household income (30,31).

The household's capacity to pay refers to the effective income resulting after subtracting expenses on subsistence needs (28). Effective income, which is based on a perspective of life cycle, is the achievable household's consumption level based on the assumption that a standard rate of discount is shared by all households (28). Therefore, the consumption expenditure reflects the purchasing power more accurately in comparison to the reported income in surveys targeting the households in several countries (29).

Another method, used to calculate CHE, had been developed by Ataguba and published in 2012 (32). CHE is estimated using various thresholds of non-food expenditure and of total expenditure (32). From an ethical point of view, it is important to ensure that the households' out-of-pocket health payments does not exceeds a certain fraction of the households' total income (7,32), with special consideration for the poor.

The main point enquired while calculating CHE is whether there is a specific threshold to rely on (32) and whether the chosen threshold be applied to all households regardless their income or expenditure. However, the discussion here is regarding varying the threshold of each household according to corresponding level of expenditure or income (32,33). Exceeding the threshold of z% of the household's income means that the household is incurring CHE. The argument here means that instead of using a fixed predefined threshold for every single household, the threshold should be increased with the increment of the household expenditure levels in the distribution (32). As in the Ataguba method, this threshold increases with an increase in the income of the household. Considering that even if a small portion of household expenditure is spent as health payments, the resulting effect is bigger in the poor households compared to the richer

households. Therefore, varied thresholds for households are needed (32,33). Given the deterioration of the Palestinian economy, the rise in the level of poverty (34) and the phenomenon of income inequality in Palestine (35), the use of such methodology of rank-dependent thresholds in order to capture the occurrence of CHE based on the socioeconomic status of households is even more pertinent. This is applied after the households are ranked in the order of the distribution of households' income. Households are ranked according to their income or capacity to pay and checked if the household exceeds the corresponding threshold. The rank-dependent thresholds are lower for households with lower income or expenditure and higher for the households with higher income/expenditure levels (32).

## **1.2 CHE in Palestine**

Similar to other developing countries, the recent epidemiological transition in Palestine, which is interlinked to lifestyle, diet and behavioral changes, has driven the rise in NCDs prevalence, morbidity and mortality (36,37). This led to the increase in the burden of NCDs locally (37). Additionally, Palestine is characterized by its complex political and economic context (38). Population health has been adversely affected by the long colonization and other challenges including the fragmentation of the Palestinian health system and the reliance on international aid (23,39). For instance, medicines payment by the Palestinian Ministry of Health (MOH) is exceeding marked prices of the international benchmark because of the restrictions on imports and the accumulated arrears not received by the suppliers hindering negotiation for better prices (23). This can be reflected on medicines targeting chronic illnesses such as hypertension, diabetes mellitus and cardiovascular diseases and can intensify the incidence of CHE. Furthermore, disabled members of the households have been found to encounter higher levels of total health expenditures, OOP payments and burden in comparison to non-disabled members (20–22). Health care needs and payments differ between individuals with disability according to the duration of disability (40). Locally, CHE has not been studied regarding households with members with NCDs and/or disabilities.

Few studies had studied CHE incidence in Palestine (25,41,42). One study published in 2010 studied the incidence and the intensity of CHE and the consequent impoverishment (25). It relied on fixed thresholds in calculating CHE, including threshold of 10% of total expenditure and 40% of non-food expenditure (25). It found that the proportion of households incurred CHE is 1% at the fixed threshold 40% of non-food expenditure in 1998 almost doubled by 2007 (25). It showed that between 11% and 13% of the surveyed households are pushed into deep poverty due to health expenditure (25). Another study examined the CHE incidence and determinants in Palestine in the period between 1996 and 2011, where calculating CHE relied on a fixed threshold of 10% of total expenditure (43). Results showed that CHE increased from 7.3% in 1996 to 8.2% in 2011 at the mentioned threshold (43). It studied some of the contributing socioeconomic and demographic factors of CHE (43). It found that CHE incidence is lower in the Gaza Strip than that of the West Bank and higher CHE incidence among dwellers of rural areas in the West Bank which can be attributed to difficult accessibility to healthcare services (43).

Additionally, another study relied on PCBS data collected in 2010 and published in 2013 measured CHE relying on the fixed threshold 40% of non-food expenditure and studied socio-economic and demographic categories of the households (41). It showed that the CHE incidence is in steady rise reaching 2.4% of the surveyed households (41). Also, it showed an increase in CHE incidence; that is 3.2%, among uninsured compared to 1.8% among insured households. Several socio-demographic characteristics can be considered as contributing factors of CHE in Palestine (41).

Furthermore, a comparison study, regarding catastrophic consequences between Egypt, Jordan and Palestine, was published in 2015 (42). This study used Expenditure and Consumption Survey 2010 dataset in Palestine to calculate CHE at 10% fixed threshold of total expenditure and at 40% fixed threshold of non-food

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expenditure (42). It showed that about 6.7% of the surveyed households incurred CHE at 10% of total expenditure and about 2% at 40% of non-food expenditure (42). And the CHE issue is found more prominent among affluent households in the three countries (42).

## **1.3 Determinants of CHE**

It has been found that certain types of households are more prone to experience CHE, and are thus identified as vulnerable households (16). Such vulnerable households may include but not limited to the households with disabled member/s, NCDs patients, and living in rural areas (16).

### **1.3.1 Determinants related to health**

#### **1.3.1.1** Presence of disabled member(s) in the household

The Universal Declaration of Human Rights provides the individuals with disability with the right to security in the harsh circumstances and events affecting their livelihood (44). A study conducted in Thailand showed that households with disabled members are at increased risk to incur CHE (45). In Thailand, half of the chronic patients and the individuals with disabilities are in older age groups ranging from 45 years to 59 years and more. The existing health care services provided there, to elderly, are still insufficient and are provided in public sector only. Another point is that the shifting towards aging population and nuclear families drives the elderly to live alone thus exposed to long-term care with an increase in the financial burden (45). Additionally, a study conducted in Turkey found that the risk of facing CHE is increased among households with disabled members (21). On the contrary, a study conducted in Burkina Faso had found that households with disabled member/s did not increase the likelihood of incurring CHE (46). Actually, the study conducted in Nouna District, in Burkina Faso, which is a low-income country, at the time when there is an insufficient institutional capacity which affected negatively organizing the risk-pooling at the national level and resources mobilization. This study was before the introduction of community-based health insurance. Additionally, it had been discussed that the result there may be connected to the working age groups of population, since the majority is working in the informal sector (46).

#### **1.3.1.2** Presence of NCDs patient in the household

Globally, NCDs are considered a global epidemic and the leading cause of disability and mortality worldwide (11). Addressing NCDs -which include hypertension, cardiovascular diseases and diabetes mellitus- adequately in the health system is required to achieve UHC (11). This is especially important since households with members with NCDs have been found to be more likely to incur CHE (47). These households are exposed to an increase in the ongoing payments for medicines routinely used, medical supplies, regular visits to follow up NCDs and any abrupt incidental payments due to NCDs-related complications or worsening that may lead to death (48).

The association between NCDs and CHE appears to also be incremental in nature, where a higher number of NCDs was found to be associated with increased risk of incurring CHE (49). Additionally, a study analyzed data from a nationally representative survey conducted with 12,240 households in Bangladesh in 2010, showed that 9.5% of households with NCDs incur CHE in comparison to 2.2% of the households with no diseases incurring CHE (50).

There is a connection between NCDs and disabilities. For instance, diabetes mellitus is one of the NCDs which is strongly associated with increased risk of physical disability (51–53). A study conducted in Mauritius and published in 2018 showed that diabetic patients are 67% at higher risk of disability (54). A nation-wide study conducted in Australia in 2009, with study sample of those aged over fifty years and a response rate of 45.7%, showed that the patients with NCDs and had physical and mental disabilities are more prone to encounter unaffordable out-of-pocket health payments (55).

## **1.3.2 Demographic characteristics**

Research showed an association between some demographic characteristics and CHE (16).

#### **1.3.2.1** Head of the household characteristics

Characteristics of the head of the household, which had been under study in relation to CHE, include the gender, marital status, educational level of the head of the household and the refugee status. Households with a male head of household and higher level of education were found to be more protected from CHE (16,56). This can be attributed to the better living conditions of households with male heads (56). Moreover, the educational attainment of the head of the household is connected to the financial burden for healthcare (16). The burden increases among households with a household head with lower educational attainment (16). Communication attitudes toward wellbeing and the related behaviors are reflected by the households' head educational attainment.

Studies included the marital status of the household head as one of the CHE determinants and found that households headed by not married are more likely to experience CHE (57,58).

Furthermore, a refugee is a person who left their country because of wars, persecution or violent circumstances as defined in the 1951 Refugee Convention (59). A study of Syrian refugee in Egypt had been published study in 2017 (60). It measured CHE among them and showed variation in the incidence of CHE according to the measurement used and the thresholds. Highlighting this issue is important as the resultant health-related and healthcare-seeking behaviors and

the coping strategies may contribute in increase in their financial health burden. Therefore, in this regard, comparison between refugees and non-refugees is worthwhile.

#### **1.3.2.2 Employment status**

Studies conducted to understand the determinants of CHE used the employment status of the household head (31), categorizing occupation (into agriculture, business, self-employed, etc) (21), or having whether permanent or temporary jobs (61). A study conducted in Kenya slum communities included the number of working members in the household as one of the studied determinants of CHE (5). This study found that there was an inverse relationship between number of working individuals in the households and incurring CHE (5). Presence of at least two working members in the household resulted in 1.2 times reduction in CHE incurrence in Kenya slum communities (5). In this thesis, the number of the working household members in the household is studied as a variable in this regard.

#### 1.3.2.3 Family size

Several studies showed the relation between CHE and household size (22,46,58,62–67). This significant association is mostly negative (22,58,62,63) while other studies showing positive significant association (46,64–67). A study conducted in China in 2018 relying on longitudinal data (1991-2015) showed that the smaller the household size, the higher incidence of CHE at various thresholds

(68). In Viet Nam, it showed that larger household size is associated with reduction in CHE occurrence (62). No significant association is found between CHE and household size in few studies (21,69–71).

#### **1.3.2.4** Rural/urban disparities

A study conducted in a rural area in Vietnam, Chi Linh district which is undergoing urbanization, in 2016 to distinguish the socioeconomic inequalities of CHE (72). The authors found that poor households with members reported NCDs are more exposed to CHE either in urban or rural areas (72). Additionally, a research article, published in 2010, studied the CHE level and the household factors in Turkey found that the rural households are 2.5 times highly exposed to CHE than urban households (21). Also, higher proportions of households located at rural areas than households in urban areas incurred CHE in Bangladesh (50).

### **1.3.2.5 Health insurance**

Several studies examine the effect of health insurance on catastrophic health payments; thus, health insurance schemes provide financial protection against CHE and consequently reduce poverty (21,73–75). Several studies considered health insurance as a proxy for health financial-risk dispersion and were conducted to study the effect of health insurance on CHE. Several studies in China were conducted and showed variety in the findings in this regard. For instance, a study published in China in 2016 studied the effect of New Cooperative Medical Scheme (NCMS) on household's CHE on tuberculosis-related services and found limited effect of protection from CHE (74). Furthermore, a study conducted in Turkey in 2006 found that health insurance is protective against CHE when compared to other countries (21). Additionally, community-based health insurance and National Health Insurance in India and Ghana, respectively, showed protective effects against experiencing CHE (74,75).

However, another perspective adopted the idea that health insurance may shift the healthcare seeking behaviors of those insured toward seeking healthcare services in higher-level medical centers (which provide higher cost services) when compared to the healthcare seeking behaviors of the uninsured, thus increasing the likelihood of incurring CHE (76). In this regard, a study conducted in China and published in 2008 found that the risk for CHE increased among those subscribed to health insurance when compared to those uninsured because of the healthcare seeking behaviors' shifts among insured that drive them to seek the services at higher-level medical centers (76). Another study conducted in China in 2014 had showed the failure of NCMS to prevent CHE among insured households despite the high coverage of health insurance of more than 95% (77). In low-income countries, members with diabetes mellitus are more likely to face CHE and they often cannot treat diabetes because they lack the appropriate medications despite subscribing to a health insurance scheme (78).

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## **Chapter 2: Methodology**

## 2.1 Study design

This is a quantitative study consisting of statistical analysis of secondary data from the 2018 Socio-economic Monitoring of the Palestinian Households' Survey, which is conducted by the Palestinian Central Bureau of Statistics (PCBS).

## 2.2 Study area and population

The data collected covered both the West Bank and Gaza Strip and is representative for all areas in West Bank and Gaza Strip on the governorate and type of locality level (79). This survey aims for addressing social and economic indicators' estimation. It covers demographic characteristics of the household's members, housing characteristics, household income and expenditure and other socio-economic-related characteristics (79).

## 2.3 Study sample and sampling

This study involves three-stage stratified cluster systematic random sampling. It included 11,008 households with a response rate of 90.2% (9,926 households [(5,898) in the West Bank and (4,028) in Gaza Strip)] (79). Large sample data is better analyzed quantitatively.

## **2.4 Data collection**

Data collection was conducted using a structured interview questionnaire. Data collection began in the West Bank and Gaza Strip on 27/08/2018 and was completed on 09/10/2018. The unit of analysis which is consistent with the study's purpose is "the household" (79).

Data collected included characteristics of the head of the households, sex, health insurance type, non-communicable diseases among family members (Diabetes, Hypertension (HTN) and cardiovascular diseases), family members with any disabilities, level of education, current occupation, and income (for each family member and total for household) (79). The survey includes the mean monthly income of the households and the mean monthly expenditures of the households which reflect direct measurement of the living standards (79). It has been shown that consumption is preferable for the developing countries according to the theoretical and practical aspects (80).

## 2.5 Study measures and variables

#### 2.5.1 Dependent variable

#### **Catastrophic health expenditure**

In this study, as opposed to the traditional approach of WHO and World Bank, this study applies Ataguba method (80), which adjusts CHE measurement for vertical equity and enables adjustment for the diminishing marginal income utility.

$$Z'cat = y(1-p)^{(y-1)} Zcat, \quad 0 < y < 1$$

Where y is the inequality aversion parameter ((e.g., 0.8) as used in Ataguba study (80), p is the percentile of each household (ranked from poorest to richest) Zcat: the initial thresholds used (5%, 10%, 15%, 20% and 25%) of total household expenditure and (20%, 30% and 40%) and of non-food expenditure. These thresholds are the fixed thresholds. Moreover, Z'cat indicates rank-dependent thresholds.

Equivalent household size (*Equiv hh size<sub>h</sub>*) is calculated for each household size. The use of equivalent scales in such cases is that it takes into consideration the number of members and the age of households' members. The scale used here is the OECD-modified scale which is proposed by Haagenars (81). The head of household's value is 1, for each member in adulthood the value is 0.5 and for each child, the value is 0.3.

Equivalent food expenditure is calculated

$$Food \ Exp_{h} = \frac{Food_{exph}}{total \ exp_{h}}$$

$$Food \ Equiv \ Exp_{h} = \frac{Food \ Exp_{h}}{Equiv \ hh \ size_{h}}$$

Where  $Food_{exph}$  is the food expenditure of the household.

It is noted that for the households in which their food expenditure surpasses their total expenditure, these households are defined as poor households. In case of the poor households, poverty line should be determined. Equivalent per capita subsistence expenditure will represent the poverty line (*PL*) in this study. The average equivalent food expenditure which lies between 45 and 55 percentiles of food payments.

The capacity to pay represents the total expenditure or the non-subsistence expenditure.

 $Subsistence_{exph} = PL \cdot Equiv hh size_h$ 

 $NonfoodExp_h$ 

$$= \begin{cases} total \exp_{h} - Subsistence_{exph} & if Subsistence_{exph} \leq Food_{exph} \\ total \exp_{h} - Food_{exph} & if Subsistence_{exph} > Food_{exph} \end{cases}$$

Where  $NonfoodExp_h$  is the non-food expenditure of the household

Then the ratio of  $OOP_h$  to  $NonfoodExp_h$  of  $OOP_h$  to  $total exp_h$  is used to determine the incurrence of CHE of non-food expenditure and of total expenditure of the household, respectively. Then the catastrophic health payments calculated is of total expenditure and of non-food expenditure. This occurs when the out-of-
pocket health payments exceed the rank-dependent thresholds or fixed thresholds of non-food expenditure (20%, 30% and 40% as initial thresholds) and of total expenditure (5%, 10%, 15%, 20% and 25% as initial thresholds) as the following equations, respectively:

$$Cata_{h} = \begin{cases} 0 \ if \ \frac{OOP_{h}}{total \ exp_{h}} \ or \ \frac{OOP_{h}}{NonfoodExp_{h}} < Z'cat \\ 1 \ if \ \frac{OOP_{h}}{total \ exp_{h}} \ or \ \frac{OOP_{h}}{NonfoodExp_{h}} \ge Z'cat \end{cases}$$

$$Cata_{h} = \begin{cases} 0 \ if \ \frac{OOP_{h}}{total \ exp_{h}} \ or \ \frac{OOP_{h}}{NonfoodExp_{h}} < Zcat \\ 1 \ if \ \frac{OOP_{h}}{total \ exp_{h}} \ or \ \frac{OOP_{h}}{NonfoodExp_{h}} < Zcat \end{cases}$$

Where  $Cata_h$  is the household catastrophic health incidence,  $OOP_h$  refers to the out-of-pocket health payments of the household,  $total exp_h$  is total expenditure of the household,  $non-food exp_h$  is non-food expenditure of the household The main principle used in this thesis implies generation of different thresholds for various levels of income of the households using statistical weights. These thresholds are applied to PCBS data.

In this study, the methodology proposed by Xu et al in 2003 is used to calculate CHE based on fixed thresholds (29) for further comparison with CHE of the rankdependent thresholds. This method is based on the concept of 'capacity to pay' (29). The household's OOP health spending is identified as catastrophic when the spending exceeds a predetermined threshold of the household's capacity to pay (29). The OOP payment is catastrophic when the threshold level of 40% or more of the household's capacity to pay as defined by WHO (29) is reached. The threshold of 40% of the capacity to pay has been used in a study included 59 countries (2003) (29) and in a study published in 2010 measuring the incidence of CHE across time in Palestine (25) thus enabling the comparisons of the measures across countries and across time.

### **2.5.2 Independent variables**

The following table summarizes the main independent variables that have been included in the analyses for this study.

Independent variable	Description	Variable type
Households with members with/without NCDs (Diabetes, Hypertension and cardiovascular diseases) and/or disability	<ul> <li>Households with members do not have NCDs or disability</li> <li>Households with at least one member with NCDs only</li> <li>Households with at least one member with disability only</li> <li>Households with members with both NCDs and disabilities</li> </ul>	Categorical

Independent variable	Description	Variable type					
Demographic characteristics							
	Gender: male/female	Categorical (binary)					
	Marital status: married/non-married	Categorical (binary)					
	Educational attainment: Less than secondary/Secondary or higher	Categorical (binary)					
Head of the household characteristics	<ul> <li>Number of working members:</li> <li>no working member in the household</li> <li>one working member in the household only</li> <li>at least two working members in the household</li> </ul>	Categorical					
Family size	Number of households members	Continuous					
West Bank regions	North West Bank/Middle West Bank/South West Bank	Categorical					
Locality type Urban/rural/camps		Categorical					
Insurance type No health insurance/govern Insurance type UNRWA insurance/ others		Categorical					
Refugee status Not refugee/refugee		Categorical (binary)					

### **2.6 Statistical analysis**

Based on a review of the literature, multivariate regression models are consistently used to examine the effect of key determinants on CHE. A study, which included 51 countries' datasets in the analysis, employed multilevel regression models to identify the associated contributing factors of CHE at the household and the country levels (16). In Burkina Faso, multivariate logistic regression models were employed relying several CHE thresholds to examine the determinants of CHE where households with members with NCDs, when controlling for other variables, were 3.3 to 7.8 times more likely to incur CHE at thresholds level between 20% and 60% of non-food expenditure (46).

Also, linear regression models were applied in the study to examine the likelihood of NCDs attributed CHE in Bangladesh (50). In a study conducted in West Bengal, India, in which the aim was to identify the odds ratio of experiencing CHE according to several health care need types, which included: chronic illness, ambulatory care, hospitalization and delivery, a simple logit model had been employed. This study found that the highest relative risk is among households with members with NCDs, controlled for the other variables. The results of the study implied that the NCDs impose a continuous stress on these households resulting in impact accumulation which can surpasses the shocks resulting from demanding an acute healthcare (67). Another study conducted in Bogota, Colombia used a probit binary response model was to identify the factors of incurring CHE, which was used as dummy variable determined relying on 20% threshold of household's payments capacity. The independent variables are tested for statistically significant association with the

dependent variable by bivariate analysis and then the variables with statistically significant association and with theoretical relevance were selected (82).

A study conducted in Australia among elderly aged 50 years or more relied on multivariate ordinal logistic model to examine the determinants of CHE among older Australian (55). Another study conducted in Turkey analysed variables in bivariate analysis then the statistically significant associated independent variables with the dependent variable, that is CHE as dichotomous variable, are assessed simultaneously in logistic regression model (21).

In a study conducted in China, the ordinary least square and logistic regression modelling were employed. The determinants were examined where CHE threshold used was 40% of non-food expenditure among the households with elderly and who reported having NCDs. This study calculated the concentration index, which controls for the diminishing marginal utility of income, to measure the distribution of CHE among mentioned group (83).

Another study in Malawi relied on multilevel binary logistic regression to examine the determinants of CHE, measured at 40% of non-food expenditure and at 10% of total household expenditure (84). Another study conducted in Malawi measured CHE at 40% of non-food expenditure and the extent of socioeconomic inequality was assessed relying on 'the Erreygers corrected concentration index' and then the decomposition analysis was employed to estimate the contribution of each factor of

CHE to the socioeconomic inequality in total (85). In a Portuguese study multivariate logistic regression was employed to identify the determinants of CHE which was measured at 40% threshold of non-food expenditure and other fixed thresholds (86). Additionally, a cross-sectional study conducted in Kenya and relied on national datasets in 2007 and 2013 employed a logistic regression model to identify the contributing factors of CHE. This study used the concentration index to assess the extent of socioeconomic inequalities in CHE incidence which is then decomposed to estimate the relative contribution of each determinant of CHE in Kenya (87).

Multilevel logistic regression model was employed considering examining for CHE determinants at two levels, which include urban and rural areas in Bangladesh, at 10% threshold of total expenditure and at 25% threshold of non-food expenditure (88). The use of an appropriate multilevel model has been justified by the provision of efficient estimates thus the bivariate analyses and the two-level random intercept binary logistic regression model were employed to examine the determinants of CHE in rural areas in Bangladesh (89). Furthermore, a study conducted in Bangladesh relied on Poisson regression models to identify determinants of CHE at 40% of the household's capacity to pay (90). Another study in Bangladesh showed relied on multiple logistic models to examine the contributing factors of CHE at 40% of non-food expenditure and at 10% of total expenditure (91).

#### Analysis for this study:

In this study, the main outcome of interest in this study is catastrophic health expenditure. All the analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 26. The analysis includes both the West Bank and the Gaza Strip. It is noteworthy that the geographical divisions aggravated by the political conditions of the past years producing two separate de facto health care systems in the West Bank and the Gaza Strip (92), motivates tackling equity features associated with each system separately.

We began with descriptive analysis to examine the incidence of CHE and sample characteristics. CHE was calculated based on different thresholds and different values for the inequality aversion parameter. The sensitivity analyses of CHE incidence relying on different values of inequality aversion parameter have been reported in Annex 1 and Annex 2. Then, the analysis continued with descriptive analysis by running frequency distributions for the dependent and the independent variables (presence of members with NCDs and/or disabilities, head of the household characteristics, household size, locality type and health insurance type) to understand the characteristics of the sample.

Then bivariate analysis was conducted using chi-square test to compare each independent variable with the dependent variable (CHE at 40% rank-dependent threshold of non-food expenditure and CHE at 25% rank-dependent of total expenditure) and determine the statistically significant associations. Given that

logistic regression models are commonly used in the literature and our interest in looking at CHE as a binary outcome for households, we opted for multivariate analysis using logistic regression models. The analysis was conducted to determine the effect of the key independent variables on the odds of CHE (determinants of CHE). Variables not found to be associated with the outcome variable (at p<0.10) will be excluded from the multivariate analysis, unless they are considered to be important control variables based on the literature.

# **Chapter 3: Results**

### **3.1 Sample characteristics**

Univariate analysis of the sample showed the distribution of households between the West Bank and the Gaza Strip as indicated in Table 1. The sample includes a total of 9937 households, 59.4% of the households are located in the West Bank and 40.6% of the households are located in the Gaza Strip.

In the West Bank, 90% of household are headed by male, and 10% of households are headed by female. In the Gaza Strip, 90.9% of household are headed by male, and 9.1% households are headed by female. In the West Bank, 64.6% of household heads are with less than secondary educational attainment and 35.3% of household heads are secondary or higher. In the Gaza Strip, 52.9% of household heads are with less than secondary educational attainment to 47.1% of household heads with secondary or higher educational attainment. In the West Bank, 89.7% of household heads with secondary or higher educational attainment. In the West Bank, 89.7% of household heads are married and 10.3% are not married. In the Gaza Strip, 91.6% of household heads do not have working members, 59.8% have one working member only and 25.8% with at least two working members. In the Gaza Strip, 38.9 % of the households do not have any working members.

About 42.2% of households reside in the North West Bank, 27.2% of households reside in the Middle West Bank and 30.6% reside in the South West Bank. In the West Bank, 69.2% of the surveyed households reside in urban localities, 24.4% reside in rural areas and 6.5% in camps. In the Gaza Strip, 84.8% of the surveyed households reside in urban and 15.2% camps. In the West Bank, 25.6% of the households are headed by an officially registered refugee and 74.4% are headed by a non-refugee. On the other hand, in the Gaza Strip, 63.1% of the households are headed by registered refugee and 36.9% of the households are headed by a non-refugee. In the West Bank, the average household size is 4.74 (SD 2.292), while in the Gaza Strip is 5.62 (SD 2.754). In the West Bank, 59.3% of households do not have members with NCDs (hypertension, diabetes, or high cholesterol) or disability, 18.1% have members with NCDs only, 8.4% of the households have members with disability only and 14.2% of the households have members with NCDs and disabilities. In the Gaza Strip, 47.1% of households have no members with NCDs or disability, 14.8% have at least one member with NCDs only, 16.9% of the households have at least one member with disability only and 21.2% of the households have at least one member with NCDs and disabilities.

In the West Bank, 30.3% of households' heads have no health insurance, followed by 38.6% who have governmental health insurance, 12.2% with UNRWA health insurance, 10.8% who have both governmental and UNRWA health insurance and

8.1% who have other types of health insurance. In the Gaza Strip, 5.8% of households' heads have no health insurance, followed by 26.1% who have governmental health insurance, 16.9% with UNRWA health insurance, and 50.4% who have both governmental and UNRWA health insurance.

Table	e 1:	Sampl	le char	acteristics
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Variable		Statistical summary					
variable	West Bank	Gaza Strip					
Region	5904(59.4%)	4033(40.6%)					
Demographic characteristics:							
Housebold bead's gender	Male	5313(90%)	3664(90.9%)				
nousenoiu neau s genuei	Female	591(10%)	369(9.1%)				
Household head's educational	Less than secondary	3816(64.6%)	2132(52.9%)				
level	Secondary or higher	2087(35.4%)	1901(47.1%)				
Household bood's marital status	Married	5293(89.7%)	3693(91.6%)				
Household flead s filantal status	Not married	610(10.3%)	340(8.4%)				
	Do not have working	947(14 20/)	1570(28.0%)				
Monthing month and	members (Ref)	847(14.3%)	1370(38.9%)				
working members	One working member only	3532(59.8%)	2025(50.2%)				
	At least 2 working members	1524(25.8%)	438(10.8%)				
	North WB	2493(42.2%)	-				
West Bank regions	Middle WB	1603(27.2%)	-				
	South WB	1808(30.6%)	-				
	Urban	4085(69.2%)	3418(84.8%)				
Locality type	Rural	1438(24.4%)	-				
	camps	381(6.5%)	615(15.2%)				
Define a statue	Not refugee	4391(74.4%)	1490(36.9%)				
Refugee status	Refugee	1513(25.6%)	2543(63.1%)				
Total household size		4.74(2.292)	5.62(2.754)				
Health-related characteristics:							
	No NCDs or disability in the	2400/50 20/)					
	household	3499(59.3%)	1900(47.1%)				
	NCDs member/s only in the	1000(18 19/)	F07(14 80/)				
Households' chronic	household	1069(18.1%)	597(14.8%)				
diseases/disability status	Disabled member/s in the	AOE (9 A9/)	680(16.0%)				
	household	495(6.4%)	080(10.9%)				
	Both NCDs and disability	8/1/1/ 7%)	856(21.2%)				
	present in household	041(14.270)					
	No insurance	1786(30.3%)	235(5.8%)				
	PA only	2278(38.6%)	1051(26.1%)				
Health insurance categories	UNRWA only	721(12.2%)	680(16.9%)				
	PA+UNRWA	639(10.8%)	2034(50.4%)				
	others	480(8.1%)	-				

As indicated in Table 2, there is a variation in the incidence of households' CHE according to the initial threshold ranging from 20% to 40% of non-food expenditure and from 5% to 25% of total expenditure in both the West Bank and the Gaza Strip. In the West Bank, the incidence of rank-dependent CHE is higher than in fixed thresholds. For instance, CHE incidence at threshold of 20% of non-food expenditure is 10.2% at fixed threshold and 11.9% at rank-dependent threshold. These proportions decrease with increasing the fixed and rank-dependent thresholds of non-food expenditure; reaching 1.9% at 40% of non-food expenditure and 3.1% of the rankdependent 40% threshold. Furthermore, the incidence of CHE is 36.6% at 5% fixed threshold of total expenditure and 37.7% at 5% rank-dependent threshold of total expenditure. CHE incidence decreases with increasing the threshold. About 15.5%, 8.1%, 4.7% and 3% of the households suffered CHE at 10%, 15%, 20% and 25% fixed thresholds of total expenditure, respectively, while about 17.8%, 9.6%, 5.9% and 3.7% of the households incurred CHE at 10%, 15%, 20% and 25% rank-dependent thresholds of total expenditure.

	CHE of non-food expenditure (n) (%)			CHE of total expenditure (n) (%)				
Threshold	20%	30%	40%	5%	10%	15%	20%	25%
West Bank								
Fixed	602	283	112	2150	917	478	278	177
threshold	10.2%	4.8%	1.9%	36.6%	15.5%	8.1%	4.7%	3%
Rank- dependent threshold	699 11.9%	360 6.1%	183 3.1%	2216 37.7%	1049 17.8%	567 9.6%	344 5.9%	219 3.7%
Gaza Strip								
Fixed	327	140	60	1342	598	297	162	92
threshold	8.1%	3.5%	1.5%	33.4%	14.8%	7.4%	4%	2.3%
Rank- dependent threshold	379 9.4%	159 4%	82 2%	1394 34.7%	636 15.8%	336 8.4%	183 4.6%	105 2.6%

Table 2: CHE incidence in the West Bank and the Gaza Strip at various fixed and rankdependent thresholds

As presented in Table 2, CHE incidence in Gaza Strip is lower at all fixed or rankdependent thresholds of non-food expenditure or total expenditure, when compared to the incidence in the West Bank. In the Gaza Strip, CHE incidence is 8.1% at 20% fixed threshold of non-food expenditure and 9.4% at 20% rank-dependent threshold of non-food expenditure. The incidence decreases to 3.5% and 1.5% at 30% and 40% fixed threshold of non-food expenditure, and to 4% and 2% at 30% and 40% of rankdependent threshold of total expenditure. CHE incidence is 33.4% at 5% fixed threshold of total expenditure and 34.7% at 5% rank-dependent threshold of total expenditure. About 14.8%, 7.4%, 4% and 2.3% of households incurred CHE at 10%, 15%, 20% and 25% fixed threshold of total expenditure, respectively. About 15.8%, 8.4%, 4.6% and 2.6% of households incurred CHE at 10%, 15%, 20% and 25% rankdependent threshold of total expenditure, respectively.

#### **3.2** Bivariate analysis findings

Bivariate analysis, using Chi-square analysis, was applied to test the association between the dependent variables and the independent variables and presented in Table 4.

Regarding households with NCDs and/or disability, as indicated in Table 3, there is statistically significant association between NCDs and disability status of households' members and rank-dependent CHE at 40% of non-food expenditure and 25% of total expenditure in the West Bank (p<0.001) and the Gaza Strip (p<0.01).

A higher proportion of households incurring rank-dependent CHE (9.8% and 9.4%) at 40% of non-food expenditure and 25% of total expenditure, respectively, is found in households with both patients with NCDs and disabilities in the West Bank compared to 2.8% and 2.7% of households with both conditions in the Gaza Strip. The highest proportions (3.2% and 4.7%) of households incurring rank-dependent threshold at both thresholds, respectively, are among households with disabled members only (without NCDs). In the West Bank, incurring rank-dependent CHE, among households with at least one member with chronic disease/s only, is higher (3.4% and 4%) at 40% of non-food expenditure and at 25% of total expenditure when compared to 1.2% and 2% of the households, residing in the Gaza Strip, of the same category incurring CHE

at the mentioned thresholds, respectively. Lowest incidence of CHE is found among households with no members with disability or patients with NCDs in the West Bank and the Gaza Strip. In the West Bank, CHE incidence is 1.3% and 1.8% at 40% rankdependent threshold of non-food expenditure and at 25% rank-dependent threshold of total expenditure, respectively, while compared to 1.5% and 2% in the Gaza Strip at the same corresponding rank-dependent thresholds, respectively. The incidence of rank-dependent CHE at 40% threshold of non-food expenditure and 25% of total expenditure in the West Bank and the Gaza Strip according to the household status regarding presence of household member/s with chronic disease and/or disability is presented in Table 3. Table 3: Incidence of CHE at 40% threshold of non-food expenditure and 25% of total expenditure in the West Bank and the Gaza Strip according to the household status regarding presence of at least one household member with NCDs and/or disability

	West	Bank	Gaza Strip				
	CHE of non- food expenditure at 40% threshold	CHE of total expenditure at 25% threshold	CHE of non- food expenditure at 40% threshold	CHE of total expenditure at 25% threshold			
Households with no							
members with NCDs	1.3%***	1.8%***	1.5%**	2%**			
or disability							
Households with at							
least one member	3.4%***	4%***	1.2%**	2%**			
with NCDs only							
Households with at							
least one member	4.4%***	6.5%***	3.2%**	4.7%**			
with disability only							
Households with							
NCDs and disability	9.4%***	9.8%***	2.8%**	2.7%**			
*p-value<0.05; **p-value<0.01; ***p-value<0.001							

In the West Bank and Gaza Strip, regarding household head's characteristics, there is statistically significant association between household head's characteristics (gender, marital status and educational level) and the calculated CHE at 40% of non-food expenditure threshold and 25% of total expenditure threshold (p<0.01), whereby households headed by women, an unmarried household head, and a household head with less than secondary educational attainment are statistically more likely to incur CHE at both thresholds. Both in the West Bank and the Gaza Strip, there is a

statistically significant inverse association between number of working members in the household (p<0.01) with CHE at 40% threshold of non-food expenditure and 25% threshold of total expenditure, that is the incidence of CHE decreases with more working members in the household.

In the West Bank, there is statistically significant association between households in the north, middle and south West Bank at rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure. About 3.3% of the households, located in the middle West Bank, incurred CHE at 40% rank-dependent threshold of non-food expenditure and about 4.4% of households, located in the south West Bank, incurred CHE at the same rank-dependent threshold when compared to 2% of households located in the north West Bank incurred CHE at the same rank-dependent threshold. Furthermore, about 3.4% of the households, located in the middle of West Bank, incurred CHE at 25% rank-dependent threshold of total expenditure and about 5.3% of households, located on the south West Bank, incurred CHE at the same rankdependent threshold when compared to 2.8% of households located in the north West Bank incurred CHE at the same rank-dependent threshold.

In the Gaza Strip, there is statistically significant association between households residing in rural areas and camps and the calculated CHE at 40% threshold of non-food expenditure and 25% of total expenditure, whereby households residing in camps are more likely to incur CHE at both thresholds. On the other hand, in the West Bank,

there is no statistically significant association between household locality type and the CHE at both thresholds.

In the West Bank, there is statistically no significant association between refugee status of household head and incurring CHE at threshold of 40% of non-food expenditure and at 25% of total expenditure. In the Gaza Strip, there is no statistically significant difference between refugee status of household head and incurring CHE at the 40% of non-food expenditure threshold, however there is statistically significant association at the 25% of total expenditure threshold as shown in Table 4.

CHE incurrence among households headed by members who have governmental health insurance, in the West Bank, is 4.3% and 5.3% of rank-dependent 40% of non-food expenditure and rank-dependent 25% of total expenditure, respectively. These proportions are almost double that of incurring CHE in the Gaza Strip at the same thresholds, 2.2 and 2.9%, respectively, as shown in the table of bivariate analysis findings.

In the West Bank, UNRWA health insurance is ranked the second among other health insurance categories. About 3.2% of households incurred CHE at rank-dependent 40% threshold of non-food expenditure and 2.9% at rank-dependent 25% threshold of total expenditure. When compared to the Gaza Strip, these proportions are about double; 1.2% and 1.8% of the households in Gaza Strip incurred CHE at 40% rank-

dependent threshold of non-food expenditure and at 25% rank-dependent threshold

of total expenditure.

Variable		West	Bank	Gaza Strip		
		CHE incidence	CHE incidence	CHE incidence	CHE incidence	
		at 40% non-	at 25% total exp	at 40% non-	at 25% total exp	
		food exp		food exp		
Household head's	Male	119(2.2%)	152(2.9%)	65(1.8%)	86(2.4%)	
gender	Female	64(11%)***	67(11.5%)***	17(4.7%)***	19(5.2%)**	
Household head's	Less than	162(4.3%)	187(4.9%)	60(2.8%)	71(3.3%)	
educational level	secondary					
	Secondary or	21(1%)***	32(1.5%)***	22(1.2%)***	34(1.8%)**	
	higher					
marital status	Married	117(2.2%)	150(2.8%)	62(1.7%)	83(2.3%)	
	Not married	66(10.9%)***	69(11.4%)***	20(6%)***	22(6.5%)***	
Working members	Do not have	107(58.5%)	105(47.9%)	51(62.2%)	65(61.9%)	
	working					
	members (Ref)					
	One working	64(35%)***	91(41.6%)***	26(31.7%)***	36(34.3%)***	
	member only					
≥ 2 working		12(6.6%)***	23(10.5%)***	5(6.1%)***	4(3.8%)***	
	members					
West Bank regions	North WB (Ref)	51(2%)	70(2.8%)			
	Middle WB	53(3.3%)***	54(3.4%)***			
	South WB	79(4.4%)***	95(5.3%)***			
Locality type	Urban (Ref)	118(2.9%)	153(3.8%)	59(1.7%)	79(2.3%)	
	Rural	55(3.8%)**	57(4%)			
	camps	10(2.6%)	9(2.4%)	23(3.7%)**	26(4.2%)**	
Refugee status of	Not refugee	146(3.3%)	177(4.1%)	37(2.5%)	30(2%)	
household head	(Ref)					
Refugee		37(2.4%)	42(2.8%)	68(2.7%)	52(2.1%)	
Total household size+		2.9(1.891)***	3.2(2.053)***	3.74(2.287)***	3.76(2.293)***	
Health insurance	No insurance	38(2.1%)	51(2.9%)	5(2.2%)	5(2.2%)	
categories	PA only	98(4.3%)* <sup>*</sup>	120(5.3%)***	23(2.2%)	30(2.9%)	
	UNRWA only	23(3.2%)	21(2.9%)	8(1.2%)	12(1.8%)	
	PA+UNRWA	15(2.4%)	19(3%)	46(2.3%)	58(2.9%)	
	Others	9(1.9%)	8(1.7%)			

† Independent-samples T test: mean(SD); \*p<0.05 \*\*p<0.01 \*\*\*p<0.001</pre>

### 4.3 Multivariate analysis results

As indicated in Table 5, our multivariate analysis of the West Bank data indicated statistically significant associations between the household head's educational level, the number of working members in the household, West Bank regions, household size, NCDs and disability status of household members and health insurance and rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure (p<0.05). In the Gaza Strip, the multivariate analysis showed statistically significant associations between locality type, household size and households with at least one disabled member and rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure (p<0.05).

In the West Bank, when household size increases one unit, the odds of incurring CHE at threshold 40% of non-food expenditure decreases by about 28% [OR 0.720; p<0.001] and at threshold 25% of total expenditure the odds decrease by 25.1% [OR 0.749; p<0.001]. In the Gaza Strip, when household size increases one unit, the odds of incurring CHE at threshold 40% of non-food expenditure decreases by 29.2% at both thresholds [OR 0.708; p<0.001].

In the West Bank, households with one working member only are 62% [OR 0.380; p<0.001] less likely to incur CHE at 40% non-food expenditure and are 46.5% [OR 0.535; p<0.01] less likely to incur CHE at 25% of total expenditure, compared to households which do not have working members. The likelihood of incurring CHE at

both thresholds decreases by 79.5% [OR 0.205; p<0.001] and 62% [OR 0.370; p<0.001] among households with at least two working members at 40% non-food expenditure and 25% of total expenditure, respectively, when compared to households not having working members. Regarding the Gaza Strip, no statistically significant association between number of working members in the household and incurring CHE at calculated threshold.

There is an increase in the likelihood of incurring rank-dependent CHE in the south West Bank by about 2.394 times at 40% of non-food expenditure [OR 3.394; p<0.001] and by about 1.593 times at 25% of total expenditure [OR 2.593; p<0.001] when compared to likelihood of CHE incurrence in the north West Bank at both thresholds. In the West Bank, households residing in rural areas are 67.4% [OR 1.674; p<0.01] more likely to incur rank-dependent CHE at 40% of non-food expenditure compared with urban localities. On the other hand, in the Gaza Strip, households residing in camps are 1.642 times [OR 2.642; p<0.01] more likely to incur CHE at 40% of non-food expenditure and 1.125 [OR 2.125; p<0.01] more likely to incur CHE at 25% of total expenditure compared with urban localities.

In the West Bank, households with at least one member with an NCD are 1.032 times more likely to incur CHE at 40% of non-food expenditure threshold [OR 2.032; p<0.01] than households with no chronic disease patients or disabled members in the households, and 1.052 times more likely to incur CHE at 25% of total expenditure

threshold [OR 2.052; p<0.01] than their counterpart with no members with NCDs or disability. Households with disabled members only are 1.704 times more likely to incur rank-dependent CHE at 40% non-food expenditure and are 2.490 times more likely to incur rank-dependent CHE at 25% of total expenditure compared with households not having disabled members. Households with members with both NCDs and disability are 3.233 times [OR 4.233; p<0.001] and 2.906 times [OR 3.906; p<0.001] more likely to incur rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure, respectively, compared with households with no members with NCDs and/or disabilities. In the Gaza Strip, there is statistically a significant association between households with at least one disabled member only and rank-dependent CHE at both thresholds in Gaza Strip. This category is 1.103 times [OR 2.103; p<0.05] and 1.569 times [OR 2.569; p<0.001] more likely to incur CHE at both thresholds when compared to households with members without NCDs or disability (p<0.05). Other categories showed no statically significant association with rank-dependent CHE at both thresholds.

In the West Bank, there is a statistically significant association between governmental health insurance and rank-dependent CHE at 40% of non-food expenditure and at 25% of total expenditure (p<0.05). Households with governmental health insurance are more likely to incur rank-dependent CHE by about 61% [OR 1.610; p<0.05] and 55.3% [OR 55.3%; p<0.05] at the mentioned thresholds, respectively, compared with

households with no health insurance. There is no statistically significant association between other types of insurance and the calculated CHE. In the Gaza Strip, results showed no statistically significant association between health insurance categories and rank-dependent CHE at both thresholds.

Table 5: Logistic regression

		West	Bank	Gaza Strip			
Variables		CHE (40%)	CHE (25%)	CHE (40%)	CHE (25%)		
		non-food	of total	non-food	of total exp		
		exp	exp	exp			
		OR	OR	OR	OR		
Gender	Male (Ref)						
	Female	1.085	1.146	2.642	0.919		
Educational level	Less than						
	secondary (Ref)						
	Secondary or	0.363***	0.442***	0.494**	0.648		
	higher						
Working	Do not have						
members	working						
	members (Ref)						
	One working	0.380***	0.535**	0.659	0.640		
	member only						
	At least 2	0.205***	0.370***	1.065	0.595		
	working						
	members						
WB regions	North WB (Ref)						
	Middle WB	1.958**	1.417				
	South WB	3.394***	2.593***				
Locality type	Urban (Ref)						
	Rural	1.674**	1.225				
	camps	0.966	0.734	2.642***	2.125**		
Household size		0.720***	0.749***	0.708***	0.708***		
Chronic	No chronic						
disease/disability	disease/s or						
status of	disability						
household	Chronic diseases	2.032**	2.052**	0.813	0.119		
members	only						
	Disability/ies	2.704**	3.490***	2.103*	2.569***		
	only						
	Both	4.233***	3.906***	1.555	1.215		
Health insurance	No insurance						
	PA only	1.610*	1.553*	1.316	1.768		
	UNRWA only	1.305	0.931	0.494	0.806		
	PA+UNRWA	0.872	0.901	0.966	1.384		
	Others	0.686	0.516				
* p-value <0.05; ** p-value <0.01; *** P-value <0.001							

## **Chapter 4: Discussion**

The aim of this study is to determine the CHE incidence in the West Bank and Gaza Strip, relying on the Ataguba method according to various thresholds of non-food expenditure and of total expenditure. Additionally, this study puts the spotlight on the incidence of CHE among households with members with NCDs and/or disabilities. To our knowledge, this is the first research to calculate CHE incidence relying on rankdependent thresholds of non-food expenditure and of total expenditure locally. This approach empowers formalizing the important concept of equity related to financial risk protection, including CHE as one of health spending indicators. The use of rankdependent thresholds of CHE showed higher proportions of households incurring CHE compared to that used fixed thresholds of CHE. This is the case because using rankdependent methods allows for the use of lower thresholds for the poorer households as these thresholds vary through the whole distribution. The use of rank-dependent approach recognizes both the vertical equity principle and the diminishing marginal utility of income as crucial considerations in evaluating the equity in healthcare financing. This approach had been used in Nigeria, Uganda and Swaziland and as seen in these studies (32,93–95), the lower CHE incidence at time of using fixed thresholds while calculating CHE may reflect the underestimation of catastrophic health payments. Additionally, the results of this study showed higher proportions of the households incurring CHE when measured at thresholds of total expenditure

compared to CHE measured at thresholds of non-food expenditure and this is consistent with the results from other studies (96–98).

Additionally, another key strength in this study is that it studied CHE occurrence among different groups of households, in the West Bank and the Gaza Strip, which are categorized according to the presence or absence of members with NCDs and/or disability. The findings illustrate the proportion of households with or without members with NCDs and/or disability incurring CHE in the West Bank and the Gaza Strip. In the West Bank, the incidence of CHE at rank-dependent 25% threshold of total expenditure is 9.8%, which represents the highest proportion, is among households with members with both NCDs and disability. In comparison, in the Gaza Strip, CHE incidence at the same rank-dependent threshold is 4.7% among households with members with both NCDs and disability. In the West Bank, there is five- to seven-fold increase in the incidence of CHE among households with members with NCDs and disability compared to the incidence among households with no members with NCDs or disability. However, the increase in CHE incidence among households with members with NCDs and disability does not exceed double the incidence among households with no members with NCDs or disability in the Gaza Strip. The differences between households based on whether there is a household member with NCDs or disability appear to be more pronounced in the Gaza Strip.

There are several studies that utilized different thresholds for measuring CHE. Methodological challenges had been the focus of a study conducted to understand the financial protection measurement's sensitivity of CHE indicator depending on the method used in calculation including the threshold/s used in this measurement (99). For instance, in Nouna District in Burkina Faso, CHE incidence ranged between 6% to 15% exceeding the threshold levels 20% and 60%, respectively (46).

Non-communicable diseases and disability are found to be significant contributing factors of CHE. This result is consistent with other reports. For instance, the presence of any health issue within the household increases the share devoted by the household to health services. This includes chronic conditions which duplicate the risk for such health payments. The higher out-of-pocket payments is connected to more difficulties accessing the demanded health services. It had been discussed that high health-related costs may postpone seeking care as slower paying bills rendering the health care providers in a lesser will for care provision (100).

The findings in this thesis indicate that there is high risk of incurring CHE among households with at least one NCDs patient in comparison to households with no members with NCDs or disabilities. Higher risk of incurring CHE is among households with at least one member with disability and the highest risk of incurring CHE is among households with at least one member with disability and the highest risk of incurring CHE is among

disabled members are four times more likely to describe their health status of being fair or poor (40.3%) when compared to those without any disability (9.9%) (101). The positive significant association between presence of member/s with disability in the household and CHE is consistent with several studies conducted worldwide (21,22,45,58,63,66,70,71,102). For instance, a study conducted in Turkey which found a significant positive relationship between households with disabled member and CHE studied at varied fixed thresholds relying on total expenditure and CTP (102). Another study in South Korea, relying on data from the Korean Health Panel, which found that the risk of incurring CHE is higher by about 1.2-1.4 times at different fixed thresholds of the household capacity to pay, 10%, 20%, 30% and 40% (103). Our results are consistent with the findings from another study conducted in Iran in 2018 which indicated that the risk of incurring CHE, at threshold exceeding 40% of household CTP, among households with disabled members is 27.98 times more likely than households without disabled members (104).

No significant association between presence of disabled member in the household and CHE has been seen in a study conducted in Burkina Faso (46) and Bogota, Colombia (105). On the other hand, the study of Bogota, India referred the insignificant relationship due to the variance in defining disability and insufficient related variables to estimate disability. The study relied on reporting some household member with permanent disability. The main bias was attributed to the definition

itself. Persons with permanent disability defined in the Bogota study as the those reporting inability to carry out activities during the studied period, that is 12 months duration (105).

The presence of at least one disabled member in the household increases the risk of facing CHE. These households are more exposed to expensive direct non-medical payments, such as payments for assisting tools and devices such as hearing aids, a wheelchair, etc. There are also further payments to install reasonable house adjustments and retrofitting living environment for the disabled members in the household. Furthermore, according to the PCBS data in 2017, the proportion of the individuals with disabilities is 17.3% in the West Bank and 21.8% in the Gaza Strip (106). An unemployment rate among them reached about 37% in Palestine in 2017 (106). According to the preliminary census results 2017, the proportion of individuals who do not have disability and lack health insurance is 21.3% compared to 9.9% of individuals with disabilities do have health insurance (107). This means that individuals with disabilities are twice as likely as those without disabilities to have health insurance. Insurance is provided free of charge to those with disabilities limiting function by 60% or more based on medical assessment. Services and benefit packages offered by the health insurance should be revised and rationalized. Regarding governmental health insurance, there is a gap between the Palestinian Basic Law and the Palestinian Authority health insurance system (108). According to the government health insurance system for individuals with disabilities No. 2/2021, it can result in a dramatic change. However, translating this system into measures on the ground has not taken a place yet. Proper implementation may contribute positively in reducing the financial burden imposed on households with individuals with disabilities.

The WHO reported that disabled individuals realize insufficient healthcare facilities and inadequacy of providers' skills twice as likely as those without disabled individuals (19). Disabled members are less likely to use preventive health services and are at increased risk of experiencing secondary conditions (101). Additionally, disabled individuals are more likely to engage themselves in risky behaviors, such as smoking, when compared to those without disabilities (109,110). Half of disabled individuals are unable to afford the demanded health care and are 50% more prone to experience CHE (19).

There is a connection between NCDs and disabilities. For instance, diabetes mellitus is one of the NCDs which is strongly associated with increased risk of physical disability (51–53). A study conducted in Mauritius and published in 2018 showed that diabetic patients are 67% at higher risk of disability (54). A study conducted in Australia in 2009 showed the patients with NCDs and had physical and mental disabilities are more prone to encounter unaffordable out-of-pocket health payments (55).

It is recommended to study the population groups with NCDs and groups with disabilities in-depth, that is by further studying the subgroups of these groups relying on health consequence-based approach in order to overcome the heterogeneity of the population in this regard and to create more clearer characterized population groups on this matter (111).

Economic aspects are interconnected with population health. For instance, there is a negative impact on employment. Additionally, political factors affect individual's wellbeing and are interconnected negatively with employment and with the social functions of the family (112). The insufficiency of good quality governmental health services urges people towards private sector services and higher cost healthcare providers.

Surprisingly, the households headed by those with governmental health insurance are 61.1% more likely to incur CHE at 40% of non-food expenditure and are 55.3% more likely to incur CHE at 25% of total expenditure. Governmental health insurance is a significant predictor of incurring CHE in the West Bank.

In a study relying on national longitudinal data from 1991 to 2015 in China, researchers found that higher proportions of households with different basic health insurance schemes are found to incur CHE compared with the uninsured (68). Health insurance coverage in China was found to be insufficient to protect against CHE as seen in several studies (113). A New Health Care Reform had been launched in 2009 in China. A study conducted relying on national data from 2008 to 2013, showed further inequalities in CHE incidence between rural and urban areas (113). This means

such financial risk protection measure can be used as an indicator to assess the impact of launching or following up new health care reforms.

Additionally, taking into the consideration the different types of localities is recommended when applying any health care reform aiming for reduction in financial health care burden to avoid inequalities. Reforming health insurance system is demanded. Revising and strengthening the existent health insurance system in order to ensure an efficient and sustainable one. Revising and rationalizing the benefit package is worthwhile aiming for sustainable and affordable services. In-depth studying of medications coverage is crucial as part of targeting reduction of OOP health payments and so the CHE.

According to the West Bank regions, Incidence of CHE is highest in the south. According to the multidimensional poverty report 2017 in Palestine, south West Bank, with poverty incidence of 13.6%, is found poorer than North West Bank, with poverty incidence of 10.5% (114). Additionally, a recent study published in 2017 focused on prevalence of disabilities in Palestine relying on Disability Survey 2011 dataset from PCBS surveyed children aged between 0-17 years (115). It showed that the prevalence of disabilities in south West Bank is higher compared to other areas in the West Bank (115).

In the West Bank, households residing in rural areas are 67.4% more likely to incur rank-dependent CHE at 40% of non-food expenditure compared with urban localities.

Results in the West Bank are consistent with a study conducted in Turkey, which showed that the households residing in rural areas are more likely to incur CHE than their peers residing in urban (21). It seems that further consideration of direct and indirect health payments in rural areas in the West Bank is demanded. There are limited health care options, including competent health care providers and services, in rural areas. Indirect health payments may be counted to urge people residing in rural areas toward paying for higher cost transportation and food and accommodation patients' companion. Another reason can be attributed to the accessibility to health care services, which may lead to a delay in the healthcare-seeking behavior at time of illnesses, thus resulting in further deterioration in health status and even development of consequent disability which can imply higher cost to manage.

On the other hand, in the Gaza Strip, households residing in camps are more likely to incur CHE irrespective of the adopted threshold compared with their peers residing in urban areas. In the Palestinian context, it is necessary to understand the structural socioeconomic status and behaviors of refugee and non-refugee groups in both the West Bank and the Gaza Strip. Regarding the accessibility to social services, refugee individuals enrolled in the schools of UNRWA, while non-refugees can join either the public or private schools.

Furthermore, there is inadequacy of jobs opportunities, small growth and lesser heterogeneity in the labor market in the Gaza Strip in comparison to the labor market in the West Bank. Workers from the Gaza Strip face the proximity and the entry control points, thus imposing movement restrictions in accessing the Israeli labor market when compared to the workers from the West Bank (116).

Several studies showed the relation between CHE and household size. The results in the West Bank and the Gaza Strip are consistent with a study conducted in China relying on longitudinal data (1991-2015), which showed that the smaller the household size, the higher incidence of CHE at various thresholds (68). In Viet Nam, researchers found that larger household size is associated with reduction in CHE occurrence (62). Also, in Portugal (22), turkey (63), and South Korea (58) the results are consistent with this result. In this regard, this can be attributed to the increased probability of having more working members in the household, which results in higher levels of household expenditure or income. Other countries showed larger household size is associated with an increase in CHE incidence such as in Burkina Faso (46), Iran (64), Serbia (65), Tanzania (66) and West Bengal (67). No significant association is found between CHE and household size in few studies (21,69–71). The results showed that the number of working members in the household is statistically significant correlated with CHE incidence in the West Bank. This result is consistent with the findings in the study conducted in Kenya slum communities as the same inverse relationship between both variables is found (5).

## **Chapter 5: Conclusion**

The West Bank and the Gaza Strip differ in their contextual geopolitics and history. Still financial risk protection is inadequate in both the West Bank and the Gaza Strip. The aim of this study is two-fold. First, the methodology used as different thresholds, whether fixed or rank-dependent thresholds, while calculating CHE reflects the different levels of health expenditure burden. The lower the threshold used, the higher proportion of households incurring CHE. This approach empowers formalizing of the noteworthy concept of equity related to financial risk protection.

Results can vary between studies so comparison should take into account the data sources, study samples, methodology and caution when generalizing results. The presence of members with NCDs and/or disabilities are significant factors of CHE. The connection between NCDs and disabilities should be studied in-depth, in the future research, in the Palestinian context with consideration of the household members' duration of having NCDs and/or disabilities.

Revision of health insurance schemes and related services is required with the perception of fairness and equality among various population groups, especially in the West Bank. Achieving financial risk protection efficiently requires creating the proper policy tools targeting disadvantages groups of population. Additionally, protective measures against catastrophic health payments are required.
Determining the contributing factors of CHE enhance the policy-making process for better plans ahead. Therefore, qualitative studies targeting CHE vulnerable groups are required in the future research to supplement the results of this study especially in further understanding and addressing of CHE related factors of households with members with NCDs and/or disabilities in Palestine. Vulnerable groups of population, which are at increased risk of incurring CHE, are highly demanding targeted interventions and further improvement in benefit packages of health services provided for several vulnerable groups to control healthcare payments. The priority of CHE reduction strategies should be targeted at households with multiple vulnerabilities, such as NCDs and disabilities.

Health care financing system and the social protection system should collaborate and the strengthening the partnership should be a priority for decision-makers to establish the degree of cross-subsidization between both and other institutions towards UHC for more fair, consistent and sustainable benefits.

Other factors such as healthcare-seeking behaviors and healthcare utilization are recommended to be included while studying CHE. Data in this study was not sufficient to include health care types and facilities visited. No cause-effect relationship can be shown in this study. Therefore, analyzing trends through time regarding incurring CHE is highly recommended. Longitudinal design is better in tracking trends of CHE and it is recommended to strengthen the health information system in addition to further

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consideration of inclusion of social determinants of health in the medical file of individuals seeking health care services to facilitate in-depth research related to financial protection. Furthermore, it is worthwhile to study the households' health expenditure in relation to different illnesses, diseases or injuries.

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## Annex 1

Sensitivity analysis summary report for CHE in the West Bank and the Gaza Strip with different values of inequality aversion parameter (y =

0.6, 0.7, 0.8 and 0.9)

Dependent variable		<i>y</i> = 0.6		y = 0.7		y = 0.8		y = 0.9	
		W/B	GS	\//B	GS	W/B	GS	\//B	GS
CHE	Threshold	VVD	05	VVD	05	VVD	05	VVD	05
CHE of	20%	15.8%	8.6%	13.7%	10.5%	11.9%	9.4%	10.9%	11.7%
Non-	30%	8.4%	3.6%	7.1%	4.4%	6.1%	4%	5.4%	5.4%
food	40%	4.8%	1.5%	3.8%	2.4%	3.1%	2%	2.7%	2.9%
exp									
CHE of	5%	41.5%	33.8%	39.4%	36.4%	37.7%	34.7%	37%	38.8%
total	10%	22.2%	15.2%	19.8%	17%	17.8%	15.8%	16.4%	19%
exp	15%	12.8%	7.8%	10.9%	9.4%	9.6%	8.4%	8.6%	11.1%
	20%	8%	4.2%	6.7%	5.2%	5.9%	4.6%	5.1%	6.5%
	25%	5.5%	2.4%	4.3%	3.1%	3.7%	2.6%	3.2%	3.7%

WB: West Bank, GS: Gaza Strip

## Annex 2

Sensitivity analysis summary report for CHE among households with members with different NCDs and disabilities status in the West Bank and the Gaza Strip with different values of inequality aversion parameter (y = 0.6, 0.7, 0.8 and 0.9)

Dependent variable		y = 0.6		y = 0.7		<i>y</i> = 0.8		y = 0.9	
		W/B	GS	W/R	GS	W/R	GS	W/B	GS
CHE	Threshold	WD	05	VVD	05	VVD	05	VVD	05
	no NCDs								
	or	2%	2.1%	1.6%	1.9%	1.3%	1.5%	1.2%	1.1%
CHE of 40% of non-food expenditure	disability								
	NCDs only	5.4%	1.8%	4.3%	1.5%	3.4%	1.2%	2.6%	1.3%
	Disability	7.00/	5.3%	5.9%	4%	4.4%	3.2%	3.4%	2.4%
	only	7.9%							
	Both	14.3%	3.6%	11.5%	2.9%	9.4%	2.8%	8.4%	1.9%
	no NCDs								
	or	2.6%	2.9%	2%	2.5%	1.8%	2%	1.6%	2%
CHE of 25%	disability								
of total	NCDs only	5.8%	2%	4.5%	1.8%	4%	2%	3.2%	1.8%
expenditure	Disability	0.5%	7 20/	7.20/	E 70/	6 59/	1 70/	1 00/	2 00/
	only	9.5%	1.2%	1.570	5.170	0.3%	4.770	4.070	5.8%
	Both	14.8%	4%	11.6%	3.3%	9.8%	2.7%	9.1%	2.6%

WB: West Bank, GS: Gaza Strip