



# **CONTRIBUTION TO THE ANALYSIS OF HEALTH EQUITY:**

**MEASUREMENT AND EXPLANATION OF INEQUALITY AND  
INEQUITY IN THE HEALTH CARE SECTOR IN THE CONTEXT OF  
DEVELOPING COUNTRIES: THE PALESTINIAN CASE**

**Mohammad ABU-ZAINEH**

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## **Center for Development Studies**

**Ramallah**

**Tel: +972-2959250**

**Fax:+972-2958117**

**Tel & Fax +972-82828884**

**P.O. BOX 1718**

**Website: <http://home.birzeit.edu/cds>**

**E-mail: [cds@birzeit.edu](mailto:cds@birzeit.edu)**

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*“If men’s conceptions of justice finally turn out to differ, the way in which they do so is a matter of first importance. Of course, we cannot know of how these conceptions vary, or even when they do, until we have a better account of their structure. And this now we lack, even in the case of one man, or homogenous group of men. [...]. Similarly, if we should be able to characterise one educated person’s sense of justice, we would have a good beginning towards a theory of justice. We may suppose that everyone has in himself the whole form of the moral conception”.*

**John Rawls (1971), *A Theory of Justice*.**

*... to my lovely family,  
grateful parents,  
& precious Palestine ...*

## **Center for Development Studies**

The Development Studies Program (DSP) at Birzeit University was established in 1997 as a specialized policy and research-oriented program for development issues that link the academic and policy-making communities. The DSP grew out of the university-affiliated Human Development Project initiated in 1995. Since then, the DSP has published 44 studies, conducted 40 surveys and opinion polls, and has built up a reputation for quality, relevance and impact. DSP produced all four UNDP Palestine Human Development Reports, and pioneered the dissemination of development ideas and discussion into the wider community through the monthly publication of 'Al Bayder' supplement in a national newspaper. Further, it built up the largest development library in the West Bank and Gaza, providing access to development information resources for Palestinians across the Territory.

In 2007, in celebration of 10 years of achievement and in response to new demand, Birzeit University decided to upgrade and expand the Program to the status of a Center. The new Center for Development Studies (CDS) benefits from highly-experienced core staff and a large network of affiliated senior researchers. CDS also draws on over 100 field researchers and supervisors trained through years of operations across all West Bank and Gaza regions. CDS has offices in the West Bank and Gaza Strip where it implements its work in cooperation with an established network of governmental and non-governmental institutions.

## **Foreword**

The Center for Development Studies aspires to support the foundations of sustainable development through academic research and dissemination of research findings. The work presented in this volume reflects the interdisciplinary nature of CDS's mission in that it is scientific research focused on health and income inequality. As inequality is an issue of growing concern to Palestinian development, CDS is pleased to present the work by Dr. Abu-Zaineh to the community to maximize the positive contribution of this research.

The three main essays that comprise this study on 'the measurement and explanation of income related inequality and inequity in health' tackle issues relating to measurement and explanation of inequality in the context of developing countries, using the case of the occupied Palestinian territory. The unique situation in the occupied Palestinian territory may mean that standard measures of inequality are inapplicable here. Suggestions are provided for better adaptation of the measures for the Palestinian context. These would incorporate dimensions which better reflect the problem of inequality on the ground and may provide policy makers a more accurate representation of the Palestinian situation.

The Center would like to thank Dr. Abu-Zaineh for this distinguished work which will be of interest to academics as well as policy makers. We also thank our partner the Ford Foundation for their continued generous support.

Dr. Yousef Daoud  
Acting Director  
Center for Development Studies  
Birzeit University

## **Abstract**

The question of relative inequalities in many dimensions of wellbeing reveals prominent on the front of the international scene. Foremost, however, inequalities in health came out to place on the top of the global policy agenda. This Thesis sharpens its focus on the measurement and explanation of income-related inequality and inequity in health. It considers the feasibility and applicability of standard measures previously proposed in health economic literature in the context of low-income and developing countries. The omnipresence of massive socioeconomic inequalities within these countries along with the systemic features of health financing systems, in particular the heavy reliance on direct payments and the incomplete coverage of risk-sharing schemes, imply quite varied equity issues compared to those in high-income countries. Under conditions, refined approaches to the measurement and explanation of equity are required should these be informative for complex debate on the health sector reforms. The Thesis consists of three self-contained essays, which all deal with the analysis of equity in finance and delivery of health care in the Palestinian health care sector. Essay I reconsiders the summary measures of inequality commonly used to assess vertical equity in health care finance. It shows how an exclusive reliance on a single-valued measure can provide imperfect description of the nature of inequality prevailing in the distribution of health payments. While providing a further evidence on the value added of going beyond the commonly used “summary index approach”, the essay emphasised the use of appropriate statistical inference method for the measurement of inequalities. Essay II extends the distributional analysis of health care finance within a decomposition framework. It shows how the overall income-inequality effects of health payments can be disentangled into vertical and horizontal inequalities, and reranking effects. The essay shows that the decomposition model previously proposed to assess the extent of these three effects suffer from measurement pitfalls, and need to be appropriately adapted to accommodate real data survey. The essay applies a modified decomposition method that can provide a more appropriate measure for each of the three decomposable effects. It shows how the unequal treatment of equals and the improper treatment of unequals can be fairly more important in determining the degree of income-inequality induced by health care financing than the contribution of vertical effect. Essay III discusses the issues involved in the measurement and explanations of inequity in the delivery of health care. It seeks to determine whether and to what extent there is differential utilisation of various levels of health care – after accounting for differences in need. The essay presents and applies a more elaborated decomposition based on microsimulation. Besides avoiding the measurement limitations imposed by the standard methods, the microsimulation-based decomposition enables to duck the potentially contentious role of heterogeneity in behaviour, as well as the institutional features of the health systems in the analysis of inequality. Several policy-relevant factors, which have to be taken into account for future attempt aiming at limiting existing inequalities in the Palestinian health care sector are discussed and identified. The thesis concludes by advancing some reflections on equity issues and the future research required to better apprehending them.

## Résumé

La question des inégalités socio-économiques se situe aujourd'hui au cœur des préoccupations de la communauté internationale. Néanmoins, ce sont essentiellement les inégalités de santé et l'impact des dépenses de santé sur l'appauvrissement et les inégalités de revenus qui figurent dans les priorités des politiques destinées à réformer le secteur de la santé. Ces politiques se donnent ainsi pour objectif principal d'améliorer l'état de santé des populations tout en réduisant les inégalités d'accès aux soins. Cette thèse s'inscrit dans le champ de la mesure et de l'explication des inégalités de santé dans le contexte des pays en développement (PED). Elle s'interroge en conséquence sur le bien-fondé des mesures standard d'équité précédemment utilisées dans les pays développés. En effet, la prégnance des inégalités socio-économiques ainsi que les spécificités des systèmes de santé dans les PED invitent à envisager des approches plus fines, capables de tenir compte de toutes ces particularités. De ce fait, le présent travail accorde un intérêt particulier à la valeur ajoutée apportée par des approches plus élaborées des inégalités. Pour ce faire, il s'appuie sur des données empiriques issues de la première enquête nationale destinée à établir des comptes nationaux de la santé dans les Territoires Palestiniens Occupés (OPT). Cette thèse se compose de trois articles portant sur la problématique de l'équité et la performance de l'actuel système palestinien du financement des soins et de la prise en charge : primaire, secondaire et tertiaire. Le premier essai est consacré à l'étude de la progressivité caractérisant le financement de soins et l'équité verticale. Cette dernière, fréquemment évaluée à l'aide d'indices synthétiques agrégés et testée en utilisant la méthode classique asymptotique, est ici étudiée à travers une approche désagrégée privilégiant la méthode économétrique du *bootstrap*. Le second essai prolonge l'analyse de l'équité, en considérant la relation entre la non-proportionnalité des paiements de soins et leur impact redistributif, à l'aide d'un modèle de décomposition. Ce modèle permet d'évaluer tant l'équité horizontale que l'effet de reclassement (*reranking*) induits par les modes de financement du système de soins. Enfin, le dernier essai examine les inégalités en matière d'accès aux soins dans le cadre d'un modèle de décomposition basé sur une technique de microsimulation. A l'inverse de la méthode standard, la méthodologie appliquée ici permet de révéler le rôle respectif des inégalités socio-économiques, de l'hétérogénéité des comportements des groupes socio-économiques, ainsi que l'impact potentiel des caractéristiques institutionnelles du système de santé. Les résultats présentés dans cette thèse invitent à reconsidérer le financement actuel du système de santé palestinien en privilégiant des modes de financement *ex ante*. Des recommandations sont proposées pour améliorer les performances du système d'assurance publique ainsi que le système actuel de prise en charge dans les OPT. Pour finir, des perspectives de recherche sur l'analyse de l'équité en santé sont envisagées pour mieux appréhender certains aspects des problèmes auxquels sont confrontées les populations défavorisées dans les pays en développement.

## **Acknowledgment**

*Today, I can tot up twelve years of my life after I had made up my mind to study Economics! Amazingly, this was just after my graduation from Secondary School!*

*My interest in the study of Economics can however be traced back to a very early age.*

*I was born in March of 1977 in Jenin (called in the ancient Bible Ein-Ganeem) – one of the city's quarters in the North of West Bank, which has incessantly been a center of Israeli-Palestinian conflict and severe civil unrest.*

*The defining event of my early life occurred during the first Palestinian Uprising (Intifada) when I was in my early 13's. Without going into the details, which I vividly remember to this day, I almost drowned. When I regained consciousness after being saved, someone told me I had almost died.*

*Adverse circumstances in early life set trajectories for development throughout life...*

*At that time, I had but only one impetus: acquire a profound understanding of the circumstances and phenomena with which the citizens of today's world are confronted.*

*The question that came up in my mind was: why do people face unequal opportunities of saving, maintaining and enjoying their lives? Proviso life is in itself a value, why does one's value for something like his/her life constitute often an "ethical" basis to eradicate someone else's life?*

*Age 14 is a bit early to be thinking about such grand things, life is given, prearranged, and maintained by God, the Vicar said...!*

*In his own library, however, I found a book in which I read the following statements: "Before the emergence of science, it was simply assumed that if we found order in things, then those things must have been put in order by someone – God – in the case of physical laws, but if we found (dis)order in the case of man-made objects and institutions it is the specific humans".*

*At that time, I had many doubts... Today, I could never thank enough the Vicar...and also the person who pushed me further to harmonize Health with Economics - the Pharmacist economist Dr. Awad MATARIA. Thank you Awad! Believe me, I learnt from you more that you could imagine!*

*Millions of thanks are also due to all my professors from Birzeit University: those who taught me the basics of Economics Science and Scientific Research. Special thanks to Prof. Yousef DAOUD who accepted to present on my behalf some of my thesis work when I was unable to get a visa to a neighbouring country!!*

*My Thesis journey started with an "ill-at-ease" expression: "Inequality in Health"; so eccentric that I have spent the last three and half years of my life in trying to comprehend and have a handle on it! It was not trouble-free...!*

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*I am happy to admit that this work could have never seen the light of day without the continuing support of all members of my family and my friends; I love you and miss you all!*

*My way back to seeing you is getting closer...*

*In the wounded Palestine we have a proverb saying: “Life is bitter abroad!”*

*I finally would like to thank all those who added a flavor to my life in France and who made me feel in a second Home...La France...*

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**ACRONYMS AND ABBREVIATIONS**

APT: Ability to pay	RE: Total Redistributive Effects
BTS: Bootstrapping	RR: Total Reranking Effects
CI: Concentration Index	RS: Reynolds-Smolensky index of redistribution
CIEs: Close-Income Equals	SES: Socio-Economic Status
EIEs: Exact-Income Equals	TPM: Two-Part Model
ERP: Error in Rejection Probability	UNRWA: United Nations Relief and Works Agency for Palestine Refugees in the Near East
ERs: Enumeration Areas	VE: Vertical Effect
ETE's: Equal Treatment of Equals principle	WB: West Bank
GC: Gini Coefficient	
GDP: Gross Domestic Product	
GHI: Governmental Health Insurance	
GNI: Gross National Income	
GLM: Generalised Linear Model	
GS: Gaza Strip	
HCEU-2004: Health Care Expenditure and Utilisation Survey of 2004	
HE: Horizontal Effect	
HI <sub>WVP</sub> : Wagstaff, van Doorslaer & Paci index of Horizontal inequity	
HI <sub>WV</sub> : Wagstaff and van Doorslaer index of Horizontal inequity	
KPI: Kakwani Index of Progressivity	
MoH: Ministry of Health	
NIS: New Israeli Shekel	
OLS: Ordinary Least Square	
OPT: Occupied Palestinian Territory	
PNA: Palestinian National Authority	
PCBS: Palestinian Central Bureau of Statistics	
PHC: Primary Health Care	
PHEC: Palestinian Population, Housing and Establishment Census of 1997	
PNGOs: Palestinian Non-Governmental Organizations	





## **GENERAL INTRODUCTION AND LITERATURE SYNTHESIS <sup>1</sup>**

---

<sup>1</sup> The text of this Introductory Chapter has benefited much from author's participation and discussions in recent international conferences on "Inequality and Public Policy" and "Health Care Financing and Equity", mainly:  
The 13<sup>th</sup> Economic Research Forum's Conference (ERF), 26-28 December, 2007, Cairo, Egypt.  
The "Sondages" Conference of the French Society of Statistics (SFDS), 5-7 November, 2007, Marseille, France.  
The 2<sup>nd</sup> International Symposium on Economic Theory, Policy and Applications, 6-9 Aug. 2007, Athens, Greece  
The 6<sup>th</sup> International Health Economics Association's Congress (iHEA), 8-11 July, 2007, Copenhagen, Denmark  
The 2<sup>nd</sup> International Conference on Health Financing in Developing Countries, Centre of Studies and Research on International Development (CERDI), 1-2 December 2005, Clermont-Ferrand, France.  
The VI<sup>th</sup> Unimed-Forum, "Cooperation and Public Policy in the Mediterranean Basin", University of Paul Cézanne - Aix-Marseille III – Faculty of Applied Economics, 15-16 December 2004, Aix-en-Provence, France.



## 0.1 PREAMBLE: SETTING THE SCENE

The question of relative inequalities and absolute deprivations in many dimensions of wellbeing – living standards, educational attainments and health outcomes – reveals, more than ever prominent, on the front of the international scene (WHO, 2008; World-Bank, 2005; UNDP, 2005). Moreover, the measurement of inequalities and distributional analyses are placed in the context of recent developments in economics, statistics, and social sciences (Cowell, 2000; O'Donnell et al., 2007). Foremost, however, inequalities in health and the health care sector came out to be placed on the top of the global policy agenda (UN, 2002), and began to receive an ever-increasing attention from academia, development and policy circles, as well as international organisations. Though, “inequality in health” are likely to be associated with social disadvantages in other spheres of wellbeing (Wilkinson and Pickett, 2006; van Doorslaer and Koolman, 2004), today, it is increasingly recognised that, given the intrinsic value that it has, health should be as well regarded as key component of population's wellbeing and arguably belongs to a social welfare function (Pradhan et al., 2003). Inequalities in health are, thus, viewed as concerns in themselves (McKee, 2001; Gilson, 2007), and poor health as an intrinsically significant measure of “capability deprivation” (Sen, 2002). Nevertheless, improving health outcomes and enhancing “equity” in health care systems continue to be amongst the most compelling policy objectives. The remarkable rising of interest in “equity” has manifested itself over the last few years on several occasions and at different levels. An increased awareness of various equity issues has become more evident on the part of policy-makers, with several resolutions and policy statements being endorsed by governments, bilateral and multilateral donors, and international organisations (WHO, 2005; UN, 2002; World-Bank, 2005; World-Bank, 1997; Baeza et al., 2001), all emphasising, and proclaiming, the improvement of health outcomes of the world's poor through promoting a more equitable health system, and reducing “unjustified inequalities” in health variables.

In its 1997 strategy paper for health sector, the World Bank, for instance, has committed to work in coordination with the international community and developing countries to reduce the “impoverishing effects” of ill-health (World-Bank, 1997), and in its 2000/2001 World Development Report (WDR) “Attacking Poverty” (World-Bank, 2000), the Bank re-emphasised the importance of modifying the health systems to provide financial protection against catastrophic health care expenditures as an important policy goal of any health care system (Narayan et al., 2000). Remarkably, however, in their 2005/2006 World Development Report (WDR) “*Equity and Development*” and Human Development Report (HDR) “*Aid, Trade and Security in an Unequal World*”, both the World Bank (World-Bank, 2005) and the United Nations Development Programme (UNDP, 2005) break new grounds, not only by focusing attention on the issue of “equity” and “inequalities”, but also by putting them at the heart of the world's development proprieties; arguing that: greater equity can reduce poverty, enhance economic growth and efficiency, advance development, and deliver increased opportunities to the poorest groups in our societies. In addition to bringing to light further evidences about the omnipresence of massive inequalities – within and across countries –, the WDR and the HDR discuss the mechanisms through which inequalities impair development, and advocate taking explicit account of equity in determining any development priorities. According to the WDR “*equity*” is defined as the requirement that “individuals should have equal opportunities to pursue a life of their choosing and be spared from extreme deprivations in outcomes” [p.2]. Clearly, such equity-requirement invokes two elements: an emphasis on the normative reasoning of “starting gate equality” (Roemer, 1994), and an avowal that outcomes which fall beneath a threshold of minimal adequacy should be disvalued.

By the same token, in its 2000 World Health Report (WHR) “*Health Systems: Improving*

*Performance*” (WHO, 2000), the World Health Organization (WHO) has focused attention on “fairness” of health systems, and a framework for assessing its equity performance has been advanced. Accordingly, the WHR argued that a key dimension of a health system performance is the fairness of its financing system. Besides, proposing and estimating a value of fairness of financing contribution (the so-called FFC index), the WHO discussed the ways policy-makers can improve fairness in paying for health care, and proposed a number of goals for health systems, stated as two folds: the best attainable average level of good health, and the smallest feasible differences amongst individuals (WHO, 2000). Nonetheless, the WHO’s framework is interested in measuring “health inequality” as a distinct dimension of health system performance, and a “WHO index of health inequality” has been deliberated (Murray and Frenk, 1999). Furthermore, and quite interestingly, the WHO’s Commission on “Macroeconomics and Health” (WHO-CMH, 2001), though called for more, soundly-used, money for health care, an importance has been attached to various equity dimensions in the process of generating and optimising the benefits extracted from the extra money.

The above clearly suggest that in evaluating the performance of a country’s health system, it is not the “average achievement” that only matters, but as equally, the “distribution of outcomes” in a population. Moreover, the arguments that have brought to bear on the issue of equity and fairness in these reports also suggest that the omnipresent unequal distribution of opportunities, between the “poor” and the “better-off”, and with respect to a variety of aspects may matter even more than the distribution of outcomes, in and of themselves. This is because observed inequalities in the distribution of outcomes are likely to reflect very significant differences in actual opportunities and material constraints confronted by individuals belonging to different socioeconomic groups of population. These inequalities should, therefore, be regarded as “unfair” or “inequitable”. These arguments seem to corroborate Amartya Sen’s hypotheses on “adaptive preferences”; “capability deprivations” and “empowerments” (Sen, 2002; Sen, 1993): populations confronted with massive material constraints for survival have substantial difficulty in expressing what their “true” needs would be if they had more “opportunities” and “capabilities” in their daily lives. This suggests that inequalities in opportunities are a key issue in defining the welfare of a population. According to Sen (1992), it is not only “utility” per se that should be regarded, but the extent to which people do have equal opportunities to elucidate their preferences. Considering disparities across socioeconomic groups in the actual opportunities, and capacities to contribute to a country’ development may, therefore, indicate how far the distance is from realising the substantive outcomes.

Despite the remarkable interest in equity and the socioeconomic development achieved in the last years, worldwide evidence brought out by the recent development reports (the WDR and the HDR), demonstrated that relative inequalities and social disadvantages have been rising in many critical respects including, education, health, socioeconomic status, employment opportunities and political power. Quite interestingly, the WDR has emphasised the role of “historical inertia” and the “imprint of colonisation” in shaping existing inequalities and deprivations across and within countries (World-Bank, 2005). In addition, latest “World Health Statistics” (WHO, 2008) highlights the persistence of severe health inequalities between the poorest and wealthiest classes of population. Figures on the distribution of catastrophic health care spending demonstrate some gloomy trends; with around 150 million people suffer catastrophic health care expenditures, while more than 100 million people are impoverished due to the use of out-of-pocket payments to finance health care services (WHO, 2008).

Nonetheless, recent evidence coming from many developed countries (van Doorslaer et al., 2006; Wagstaff and van Doorslaer, 2000) demonstrate that in spite of the presence of a nearly universal health coverage, inequalities in access to, and utilisation of, health care services continue to persist: the poorest of the population do not receive the type and quantity of health care that they occasionally, continuously or urgently, require, culminating into a vicious cycle of impoverishment and worsened health inequalities. It has also been shown (van Doorslaer et al., 2007; van Doorslaer et al., 1999) that payments for, and financing of, health care services can be associated with multiple adverse effects on household living standards: severely threaten their income sufficiency; disrupt their positions in the socioeconomic hierarchy, and thus, exacerbate overall inequalities in the distribution of income. In short, the “inverse care law”, which was described by Tudor (1971) more than three decades ago, and according to which the “poor” shoulder the greatest burden of disease and receive a smaller share of health care than do healthy and better-off people, remains *alive*.

Though, the literature on equity continues to grow vigorously in developed countries, evidence from developing countries remain hitherto comparatively sparse (Cissé et al., 2007; Palmer et al., 2004). In addition, the few studies that attempted to incorporate the subject relied on analytical methods that serve, at their best, to provide aggregate descriptive results on the degree of inequalities, with no attempts being made to unveil the factors that contribute to their persistence. This is despite the rapidly evolving context of research in the field, the considerable conceptual, theoretical and methodological developments attached to the subject, as well as the controversy surrounding the definition of “equity”. The next section goes on to elucidate the implications of such evolution and the controversial policy and academic debates. This is followed by the statement of the research problem, the aims and objectives of the Thesis, as well as the novelty features in the present work.

## 0.2 THE EVOLVING “CONTEXT” FOR HEALTH EQUITY RESEARCH

### 0.2.1 The “*Policy*” Context: A Renewal of Concerns and Interests

Apart from the apparent heterogeneity in the definitions and interpretations, “equity” or “distributive justice” has long been considered a goal that is pursued by policy-makers (Le Grand, 1984; Culyer, 1989). Several policy-related factors have, however, fuelled the resurgence of interest and the “increased popularity” of health equity during the course of the last two decades (O’Donnell et al., 2007). In the context of developed and industrialised countries, part of the revival interest in equity has been attributed to a number of factors (van Doorslaer et al., 1993). These include, *inter alia*, a change of attitudes amongst policy-makers and their ideologically hostile views regarding various issues of equality and equity (Wagstaff and van Doorslaer, 2000); a shift in governments’ typical concentration on cost-containment, sustainability and efficiency issues during the 1980s towards more “equity-oriented” health sector reforms in the 1990s; and the need to evaluate the effects of health sector reforms that have been initiated in the mid-1980s, and implemented during the 1990s in several European countries (Evans et al., 2001; Wagstaff and van Doorslaer, 1992). It seems, however, important to note that while the renewed interest in equity in the context of these countries has been driven by the increased awareness on the part of policy-makers<sup>2</sup> with regard to health equity issues, many of the developed countries’ health systems (in particular, the OECD countries with the notable exception being the US) have for long time been established on, or adopted, a so-called “egalitarian approach” to health care (Hurst, 1992), and therefore, an implied commitment toward delivering health care according to “need” rather than “ability to

<sup>2</sup> Indeed, in a recent publication, O’Donnell et al. (2008) note that: “the 1990s were kinder to health equity. Researchers in the field began to receive a sympathetic hearing in many countries”.

pay”. A common strand of equity-debates in such a context has, therefore, been, or oriented towards, evaluating the extent to which the “egalitarian” principles in health care have been achieved, and/or reforms needed to get closer – *if not right* – to them (Kidson, 1999).

In contrast, the resurgence of interest in equity issues in the context of developing countries has mainly been fuelled by the increasing realisation that new mechanisms to promote equitable health care financing and to ensure more equitable access to health care for the poor are required (McIntyre, 2007). Indeed, the current debates on equity issues in health in many developing countries can be traced back to the earlier implementation of the cost-recovery or cost-sharing schemes in the mid-1980s (Akin et al., 1987). The latter policies that called for contributions from users of public facilities, primarily through out-of-pocket payments or user-fees, were much in the “public eye” (McIntyre, 2007). In fact, following the so-called “Bamako Initiative”, which was launched at a meeting of African Ministers of Health in Bamako in 1987 (Chabot, 1988), the focus in many developing countries, in particular African countries, began to swing away from the “*Health for All*” (WHO, 1978), toward resource mobilisation, sustainability and efficiency of health care systems (Gilson, 1988). Undoubtedly, however, “poverty” and “equity” issues continued to figure out extensively in the arguments favouring such policy “alternative”, on the grounds that the introduction or expansion of user-fees for health care, while allowing to generate (significant additional) revenues for health, can as well help promote “equity” through targeting governments subsidies towards the poor; e.g., publicly-funded waivers and exemption mechanisms (Bitran and Giedion, 2003), as well as improve quality and availability of health care services (Litvack and Bodart, 1993; Chalkley and Robinson, 1997). Nonetheless, the early implementation of such policies has been vigorously challenged by significant equity-concern regarding the utilisation of, and access to, health care services (Creese, 1991).

Indeed, this “*policy*” climate focusing on cost-recovery through user-fees did not last so long. The second half of 1990s has witnessed a renewal of interest in “equity” (Gwatkin et al., 2004), with evidence, particularly from African countries, beginning to show that the expectations of cost-recovery policies have not been “fully” met (James et al., 2006). Although some studies (e.g., Akashi et al., 2004) have sometimes found that the introduction of user-fees increased resources and improved quality of health care, such policy has not been able to generate substantial revenues (Arhin-Tenkorage, 2000), nor presumably, global efficiency gains for national health systems (Cissé et al., 2004). More importantly, it has been shown that cost-recovery schemes deterred utilisation and access to basic health care services, with poor segments of population being the most adversely affected (Gilson, 1997). Consequently, the pendulum began to swing too far the other way over the last few years, with a number of international organisations calling for the abolition of user-fees, making an explicit reference to “equity” (UN, 2002; UN, 2005; Commission-for-Africa, 2005). Hence then several countries started, in effect, to get rid of some or even all of user-fees for health care (Gilson and McIntyre, 2005); e.g., Uganda (Nabyonga et al., 2005), Burundi (IRIN, 2006); and Zambia (Africa-Focus, 2006). In parallel, there has been a great deal of interest amongst economists (Preker and Carrin, 2004) and international organisations (World-Bank, 2005; World-Bank, 1997; WHO, 2000; WHO, 2005) in developing health financing systems, which ensure that people have access to health care without risking catastrophic payments and impoverishment. A consensus has grown that *ex ante* methods to financing health care, whereby people contribute regularly through insurance contributions and/or tax-liabilities provide a greater financial protection to households than *ex post* financing (McIntyre et al., 2005). Indeed, the last decade of the second millennium has witnessed the emergence of many insurance schemes, particularly, in form of community-based insurance schemes. The poor-

rich exacerbated inequalities, the decentralisation process unleashed in these countries, and the success stories of micro-finance schemes fuelled their emergence (Carrin et al., 2005).

### 0.2.2 The “*Research*” Context: A Continual Flow of Techniques and Methods

Along with the above-described changing policy climate favouring “*equity in health*”, academic and scientific research circles were also developing similar concern in the subject; and some including Nobel Prize winner Amartya Sen considered inequalities in health to be more worrisome than inequalities in other spheres (Sen, 2002). A key role in the current uprising of interest in “*equity in health*” can be attributed to the broader context of research; mainly, the change in the views of economists and researchers themselves regarding the “*scientific status*” of research on equity, and the running debates over the last twenty-five years on: the fallacy of “equity-efficiency” trade-off, and the scope of conflict between them, on the one hand, and the “*normative-positive*” character of equity issue, on the other hand. Indeed, although equity has typically been recognised by economists – along with efficiency – as an important policy objective (Le Grand, 1984), the dominant views in economics – at least until fairly recently – was that a big and fundamental trade-off exists between equity – as relates to the principle of fair distribution of resources – and efficiency – as concerns losses due to distortion in economic behaviours through the process of redistribution (Okun, 1975). Such conceived “equity-efficiency trade-off” has widely seen to severely constrain the scope of research for attacking poverty and exacerbated inequalities, using redistributive policies (Ravallion, 2003). Equity considerations had little role to play in this view – in fact, any measure favouring the poor was regarded as “costly”; e.g., “redistribution reduces economic incentives and performance” (Bardhan, 1996), or as it is described in a widely cited passage of Okun (1975) to be like “carrying money from the rich to the poor in a leaky bucket”.

Nonetheless, although they did not always identify the two notions of “efficiency” and “equity” as opposing objectives, some economists tended to emphasise that: given that equity considerations are prompted by “distributive justice”, they ought not to be influenced by costs considerations – equity here involves fair distribution regardless of the sacrifice of the rest of the society, and so, there is a scope for conflict between equity and efficiency considerations (Culyer, 1980). Of course, many economists (e.g., Le Grand, 1991) have for many years argued that the underlying assumptions of these welfare theorems are fundamentally stringent and flawed. This is because market failures abound, and with market-imperfections, the principle of interventions that may enhance both: equity and efficiency is well-established (World-Bank, 2005)<sup>3</sup>. Indeed, during the last few decades, many economists have shown that market imperfections, such as asymmetric information and externalities, mean that there are always interventions that will be able to “make many better-off without making anyone worse-off” (e.g., Greenwald and Stiglitz, 1986; Donaldson et al., 2005), while many literature in the late 1990s have argued that such trade-off do not exist (e.g., Kakwani and Pernia, 2000), or are often exaggerated (e.g., Ravallion, 2001; Ravallion, 2003).

Besides the changes in researchers’ views on the presence of equity-efficiency trade-off, pretension of equity research towards “*scientific status*” has also been another area of debate. In fact, the typically dominant perception amongst economists was that, since questions of

<sup>3</sup> A simple illustration of “equity/efficiency-enhancing” situation can be shown using the standard trade-off diagram with equity measured on the vertical axis and efficiency on the horizontal axis. A point within the production possibility frontier represents *inefficient* utilisation of scarce resources, since an alternative arrangement can be obtained by moving from the interior point to the frontier, where more *equity* and *efficiency* can be obtained (McConnell & Brue, 2008).



equity are value-laden, research on them should be necessarily normative in character<sup>4</sup> (Pazner and Schmeidler, 1978; Le Grand, 1991). And so, as Wagstaff and van Doorslaer (2000a) put it: “many seemed to shy away from the area because of this” [p.1805]. In their review of the status of research on equity, which has been undertaken by economists in developed countries up to the year 2000, these authors, whose research works constituted a major reference on the subject during the last two decades, go further to argue that “... while the question of what equity is all about is indeed a normative question, the questions of whether equity, defined in a specific sense, has been achieved, or has increased, or tends to be higher in one type of health care system than other, lie firmly within the realm of positive economics ...”[p.1805]. Though, the normative-positive distinctions for many equity questions can often be hardly self-evident, given the inherent normative content of measures and interpretations, the upshot of the forgoing quotation is that: when studying equity one would need to clearly state not only a set of *positive* research questions, but also a set of definitions and standards against which these questions are to be evaluated and interpreted.

There are other important factors that have undoubtedly contributed to the recent growth in the *quantity* and *quality* of research work on the subject of equity (O'Donnell et al., 2007). One is the rapidly evolving *research capabilities* in the field of measurement over the last fifteen years. Thanks to recent developments in computer software programs, distributional analyses based on surveys datasets have become far more efficient than ever before. Indeed, with the information technology advances from the outdated mainframes to personal computers in the early 1980s, many software programs (SAS, Stata, and GAUSS) have been developed to analyse large databases in an efficient way. Until very recently, however, there has been no single specifically-designed software program for inequality and income distribution analysis. By and large, the popular statistical packages, like SAS, Stata, and SPSS, have not been designed purposely for economists who are interested in conducting different types of statistical analyses on inequality, redistribution, and poverty (Zhang, 2003). Two innovative and specifically-designed statistical packages have recently been developed for various types of inequality analyses: DAD, which stands for Distributive Analysis, developed by Duclos, Araar and Fortin (1998), and DASP, which stands for Distributive Analysis Stata Package, developed in 2006 (Araar and Duclos, 2007). Compared to the commonly used statistical packages, these packages have indeed facilitated the complex computational procedures for a wide range of inequality and poverty indices, and enabled the estimation of some statistical measures of precision (*e.g.*, standard errors and confidence intervals), while accommodating for complex sampling designs<sup>5</sup>.

This “*computational revolution*” has been accompanied by remarkably increasing efforts, in both parts of the world, developed and developing countries, to develop and produce more comprehensive and reliable datasets that can indeed be oriented to study and compare the distributions of income, health and health care across various demographic and socioeconomic groups of population, as well as across countries. Examples of multi-round integrated surveys include: the World Bank’s Living Standards Measurement Study (LSMS)<sup>6</sup>,

<sup>4</sup> Indeed, like the classical economic theory, the neoclassical theory stresses the distinction between the two areas of economic research: *positive economics* that deals with the cognitive scientific contents of economics and normative economics that focuses on equity and welfare issues.

<sup>5</sup> Statistical measures of precision (*e.g.*, standard errors) provided by DAD and DASP packages are based on asymptotic statistical properties, which are obtained strictly only in the case of infinite samples. For finite samples, which are of course the norm, the validity of asymptotic methods is open to discussion. For this study, an alternative method based on a non-standard bootstrap econometric technique for computing statistical measures of precision in samples of limited size will be considered.

<sup>6</sup> Available at: <http://go.worldbank.org/B9VEQWV3Z0>

which was established in 1980, but has recently grown in its scope; the European Community Household Panel (ECHP)<sup>7</sup>, which was launched in the 1990s by the European Union; and the World Health Surveys (WHS)<sup>8</sup>, which was developed by the World Health Organisation to compile comprehensive information on the health of populations.

The voluminous literature on the subject of equity, which actually started to take off upwards in the 1990's<sup>9</sup>, has drawn extensively on established techniques from public finance and income redistribution literature (Wagstaff, 2002). This literature has, however, been occasioned by heterogeneity of ideas and definitions; inconsistency of results and/or their tentative interpretations. This is addition to the vigorous debates, in both academia and policy circles, which have characterised this field of research, and often left the assessment of inequality and inequity with "irreducible incompleteness" (Sen, 2000). Indeed, while the literature offers a wide assortment of analytical tools and methods, such heterogeneity may call for attention about the most appropriate definitions and approaches to endorse. This is because the assessment of inequity is shown (Williams and Cookson, 2000; Wagstaff and van Doorslaer, 2000) to depend largely on definitions and dimensions that are chosen to quantify inequalities, the specific indicators used to apprehend them, and the different theories of "distributive justice" that are referred to in order to express a judgment about the "fairness" of the observed distributions. Though, many of these issues are well rehearsed in the literature, it may be, especially, useful to provide here a cursory treatment touching on the points that bear directly upon our research problematic and analysis of equity.

### 0.3 SORTING OUT DEFINITIONS: A VIGOROUS AREA OF DEBATE

#### 0.3.1 How Have "*Inequalities*" Been Defined, And What Are the Implications?

The widespread interest in equity and equality may, into the bargain, reflect an agreement amongst both: policy-makers and academic researchers over what is meant by these terms. Yet, appearances can, sometimes, be deceptive. As argued by Cowell (2000) "inequality" is "a subject where much energy can be spent arguing about the meaning of the terms" (Cowell, 2000; p.89). Thus, answers to questions like: What is exactly meant by "*equity*"? Is it different from "*equality*"? And how these are to be quantified, explained, and interpreted? are far from being self-evident (van Doorslaer et al., 1993). As already mentioned above, one reason that is usually given to this is that, unlike efficiency, many of the equity-related questions involve value judgement about "*what ought to be*", and thus, belong to the normative rather than positive area of economic reasoning (Atkinson, 1970). But there is, undoubtedly, another reason behind the proliferation of definitions and meanings attached to these terms; this is due much to the multi-disciplinary nature of the subject: the study of *inequality* has not been confined to the domain of economics. As shown by Wagstaff and van Doorslaer (2000), ethicists and philosophers (e.g., Williams, 1993; Williams and Cookson, 2000), sociologists and epidemiologists (e.g., Susser, 1993), have all extensively contributed to the question of equity, and established their own views, definitions, and standards. Nonetheless, clarifying the terms and other related concepts is, of course, a fundamental issue and a pre-requisite exercise before proceeding further with our scientific diagnosis. Given that this study is on Economics of Health Equity, attention will be primarily paid to views, meanings, and interpretations of these terms in the broader space of Economics, and the narrower space of Health Economics.

<sup>7</sup> Available at: <http://circa.europa.eu/irc/dsis/echpanel/info/data/information.html>

<sup>8</sup> Available at: <http://www.who.int/healthinfo/survey/en/>

<sup>9</sup> According to O'Donnell, et al (2008), the number of articles published in journals indexed in Medline with equity in abstract has shown an increase; with 294 articles published in 2005 compared to only 33 articles in 1980 (or 4.3 articles per 10,000 articles in 2005 compared to 1.2 in 1980; a 260 percent increase).

A first comprehensive review on inequality has been provided in (Atkinson, 1970). The author recognises the fact that establishing a definition for “inequality” is not straightforward, because it is, in itself, a “value-judgement”. Nevertheless, he underlines a set of basic factors that *ought to* be considered when dealing with inequality issues. Among these are: the distribution of income and wealth, which has to be assessed in the light of individual differences and needs; the decisions made by individuals according to their preferences, which can culminate in disparities in the distribution of income; the equality of opportunity issue; and the systematic variation of income and wealth over a typical person’s life. In the same vein, Cowell (1995) considers that “inequality” is in itself an “awkward term”, because the meanings to be attached to it are not “self-explanatory”. He suggests the idea of “perfect equality” as a framework for specifying inequality – “inequality” can, then, be defined as “a departure from some idea of perfect equality” – but he raises the following point: even if “equality” can be seen as a given quantity of wealth distributed “equally” from an unemotive mathematical point of view, it can also be seen as a “Garden of Eden” to be sought by a society. According to this author, a coherent and implementable definition of inequality must specify “a numerical rigor”, as well as a “value-judgement”. Cowell also provides a list of factors that need to be considered when studying inequality. These include: the specification of a “social unit” (e.g., individual or household); the identification of a “particular attribute” in order to distinguish those who are wealthier than others (e.g., income, wealth, land-ownership, and so on); and finally, a method for representing or *aggregating* the allocation among the “units” in a given population (Cowell, 2000).

### 0.3.2 Inequality in Levels of Living: Relativists’ vs. Absolutists’ Views of Justice

Despite the heterogeneity of ideas and approaches to the measurement of inequality<sup>10</sup>, it is possible to distinguish between two alternate *views of justice*, which are commonly found in theoretical and applied economics. The most popular concept is what is termed in the literature as “Relative Inequality” (*RI*). This specifies inequality as a function of the ratios of individual incomes to the overall mean, and implied by *scale independence axiom* property; i.e., if everyone’s income is multiplied by a constant term, inequality remain unchanged (Yoram and Cowell, 1999). The alternate concept is the “Absolute inequality” (*AI*), which specifies inequality in terms of absolute, rather than relative, differences in the levels of living (Kolm, 1976; Bishop et al., 1988). This implies that if everyone’s income is increased by the same amount, inequality will remain the same<sup>11</sup>. There is some evidence (e.g., Stern et al., 2005) showing a positive relation between growth and *AI*, whereby the change in income due to growth occurs mainly for the richer part of the population and is not detected for the poorer parts; whereas some findings reported in the literature (e.g., Dollar and Kraay, 2002) show that greater trade openness has, roughly, the same effect on growth rate of income at different levels, suggesting that openness is distribution-neutral in that *RI* is unchanged on average.

Literature’s findings on the effects of structural adjustments policies, such as trade liberalisation, the implementation of user-fees in the health care sector, and the reductions in public expenditures, on relative inequalities, have, however, been paradoxical. Whilst some studies (Cheng et al., 2000; Fischer, 1992) speculated – based on simple trade models, such as the Stolper-Samuelson theorem – that greater liberalisation would lessen relative inequalities

<sup>10</sup> For recent surveys of alternate approaches to the measurement of inequality cf. Sen (1997) and Cowell (2000).

<sup>11</sup> The difference between *RI* and *AI* can be presented in terms of a very simple two-person economy, as in (Ravallion, 2005): with just two persons whose incomes are \$1,000 and \$10,000. If both incomes double in size then the *RI* will remain *unchanged*: the richer individual is still 10 times richer. However, the *absolute* difference in their incomes has doubled, from \$9,000 to \$18,000. The *RI* is unchanged though *AI* has sharply risen: income gain is 10 times higher for the high-income individual.

in developing countries, these findings have been much contradicted by other studies (including the 2005/2006 WDR) showing that within-countries relative inequalities and disadvantages have been rising in recent years (e.g., Goldberg and Pavcnik, 2004; Feenstra and Hanson, 2001). Though, the cause(s) behind the widening inequalities in income distributions have not been explicitly stated in the latest 2005/2006 WDR, there is a strong case suggesting that at least one of the aforementioned structural adjustments policies might have been responsible for the increases in the relative inequalities (Reddy and Pogge, 2006). Findings cited above are instructive in showing the genuine differences in the value-judgements underlying views and measurement of inequality (e.g., *RI* vs. *AI*), as well as the long-standing debates about which is the better measure of inequality. As argued by Ravallion (2004): it is not that one concept of inequality is right and the other is wrong, but they simply reflect different judgements about what does constitute inequality. Whatever views are being used to identify and judge the prevailing economic inequalities, it is obvious that, on theoretical grounds, one particular position, *viz.*, “egalitarianism”, whereby “*fairness*” is defined in terms of an “admissible class of income distributions” (Rawls, 1971), has dominated the modern literature on income inequality and redistribution (Sen, 2000). Egalitarianism has been, in many ways, the “official” theory of “distributive justice” for defining and assessing income inequality (Cowell, 2000), and its pervasive influence is acknowledged in the present work to illustrate the issue of equity as per health care sector. However, it remains unclear, whether one seeks to ultimately achieve an “egalitarian” distribution. The rhetoric seems to be somehow geared towards quantifying the prevailing degree of inequality against such an “egalitarian scale”, and the connections to “ethical” norms for the acceptability of the distribution are almost left for policy-makers and the public. In economic literature the term “equity” is, thus, commonly taken to refer to degree of fairness in the allocation of resources; whereas, “fairness” is usually used to mean reducing inequalities in the distribution of resources and/or in the distribution of a particular good; e.g., health, which are seen “undue” (Williams and Cookson, 2000). This calls for some analytical tools that can enable comparisons to be made between individuals (or groups) distinguished by some common characteristics.

Amongst the most powerful tools that have been used by econometricians for a century to measure economic inequality are the so-called Lorenz Curves (*LCs*) (Lorenz, 1905), and their various functionals such as the Gini indices (Gini, 1912). The conventional *LC* that is commonly used for drawing conclusion about welfare is the Relative Lorenz Curve (*RLC*), which involves a normalisation of the cumulative income functional by the mean (Serfling, 1980). The alternate is the Absolute Lorenz Curve (*ALC*), which is based on the absolute rather than relative differences, and especially, useful when large proportions of income are negative (Moyes, 1987; Cowell, 2000). Despite being conventional for ranking individuals in two situations, one difficulty of using the *LCs* for comparing inequalities, lies in the fact that curves can cross, and therefore, as shown by Sen (2000), intersecting *LCs* may occasion heterogeneity of ideas about inequality and leave social assessment incomplete.

### 0.3.3 (In-) Equality and Equity in Health: What Does “Equity in Health” Mean?

Like the literature on economic inequality, there is, in fact, little consensus about the meaning of these terms *as per* health and health care. Yet, the space of ideas is not narrow here. The definitions of “*health inequalities*” and “*health equity*” and how they should be quantified have indeed been at the heart of the emerging international debate throughout the last two decades (Williams and Cookson, 2000; Evans et al., 2001; Braveman et al., 1996). Though, it is obvious that many of the definitions and dimensions provided in the literature can be related, it may be, especially, useful to distinguish between “equity in health and health care”;

“equity in financing health care” and “equity in access to and utilisation of health care”. According to Whitehead (1990) “*equity in health*” implies that “ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that no one should be disadvantaged from achieving this potential, if it can be avoided” (Whitehead, 1990; p.29). Therefore, inequity in health refers to differences in health that “are not only unnecessary and avoidable but, in addition, are considered unfair and unjust”; whereas, “*equity in health care*” can be defined as “equal access to available care for equal need; equal utilisation for equal need, and equal quality of care for all” (Whitehead, 1990; p. 14).

The 1995-1998 WHO/EURO initiative on “equity in health”, which was launched with aim of placing the issue of equity higher on the policy agendas and strengthening the capacity for monitoring health equity (WHO, 1996), has drawn on Whitehead’s definitions, and defined equity as: “minimising avoidable disparities in health and its determinants – including but not limited to health care – between groups of people who have different levels of social advantage or privilege; i.e., different levels of power, wealth, or prestige due to their positions in society relative to other groups; noting that “[in] virtually every society in the world, differences in social advantage are reflected by socioeconomic, gender, ethnic, age, and other differences” (WHO, 1996; WHO, 1998). The 1995-1998 WHO/EURO documents also stated that *equity in health care* implies consideration of “...need rather than social advantage...in decisions about resource allocation that affect health” (WHO, 1996; WHO, 1998). In the late 1990s (specifically during the period 1998-2003), the WHO has, however, advocated a new measurement approach, whereby inequality in health is defined as: any avoidable differences in health between any individuals who should not be grouped a priori according to social characteristics, except possibly geographic location (Murray et al., 1999; Murray et al., 2000). This approach has, however, been criticised by some (e.g., Braveman and Starfield, 2001; Braveman and Tarimo, 2002), on the grounds that it removes socioeconomic and human rights considerations from the process of identifying inequities in health.

The International Society for Equity in Health (ISEqH)<sup>12</sup> defines “*equity in health*” as: “the absence of systematic and potentially remediable differences in one or more aspects of health across populations or population subgroups defined socially, economically, demographically, or geographically”. Thus, unlike the definition used by the WHO – during the 1998-2003 –, and along the lines of others (e.g., Standing, 1997; Braveman and Gruskin, 2003), the ISEqH’s definition emphasises two important dimensions, which are deemed relevant to the measurement of inequity: the *systematic* – rather than the *random* or occasional – differences, and the *inter-groups comparisons*. Though succinct, the ISEqH’s definition does not indicate whether the relevant comparisons are between groups that differ in their underlying socioeconomic positions. For instance, using the ISEqH definition, equity were assessed based on comparing rates of illness between people residing in geographically distinct, but socially similar areas (Braveman, 2006).

Several other definitions, in addition to WHO’s and ISEqH’s, have of course appeared in the international literature. However, some have been employed more than others due to their greater acceptability among policy-makers, and to their applicability to the measurement and implications of health inequity (Culyer and Wagstaff, 1993). For instance, ECUity Group<sup>13</sup> has

<sup>12</sup> The ISEqH was established in 1996 by a group of academic and scientific researchers to promote equity in health and health services internationally through education, research, publication, communication and scientific exchange. The ISEqH launched in 2002 a peer-reviewed, electronic journal the [International Journal for Equity in Health](http://www.iseqh.org/en/workdef.htm). More information about the ISEqH are available at: <http://www.iseqh.org/en/workdef.htm>

<sup>13</sup> Initiated in 1989 by academic and professional researchers from a range of developed countries to assess

adopted a more concise and accessible definition that are, not only acceptable by almost all of the policy-makers in the OECD countries, but also workable definitions that are amenable to the empirical measurement and policy implications. The ECuity group's definitions refer explicitly to *inequalities* as: differences in health between people with different socioeconomic positions; hence the terms: “*Income-related and Socioeconomic-related Inequalities in Health*”. These inter-groups differences stem, according to ECuity group, – from inequalities in: the determinants of health (e.g., education); constraints confronted by the poor and the better-off (e.g., direct costs; time costs; access to insurance, living conditions), and should be seen as “*inequities*” (van Doorslaer et al., 1997).

### 0.3.4 Equity in Health Care: From Theoretical Debates to the “Twin Principles”

The concepts of equity and fairness as applied to the “Health Care Systems” *per se* have, nonetheless, been a much-debated subject. Much of the earlier debates that have brought to bear on the issue tended in the past to degenerate into controversies over the role and positions of various ideological viewpoints in formulating definitions and objectives of equity for health care systems. Views and definitions of equity, which are found in the literature have been grouped by others (e.g., Williams, 1993; Gillon, 1986; Wagstaff and van Doorslaer, 2000)<sup>14</sup> into three distinct school of thoughts – referred to as: *libertarianism*, *utilitarianism* and *egalitarianism*. Similar to the literature on economic inequality, the latter school of thoughts, which overlaps with: the *Aristotelian* notion of “equal treatment of equals” and the *Marxian* views about the distribution of resources: “from each according to his/her ability, and to each according to his/her need”, was found (Wagstaff and van Doorslaer, 1993) to be the most frequently encountered “ideological” positions underlying the empirical work on equity in health and health care system. In addition, it was found to accord with the views of health professionals, publics, as well as policy-makers in several industrialised countries and in a good few developing countries (Wagstaff, 2002).

Two distinct strands of thinking, which have emerged from such earlier equity-debates, need to be highlighted. The first strand is that payments for health care ought to be linked *not* to the usage of health care services but rather to individuals' abilities-to-pay (ATP). The second strand starts from the premise that health care ought to be distributed according to individuals' needs, rather than their willingness or abilities-to-pay. This suggests that an equitable health care system should offer a protection against the significant financial burdens induced by ill-health (that is no one is impoverished by its need to health care), and that the unexpected health care cost burden does not fall solely on an individual or a household (i.e., cross-subsidisation). Nonetheless, the distribution of health care would also entail a fulfilment of individuals' need (Roberts et al., 2004). The above two principles are commonly described as “*the twin principle of equity*”, and involve an assessment of “*equity in health care finance*” and “*equity in health care delivery*”, respectively (Wagstaff and van Doorslaer, 1993). But how have these principles been understood, interpreted and operationalised?

#### 0.3.4.1 Equity in Financing Health Care: What should Equitable Payment Mean?

Despite the “pro-egalitarian bias”, broadly accepting the rationale that the payments towards

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various aspects of equity in the OECD countries; more information on ECuity Group is available at [http://www2.eur.nl/ecuity/about\\_us.htm](http://www2.eur.nl/ecuity/about_us.htm)

<sup>14</sup> For a useful survey and discussion of various *theories of social justice* underlying the debates and of their applicability to health care, cf. (Gillon 1986). For a discussion of the role of ideological viewpoints in formulating equity definitions and objectives in the finance and delivery of health care, cf. (Williams, 1993), and for a review on the views adopted by researchers and policy-makers cf. Wagstaff and van Doorslaer (1993).

health care should be directly and continuously levied on the basis of ATP, the egalitarian concepts of fairness in health care finance/payments continue to spark vigorous debates amongst scholars and the international health community. Much of the recent debates centre, however, on how should the egalitarian notion of fairness be interpreted and further operationalised. Indeed, while it is clear that a “fair” or “equitable” health care payment structure should steer clear of all the “impoverishing effects” induced by catastrophic health care outlays, the *egalitarian* concepts generally taken to mean that: “individuals with different ATP should make appropriately dissimilar payments” (referred to as *vertical equity*), remain not self-explanatory. They do not, for instance, tell us how *equitable* payments are – with respect to ATP – nor presumably do they tell how these payments should be linked to ATP; more specifically, what is exactly meant by “*appropriately dissimilar payments?*”

For instance, McIntyre (2007) argued, as do have others, that the egalitarian requirement of linking health care payments to ATP does not immediately imply whether it is preferable to have a “*proportional*” payment scheme – whereby everyone, regardless of his/her income should contribute the same proportion to health care funding (noting that higher income-groups will still pay higher for health care in absolute terms), or a “*progressive*” scheme, whereby high-income groups should contribute higher proportion of their incomes than lower-income groups. The “*equity yardstick*” proposed by the WHO (2000) coincides with the former interpretation; that is payments for health care should be linked not just to ATP but in *proportion* to it. This implies that the only aspect of *inequity* that matters in judging the performance of health care systems – and ought to be quantified – is the extent to which payment deviate from proportionality. In short, the WHO’s requirement of *fairness* in financing health care implies *proportionality* with respect to ATP. Some (e.g., Wagstaff and van Doorslaer, 2001) criticised the WHO’s index of fairness (the FFC), on the grounds that “it treats *progressivity* as just as unfair as “*regressivity*”, and that it does not allow to capture the extent of disparities in payments amongst groups of equals ATP; i.e. violation of complete fairness, which requires equal treatment of equals’ ATP (referred to as *horizontal equity*).

On the other extreme, some (e.g., Mkandawire, 2005; Squire, 1993; McIntyre et al., 2005) explicitly advocate a *progressive* health care financing structure on the grounds that health care financing, being linked to individuals’ levels of living (as a proxy of ATP), should be assessed in terms of its cross-subsidisation function not only from the healthy to the ill, but also from the “rich” to the “poor”. This simply implies that disproportionality matters for judging equity performance of a health care financing system, since the linkage of payments to ATP principle implied by the notion of *progressivity* of such payments on pre-payments income, and thus, by the degree of the (vertical) income redistribution which they generate. Accordingly, health care system should help lessen the overall prevailing income-inequality in a country. Such argument has been much supported by a group of researchers working in developing countries– the so-called EQUINET (2008)<sup>15</sup>– arguing that, especially for countries with a substantial degree of income-inequality, progressive funded social services are central to redistributive policies aiming at reducing relative income inequalities in such countries.

Yet, other egalitarian-inspired views are those expressed by ECuity group’s researchers, who take an “agonistic” or “positivist” position in such debate, grounded on the proviso that: the

<sup>15</sup> EQUINET stands for Regional Network on Equity in Health, lunched in 1999 by a group of researchers, civil society members, with the aim of promoting and realising shared values of equity in health. The network includes members and institutions from: Botswana, Malawi, Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe. More information about the net is available at: <http://www.equinet africa.org/>

linkage of payments to ATP should simply be measured by the degree of progressivity of payments on pre-payment income, which ought not to prespecify exactly how payments should be linked to ATP (Wagstaff and van Doorslaer, 2001). Though, advocates of such “positivist” egalitarian views have incorporated into the analysis of equity in financing health care the serious concerns raised by policy-makers regarding the potential impacts of *regressive* payments on the distribution of income. Indeed, in the late 1990s, these researchers (Wagstaff and van Doorslaer, 1997) have introduced, for the first time into health economics literature, decomposition frameworks borrowed from tax literature, and pointed that: “a broader analysis of income redistribution consequences of health care financing arrangements needs...to look beyond progressivity to the full range of determinants of redistributive effect” [pp. 292]. This is because “health care financing...might be very progressive ... and therefore deemed vertically equitable but might because of dispersion in payments made at each income level, be deemed inequitable in a horizontal sense” [pp. 293]. The above clearly suggest that *progressivity* is commonly taken – in the empirical research of ECuity group – to mean *vertical equity*, and *redistributive effect* (RE) is taken to refer to any (intended or unintended) pro-poor (pro-rich) change in income-inequality that is brought out by health care payment. Therefore, in the context of this study, we have made the choice to privilege the egalitarian conception of “*distributive justice*” for defining and assessing *fairness* in health care. This involves acknowledging that people with higher incomes ought to pay appropriately more in proportion to their income; i.e. vertical equity defined by progressivity. The term *appropriately* is taken to refer to the requirement that equitable payments, though ought to be disproportionately related to ATP, it should not change individuals’ rank in the distribution of income, or worsen income inequality. A *fair* system should also treat equally, those who are deemed *on average equals*; i.e., *horizontal equity*. Furthermore, though, the role of income transfer is not a prime function of the health care financing system, the above principles are implicated by redistribution; so an equitable finance is by definition “pro-poor”. Adopting this involves an assessment not only of equity in finance but also in health care delivery and use.

#### 0.3.4.2 Equity (and Equality) in Health Care Delivery: Equality of What?

The assessment and judgment of equity performance of the health care system should not rely solely on the distributional analyses of health care payments, but should simultaneously examine the distribution of health care use (Culyer, 1981). Indeed, especially in the context of developing countries where large proportion of health care is funded directly through out-of-pocket payments, *progressivity* analysis of health care payments might not necessarily be a sign of an equitable health care delivery system. An assessment of whether the latter is *fair* involves an assessment of whether the distribution of health care use *per se*, and with respect to individuals’ needs is *fair* (Wagstaff, 2002). However, once again, methods for quantifying (in-)equity in a health care delivery system have been extensively challenged by the need to operationalising definitions and agreeing on interpretations. Thus, as before, much of the equity debate in this area of analysis has focused on how should the egalitarian notion of “*distribution according to need*” be interpreted and operationalised. It is evident that the latter requires, in principle, *de-linking* the delivery of, and access to, all types of health care services from ATP, and eventually removing any (other) financial and non financial impediments. An equitable distribution of health care shall, therefore, solely reflect the distribution of needs across different socioeconomic groups. This implies that the notion of “*need*”, against which equity assessment is preformed, needs to be defined and quantified in appropriate way. There is, however, no consensus with respect to the definition of “*need*”, which remains a rather “elusive” concept (Sen, 1992; Culyer, 1995).



For instance, Mooney (1983) noted, as do have others (e.g., Aday et al., 1984), that the requirement of “distribution according to need” should also be interpreted in terms of the “*twin principles of equity*”: treating the same those who are the same in a relevant respect such as having the same need (*horizontal equity or equal treatment for equal need*); and treating differently those who are different in relevant respects such as having different need (*vertical equity or different treatment for different need*). In his influential article “*Need: the idea won’t work but we still need it*”, Culyer (1995) notes that: “neither type of equity is operational if the concept of “*need*” is not sufficiently quantifiable for judgments of *sameness* or *difference* to be made with acceptable precision for the purposes in hand” [pp. 227]. Besides acknowledging the difficulty of defining “need” and the diverge interpretations underlying this notion, Culyer discussed the lack of clarity in the ethical basis of the diverse definitions of *need* in health care, and the conditions/characteristics which are necessary to make the “idea of need” virtually workable and useful. That it has to be: up-front and easily interpretable; directly derived from the objective(s) of the health system; capable of empirical application in issues of horizontal and vertical distribution; service- and person-specific; enable a straightforward link to be made to resources; and that it should not, if acted upon as a distributional principle, produce manifestly inequitable results (Culyer, 1995; pp. 727).

But, even if all Culyer’s conditions of need are met, definitions of “*need*” represent only one difficulty. Another is that, some workable definitions of the “*egalitarian yardstick*” that enable to assess “how equitable a delivery health care system is” are required (Wagstaff and van Doorslaer, 2000). Obviously, since the above yardstick involves the departure from some idea of complete fairness, one needs to answer the fundamental question: “*equality of what?*” Typically, the *egalitarian* notion is unthinkingly taken to mean “*equality of treatment*”. A conventional interpretation might, thus, be “*equality of access to treatment*”. However, access to treatment is not easily observable. Furthermore, no consensus on what the term “*access to treatment*” means. For example, for Le Grand (1982) and Mooney (1983, 1994) “*access to treatment*” and “*receipt of treatment*” are not synonyms. According to these authors, the former refers to the *opportunities* open to people (e.g., right of entry), whereas the latter concerns both whether these opportunities do exist, and if so, whether a person has availed himself of them<sup>16</sup>. In the works of ECuity group (1993; 2000; 2004) as is in the common practice in the literature – *access to treatment* is almost defined in terms of the “*effective-utilisation*” of different types of health care services (e.g., general practitioners, specialists), and apprehended either through imputed expenditures or physical units of consumption, which remain the only measurable variables; whereas, “*need*” is typically proxied by *ill-health status* (e.g., morbidity indicators) and demographic characteristics (e.g., age-gender).

Yet, as before, in addressing the issue of equal treatment of equals, simultaneous considerations must be given to the precise form that the “differential treatment of unequals” should take (van Doorslaer et al., 1992). This, of course, begs the more contentious question of: how should the relationship between “*need*” and “*treatment*” be defined and interpreted – in relation to socioeconomic status? Clearly, persons who are in the same state of “ill-health”, but are different in other aspects such as socioeconomic characteristics (e.g., education) might not probably behave alike *vis-à-vis* health care, nor be treated equally by the system. That is, there might be “systematic differences” across different socioeconomic groups in terms of both behaviour and treatment received – given similar need or health status. With some remarkable exceptions (e.g., Cullis and West, 1979; Huber, 2006), these issues rarely get discussed in the health economics literature; and researchers (including ECuity group) have

<sup>16</sup> Differences between these terms were also emphasised by Wagstaff and van Doorslaer, (2000).

usually, implicitly or explicitly, assumed homogenous behaviour across socioeconomic groups. That is, the systematic differences of the equity yardstick are only assessed in terms of the average behaviour of ungrouped individuals (cf. e.g., van Doorslaer et al., 2004). Such a practice, which implies that the society allocates the same amount of health care to all socioeconomic groups (i.e., vertically equitable), is, yet, open to discussion.

As will be argued and shown in this thesis, trying to analyse horizontal inequity whilst assuming vertical equity in the system of health care delivery would do little justice to either. The issues of horizontal and vertical distribution in the delivery of health care service are not, of course, unrelated. But, neither concept subsumes the other. The role of individual behaviour and health care system can figure in the analysis of equity, without assuming that system is by definition vertically equitable. The method employed in the present study does not, therefore, fall into the “average behaviour trap”. It does not assume that those belonging to different socioeconomic groups do have similar behaviour nor does it assume that they are treated equally. Systematic variations across these are, thus, made transparent and quantified. Yet, in common with most previous works in the field, the works presented in this thesis hinge on the egalitarian requirement of equality in access to care as defined by *effective-use*; whereas “need” for health care is defined in terms of “ill-health” – measured by a set of morbidity indicators, while accounting for variation in need across socio-demographic groups.

The above equity dimensions and measurements will be elucidated, with the aim of completing the pieces of puzzle, using the particular context of the Occupied Palestinian Territory (OPT). This is not an uninteresting case study. A focus shall, therefore, be given to the context within which the Palestinian health system functions and the capacities of its current structure to fulfil various equity objectives. The next section presents the concerns related to such context, the research problematic and specific objectives of the study.

## **0.4 THE CONTEXT OF THE PRESENT RESEARCH**

### **0.4.1 Statement of the Research Problem: “Equity” within a “Political Turmoil”**

Health care system in the OPT is bounded with so many problems ranging from inadequate finance, malpractices (e.g., inefficiency, cronyism and corruption) to extraordinary fragmentation and high risk of exclusion of the disadvantaged and vulnerable groups. Though the question of its funding through mobilising additional and sustainable recourses has its own role to play, today, several researchers (e.g., Mataria et al., 2008; Miranda, 2004; Giacaman et al., 2007; Horton, 2007; Hamdan et al., 2003), international organisations (WHO, 2008; World-Bank and BCRD, 2006; UNDP, 2007), and aid agencies (ICRC, 2007; DFID, 2006; Oxfam-International, 2007) express serious concerns regarding the question of fairness in various aspects of health and health care; with claims that the current arrangements of financing and delivering health care may well be associated with major risks of exacerbation of inequities. Although similar problems exist elsewhere, these are exaggerated and perpetuated under conditions of turbulent history of colonialisation; systematic and unrelenting measures of military occupation, as well as a chronic political turmoil in the two Palestinian regions: West Bank (WB) and Gaza Strip (GS). All brutally increased poverty and deprivation in many aspects of life, and severely affected the already existing problems of access to, and provision of, health care. Despite the idiosyncrasy of the current situation, the question of “*equity*” in the health care sector in the OPT stands, as in other contexts, as a key issue in the current debate about reforms aiming at enhancing its efficiency and sustainability, while purporting to promote social rights to, and equity in, health.

As noted at the outset, there has been recently a great deal of interest in health equity and in reforming health systems to reduce inequalities, financial risks and unequal burdens. Unfortunately, however, like debates on equity issues in the context of developing countries (McIntyre et al., 2005; Bridsall and Hecht, 1995), equity-debate in the particular context of the OPT, has been so far parochial in character; lacking coherent and detailed evidence, appropriate definitions and measures against which to evaluate and judge equity features of the current health care arrangements. Though, it is undoubtedly true that much can be learnt from other experiences about (dis)advantages of alternate methods of funding and delivering health care, and about the likely equity implications of reforms to these systems, reforms remain a highly context-dependent process (Giacaman et al., 2003). Even when dealing with similar methods, factors that might drive inequalities, their interpretations and implications may highly diverge. This is due to conditions and realities, which vary from country to country, such as the relative presence of socioeconomic inequalities, the relative importance of different sources of financing-mix, the political interests in, and the capacity of, arrangements to achieve, some or all of the equity objectives of reforms (Standing, 1999).

Health conditions and health care arrangements in OPT have been recently the subject of several publications (e.g., Giacaman et al., 2003; Hilsenrath and Singh, 2007; Mataria et al., 2008). Previous studies tended to focus on describing the historical evolution in the health care sector along with the obstacles that have faced its reforms during the last fifteen-years (e.g., Giacaman, 1994; Giacaman et al., 2003; Giacaman et al., 2008). Other empirical-based studies (e.g., Mataria et al., 2004; Mataria et al., 2006; Mataria et al., 2007) addressed, using contingent valuation methods, the question of “price-setting” for primary care, in relation to quality aspects. Though, some of these studies (e.g., Hamdan et al., 2003; Mataria et al., 2006) have tried to go further to address and comment on various *equity* dimensions, the result is that remarkably little is known about *equity* characteristics of health care financing and delivery arrangements and about the type of *equity-oriented* health sector reforms that are needed. This is despite the importance attached to the issue in formulating policy objectives for health sector reforms in the context of OPT (NHP, 1991; PNA-MoH, 1999). And some (Giacaman et al., 2003) go so far as to attach greater importance to *equity* than to *efficiency* in health care; arguing that: it is not efficiency or the reform process per se that is needed, but the construction of a health system that will promote the social right to health development for Palestinian citizens including the factors of *equity*. Contrary to what is sometimes claimed (Qato, 2004; Hilsenrath, 2005; Hilsenrath and Singh, 2007), then, there seems to be broad measure of support for “prioritising” *equity* in health sector reforms in the context of the OPT.

Prior to the advent of a first “Self-Governing Body” for the Palestinian population residing in the two regions of the OPT (GS and WB with the Palestinian Arab East Jerusalem excluded) – what has become known as “the Palestinian National Authority” (PNA) in 1994 – an initiative to develop a “*Palestinian National Strategic Health Plan*” has been undertaken in 1991. This plan, hereafter referred to as the “initial plan”, has set, for the first time, policy statement and objectives for health sector to be perused by policy-makers of the envisaged Palestinian state, and has been designed in coordination with, and major inputs from, many stakeholders, in particular the civil society and non-governmental organisations (NGOs). With regard to the theme of *equity*, we extract hereinbelow a key quotation from this earlier plan (NHP, 1991): “... *health services will be accessible to all individuals and families of the dispersed Palestinian communities by means acceptable to them, through full participation, and at a cost that the concerned communities can afford ... distributional issues will depend totally upon demography, available resources, and accessibility*” [p.5]. Though, policy statement in the above quotation does not state explicitly equity objectives in health care

sector as that: payments towards health care will be *linked* to individuals' ATP or *de-linked* from their usage of medical facilities, nor presumably does it illustrate the ways of individuals' *participation* towards financing health services (e.g., tax-based, insurance contributions, user-fees, etc), a commitment to the notion of *equity* is still evident by stressing the *accessibility and affordability* issues in the provision of health care, and by relating the distributional issues to the available resources. It is also evident from the above quotation that policy-makers of the OPT will be committed to the notion that all citizens *should* have access to health services, even if equity objectives in delivering health care services were not explicitly stated in terms of “*equal access to equal need*” or “*universal coverage*”.

As stated above, this initial plan has, however, been developed before the establishment of a Palestinian Ministry of Health (MoH), and might therefore be motivated, as elsewhere (Cissé et al., 2004), by an eager national aspiration to significantly reforming health sector and enhancing its capacity to attain the principal goals of a health system (WHO, 2000): improving health status of population; reducing financial risks, and convalescing individual satisfaction – after nearly three decades of turbulent colonisation under which health sector was extremely stunted, marginalised and underdeveloped (Hamdan et al., 2003)<sup>17</sup>. Yet, following its inception in 1994, reforms have been taking place in the Palestinian health sector with the involvement of several international aid and United Nations (UN) agencies, as well as local and international NGOs (Giacaman et al., 2003). Since then, the PNA represented by its MoH, and in coordination with several non-ministry stakeholders, has produced three official and detailed national strategic plans: the first 1994/1999 was published by Palestinian Council of Health (PCoH, 1994), the second 1999/2003 by the MoH (PNA-MoH, 1999), while a third is currently being prepared (PNA-MoH, 2008), these plans are hereafter referred to as “official plans”. Though many of the policy statements in the “initial plan” were repeated in the successive official plans, these latter have referred to “stewardship” and “management responsibility”<sup>18</sup> of the PNA and its MoH to properly address system-wide development issues for health sector, with more specific goals (Schoenbaum et al., 2005). Hence, besides assuming a primary “responsibility” for the PNA in promoting the wellbeing of the entire Palestinian population, ideally through offering *accessible, affordable, equitable and sustainable* health care of “good quality” and “cost-effectiveness” (PCoH, 1994; p. 32), the 1994/1999 plan has assigned to the MoH a coordination role, with views to regulate health sector and integrate the activities of heterogeneous health care actors: the public sector; a rapidly developing private-for-profit sector; a wide spectrum of relevant not-for profit NGOs as well as the “United Nations Relief and Works Agency for Palestinian Refugees-UNRWA”. The 1999/2003 plan has further specified, among others, two major objectives of reforms for health care sector (PNA-MoH, 1999, p. 28-29): i) reforming financing system through adopting appropriate cost recovery schemes and expanding health insurance alternatives to improve financial sustainability, and to ensure equity and accessibility to appropriate levels of health care (primary, secondary and tertiary), especially for rural and disadvantaged areas; and ii) considering primary-level as a backbone of the delivery system, and a strategy towards achieving an affordable and accessible health care for all of the Palestinian population.

It is clear that – when compared with the policy statement of the initial plan – reform’s objectives for the health sector are taken further in the second plan to specify two ways of participation towards financing health care: the implementation of cost-recovery schemes

<sup>17</sup> For more details about the characteristics of the health care sector and health conditions under the Israeli military occupation (1967-1994), cf. Giacaman et al (2003); Giacaman (1994).

<sup>18</sup> The 2000 WHR defines *stewardship* as the “careful and responsible management of the wellbeing of the population”, and refers to the *responsibility* of the “State” for the welfare of its population (WHO, 2000).

through user-fees and users' co-payments and the expansion of *insurance schemes*. Furthermore, it is being made clear that the provision of health care should guarantee accessibility to appropriate levels of care, through making primary-level affordable; given the latter represents the first contact between individuals and health care system and through which a referral to *secondary* or *tertiary* services are generally entitled<sup>19</sup>. *Accessibility*, here, is taken to refer to the degree to which individuals are able to contact the needed services, which can be thought of in terms of opportunities open to people; and therefore, it reflects a central element in the relationship between individuals, on the one hand, and the provision and funding arrangements of health care, on the other hand (Hamdan et al., 2003). Quite obvious, these systemic objectives reflect a continuing commitment amongst policy-makers and stakeholders in the OPT to the notion of *equity* in health care; even if the implementation of cost recovery and the expansions of insurance schemes were not *linked* to ATP; this has, at least, been coupled with the *affordability* of, and *accessibility* to, health care services.

It is these ethical premises and concerns that have provided the point of departure of the present study to evaluate the *fairness* of the current health care financing and delivery arrangements in the OPT; however, without neglecting the institutional and political realities, which have been compromising its overall performance and the capacity of its structure to fulfil the stated systemic objectives. Endow with the conventional fact that a health care system does not operate in a vacuum and needs to be understood within the broader context in which it operates (Hamdan and Defever, 2002). Beside being challenged by a complex and fragmented structure (WHO, 2006), the health care sector in the OPT has been operating since the handover of responsibility for health care to the PNA in 1994 (following the execution of the so-called Oslo Peace Accords<sup>20</sup>) in a very changing and unstable environment, which has undoubtedly dogged its performance and increased the risk of inequities in the finance and delivery of health care. Several key changes occurred in OPT during the 1990s and following 2000 and which make the study of equity in the OPT and the period chosen additionally interesting. First, user-fees in both the public sector and the non-profit sector introduced and rose (Lennock and Shubita, 1998). The increase was especially pronounced for secondary and tertiary care services, where fees appear to have risen by over 65% in real terms between 1994 and 2001, but was also noticeable in primary centers, even though these were still supposed to be provided for modest user charges (Schoenbaum et al., 2005). Second, there has been a large rise in the role of private for-profit sector and in private health insurance market (Hamdan et al., 2003). Fees for private clinics and specialist doctors apparently rose by nearly 85% over the period 1994-2001. Private cover peaked at a round 20% in 2000 and is most common among higher-income groups of population. Third, expenditures on drugs actually rose, due to a rise of 64% in the real price of medicines during over the period 1994-2001 (MAS, 2001). The latter seems to have been due in part to the overall increase in private investment in the health sector and the absence of regulation of the pharmaceutical sector and in part to increased donor assistance in supplies (PALTRADE, 2001). Forth, public health insurance has expanded its coverage since 1994. Initially, this was on a compulsory basis for public sector employees. However, the scheme has been opened up to others – in the informal and private sectors – on a voluntary basis. By 2001, over 60% of the Palestinian households were covered by public scheme, a little less than half of these being covered on a voluntary

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<sup>19</sup> It is important to note that the primary-level was not explicitly assigned, according to these plans a gatekeeper role. In practice, the health care system lacks an “effective gatekeeper” (Schoenbaum et al., 2005).



<sup>20</sup> According to Oslo Accords (signed officially on 13<sup>th</sup> September 1993 by the Palestinian Liberation Organisation (PLO) and state of Israel) the PNA assumed control over some areas of the WB and GS. In practice, however, the PNA has *notional power* and *little authority*, other than the administration and provision of civil services for the Palestinian population in the areas under its control.

basis. Public insurance contributions were reduced or waived for some groups (e.g., unemployed) following the *Intifada* (MoH-PHIC, 2006), even though co-payments and users charges paid at public facilities remain (Schoenbaum et al., 2005).

***An acute financial crisis***...The dramatic political changes and chronic impediments of the late 2000 and which accentuating with the progression of the second Palestinian uprising (*Intifada*) have further compromised the performance of the Palestinian health care sector, and culminated into an acute financial crisis. Especially, due to: the imposed closures and restrictions on movement of goods and individuals; the complete termination of tax revenues transferred by Israel to the PNA; the unstable donor funding; the indigent performance of the local economy; the very small tax-base and the existence of other competing proprieties, etc., the resources allocated from the PNA's general revenues to the health care have plummeted (Ajluni, 2003; Giacaman et al., 2003). The deteriorating Palestinian economy of the late 2000 had a marked impact on health care finance. In addition to a substantial drop in the levels of public expenditures, the health care system experienced what could be called "*spontaneous shocks*". Struggling with serious budgetary imbalances, the PNA expenditures on health has become increasingly dependent on donor assistance – recent estimations indicate that up to 50 percent of MoH recurrent expenditures are covered by donors (WHO, 2008). On the other hand, a rise in the share of private financing was also noticeable, with over half of total health expenditures being funded by direct out-of-pocket payments (PCBS, 2004; PCBS, 2006).

***A humanitarian crisis***...Nonetheless, all of the above has had a devastating impact on the wellbeing of Palestinians in many dimensions including, health status, education, political power, and real incomes – with a fall in the GDP per capita by one-third of its real value – from US\$1,612 in 1999 to 1,129 in 2006 (World-Bank, 2007), and a spiralling rate of unemployment (PCBS, 2007), resulting in 57% of households living under the poverty line of US\$2.8 per capita per day in 2007, and about half of them, 30%, live in extreme poverty, which defined as household of two adults and four children live on NIS 1,000 (US\$ 250.6) per month or less (UNDP, 2007). This massive impoverishment and "capability deprivation" of the population has, undoubtedly, compromised the *financial accessibility* to health services.

***And significant physical barriers***.... *Accessibility* to health care greatly depends on the political situation, which not only poses *financial* barriers due to increased impoverishment, but also *physical* barriers due to the separated wall, the permanent military checkpoints and curfews that often impede individuals from reaching the required health care – see Box 0.1 (ICRC, 2007; WHO, 2008; Barghouthi et al., 2005). A recent national survey conducted in 2003, indicate that about 13% of those who needed health care did not receive it, whereas about 5.0% of the population indicated that they needed more than an hour to reach a health facility. In terms of cost 33.3% of those seeking health care did not receive any due to high costs, including transportation costs, which rose significantly after 2000 (PCBS, 2004); again indicating the effects of the imposed physical barriers on access to health care in the OPT.

<b>Box 0.1: Physical Barriers in the OPT</b>	
a. Separated Wall	b. Crossing Checkpoint
 <p>“In 2006, the WB Barrier separated the village of Abu Dis, home to 30,000 people, into two different parts separating families from each others, and farmers from their fields. Abu Dis used to be a thriving village on the road connecting East Jerusalem and Jericho. Since the road is blocked, some 50% of the 187 businesses along the road had to close down”.</p> <p>Source: International committee of Red Cross-2007</p>	 <p>“A Palestinian family crosses Huwara checkpoint, one of the two entry passages along the main road connecting Nablus to the rest of the West Bank. Private vehicles are not allowed through this check point, unless the owner holds a special permit”.</p> <p>Source: International committee of Red Cross-2007</p>

The combination of all the conditions mentioned above while emphasising the concerns previously raised by several researchers and humanitarian organisations about equity in the health care sector, require going some way towards identifying not only the extent of prevailing inequities, but also their impact on individuals’ wellbeing and the actual causes. As a response to these concerns and current debates on health care sector reforms in the local context, this study seeks to present an evaluation of equity features of the currently used methods of financing and delivering health care in the OPT. While attempting to fill the gap in the literature about equity of health care sector in the OPT, the thesis hopes to provide policy-makers, as well as other relevant international and local stakeholders with groundbreaking information about various aspects of equity. The analyses presented in the study have been produced using the latest rigorous methodological developments in the field. The resultant evidence is coherent one and can be used to help formulate health policy objectives – as per the “2008 National Health Plan” whose draft is currently being circulated for discussion – about the types of reforms that can better guarantee the implementation of equity-enhancing measures of reforms. Beside the important impact that its results are expected to have on reforms of the Palestinian health care sector, the results could also be useful to other developing countries with comparable levels of socioeconomic developments, looking for ameliorating the equity performance of their health care systems.

#### 0.4.2 Source of Data

Interestingly, the Palestinian case – unlike the situation in many other low and middle-income countries – is characterised by the presence of a good amount of data, acquired through repeated surveys and census of high quality standards. The rapidly changing environment and the consequences of the chronic conflict, yet with an information-rich context, make of the WB and GS a fertile area that – following proper analyses – would help inform decisions necessary for local future plans and for extracting conclusions with wider international connotations. The data for the empirical analyses of equity – to be presented in the following

three essays – are all taken from a recent nationally representative survey on Household Health Care Expenditures and Utilisation carried out in 2004 by the Palestinian Central Bureau of Statistics (PCBS, 2004). This survey which is hereafter referred to as the [HCEU survey](#) represents the first and only national survey of its kind to be conducted in the WB and GS. The major objective of the [HCEU survey](#) was to provide a basis for establishing a system of *National Health Accounts* (NHAs) for the OPT. A system of NHAs is a policy tool that describes health expenditures and the circulation of funding within and between various health sector(s) during a specific period of time. It also describes the sources, financing channels and uses of each, and all, health care resources, with a detailed description of health care at the functional level (Berman, 1997). Accordingly, the [HCEU survey](#) offers a fairly comprehensive dataset that enables analyses of different patterns of health care finance and utilisation in the local context of the OPT.

It is worth mention that the PCBS has conducted – in parallel to the HCEU survey – another national survey: the “Health Care Providers and Beneficiaries Survey” (HCPB-2005). The latter attempted to provide some supplementary and detailed information on the various health care providers acting within the Palestinian health care sector. Collected data in this survey include: market share of each health care providers (based on a quantification of the type of activities and quantities of visits and services provided); the workforce employed by each of them, and estimations of insinuations’ revenues and expenditures on health care (PCBS, 2006). However, given that the main focus of the HCPB survey was the institutions of health care, rather than the users of services, we have opted to use the dataset of [HCEU-survey](#) for the empirical analysis. This survey provides appropriate and detailed information which has not so far been exhaustively analysed. More information about the contents and the variables collected in [HCEU survey](#) are given in [Appendix A.1](#) and in the relevant chapters.

#### 0.4.3 Aims and Objectives of the Study

The purpose of this study, then, is two fold. First, it aims to elucidate the utility of recent methodological developments in the field of health equity analyses and measurements. Second, it aims to inform and support the on-going policy dialogue with empirical based-evidence about equity performance of health care sector in the OPT and reforms needed to enhance equity. The major research question of equity appraisal set in this thesis is, therefore,

*“Whether (and to what extent) health care in the WB and GS are financed and delivered in an equitable way, and what are the policy-relevant factors that contribute to inequity”.*

In order to fulfil its overall aims and research questions, the study has identified the following interrelated and specific objectives:

- To discuss and assess the extent to which the established measures and techniques of equity – initially developed in the context of developed countries – can help inform the complex debates involved in health reforms in the context of developing countries.
- To elucidate the value-added of using more technically-involved methods to quantifying and explaining inequities in the context developing countries.
- To assess the distribution of payments/contributions towards the provision of health care services for alternate sources of health care financing.
- To assess the distributional impact of health care payments burden on the prevailing income distribution, and the extent to which the prevailing health care financing-mix contributes to the uneven income distribution.
- To compare various equity dimensions (vertical, horizontal and reranking effects) of



health care financing schemes; namely, the *ex ante* and *ex post* methods of financing.

- To assess the distributions of need for, and use of, three levels of health care: primary, secondary and tertiary health care across socioeconomic groups.
- To identify the actual factors responsible of (any) observed inequalities in the provision of each of the above levels of health care.

The structure of the study – presented in following [sub-section](#) – is set to comply with the above aims and objectives.

#### 0.4.4 Structure of the Study

Beside this introductory, this thesis consists of three self-contained essays, which all deal with the analysis of equity in health care sector in the particular context of the OPT. **Essay I** reconsiders the aggregate summary measures of progressivity and distributional impact commonly used to assess equity in health care finance. It shows how an exclusive reliance on a single-valued measure can provide imperfect description of the nature of inequality prevailing in the distribution. While providing a further evidence on the value added of going beyond the commonly used “aggregate summary index approach”, the essay also emphasised the use of “appropriate” and “efficient” statistical inference methods for the measurement of inequalities. The essay includes a brief review of the theoretical debates and the previous empirical research on equity issues of health care finance, with a focus on those conducted in developing countries (Section 2). This is followed by describing inequality measures and the methods of statistical inference (Section 3). The chapter also provides a brief discussion of various issues related to data requirements, variables definitions, and computational methods used to assess inequity in health care finance. The chapter presents and compares findings using two common measures of redistribution and progressivity, and at the two levels of analysis: the *aggregate level* for summery indices and at the disaggregate levels for the differences in *p*-ordinates corresponding to income deciles (Section 4). The last two sections (Sections 5 and 6) contain some discussion and conclusions.

**Essay II** considers the relationship between progressivity and the distributional impact health care payments (examined in the first essay) within a broader context of decomposition analysis. It shows how the overall income inequality effects of health payments can be disentangled into vertical and horizontal effects (inequities), and reranking. The essay shows that the AJL measurement model previously proposed and applied to assess the extent of these three effects suffer from serious pitfalls, and need to be appropriately adapted to real data survey. The essay attempts therefore to apply a new (modified) method of decomposition that can provide a more appropriate measure for each of the three decomposable effects. The essay shows how the unequal treatment of equals and the improper treatment of can be fairly more important in determining the degree of overall income inequality induced by health care financing than the *progressivity (regressivity)* contribution that had previously attracted the most attention in the literature. The chapter discusses the methods previously used to decompose overall inequality (Section 1). This is followed by describing the measurement model used in this study (Section 2). Empirical results and main findings are presented in Section 3. A sensitivity analysis of decomposition components to the definition of income-equals is also provided in this section. The last two sections contain some discussion and conclusions.

**Essay III** discusses the issues involved in the measurement and explanations of inequity in the delivery of health care. The essay seeks to determine whether (and to what extent) there is differential utilisation of various levels of health care by income – after accounting for

differences in medical need. It proposes and applies a more elaborated decomposition approach that allows rectifying the commonly used methods invoked by ECuity group to decompose inequality in utilisation into its “justifiable” and “unjustifiable” parts. Inequality in the use of health care is deemed “justifiable” or “legitimate” when differences in utilisation reflect solely differences in medical need. By contrast, the “unjustifiable” inequalities (defined in terms of horizontal equity principle) arise from differences in ‘other’ non-need characteristics (or policy-relevant factors). It shows how the total income-related inequality in the utilisation of health care (as measured by the concentration index) can be decomposed into its “justifiable” and “unjustifiable” parts, while allowing for more appropriate non-linear methods for estimating (expected) health care use, thus, avoiding linearity restrictions imposed by the standard methods of decomposition. Therefore, in addition to discussing the limitations of standard methods for the measurement and decomposition of income-related inequality in health care (Section 2), the essay presents an innovative method of decomposition (Section 3). The chapter also provides a brief discussion of various issues related to data requirements, variables definitions, and computational methods used to assess inequity in health care delivery (Section 4). An application of the proposed methods is given in for three levels of health care utilisation: primary, secondary and tertiary-care (Section 5), and the last two sections (Sections 6 and 7) contain some discussion and conclusions.



**ESSAY I: MEASURING AND TESTING FOR EQUITY IN HEALTH CARE FINANCE**<sup>21</sup>

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<sup>21</sup> This essay is essentially based to the following paper: Abu-Zaineh, M., Mataria, A., Luchini, S., and Moatti, JP. (2008); "Equity in Health Care Financing in the Palestinian Context: the value-added of the disaggregate approach" [Social Science & Medicine 66\(11\)2308-2320](#).

The paper was presented and discussed with a special focus on statistical inference methods used at: "Colloque Sondages-2007" of the French Society of Statistics (SFDS), 5-7 November, 2007, Marseille-France.

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## SUMMARY

This essay considers the utility of standard measurement methods, namely *progressivity-transfer summary indices* – commonly used to assess equity in health care finance in developed countries. It reviews some conceptual and measurements issues involved in the application of these methods to explain income-related inequality and inequity in health care finance in the context of developing countries. In contrast to developed countries, the aggregate summary index approach might be less informative in the context of developing countries whose health care financing system are dominated by the *ex post* direct payments and the exacerbating inequality conditions. Consequently, the essay goes beyond these methods to apply a more “refined” disaggregate analysis that allows evaluating the vertical stance of the payments structure at specific ranges in the income distribution, using dominance criterion framework. The bootstrap econometric method (BTS) for the measurement of inequality are explored and applied to test for the statistical significance in the differences at both aggregate and disaggregate levels of the distributions. The methods are applied to three sources of health care financing: direct out-of-pocket payments, public insurance contributions and private insurance premiums. The analysis confirms that the disaggregate approach can reveal certain features that might otherwise be concealed by relying solely on the single-valued summary measures of inequality. In the two Palestinian regions, the aggregate and disaggregate analyses identify significant regressive patterns of direct health care payments, with the lower-income groups of the population bearing higher burden of direct health expenditures – as a proportion of their income – than do the higher-income groups. By contrast, while the aggregate approach does not ascertain the progressive feature of any of the available insurance schemes overall, the disaggregate analysis reveals statistically significant progressive patterns over the upper half of the income distribution, of the governmental health insurance system. Recommendations are advanced to reduce the regressivity of direct payments for health care and to enhance progressivity of the public insurance system. Perspective for future research to improve equity analysis in health care financing are also made.

**JEL Classification:** C15 ; C34 ; D63 ; I11 ; I19

**Keywords:** Health Care Financing; Progressivity; Gini Coefficient; Kakwani index; Reynolds-Smolensky index; Disaggregate Approach; Statistical Inference; Bootstrap Methods



## RÉSUMÉ

Cet article tente d'évaluer l'équité verticale de l'actuel système de financement des soins dans les territoires palestiniens occupés, à l'aide des données issues de la première enquête nationale sur les dépenses de santé des ménages réalisée en 2004. L'équité verticale est fréquemment étudiée à l'aide d'*indices synthétiques et agrégés d'inégalité*. Cet article privilégie une approche *désagrégée*, empruntée à la littérature sur la fiscalité, permettant d'affiner l'analyse de la progressivité et de l'impact de différents modes de financement des soins (paiement direct, assurance publique et privée) sur la répartition des revenus. Contrairement à la plupart des travaux préexistants, l'inférence statistique des mesures de l'inégalité est ici évaluée en utilisant la méthode économétrique du bootstrap. Celle-ci permet de tester la significativité statistique des effets verticaux du financement des soins sur chaque décile de revenu tout en s'affranchissant des limites inhérentes à la méthode asymptotique classique. Nos résultats montrent le caractère significativement régressif des paiements directs par les ménages. En revanche, l'assurance de santé publique a un caractère progressif, bien que ses effets verticaux n'apparaissent significatifs que sur les déciles les plus élevés de la distribution des revenus. Enfin, les effets verticaux des assurances privées n'apparaissent pas significatifs, malgré le caractère potentiellement progressif de ce mode de financement. Ces résultats invitent à reconsidérer le financement actuel du système de santé palestinien en privilégiant des modes de financement *ex ante*. L'article propose des recommandations pour améliorer les performances du système d'assurance public des territoires palestiniens occupés, en accroissant sa capacité à limiter les inégalités dans le financement des soins.

**JEL Classification:** C15 ; C34 ; D63 ; I11 ; I19

**Mots-clé :** Financement des soins, Coefficient de Gini ; Indice de Kakwani ; Indice de Reynolds-Smolensky ; Progressivité ; approche désagrégée ; Inférence statistique ; Méthode Bootstrap.





## 1.1 INTRODUCTION

Equity or fairness in payments for health care is an important policy issue for evaluating the performance of the health care systems (WHO, 2000). The “bedrock principles” of relating these payments to individuals’ ability to pay (ATP) and protecting people from payments that can deter accessibility to health care services and threaten both income-sufficiency and income-inequality, are increasingly being accepted as a desirable policy objectives for health sector reforms in many developing countries (McIntyre, 2007; ISEqH, 2006; Wagstaff, 2002). For instance, the Palestinian “National Health Plans” (PNA-MoH, 1999), including the latest of 2008, have identified “equitable” and “affordable” health care as a guiding principle for health care sector reform (HPU, 2008; p.17). It is, therefore, believed that reforms aiming at increasing *efficiency* in utilising limited health care resources should simultaneously address the issue of *equity* as an integral part of any future policy intervention (Gwatkin, 2001; Gottret and Schieber, 2006). The current debates on equity in health care finance in the context of developing and poorer countries seem however to reflect somewhat diverse issues and concerns; with the primary one is about the deterrent effects that direct out-of-pocket payments can have on the distribution of health care use (Roy and Howard, 2007). This concern stems, therefore, from a more fundamental concern about the distribution of health *per se* – i.e., the income-related health-inequalities (Culyer, 1993). Yet, another concern relates to the impoverishing effect that the uninsured-risk payments could have on households’ income-sufficiency (Xu et al., 2007). Important concern is also derived from the detrimental impact of these payments on the distribution of income *per se* (Ichoku and Fonta, 2006), and so, on income-inequality. Indeed, the latter was shown to be an issue of fundamental rather than instrumental interest to equity issues involved in health care finance (Wagstaff 2002).

Unfortunately, empirical evidence about equity implications of the current health care financing schemes in developing countries remains comparatively sparse (Cissé et al., 2007). Nonetheless, standard measurement methods that have been previously proposed and used (Wagstaff and van Doorslaer, 1992) to quantify the degree of income-related inequality in the distribution of health care payments might not be fully appropriate and directly transferable to inform the complex policy debates involved in health sector reform in the context of developing and poorer countries. Some of the reasons for this difficulty seem to derive from conceptual and measurement issues that underlie the standard measurement methods of inequality (Sen, 2000). Others are, however, practical and related to the systemic features and the structure of health care financing systems in many developing countries. The standard analysis of equity in the finance of health care has drawn extensively on insights and analogies from the normative public finance and income redistribution literature (Wagstaff and van Doorslaer, 2000). Accordingly, conclusions about equity features of various forms of health care financing are typically inferred using the aggregate summary measures of inequality; e.g., Kakwani index of progressivity (*KPI*) (Kakwani, 1977) and Reynolds-Smolensky index of redistribution (*RS*) (Reynolds and Smolensky, 1977). Such two indices are derived from the general class of Gini-type indices and rank-based measures. Applied to health care finance, the two indices (*KPI* and *RS*) are related to the normative notion of “*unequal treatment of unequals*”, and could serve to assess respectively the extent to which health care is financed according to *ATP* – a measure of *vertical equity* –, and the extent to which such financing are associated with (dis)equalising effect on the prevalent income-inequality – a measure of *vertical (redistributive) effects*. An important feature of these indices are that they

provide a single-value measure of the magnitude of inequality prevailing in a distribution<sup>22</sup>, and thus, facilitate comparisons both within and across countries (Wagstaff and van Doorslaer, 1992). These methods were first introduced into the literature of health economics by Wagstaff *et al.* (1989), and were shown to be particularly useful for providing comparative information about equity features of various sources of financing across and within high-income countries, where health systems offer “nearly” universal coverage for their relatively “homogeneous populations” (Wagstaff *et al.*, 1999; van Doorslaer *et al.*, 2004).

However, despite their convenient cardinal representation, an exclusive reliance on such indices might not reveal actual equity implications of health care financing across different groups of the population. As already shown by Klavus (2001): “*due to its generality...a summary measure can indicate significant progressivity or regressivity in cases, where such outcomes apply only to some part of income distribution. While the inequality assessment given by the summary measure...would not be incorrect...it would certainly yield an imperfect description of the nature of inequality prevailing in the distribution*” [p.364]. Such limitation might be particularly problematic in the context of developing countries. This is because relative discrepancies in living standards across different groups of the population predominate and represent a common trend in the prevalent distribution; whereas the lack of universal system of health care finance implies that large proportions of health expenditures are funded directly through out-of-pocket payments (Gottret and Schieber, 2006). The stochastic nature of illnesses may then result in a widely diverse health care needs, and consequently, varied health care payments across different groups of the population. Under conditions of health care financing dominated by direct out-of-pocket payments, such stochastic nature of illnesses may occasionally culminate into expenditures constituting relatively high shares of households’ resources, disturbing their material living standards, or even pushing them to below poverty lines (Xu *et al.*, 2003). The extent to which health care payments is distributed according to ATP principle or disturb individuals’ living standards is expected to vary significantly across the different groups; reflecting, mainly, the underlying distribution of health care need/use. Even though, the heavy financial burden that direct payments impose, in particular on the lowest-income groups, may lead them to use disproportionately *less* health care despite their greater need, and hence, the “deterrent effect” would probably be greater for the poor than for the rich (Le Grand, 1991).

As a result, health care financing systems can be only mildly regressive or even progressive, on average, and thus, deemed *vertically equitable*, but such result may conceal an “inequitable” distribution of health care utilisation with respect to need [An issue addressed in the 3<sup>rd</sup> Essay]<sup>23</sup>. Though, independent of utilisation, similar arguments hold for the *ex ante* forms of payments for health care: the degree to which the progressive source of financing through pre-payment schemes are related to ATP, and thus, redistribute income (from rich to poor) would be

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<sup>22</sup> For a comprehensive review and discussion of various statistical properties of the two indices and others cf. Lambert (1994).

<sup>23</sup> This implies that, especially in the context developing countries, the assessment and judgement of equity performance of health care systems should not rely solely on the analysis of *health care payments distribution*, but should simultaneously examine the *distribution of health care use/need* (by income). The focus of this essay will be exclusively on the former.

questioned by the extent of coverage of insurance benefits across different groups of population. Using a single-valued summary index would, therefore, lead to a masking effect, since it cannot tell us if, for instance, the observed weak (or insignificant) *regressivity* identified at the aggregate level was due to the low expenditures at low-income levels; or if the observed *progressivity* identified overall was due to high proportions of incomes spent on health care by the better-off than the poor (Wagstaff, 2002). Consequently, a more revealing analysis may require going beyond the summary measures to examine inequalities at the disaggregate levels. A disaggregate analysis approach, which has been previously explored in the literature of health care financing (e.g., Klavus, 2001) and of tax progressivity (e.g., Andres and Calonge, 2005) may lend itself better to such interpretation. While involving actual estimates of relative payment burdens at various levels in the distribution, such approach allows identifying the significance of the distributional outcome at each of these levels, and provide a criterion for making inequality comparisons within the dominance framework. The latter involves using appropriate statistical inference method for testing dominance relations at various levels of two dependent distributions.

Indeed, another serious limitation of previous empirical work on the distributional analysis of health care financing, which may fuel unnecessary misinterpretations and controversies in policy debates, is related to the fact that most of these studies have rarely assessed the statistical significance of inequality measures used. Clearly, the micro data that are at the heart of all inequality estimates are drawn from statistical samples, which are subject to well-known sampling errors (Maasoumi, 1997). Due to sampling variability and the absence of statistical tests, we cannot know whether, for instance, point estimates of progressivity are significantly different across different groups of population (Bishop et al., 1989). Similarly, without such test it is impossible to determine with precision what effects payments for health care have had on the prevalent distribution of income (Bishop et al., 1998). The need to perform a statistical test for inequality estimates is, therefore, crucial to the distributional analysis of health care finance<sup>24</sup>. However, constructing appropriate procedure to testing for inequality measures are not straightforward and represent a major challenge, since one need to address some statistical problems related to inequality measures and the sample distribution (Davidson and Duclos, 2006).

Two types of statistical inference tests have been proposed in the literature of income inequality, based on asymptotic approximations and bootstrap methods (Davidson and Flachaire, 2007). The few studies that incorporated such endeavour in specific area of health care financing (e.g., Klavus, 2001; Szende and Culyer, 2006; Cissé et al., 2007) have resorted to asymptotic method<sup>25</sup>, which has its own limitations (Mills and Zandvakili, 1997)<sup>26</sup>. However, compared with standard asymptotic method, statistical inference based on bootstrap econometric methods were shown to

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<sup>24</sup> Indeed, Wagstaff et al. (1999) have acknowledged this limitation and pointed out that since “...neither this change in progressivity index nor any of the others...have been subjected to tests of statistical significance. It is possible that some of the changes may simply be due to sampling variation” [p. 285]

<sup>25</sup> For a review of studies that have previously employed this approach of statistical inference, cf. Maasoumi (1997).

<sup>26</sup> For instance, one methodological limitation of relying on the asymptotic estimates for inequality measures, is that inequality measures used in the literature are all bounded (e.g., Gini coefficient lies in the [0, 1]), whereas the application of standard asymptotic method may lead to estimated intervals that extend beyond the theoretical bounds of a particular measure (e.g., a negative lower bound for Gini coefficient) (Mills and Zandvakili, 1997)

lead to more subtle treatment for statistical problems associated with the measures of inequality (Biewen, 2002; Davidson and Flachaire, 2007; Bhattacharya, 2007). Contrary to the asymptotic method, an advantage of bootstrap method is that it allows incorporating correlation structures existing in the dataset, while no complex composition of covariance structure is required as is typically the case in the asymptotic method. Besides, allowing us to take into account complex multi-stage sampling designs, as well as sample weights, non-parametric testing based on the bootstrap takes into account the specific bounds of the inequality measures. Bootstrap test for inequality may, therefore, provide improved reliability of statistical inference compared with the asymptotic tests so far used in the literature (Biewen, 2002; Andres and Calonge, 2005).

The purpose of this essay is to apply the above methods and to elucidate the extent to which they can help clarifying the debates about equity issues in health care financing in the context of developing countries – using the particular case of the Occupied Palestinian Territory (OPT). The evolution and “spontaneous reforms” that the Palestinian health care financing structure has experienced along with the consequences of a turbulent and rapidly changing environment make the OPT an interesting case study, which can help extracting conclusions with wider connotations on the measurement issues involved, in addition to inform local decisions for future health sector reform. A methodological extension to previous work is provided by the application of new inference procedures for the analysis of inequality of which progressivity and redistribution measures are leading examples. The essay begins with a brief review of major issues involved in health care financing and equity including the findings of previous research in the context of both developed and developing countries (Section 2). An overview of the health care financing arrangements in the OPT is also provided (Section 3). It then outlines the measurement and the statistical inference method (Section 4). This is followed by discussing some issues related to data requirement and estimation. The essay then goes on to present the empirical findings (Section 5). The last two sections contain discussion (Section 5) and conclusion (Section 6).

## 1.2 MAJOR ISSUES IN HEALTH CARE FINANCING

### 1.2.1 Financing Modalities, Equity Features, and Previous Research: A Backdrop

Typically, health care services are financed through a mixture of two or more of four sources (Gottret and Schieber, 2006): (1) various forms of taxation (earmarked and non-earmarked taxes); (2) social insurance contributions; (3) private insurance premiums; and (4) out-of-pocket direct payments (or user-fees). The importance attached to each of which in the overall financing-mix is shown (Mossialos and Diakon, 2002; Bennet, 2001) to vary substantially from country to country and across times; depending largely on whether a health care sector is predominantly public or private and on the level of socio-economic development of the country (Asfaw, 2003). In the context of almost all developed and industrialised countries – with the notable exceptions being the US and Switzerland – most health care paid for largely or wholly outside the commercial market place; either by governments with funds raised from various forms of taxation (the Beveridge system applied in; e.g. UK, Denmark, Sweden), or by social insurance institutions (the Bismarckian system applied in; e.g. Germany, France) (Bärnighausen and Sauerborn, 2002). A common feature of health care finance in these countries is that a universal funding system, which imposes compulsory levies on all or most of the population, dominate; whereas private resources through out-of-pocket payments (user-charges) and/or private (voluntary) insurance

premiums are usually used to *supplement* the publicly funded social coverage (Gottret and Schieber, 2006). Though, it is sometimes difficult to draw a clear distinction between the two universal systems, since both involve payroll mandatory deductions, social insurance systems are generally distinguished by the presence of independent or quasi-independent fund and a clear link between individuals' contributions and their entitlement to a defined benefit package (Normand, 1999).

Unlike developed countries, institutional realities prevailing in many developing countries have often imposed real barriers in front of formulating a universal and solvable system of national fund (Dror and Preker, 2002). Though, many developing countries have traditionally relied on the general government revenues – accompanied by “modest” user-charges – to finance the bulk of their health care expenditures (Baker and Gaag, 1993), such methods were greatly challenged by the very narrow fiscal space – the sheer small size of tax-base and the limited tax collecting capacities (Shaw and Ainsworth, 1996). Nonetheless, the presence of a wide variety of rural and informal economic sectors along with the exacerbated poverty conditions have made control over private resources extremely difficult and complicated (Dror and Jacquier, 1999), hindered the simple individuals identification on the basis of their contributive capacities (Carrin et al., 2005), and thus, precluded conditions necessary to set up universal systems of social insurance (Ensor, 1999; Ensor and Witter, 2001; Jowett, 2004). Even if numerous public (mandatory) and private (voluntary) insurance schemes were put in place in many of these countries, their scope of coverage have often been limited to those in public and formal sector enterprises, whereas private schemes have only reached the wealthier groups of population. Insurance schemes remain therefore a very limited source of health care finance – constituting circa 2 to 7 percent of the total health expenditures in low-income countries (LICs) (World-Bank, 2006).

Consequently, many countries in this part of the world continue to finance the bulk of their health care expenditures privately through direct out-of-pocket payments. Such source of financing, which are typically driven by the “benefit principle” rather than “the ATP principle”, appears to account for substantial shares of overall financing-mix in LICs – more than 60 percent (World-Bank, 2006). These figures, regarded as troublesome, are reported despite the overwhelming consensus in favour of pre-payment and risk-sharing mechanisms, which can allow in a much “simpler” way to assure an equitable financing structure, by adjusting individuals' contributions based on their ATP (Kutzin, 2001; Carrin et al., 2005; WHO, 2005). Nonetheless, funding through external sources continue to play a significant role in stabilising the budgetary imbalance of health care sectors, with a share ranging between 8 to 30 percent of total health expenditures (Schneider and Gilson, 1999). Despite its importance such source may not always coincide with the propriety and health care policy of recipient governments (Adelmana and Norrissa, 2002).

What is the optimal financing-mix and what are the equity features of these financing modalities? Generally, economic theories do not provide a clear-cut answer regarding the optimal combination of different sources of finance to be used in the health care sector (Asfaw, 2003; Preker and Langenbrunner, 2005), and each component in a country's financing-mix should be assessed on the basis of its equity; efficiency; sustainability, as well as the feasibility of implementation (Roberts et al., 2004).

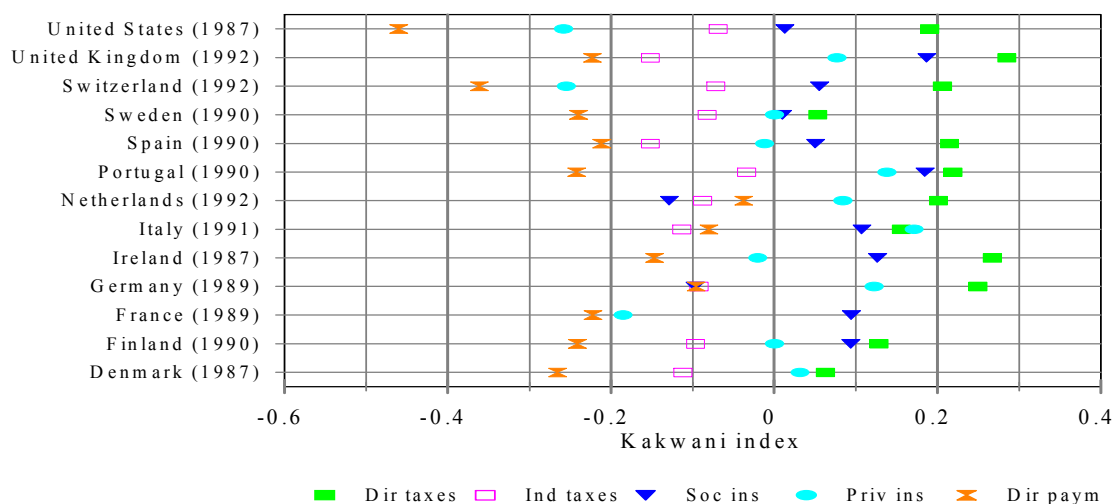
#### 1.2.1.1 Who Pay for Health Care in Developed Countries?

The question of “how equitable are different financing sources” is therefore an important dimension in choosing the optimal financing-mix, and has been extensively addressed in the

context of developed countries, using summary indices of progressivity (e.g., Gerdtham and Sundberg, 1998; Wagstaff and van Doorslaer, 1992; Wagstaff et al., 1999). A review of cross-country comparative studies reveals a range of findings about equity features of each and all source(s) of health care finance [cf. Figure 1.1]. The following features may worth highlighting:

- Out-of-pocket payments are identified, almost consistently, to be the “most regressive” source; with the high magnitudes of regressivity observed in many universal systems – where modest user charges are usually imposed – are speculated to be a result of the pro-rich distribution of health, and thus, the heavy use of health care at lower-income levels.
- Progressivity of social insurance schemes are shown to vary significantly, reflecting mainly the effects of different elements, such as (non-)involvement of high-income individuals; presence of ceiling rates, which tend to make contributions regressive, and the exemptions for certain groups (e.g., pensioners), which have some progressive effects.
- Progressivity of taxation overall depends on the type of taxes levied and its relative weight in the overall tax-burden. Direct taxes are shown consistently progressive and indirect taxes regressive; overall, tax financing emerged fairly progressive.
- Private insurance schemes are generally regressive since they are paid for by non-income based-premiums; i.e., based on risk-adjusted premia (Gottret and Schieber, 2006). However, reported results show that this is only true in countries where the majority of the population has no public cover; e.g. US and Switzerland, whereas in others where they supplement public cover; e.g. UK and Spain, private insurance were shown progressive.

As far as comparisons between systems and policy implications are concerned, findings reported in these studies indicate that *tax-financed* systems (such as those operating in the UK, Denmark, Ireland, and Portugal) are overall more progressive than *social insurance* systems (such as those operating in France, Netherlands and Spain); whereas the predominantly private systems (such as the American and Swiss systems) are shown to be highly regressive. Reforms advocated by many European and American researchers (Wagstaff and van Doorslaer, 1992; Wagstaff et al., 1999) to enhance overall progressivity (or reduce regressivity) of the health care financing systems, called, therefore, for a switch from social insurance systems to tax-financing systems and for a greater emphasis on “public financing” in a predominantly private systems.

**Figure 1.1: Progressivity by Source of Finance Across High-Income Countries**


\* Progressivity as summarised by the KPI whose value ranges between  $-2$  to  $1$ , with positive (negative) values indicates progressive (regressive) source of finance.

♣ Source: O'Donnell et al., 2007, Analyzing health equity using household survey data, World Bank. Available at: [www.worldbank.org/analyzinghealthequity](http://www.worldbank.org/analyzinghealthequity) (Accessed on 25<sup>th</sup> March, 2008)

### 1.2.1.2 Who Pay for Health Care in Developing Countries?

Turning to developing (low- and middle-income) countries; there has been, in fact, until fairly recently no empirical evidence that compares equity features (progressivity) of various sources of health care finance. Initially, the few studies that were undertaken to address the issue of “equity in financing health care” in the context of these countries have focused either on describing distributions of private spending by socioeconomic groups, using simple tabulations (e.g., Baker and Gaag, 1993; McIntyre et al., 2005; Pannarunthai and Mills, 1997) – as opposed to “summary indices” employed in the context of developed countries – or by measuring the benefit incidence of public subsidies for health care services (e.g., Demery et al., 1995; Castro-Leal, 1996; Castro-Leal et al., 2000). Evidence available in these early studies “consistently” suggest that despite their greater need for treatment, the poor make, in general, less use of public and private health facilities, but they still pay more (in proportion to their resources) than the better-off. The “corollary” was that out-of-pocket payments are invariably inequitable source of finance; suggesting that the system of exemptions failed to provide adequate protection to the poor (Baker and Gaag, 1993; Ensor and Pham, 1996; Whitehead et al., 2001; Segall et al., 2002). Nonetheless, studies examined the incidence and distributions of benefits from the publicly (tax) funded services have shown that the rich benefit most from these services; suggesting that many governments’ subsidies fall well short of targets (Castro-Leal et al., 2000; World-Bank, 2004).

Moving beyond the “tabulated” analyses to apply the “summary indices” has only recently taken place in the context of some Asian (e.g., EQUITAP, 2005) and African countries (e.g., Cissé et al., 2007; O'Donnell et al., 2007), with the aim of quantifying the degree of progressivity (equity)

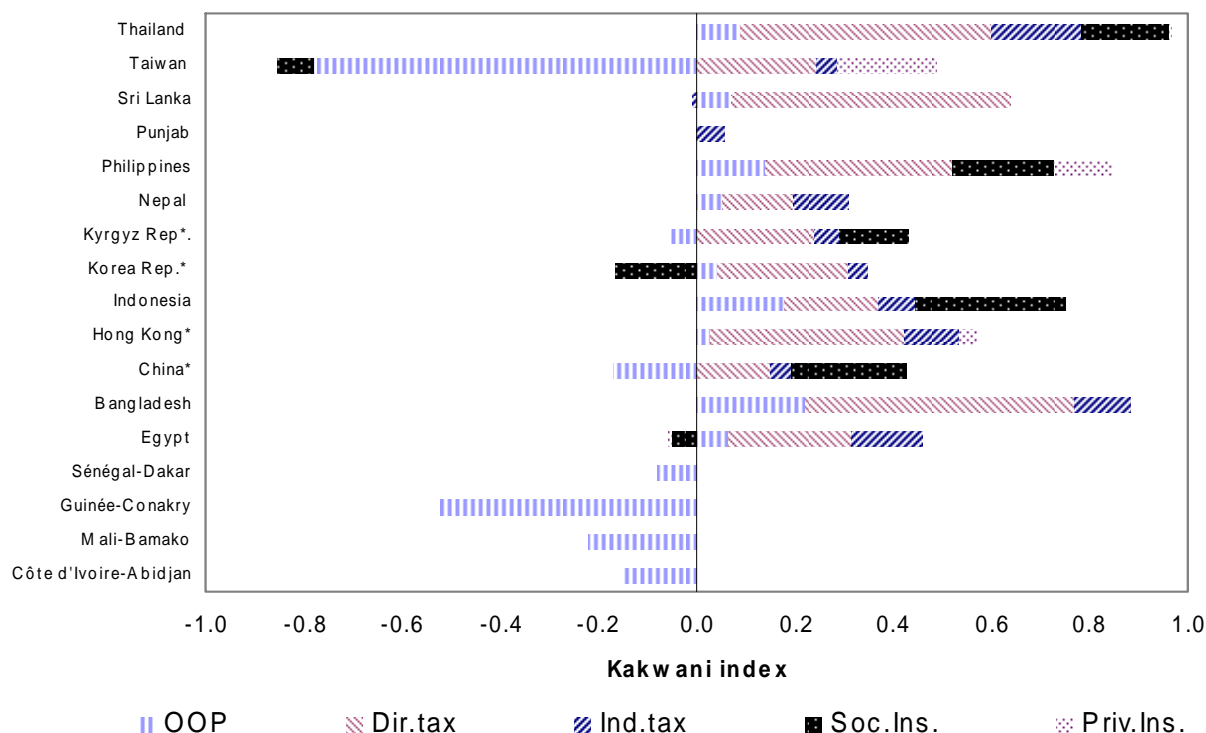


in financing health care within and across these countries. A review of the empirical estimates of the summary indices reported in these studies demonstrates quite mixed evidence that contradict much of the findings reported in previous studies and those reported for developed countries. Some trends may worth to be highlighted [cf. Figure 1.2]:

- Predominantly private systems of finance, where out-of-pocket is the most important component in the financing-mix, was not always (significantly or highly) regressive. Payments emerged progressive in many Asian, especially the lower-income countries; and in Egypt; but appeared regressive or only mildly regressive in West African countries.
- Pre-payment arrangements, such as social or national (mandatory) insurance schemes, though involve risk-pooling and financial protection; such characteristics did not immediately imply an equitable source of finance. Especially, in the context of “universal” coverage systems (e.g., South Korea and Taiwan) insurance contributions emerged regressive; whereas in the case of “partial” coverage systems, mixed evidence were reported: these appeared to be significantly progressive in some Asian countries (e.g. Indonesia, Thailand and China) but significantly regressive in the case of Egypt.
- Funding from general government revenues were found, almost consistently, progressive means of financing health care. Interestingly, however, direct taxation was ranked “the most progressive” source of finance even in the poorer economies where a very narrow tax base exists; e.g., Bangladesh, whereas indirect taxation was found sometimes progressive despite the fact that many items, in particular those purchased by the poor were not subject to tax-exemptions; e.g., Egypt (Osman et al., 2006).

What are the equity implications of these findings? Unlike the findings reported for many developed countries, where clear policy implications were drawn based “summary indices” of progressivity, it seems, then, more difficult to infer equity features of the current financing-mix in developing countries by relying the analysis of equity on these indices. As already noted above, although “summary indices” can be useful for making comparisons across countries, equity implications of a given distribution can vary significantly across different groups of populations. These indices inevitably lose some of the information that might be relevant for policy implications, especially, in the context of the predominately private and partially coverage system of health care financing. This brief introduction on equity implications of health care financing and previous findings provides a backdrop against which to review and assess equity features of the current health care financing mix in the OPT.

**Figure 1.2: Progressivity by Source of Finance across Low- and Middle-Income Countries\***



\* Progressivity as summarised by the KPI.

Source: Compiled based on author's review of recent studies; mainly: EQUITAP, 2005 and Cissé et al. 2007

### 1.3 HEALTH CARE FINANCE IN THE OPT: AN OVERVIEW

In the local context of the OPT, health services are financed through a mixture of public, private and external resources. In 1996, a World bank study (World Bank 1998) has estimated total health care expenditures for the OPT at about US\$ 287 million, indicating a per capita health expenditure of US\$122 (about 9 percent of the OPT's GDP). About one-third of all health care expenditures (32.0 percent) were supported by the MoH, while 37.0 percent came from private contributions (through out-of-pocket payments), 24.0 percent from external resources (including UNRWA), and 7 percent were taken in charge by the NGOs sector (World Bank 1998). A recent review on health sector expenditure conducted in 2005 (DFID, 2006) reached somewhat similar estimates that total health expenditures were 8-9 percent of the GDP, with a per capita health expenditure of US\$ 135.0. Estimates from recent national surveys (HCEU-2004 and HCPB-2005) were, however, more conservative: total health care expenditures were estimated at about US\$ 221-266 million, indicating a per capita health expenditure of US\$73 (5.3 to 6.4 percent of the OPT's GDP). Regardless of the variations in the reported figures, a common feature of all these estimates is that a relatively high proportion of the OPT's GDP are devoted to health care, both compared with health expenditures as a proportion of GDP in countries with similar income

levels, and with several high-income countries (WHO, 2008)<sup>27</sup>.

It is, however, important to note that the high share of GDP devoted to health care was a direct result both of the relatively depressed GDP levels (World-Bank, 2005), and of the high level of investment needed to rehabilitate a system that had been neglected under the Israeli military occupation – between 1967 and 1994 (Giacaman et al., 2003). The task of re-building a functioning health care system for the OPT has been aided by substantial assistance from the international donor community. This source of finance has played an important role, especially in the financing of capital projects. For instance, between 1994 and 2000, the donors committed US\$353 million to the health sector and disbursed approximately half of that amount in actual assistance (World-Bank, 2000). Despite that, external sources were shown (Mataria et al., 2008) to be extremely sporadic and associated with risk for the self-sufficiency of the health system<sup>28</sup>. Indeed, following the recent PNA financial crisis, the MoH was not able to provide its essential operational budget. In addition, most of the new programmes and activities included in its Medium-Term Development Plan 2006-2008 were not initiated, mainly due to financial obstacles (MTDP, 2005). A recent study presented to the Ad Hoc Liaison Committee (World-Bank, 2007) recognizes that despite the considerable aid flows to the OPT, donations remain fragmented and focused on bilateral arrangements with donors based on short-term political positions rather than a collective, longer-term view on broader economic and governance fundamentals.

The major part of health care expenditures is represented by households direct contributions (World Bank 1998). The 2000 Household Consumption and Expenditure Survey indicated that, on average, about 4 percent (around US\$30) of households' monthly expenditures goes for health care (PCBS, 2000). According to the recent national surveys (the HCEU-2004 and HCPB-2005), Palestinian households spend significant proportions of their own resources, out-of-pocket, on health care, with an average of 42 percent of the total health care expenditure. The expenditure of the PNA sector was estimated at about 33.5 percent; while 14.5 percent were taken in charge by the NGOs sector<sup>29</sup> and 9.8 percent came from external resources (through the UNRWA)<sup>30</sup>. Direct out-of-pocket payments remain, therefore, the largest component in the health care financing-mix of the OPT. On average, out-of-pocket payments amounted to US\$ 5.4 at the MoH; US\$ 32.3 at

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<sup>27</sup> Among the neighbouring countries, Syria spends 4.2%, Egypt% 5.6, and Israel 7.8% of their GDP on health.

<sup>28</sup> The aid from the donors has been unstable and dependant on political stability. Donors financing ranged between 13-16% of the economy's GNI in 1994-1997, after which it slightly decreased to around 12% of the GNI. During the Intifada aid increased (13.4% at the end of 2000) (Ajluni, 2003), yet again this increase was not sustained and decreased again in 2006. Nonetheless the imposition of international sanctions following the democratic election of the Islamic Resistance Movement (known as Hamas) has had a devastating impact on an already severely damaged economy, given its extreme dependence on external sources of finance. As a result, the PNA's ability to carry out basic functions of government such as paying salaries and providing humanitarian assistance were greatly impaired.

<sup>29</sup> NGOs are mainly financed by the international donations; in 1996, the World Bank estimated that about 7.0% of all health expenditures (US\$ 19.5 million) were covered by NGOs' financial resources (World-Bank, 1998).

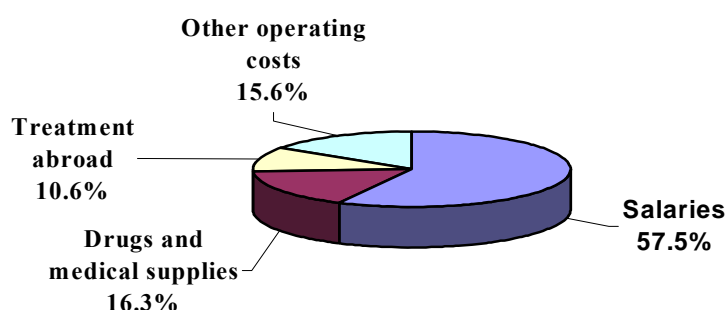
<sup>30</sup> UNRWA operations are financed by voluntary contributions from member governments and other United Nations' bodies. In 2001, UNRWA expenditures on health programs in the WB and GS amounted to US\$ 28.6 million, representing around 21% of the total UNRWA budget allocated for the WB and GS. UNRWA provides a package of preventive and curative services for *registered* refugees in GS free of charge, whereas those in the WB must pay up to 25% of the treatment costs in WB (Lennock et al. 1998). Currently, UNRWA is facing difficulties in responding to the increasing demand for health services after the recent crisis in the OPT (Hamdan et al. 2003).

NGOs, and US\$ 43.5 at the private sector (PCBS, 2004).

### 1.3.1 The Public Sector

The public sector is represented by the Ministry of Health (MoH), which has a fixed budget defined by the Ministry of Finance (MoF). The annual operating budget for the MoH peaked at around US\$100 in 1997 but has declined since then mainly due the deteriorating of the local economy (Schoenbaum et al., 2005). In recent years, the MoH budget constituted about 10-11 percent of the overall PNA budget (Hamdan et al., 2003). At least up to the outbreak of the second Intifada in 2000, the finance of health sector from the general government revenues (GGR) came from: the General Tax Revenues (GTR) (about 55-60 percent, with no earmarked taxes being specified); Governmental Health Insurance (GHI) contributions (25-30 percent), and users cost-sharing (10-15 percent) (Schoenbaum et al., 2005). In 2001, the annual MoH budget amounted to US\$80 million (US\$24.3 per capita), out of which, 35.8 percent were covered by revenues collected from insurance contributions, 23.7 percent from users cost-sharing, 25 percent from donations, and the rest was funded from GTR (MOH-MHIS, 2002). The decline in the proportion of finance from GTR was mainly due to the termination of tax transfer by Israel to the PNA and the worsening economic conditions following the Intifada-2000<sup>31</sup>. The large proportion of MoH expenditures is on salaries (57.5 percent of its budget)<sup>32</sup>, and about 16.3 percent goes for drugs, vaccines and medical supplies (MOH-MHIS, 2002; PNA-MoH, 2008). Figure 1.3 presents the distribution of all MoH health care expenditures on the different activities.

Figure 1.3: Proportional Distribution of MoH expenditure by activity, 2001



Source of data: (MOH-MHIS, 2002)

<sup>31</sup> The PNA is highly dependent on two sources of income: the first is the annual aid package from Western donors of about US\$ 1 billion per year, most of which is now suspended for GS. The second is a monthly transfer by Israel of about US\$ 55 million in customs and tax revenues that it collects for the PNA; a source of revenue that is absolutely critical to the PNA budget and totally suspended following the second Intifada (AMCHR, 2008).

<sup>32</sup> Salaries has been the largest and fastest growing components of MoH expenditures, with the number of MoH employees more than doubled between 1993 and 2001, from 4,020 to 8,285 (Schoenbaum et al., 2005).

### 1.3.2 Public/Governmental Health Insurance System (GHI)

The main health insurance system in the OPT is the Governmental Health Insurance (GHI). It existed before the creation of the PNA and continued as a department under the administration of its MoH (World Bank 1998). Under Israeli administration (1967-1994), the GHI was restricted to “public” sector employees and Palestinians working in Israel, and priced to be self-funding, so that the premiums correspond to the annual average cost of covered services used by enrollees (Schoenbaum et al., 2005). Though, the functioning of the GHI under the MoH administration remains generally similar to that run by Israel, some key changes were taken place (MoH-PHIC, 2006). First, a strategy of extending coverage to include private sector’s employees and workers in the informal sectors, with a goal of “*universalism*”, has been in operation since handover of health sector responsibility in 1994 (PCoH, 1994). Secondly, a policy of “adjusting” or “re-structuring” premiums was applied, with the aim of promoting more “*affordable contributions*” to different groups of population. Generally, this was done through: plummeting contributions rates, with a reduction of about 24 percent compared with those charged under the Israeli administration; flattening the contributions made by government’s employees, with a rate of 5 to 7 percent of their monthly salaries; imposing a ceiling, where no one should pay more than a certain amount irrespective of his/her earnings, and partially (or fully) subsidising the contributions of the vulnerable groups of population – referred to as “*hardship cases*” (Lennock and Shubita, 1998). The above was generally “effective” in expanding the coverage of GHI from less than 20 percent of the total WB and GS population under the Israeli administration to over 50 percent in 2000 (MoH-PHIC, 2006). Correspondingly, five types of insurance arrangements can be identified (MOH-MHIS, 2002; MoH-PHIC, 2006):

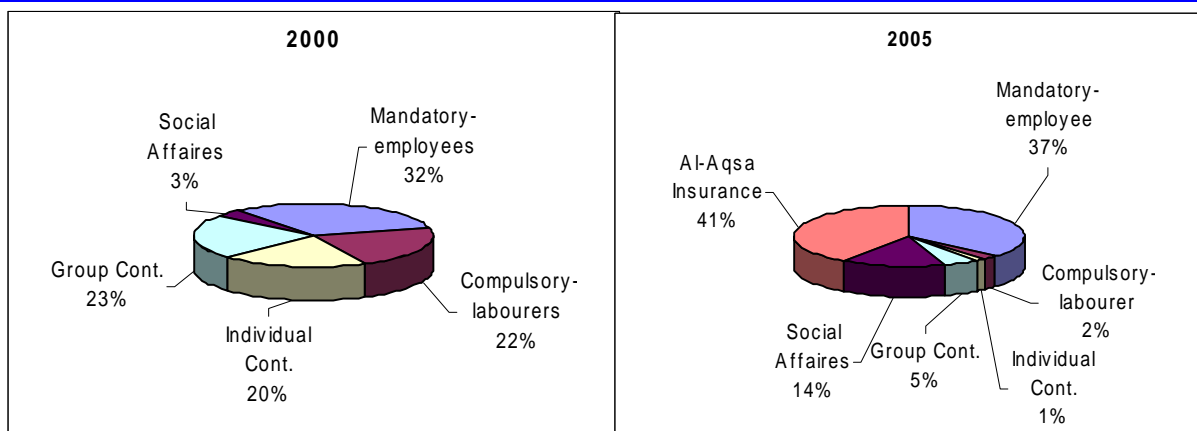
- **Mandatory:** this concerns all individuals working in the public sector (including municipalities, police and security forces, retired employees and their dependents) who are required by law to contribute to GHI, and from whom flat rate contributions of 5 to 7 percent is deducted directly from their payroll by the Ministry of Finance (MoF). This category constituted the major group of participants in the GHI system and its funding (32 % of all insured families and resulted in 57 % of the total GHI revenues). In 2005, this category represented 37 % of all insured and resulted in 56.1 % of the total GHI revenues.
- **Compulsory:** this is also a compulsory insurance arrangement with special allocated premiums deducted by Israeli employers on behalf of the Palestinians labourers in Israel and transferred to the MoF. This group represented the second category in the GHI up till 2000 when the proportion of participants decreased dramatically, due to the Israeli-imposed closure, from 22 percent of all GHI participants (who resulted in 25.3% of its total revenue) to only 2 % of all participants and 8 % of total GHI revenue in 2005.
- **Individual Contracts:** this category mainly concerns self-employed individuals and workers in the informal sector who pay a premium in the range of US\$ 12 to US\$ 18 per month to be covered. In 2000, this category represented 20% of GHI-insured families and 16 percent of its total revenues. The flagging of the Palestinian economy after 2000 affected this type of enrolment. In 2005, this category represented only 1.4% and resulted in 2.1% of total GHI revenues.
- **Group Contracts:** this is also a voluntary arrangement through which special contributions rates may be negotiated. Enrolment in this category is usually undertaken by private sector employers, NGOs, as well as self-employed groups. The participation in

GHI under this arrangement also decreased from 23% of the total insureds in 2000 to 5.1% in 2005, with a decrease in the corresponding revenues from 19.2% to 14.0% in 2005.

- **Social Affaires Insurance:** this arrangement concerns mainly indigent families. Enrolment is usually made through application to the Ministry of Social Affaires (MoSA) which assesses the need and considers the assistance. The number of families granted assistance under such arrangement showed an increase from 29,907 in 2000 to 47,740 in 2005 (that is 3% of the total GHI participants in 2000 to 14% in 2005). There is, however, no precise figures available about the number of applicants refused assistance and the amount of assistance granted; i.e. whether contributions were fully or partially subsidised.

The GHI benefit package includes inpatient and outpatient services which are provided at MoH facilities, with co-payments paid for a number of specified medical services and for medications. For example, insured patients are charged \$US 0.21 per laboratory test and for imaging services; whereas patients who obtain drugs from MoH clinics are charged, on average, \$US0.63 per prescription, medications obtained from private pharmacies and clinics are not covered by the GHI<sup>33</sup>. Since all enrollees' household members are usually entitled to public services, contribution rules are generally applied to households or families rather than individuals. Figure 1.4 shows the composition of enrollees in the GHI arrangements and the changes in their relative importance pre- and post- the outbreak of second Intifada-2000.

**Figure 1.4: Composition of GHI Enrolees in 2000 and 2005**



Source of data: (MOH-MHIS, 2002; MoH-PHIC, 2006)

As shown in Figure 1.4, the upshot of the current situation was significant dwindles in the percentage of participants under both the compulsory and voluntary arrangements. However, the most fundamental change was a new category of enrolment, the so-labelled “*Al-Aqsa insurance*”.

<sup>33</sup> It has been noted (Schoenbaum et al., 2005) that, in practice, not all GHI-covered medications are consistently available across geographic areas. This is mainly due to the lack of many drugs and the insecure supply, as well as the poor distribution. Despite that the purchases of drugs from private pharmacies remains uncovered by the GHI, even if these were prescribed by at MoH facilities and were unavailable in the public sector.

The latter category was set in place after a decree issued by the then president of the PNA (Yaser Arafat) that all Palestinian victims of the *Al-Aqsa* Intifada should be covered by health insurance. Correspondingly, the MoH started to waive GHI premiums for some groups of insureds, mainly, the Palestinian labourers in Israel who fall unemployed and to allow for a *free* cover, and then, *low-priced* voluntary enrolment to cater for unmet needs of low-income groups, and those injured and affected by the Israeli accentuated measures of oppression. As a result, GHI revenues from premiums declined from a total of US\$29.5 million in 2000 to US\$21.8 million in 2002 before peaking again at US\$29.9 million in 2005 (MoH-PHIC, 2006); whereas *eligibility* for GHI coverage is estimated to be around 80 percent of the population in 2005 (Schoenbaum et al., 2005), *effective* enrolment remains at about 60 percent of the population (MoH-PHIC, 2006)<sup>34</sup>.

Though, the expansion of insurance eligibility and reduction of premiums were largely fuelled by the overwhelming need to promote *equity* in the provision of public health care through offering a “low-priced” coverage to the mostly affected classes of population, the practice followed latterly has made such coverage obtainable for high proportions of households (23% of total population), regardless of any income-related criteria. Yet, this increase in the number of individuals entitled for public services, has not been associated with a proper augmentation in the capacity of the services, leading to an increase in the public system’s liabilities and a deterioration in the quality of care provided, including a lack of essential drugs and supplies (MAS, 2000; Giacaman et al., 2003). Nonetheless, the net effects of all these changes on “*equity in financing and delivering*” health care were seen (Lennox and Shubita, 1998; Giacaman et al., 2003) highly questionable. Even for people whose premiums were waived or reduced, some charges and co-payments remain. For instance, individuals who are referred by a private provider to public services are charged US\$ 4 per referral (Schoenbaum et al., 2005). Then again, for voluntary enrollees the fixed premiums means that lower-income groups still spend a greater proportion of their income on insurance (Lennox and Shubita, 1998). In addition, the existence of the ceiling for mandatory enrollees can make insurance a less progressive (or even a regressive) source of finance.

### 1.3.3 Private Health Insurance Schemes

Various forms of private insurance plans have been in existence for many decades in the two regions of the OPT (Hamed and Al-Botmeh, 1997). However, private insurance market has grown considerably after 1994 as part of the overall increase in private investment in the health sector (Abdul-Jawad et al., 2004). Currently, there are seven private-for-profit insurance companies that provide diverse employment-based and individual-based plans of health insurance. Members of the private insurance schemes are mostly private organisations that contract private insurance plans to cover their employees; e.g., private firms, banks, universities, as well as local and international NGOs (Hamdan et al., 2003). Locally, contributions to the private schemes are made by both employers and employees, whereas special rates can be negotiated based on the number insured employees and the benefit packages. In general, private coverage excludes many pre-existing conditions and chronic illnesses, such as diabetes, heart diseases, etc.; whereas some medical services, such as pre- and post-natal care are available upon payment of additional premiums. In many cases, maximum ceiling for claims in a one year period

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<sup>34</sup> Note that not every one who is *eligible* for GHI coverage has actually enrolled; as soon as premiums are required the percentage of *effective* enrolment peaked at 56.8% of total households in the OPT (MoH 2006).

are imposed (Lennox and Shubita, 1998).

Especially, due to the relatively high premiums (about three times higher compared to the GHI), private schemes cater so far for a tiny proportion of the population. The enrolment in private insurance schemes peaked at around 20 percent of total OPT population in 2000 (PCBS, 2000), indicating a relatively high coverage of private schemes when compared with countries with similar income levels (Sekhri and Savedoff, 2005). However, the hollowing out of the Palestinian economy and the economic hardships accompanying the second Intifada has affected the private demand for, and participation in, private insurance schemes (Schoenbaum et al., 2005). Recent estimates from the HCEU-2004 survey suggest a coverage private level up to 11 percent of total surveyed households in the OPT; with some regional differences between the WB and GS in terms of both enrolment levels and average premiums: while average premiums in the WB is estimated to be about two times higher than that reported in GS, the majority of private insureds were concentrated in the WB (11.9% of the total households) compared with only 7.6 percent in GS. Overall, these schemes make a non-significant contribution to health care financing-mix in the OPT. Estimates from the HCEU-2004 survey indicates a contribution of less than 5 percent of the total health expenditures. As elsewhere, the role and practices of private schemes in the local context of the OPT have been somewhat controversial (Lennox and Shubita, 1998; Giacaman et al., 2003), not only because schemes often reach the better-off segments of population, but also due to the lack of adequate regulations that mandate certain insurance practices such as premium calculations, and acceptance of applicants. Nonetheless, it has been noted that the calculations of private insurance premiums are far from being levied on the basis on individuals' ATP, suggesting an inequitable (regressive) source of financing (Lennox and Shubita, 1998).

## 1.4 METHODOLOGICAL ISSUES

### 1.4.1 Measurement of Equity in Health Care Payments

The standard measurement method involves summarising – over the entire income range – the degree of income-related inequality in health care payments; the degree of progressivity of payment with respect to pre-payment income distribution (a measure of ATP), and the vertical income (redistribution) effect associated with it. Among the summary indices commonly used in the health economics literature (Wagstaff and van Doorslaer, 2000) to quantify the above relations are the Gini-based indices; namely, the concentration indices (CIs) of income-related inequality; the progressivity index proposed by Kakwani (1977), *KPI*, and the redistribution index proposed by Reynolds and Smolensky (1977), *RS*. The literature of taxation proposes a variety of other indices (Lambert 1993)<sup>35</sup>. In the case of this study, we employ the above indices but we depart in our empirical analysis from the popular approach by adopting a disaggregate analysis. In what follows we briefly describe the standard measures and the disaggregate analysis.

Unlike Gini coefficients of income-inequality, *G*, the CIs are bivariate measures of inequality that have various applications (Wagstaff et al., 1989)<sup>36</sup>. They summarise the relevant information

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<sup>35</sup> Among these the so-called “Suits (1977) index”. Wagstaff et al (1992) compared KPI and Suits' index; the general finding was that both have similar properties, however, the latter gives greater weight to departures from proportionality occurring amongst the higher income groups compared to KPI.

<sup>36</sup> The CIs were firstly introduced into health economics literature by Wagstaff et al 1989. Since then, they have been



from the distribution of the variable of interest (in this case health care payment,  $T$ , and post-payment income  $X-T$ ) in relation to the rank of living standard as per another variable (e.g., pre-payment income,  $X$ ). The value of  $CI$  is restricted to the range  $[-1, 1]$ , with a negative (positive) value indicates a disproportionate concentration of the variable of interest among the poor (rich). Thus, applied to health care finance, a negative (positive) value of  $CI$  indicates that the poor (rich) contribute a larger share than the rich (poor). A value of zero indicates that everyone pays the same, irrespective of ATP. The  $CI$  indicates the magnitude and direction of income-related inequality in payments for health care, but cannot enable one to answer the “equity” question of: “who pay most as a proportion of ATP”, and thus “whether health care payments rise (fall) as a proportion of ATP as the latter rises”.

Progressivity indices, which are directly related to the concept of  $CI$ s, can do so. The  $KPI$  summarises the extent to which the distribution of payments,  $L_T$ , departs from proportionality – proportionality being measured against the distribution of pre-payment income,  $L_X$  –, and involves comparing the concentration index of payment,  $C_T$ , with the Gini coefficient of income inequality,  $G_X$ . The  $KPI$  is, thus, used as a summary measure of (dis)proportionality of payments *vis-à-vis* pre-payment income. The presence of disproportionality of payments on pre-payment income – implies that the former exert (dis-)equalising effects on the latter (Lambert and Pfähler, 1988). The  $RS$  index is used to capture any potential modification in income-inequality that is induced by health care payments. This is measured through comparing the Gini coefficients of pre-payment income-inequality,  $G_X$ , with the concentration index of post-payment income-inequality,  $C_{X-T}$ . Arithmetically, the value of the  $KPI$  lies in ranges of  $[-2, 1]$  while it is in the range of  $[-1, 1]$  for the  $RS$  index. A positive (negative) value of the indices indicates a *progressive* (*regressive*) structure, and thus, the post-payment income distribution would be *more* (*less*) *equal* compared to pre-payment distribution. The latter qualify a *pro-poor* (*pro-rich*) vertical redistribution effect of a payment scheme. Lastly, a zero value indicates *proportionality*, and hence, the payment scheme does not have any impact on income-inequality.

Thus, for a given pre-payment income distribution,  $L_X$ , and health care payments schedule,  $L_T$ , the two summary indices can be defined and assessed as follows,

$$KPI = 2 \int_0^1 \left[ L_{X(r)} - L_{T(r)} \right] dr = C_T - G_X \quad (1)$$

$$RS = 2 \int_0^1 \left[ L_{X-T(r)} - L_{X(r)} \right] dr = G_X - C_{X-T} \quad (2)$$

where  $r$  in the parenthesis here indicates the rank of household in the pre-payment income distribution, and thus, a fundamental assumption underlying the two summary indices is that the payment schedule does not produce any change in the rank-order of income units in the transition from pre-payment to post-payment income (Lambert, 1993). Clearly, to the extent that the magnitude (i.e., *height*) of health payments ( $T$ ) induces income-reranking in the post-payment period, the  $RS$  index would not tell us the whole story about the overall income-(in)equality effect

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extensively used to describe inequality (by income) in health, health care use, and health care payments.

of health care payments [an issue to which we return in the next essay]. While the two indices are derived from the concept of Lorenz curves and the associated concentration curves, one limitation of relying on their aggregate single values lies in the fact that progressivity (regressivity) prevailing in some parts of the distribution may not be significantly applicable to other parts (Klavus, 2001). Another difficulty may arise when the two underlying distributional curves cross whereas the observed single value result is *non-zero*. This occurs when inequalities favouring the poor (rich) in some part are not *exactly* offset by inequalities favouring the rich (poor) in the other part (Wagstaff and van Doorslaer, 1992). Consequently, inequality evidence based on the single-valued summery index can provide imperfect description of the nature of inequality prevailing in the distribution. For these reasons, it is obviously useful to conduct the analysis at the disaggregate level and perform statistical tests at certain ranges of the income distribution rather than in the overall distribution. Therefore, in the present analysis, we deploy the disaggregate analysis approach as used by Klavus (2001). Specifically, we estimate the underlying distributions of the above indices,  $L_X$ ,  $L_{X-T}$  and  $L_T$  for a set of  $p$ -ordinates – where  $p$  is defined over the  $k^{\text{th}}$  percentile point (e.g.; 10<sup>th</sup> percentile), as follows:

$$PR(p) = L_X(p) - L_T(p) \quad (3)$$

$$RE(p) = L_X(p) - L_{X-T}(p) \quad (4)$$

where  $L_X(p)$  and  $L_{X-T}(p)$  are the pre-payment and post-payment income distributions, respectively, and representing the fractions of income received by  $p^{\text{th}}$  proportion of population before and after paying for health care. Similarly,  $L_T(p)$  represents the distribution of payments for health care, and indicating the proportion paid for health care by the  $p^{\text{th}}$  proportion of population. Each of which is being estimated for a set of  $p$ -ordinates. Therefore, in the case of *decile-ordinates*,  $p$  takes the values from 1 to 9. Such *disaggregate approach* shall enable us to properly identify the prevailing inequalities at various levels of the aggregation while testing for differences in the ordinates of  $L_X(p)$  and  $L_T(p)$  and  $L_X(p)$  and  $L_{X-T}(p)$  at a given percentile points. In the next section, we develop statistical inference using a *bootstrap-based* method for both cases: progressivity and redistribution indices – i.e., aggregate level – and for the differences in  $p$ -ordinates corresponding to income deciles – i.e., at the disaggregate level of analysis.

#### 1.4.2 Statistical Inference for Measures of Inequality

Given the above inequality measures being estimated from sample data, comparisons between them should be subject to tests of statistical significance (Cissé et al., 2007). Statistical inference for inequality measures is, therefore, another quantitative aspect which needs to be considered. Constructing appropriate procedures to testing for inequality measures represents, however, a major challenge as it requires leaping over a number of hurdles (Davidson and Flachaire, 2007). Specifically, one needs to address key issues that are relevant to assessing the sensitivity of inequality measures: (1) the particular nature of statistical properties of inequality measures being considered, and their sampling distributions; (2) the potential presence of correlation in dataset (e.g., dependent distributions coming from a single sample); (3) the presence and impact of outliers (e.g., heavy-tailed income distributions), and (4) accounting for the complex sampling designs from which data are drawn. As it happens, statistical inference based on bootstrapping techniques can lend itself better for a more subtle treatment of the issues in order (e.g.; Davidson

and Duclos, 2006; Andres and Calonge, 2005; Giovanni et al., 2006). Therefore, in this section, we address the above issues by constructing bootstrap-based procedures (BTS) to compare standard errors, probability intervals and conduct hypothesis testing.

The BTS is a re-sampling method used to simulate the empirical distribution of an estimator (Efron and Tibshirani, 1993)<sup>37</sup> – in our case: an inequality or progressivity index and the Lorenz curve ordinates, which we denote by  $I$ . Basically, the BTS provides a numerical approximation to the distribution of interest,  $F$ , in a similar way to *Edgeworth Expansions* – a technique used to provide an approximation to a *distribution function*, and involves a series of expansions around the normal distribution (Bhattacharya and Qumsiyeh, 1989). A standard BTS procedure can conventionally be undertaken by drawing randomly, with replacement,  $R$  independent samples of a size equal to the original sample size (i.e.,  $m = n$ ). It assumes that the observed distribution is a “purely” random sample of the underlying population distribution and the observations are independent (Efron and Tibshirani, 1993). Given that inequality measures are non-linear functions of a random variable such as income, the heavy-tailed income distributions, and the fact that the sample may not be a “purely” random of the underlying population distribution, applying the standard *BTS* may fail to provide accurate inference for inequality measures – e.g., inconsistent standard error – and consequently, make conventional hypothesis testing inappropriate (Davidson and Flachaire, 2007). In order to improve the reliability of *BTS* inference test we have opted to implement a *non-standard* *BTS* using: the “*m-out-of-n* *BTS*” – a technique used to assess the reliability of standard errors when a small number of extreme values have an overwhelming influence on the behaviour of *BTS* distribution function, and involves evaluating the error in rejection probability (ERP) under different choices of  $m$ , where  $m$  is the sub-sample size and equals  $n$  in the standard *BTS* (Davidson and Flachaire, 2007). Details of technical derivations can be found in standard references such as (Horowitz, 2000; Shao and Tu, 1995; Deaton, 1997), and recent applications are provided in (Giovanni et al., 2006; Davidson and Flachaire, 2007; Andres and Calonge, 2005). However, to illustrate the methods used, we briefly point to the implemented procedures for both cases: the aggregate indices and  $p$ -ordinates.

Consider a statistic  $\hat{I}$  based on a sample of size  $n$ , hence, instead of assuming the shape of the distribution of  $\hat{I}$  statistic, the distribution of  $\hat{I}$  is approximated through investigating its variation over a large number of *pseudo-samples* obtained by randomly selecting, with replacement, a large number ( $R$ ) of sub-samples of size  $m$ , out of the dataset – the *BTS* re-samples. In case where the dataset are sampled based on multi-stage designs, drawings can be made out of clusters. This step was not followed in our procedure since the necessary clusters sampling information was not available. We have, however, corrected for differences in sampling probability rather than the different types of the multi-stage sampling designs used in the survey. This was completed using *inflation technique* (e.g., van Doorslaer and Koolman, 2004). The latter involves inflating the sample size by multiplying the sampling weights by the inverse of the smallest weight and rounded to the nearest integer. This culminated in an *expanded sample* from which our random sub-samples have been drawn. The same statistic is then computed for each *BTS* re-sample, yielding  $\hat{I}^*$  – the so-called the *bootstrap replication of the statistic*  $\hat{I}$ . The sampling variation of  $\hat{I}^*$  could be estimated by applying the expression of standard errors to the  $R$ -length vector of *BTS*

<sup>37</sup> For detailed expositions on the bootstrap (cf. Efron, 1979; 1993; Freedman et al. 1984; Hall 1984; 1988).

replications. Regarding the estimation of probability confidence intervals, BTS provides us with several alternative methods to construct tail probabilities for the statistic  $\hat{I}$ . However, in our case we have used the most recommended method (Andres and Calonge, 2005; Mills and Zandvakili, 1997), known as the “percentile method”<sup>38</sup>. The procedure involves an estimation of the empirical function  $\hat{F}_R$  of the statistic of interest  $\hat{I}$  from  $R$  of *BTS* samples,

$$\hat{F}_R(x) = \frac{1}{R} \sum_{i=1}^R I_{-\infty, x}(\hat{I}_i^*) \quad (5)$$

The empirical percentiles  $(\alpha/2)$  and  $(1-\alpha/2)$  can, then, be computed for a significance level of  $(\alpha)$ , denoted by  $\hat{F}_R^{-1}\left(\frac{\alpha}{2}\right)$  and  $\hat{F}_R^{-1}\left(1-\frac{\alpha}{2}\right)$ , respectively. The confidence interval can be estimated as follows,

$$\left[ \hat{I}_{L1}^*, \hat{I}_{L2}^* \right] = \left[ \hat{F}_R^{-1}\left(\frac{\alpha}{2}\right), \hat{F}_R^{-1}\left(1-\frac{\alpha}{2}\right) \right] \quad (6)$$

Using the underlying relationship between confidence intervals and hypothesis tests, tail probability values for hypothesis tests can be computed from *BTS* distribution. Note that since our distributions are obtained from the same sample, comparing the two Lorenz curves,  $L_X$  and  $L_{X-T}$ , or  $L_X$  with the concentration curve ( $L_T$ ), involves different *BTS* testing procedure than comparing two independently distributed curves obtained from separate samples. Testing for the former relationship requires the *joint composition* of the two distributions; the observed data in such a case  $\{(X_1, Y_1), (X_2, Y_2), \dots, (X_n, Y_n)\}$  are drawn from the *joint sampling distribution* in which each observation consists of a vector of two components, e.g., pre-payment and post-payment incomes measured for the same household in a particular year; whereas in the latter case, the test can be completed based on the separate distributions  $(X_1, X_2, \dots, X_n)$ ,  $(Y_1, Y_2, \dots, Y_n)$ , of the independent samples. Thus, the following *BTS* testing procedures can be adapted for each case. Let  $V_1$  and  $V_2$  be two vectors representing the *BTS* values of pre-payment and post-payment incomes, and let the hypothesis testing be:

$$H_0: I_1 = I_2 \text{ against } H_A: I_1 \neq I_2$$

or equivalently,

$$H_0: D = 0 \text{ against } H_A: D \neq 0$$

where  $D = V_2 - V_1$ . In the case of independent samples the *BTS* testing procedures can be

<sup>38</sup> Among the other methods is the “boot-t”, which is similar to the construction of the *Student’s-t* intervals, and involves the estimation of the standard error by some other method, usually asymptotic method. Burr (1994) compared different methods to obtain *BTS* confidence intervals, and found that the “boot-t” tend to be very unstable. By contrast, the *percentile method*, which involves estimating tail probabilities directly from the *BTS* distribution, takes into account the statistic’s bounds.

conducted by first obtaining the difference statistics  $\hat{D} = \hat{I}_2 - \hat{I}_1$ , and then *BTS* re-sampling can be obtained separately from each sample. In the case of dependent distributions (our case) the joint distribution should be re-sampled as a whole. Thus, instead of separately bootstrapping  $V_1$  and  $V_2$ , we have bootstrapped  $D$ , such that each pair of observations belonging to the same individual is treated as a *block*. The *BTS* probability intervals and the *p-value* of the test can then be computed based on the empirical distribution of the statistic  $\hat{D}$ , which is obtained by fixing  $R$  at 1000 simulated samples of size  $m$ . The latter is selected through evaluating the sensitivity of *ERP* under different choices of  $m$  (Davidson and Flachaire, 2007).

It should be noted that testing for dominance relations at the disaggregate level requires different hypothesis procedure than testing for inequality at the aggregate level. This is because the latter involves testing for a vector of *p*-ordinates – i.e., a *multiple testing context* – whilst the former case involves testing for a *single* value. For testing hypothesis concerning the dominance relations between two curves (e.g., the concentration curve of payments *against* the Lorenz curve of income) as they correspond to a set of *p*-ordinates – *p* is defined over  $k^{\text{th}}$  percentile point–, the testing procedure requires, first, computing the estimated differences between the two curves; and, then, testing, respectively, for differences in the ordinates of  $L_X(p)$  and  $L_T(p)$  and  $L_X(p)$  and  $L_{X-T}(p)$ . The test statistic can, thus, be defined as  $\hat{D}(p_i), i= 1, \dots, k$  – where  $\hat{D}(p_i)$ , is the estimated difference between the two curves evaluated over the  $k^{\text{th}}$  percentile. One of the decision rules that could be used in the context of Lorenz (concentration) dominance tests entails significant difference between ordinates at all *percentile* points to reject (accept) non-dominance (dominance) (Howes, 1996; Sahn et al., 2000). Thus, the hypothesis to be tested in this case can be expressed using the intersection-union principle (Casella and Berger, 1990) as follows,

$$H_0: \bigcup_{i=1}^k \left\{ \hat{D}(p_i) = 0 \right\} \text{ against } H_A: \bigcap_{i=1}^k \left\{ \hat{D}(p_i) \neq 0 \right\}$$

where  $\hat{D}(p_i)$ , represent differences between the two curves for each *i*; *i* taking the values from 1 to 9 in the case of deciles, and the null hypothesis of *non-dominance* is expressed as a union of the individual hypotheses, whilst the alternative hypothesis of dominance is defined by the intersection of the individual alternative hypotheses. The decision rule consists, therefore, in rejecting the null of non-dominance  $H_0 \Leftrightarrow p\text{-value } j < \alpha_j \forall j = 1, \dots, 9$ . One obvious advantage of applying such a “*strict*” rule of decision is that it reduces the probability of *erroneously* rejecting non-dominance (Sahn et al., 2000). However, there is some evidence based on Monte Carlo simulation (Dardanoni and Forcina., 1999) suggest that although stricter, such a rule of decision can greatly reduce the power of detecting dominance when true. Furthermore, if there is at least one *significant* difference between the ordinates in each direction (e.g., one *percentile* point at which  $L_X$  lies significantly above  $L_T$  and one point at which  $L_T$  lies significantly above  $L_X$ ), then it is concluded that the relationship is ambiguous; i.e., intersecting-curves. If there are no significant differences in either direction, then null of *non-dominance* is not rejected (Cissé et al., 2007).

An alternative way consists in using and presenting the individuals hypotheses testing (Bishop et al., 1992; Beach and Richmond, 1985; Stoline and Ury, 1979). This implies checking “disjointedly” whether the difference between ordinates for each  $\hat{D}(p_i)$  is statistically significant.

Thus, if  $\hat{D}(p_i)$  are presented graphically on the  $y$ -axis, along with their corresponding confidence intervals, against the corresponding  $p$ -ordinates, the dominance test rejects the null hypothesis of non-dominance should the *BTS* confidence intervals, evaluated over  $p$ -ordinates, do not *cross* the abscissa axis. Given that we are interested here in *checking* whether the distance (dominance) holds across various segments of population, we have opted to use the latter decision rule for the present exercise.

### 1.4.3 Data Requirement, Variable Definitions and Computation Method

#### 1.4.3.1 Data Requirement

The estimation of inequality measures of the type undertaken here – and in the proceeding essays – requires the availability of appropriate information on *two crucial variables*: standard of livings and payments/contributions toward health care. Our analysis is based on data taken from the HCEU-2004 survey (described in Section 0.4.2 and Appendix A.1) which contains the necessary information about households’ income and expenditures, as well as various types of payments towards health care. However, although undemanding, the measurement of inequality based on survey data requires establishing appropriate assumptions about: the measurement of *standard of living* to be used as a proxy of households’ ATP; the incidence of various types of health care payments to be evaluated; the macro-weights to be assigned to each source of finance/expenditures; as well as establishing an appropriate equivalence scale to be used in generating comparable units of analysis (O’Donnell et al., 2007). In the following sub-sections, we briefly address and discuss each of these issues in turn.

#### 1.4.3.2 Measurement of Living Standards and Ability-To-Pay (ATP)

Theoretically, a measure of ATP for the analysis of inequality should indicate *welfare* prior to payments for health care, and so, the measurement of ATP calls for a reliable proxy indicator that can reflect *actual* living standards and welfare levels of households (Wagstaff and van Doorslaer, 2001; Deaton and Zaidi, 2002). Our household survey offers alternative sources of data upon which a measure of ATP can be constructed; these include the most *direct* measures of living standards: households *gross* incomes and *gross* consumption expenditures. In addition, data on household assets and other characteristics, which can be used to construct alternative (*indirect*) measures of welfare and living standard, are also made available. Among these three sources of data, household *gross* expenditures are generally advocated, relative to data on income and assets as a more accurate measure of households’ living standards (Deaton and Grosh, 2000; McKenzie, 2005). This is in line with various economic theories of consumption, such as Freidman’s (1957) permanent-income hypothesis, suggesting that consumption is a better estimator of household welfare when compared with transitory or short-run income (Browning and Crossley, 2001; Deaton, 1997). Others (WHO, 2000) advocate using *discretionary* expenditures – i.e., household *gross* expenditure net of expenditures for essential living costs such as food – as a measure of household “long-term normal” living standard and to proxy ATP. Though, the arguments for preferring such a variable are convenient, it was shown (Wagstaff et van Doorslaer 2001) that

relying the distributional analysis of health care payments on discretionary expenditures might be problematic, since this entails the assumption that the system of health care payments does not affect household saving and expenditures decisions; something attests implausible, given the fact that the nondiscretionary expenditures can be sensitive to the system of health care finance; in particular in the context of developing countries, where health protection mechanisms are so far limited (McIntyre, 2007). Equally important, it has been shown (Wagstaff et al., 1999) that the relative tax rates imposed on food can differentially influence household decisions with respect to food spending. The distribution of household consumption *net* of food expenditure can be a product of the health finance systems, and so, may not provide a *benchmark* against which to assess the distributional impact of that system.

Therefore, our measure of ATP (i.e., the pre-payment income variable) is apprehended through *total household expenditures* – gross of all health care expenditures – and adjusted through an application of *equivalence scale* to generate *average income status per equivalent adult* (the method used is discussed in [sub-section 1.4.4](#)). Household *Post-payment income* is, then, estimated as pre-payment income – so defined – *net* of each, and all, health care expenditures (payments). An obvious advantage of using *gross*, rather than *net*, expenditure (or *discretionary* income) for the distributional analysis of health care payments is that it avoids variations arising from differences in consumption expenditures patterns; (e.g., expenditures on food, etc). For example, if one account for “net expenditures” as a *benchmark*, then the “RS” index may fail to capture differences across income groups induced by a health care financing scheme: one could not know, for instance, whether disparities were due to differences in health expenditures or due to differences in other consumption expenditures items. Consequently, relying on a “*benchmark necessary expenditures*” would probably “bias” downwards (or upwards) the index; without knowing whether the “*bias*” is a result of differences in other necessary goods expenditures or health care expenditures. An interesting example is the one concerning the nonemarked financing sources of health care (e.g., van Doorslaer et al., 1999).

#### 1.4.3.3 Health Care Payments and Financing Burden Incidence

In principle, the analysis of progressivity and distributional impact of health care finance requires examining each and all source(s) of health care funding, and not only those payments that are made directly or “exclusively” for health care (van Doorslaer et al., 1993). In the comparative work on equity in the finance of health care in the context of developed countries (Wagstaff et al., 1999), four sources of health care finance were so considered; these include, in addition to out-of-pocket payments, social insurance contributions, private insurance premiums, and taxes (both direct and indirect). Expectedly, however, household survey data are unlikely to make available complete information on all sources of funding/payments for health care; in particular, those on various tax payments (e.g., income tax, sales tax, etc.) are usually not recorded in such type of survey. In such cases, ECUITY group suggested using some approximation strategies; for example, the distribution of sales and excise tax burden were estimated by applying product specific tax rates to disaggregated data on the pattern of household expenditures (Wagstaff et al., 1999).

Obviously, this exercise requires access to detailed information on tax schedules (e.g., tax files as alternative data sources, especially, when no taxes are being *earmarked* for health, other than, proportions of public expenditures that are channelled through different types of direct and

indirect taxes to health care. Unfortunately, no sufficient information on health care expenditures paid through taxation was made available or accessible for us<sup>39</sup>. Note that in the case of the OPT, no taxes are *earmarked* for health care, and thus, it was difficult to decide which *non-earmarked* payments actually go towards the financing of health care<sup>40</sup>. Notwithstanding, it was impossible to estimate (even indirectly) the amount that would have been paid in taxes for health care, and “*who actually bears the burden of*” – as distinct from “*who is liable to pay*” (Wagstaff and van Doorslaer, 1992).

Therefore, the empirical analysis presented in this study is confined to the three major sources of health care finance: out-of-pocket payments (OOPs); governmental insurance (the GHI) contributions and private health insurance (PHI) premiums. As for out-of-pocket payments (OOPs), our survey data provide information on direct health expenditures based on two approaches: “utilization approach” in which data on only four types of expenditures were estimated based on individuals’ utilisation patterns of various care (primary, secondary, and tertiary), with variable recording periods ranging from two weeks to 12 months. The second source of information was based on the “direct expenditure approach” in which data on household total health care expenditures were approximated based on the same reference period (a monthly basis) using a list of questions tracking all potential types of direct and indirect expenditures incurred by each household. These include consultation fees, hospitalisation costs, medications (counting for auto-medication and traditional healers), and transportation costs, and so on up to 25 separate items. While it was possible to use data derived from the first source and unifying expenditures on various categories by simply scaling up or down, as usually followed in some empirical studies (e.g., Wagstaff et al., 1999; Lu et al., 2007), we have opted to use data available from the second source, on the grounds that these data, although likely to suffer from some *eventual bias*, but can better reflect the *actual burden of payments*. This is because asking each household to fill up a list containing a wide range of items can indeed help minimise the *recall error*. In addition, using the same *reference period* upon which these items were recorded can help avoid the variations in payments due the variable recall periods – which usually arise while trying to convert expenditures in the various categories into one basis (Wagstaff et al., 1999). Lastly, the contributions for both the GHI and private insurance schemes represent the average monthly payments made by the household for each of which.

Given that none of our three payments in question come from, or has been based on, a non-earmarked source of funding for health care, establishing the incidence of payments should thus be straightforward. Since the relevant rules of payments – in both cases: the GHI and private health insurance schemes – are typically applied to household rather than individual, their

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<sup>39</sup> In fact, if the shares of the relevant tax revenues going to finance health care were known, then the contribution of the (non-earmarked) taxes could have been estimated based on *pro rata allocation* of their shares in the total health care expenditures.

<sup>40</sup> Note that the distributional burden of (non-earmarked) taxes is typically relevant to the analysis of progressivity in cases where some of health care is actually financed from *general government revenues*. Indeed, while, *some* proportion of health care finance in the OPT come directly from the PNA, breaking down this proportion in terms of its actual sources; e.g., taxes and foreign aid is not easy in the absence of reliable information; given that the level of general taxation in the OPT remains low following the current crises, and a nontrivial share of government revenue comes from foreign aid, which is not relevant to our analysis, since the purpose here is to assess the distributional impact on the domestic population.



payments incidence are assumed to borne by the concerned household. Lastly, though the OOP payments represent the total amount of health care payments (all treatment costs) that are incurred by health care consumer, the incidence of health care direct payments burden are assumed to be borne by – and affect – the entire *household*. The latter is classically defined as the income-sharing unit, and therefore, measuring the distributional impact of the real economic burden of three payments calls for household-level – as distinct from individual-level. Using household-level as the “unit of analysis” was shown (Wagstaff and van Doorslaer, 1992) to provide a more appropriate assessment of “how payments relate to ATP”.

#### 1.4.3.4 Equivalence Scales and Economies of Scale

Since our analysis used household as a unit of observation in the measurement of expenditures, adjustment for living standards should be made to take into account differences in demographic compositions of households and their need characteristics (Deaton, 1997). This is usually done through the application of a deflator or an equivalence scale to generate an average adjusted income (expenditure) status per equivalent adult. In the present study we have opted to use the WHO/FAO scale proposed for the case of developing countries (Aho et al., 1997). This assigns a value of 1 to the adult man, of 0.8 to each adult woman, and of 0.5 to each child less than fifteen years of old.

#### 1.4.3.5 Computational Methods

There are alternate ways to compute the numerical values of inequality measures; e.g., the convenient (weighted) covariance method (e.g., Jenkins, 1988; Lerman and Yitzhaki, 1989) and the integration method (e.g., Duclos and Araar, 2006; van Doorslaer et al., 1999). This could be done using various today’s computer packages; e.g., DAD and STATA-DASP. However, given that these packages assume asymptotic distributional properties, we have alternatively chosen to compute all measures and indices using propose-built procedures in MATLAB/SIMULINK statistical package (MATLAB, 2005)<sup>41</sup>. The analysis enabled us to obtain the values, and the corresponding margin of error, for each of the above specified inequality measures. As for disaggregate analysis, the underlying distribution of the above indices are assessed over a set of *p*-ordinates. This of course requires selecting the number of percentile points at which ordinates are to be compared and tested. As mentioned above, the *refined* analysis through the disaggregate approach allows, in principle, to test for differences at various levels of *aggregation*– i.e., for any set of *p*-ordinates (5<sup>th</sup>, 10<sup>th</sup>, 20<sup>th</sup>, or 25<sup>th</sup> percentiles). A natural choice that provides a more *refined* analysis would, therefore, consist in evaluating and testing for differences at 19 evenly spaced points [ $p_1 = 0.05, \dots, p_9 = 0.95$ ]. The choice of the number of *percentile* points depends, however, mainly on the size of the samples being used. Therefore, in our case, we have chosen to conduct the analysis and to present our results as per income deciles. The disaggregate estimates of the envelope calculations,  $PR(p)$  and  $RE(p)$ , are, thus, computed as the differences between the relevant distributions evaluated at  $k = 9$  points: [ $p_1 = 0.1, \dots, p_9 = 0.9$ ]. Finally, progressivity of the

total health care finance is computed as  $\sum_{j=1}^J s_j K_j$ , where  $s_j$  is the share of total finance contributed by source  $j$ , and  $K_j$  is its specific-index (O’Donnell et al., 2007). It is important to note that the

<sup>41</sup> More information on MATLAB/SIMULINK are available at <http://www.mathworks.com/products/matlab/>

analysis considers only the distribution of financing across the domestic population and so foreign sources are excluded. Thus, the weights used may not correspond exactly to the current financing-mix in the OPT. Data of HCEU survey is used to adjust for the missing distribution (namely, the government tax revenues), and to estimate weights of sources in the financing-mix.

## 1.5 EMPIRICAL RESULTS AND MAIN FINDINGS

The results are presented in sub-sections 1.5.1; 1.5.2 and 1.5.3. The first provides simple tabulated analysis comparing income and various health care payments made by households at different income levels. The second presents the results based on the aggregate summary indices as estimated over the entire sample population, as well as the inference test statistics. Results from the disaggregate analysis are presented in the third sub-section.

### 1.5.1 Income and Health Care Payments Distributions

Table 1.1 presents the distribution of gross (pre-payment) income across the sampled households. Results show a quite high degree of inequality in the distribution of gross income in both the WB and GS parts of the OPT: the richest decile receives nearly one third of total income while the poorest decile receives circa 2%, with a slightly more equal distribution in GS compared to WB. Overall, an average household in the WB spends about 16% of its income on health care services, while an average household in GS spends only 12% – these percentages are presented in Table 1.1 as *g* out of household *gross* income. In addition, Table 1.1 presents the *shares* of the different financing sources in question out of households' total health expenditure/payments – these percentages are presented as *s*. Figures clearly confirm the dominant role of direct out-of-pocket payments in total households' health expenditures: 84.7% and 82.4% in the WB and GS, respectively. On the other hand, GHI premiums constitute about 10% and 14% of total households' health expenditures in the WB and GS, respectively. In both regions, contributions for private insurance schemes remain marginal, and represent less than 0.5% of total households' health expenditures.

Table 1.1 also presents the distribution of these three health care financing sources across income deciles. The poorest income deciles, in both the WB and GS, tend to bear a higher share of out-of-pocket payments compared to their share of total income – the inverse was found for the two richest income deciles in the WB and in GS: the richest, in both the WB and GS, tend to bear a lower share of out-of-pocket payments burden compared to their share of total income. By contrast, the shares of both GHI contributions and private insurance premiums paid by the richest two income deciles are, in general, found to be higher than their corresponding shares of households' income – the reverse is always true (with the exception of the 2<sup>nd</sup> decile in WB for the case of private health insurance) for the less wealthy half of the population. Concerning GHI and private insurance payments, the situation seems more diverse for the intermediary levels of income (6<sup>th</sup> to 8<sup>th</sup> deciles).

**Table 1.1: Distribution of Health Care Financing Sources across Income Deciles in the West Bank (WB) and Gaza Strip (GS)**

Region	% Share of payment / Income decile	Gross income	Out-Of-Pocket Payments	Governmental Health Insurance	Private Health Insurance	Total Payments
	$g^*$		0.164	0.0193	0.0017	0.1854
	$s^{**}$		84.7%	10.4%	4.9%	100.0%
West Bank (WB)	1 <sup>st</sup> decile (poorest)	1.9	2.6	1.5	0.4	2.5
	2 <sup>nd</sup>	3.2	4.6	1.9	4.0	4.3
	3 <sup>rd</sup>	4.0	5.2	2.8	2.0	4.9
	4 <sup>th</sup>	5.1	6.7	3.6	4.0	6.3
	5 <sup>th</sup>	5.8	6.1	4.1	1.0	5.8
	6 <sup>th</sup>	7.7	8.1	7.1	10.3	8.0
	7 <sup>th</sup>	9.7	10.2	10.2	10.0	10.2
	8 <sup>th</sup>	12.7	13.5	15.3	7.3	13.7
	9 <sup>th</sup>	16.4	15.1	18.5	17.8	15.5
	10 <sup>th</sup> decile (richest)	33.5	27.9	35.0	43.1	28.6
	<b>Total</b>	100%	100%	100%	100%	100%
Gaza Strip (GS)	$g^*$		0.123	0.0198	0.0013	0.1449
	$s^{**}$		82.4%	14.3%	3.3%	100%
	1 <sup>st</sup> decile (poorest)	2.3	3.4	1.6	0.2	3.1
	2 <sup>nd</sup>	3.7	4.4	2.2	2.0	4.1
	3 <sup>rd</sup>	4.6	5.3	2.9	2.4	5.0
	4 <sup>th</sup>	5.5	6.0	5.5	3.7	6.0
	5 <sup>th</sup>	6.8	8.6	6.2	6.7	8.2
	6 <sup>th</sup>	7.8	8.0	7.8	1.1	8.0
	7 <sup>th</sup>	9.9	8.6	11.4	23.2	9.0
	8 <sup>th</sup>	12.4	13.2	12.1	5.9	13.0
9 <sup>th</sup>	15.1	13.4	17.8	13.5	14.0	
10 <sup>th</sup> decile (richest)	32.0	29.1	32.3	41.4	29.6	
	<b>Total</b>	100%	100%	100%	100%	100%

\*  $g$  represent the *share* of health care expenditures out of *gross* income (i.e., the fraction of income spent on the source in question).

\*\*  $s$  represent the *shares* of the different sources of health care financing out of total health expenditure/payments.

\*\*\* Values are weighted and adjusted for demographic composition of households.

### 1.5.2 Findings on the Summary Indices of Inequality, Progressivity and Redistribution of Health Care Finance in the OPT

Table 1.2 shows, for each, and all, source(s) of health care financing, the values of,  $C_T$  (the concentration index of health care payments);  $G_X$  (the Gini coefficient for pre-payment income);  $KPI$  (the Kakwani index of progressivity of health care payments on pre-payment income);  $C_{X-T}$  (the concentration index for post-payment income *vis-à-vis* pre-payment income) and  $RS$  (the Reynolds-Smolensky index of vertical redistributive effect of health care payments *vis-à-vis* pre-payment income). Estimates of the summary indices are presented along with the corresponding values of BTS standard errors and the BTS confidence intervals at the 95 percent level. It is of interest to note, first, that due to the relatively large sample size, the estimated values of BTS standard errors are quite small compared to the estimated coefficients. For example, they are always smaller than 5 percent of the estimated Gini coefficients ( $G_X$ ) indicating a considerable precision in the estimated results.

The concentration indices ( $C_T$ ) of health care payments for the three sources of financing (presented in the first line of the upper panel of Table 1.2) appear to be invariably significantly positive [ $C_T > 0$  at the 95 percent level], and at least 0.35 in magnitude, suggesting, in general, a “pro-rich” inequality in the distribution of health care payments. It is, however, important to note that the degree of overall “income-related inequality” in the distribution of health care payments tends to vary significantly across the three sources of finance but not to a large extent between the two regions. For instance, in the two parts of the OPT the values of the concentration indices appear to be far superior in magnitude for the *ex ante* modes of financing [ $C_T = 0.5076$  and  $0.4648$  for the GHI contributions, and  $0.5558$  and  $0.5790$  for private insurance premiums, in the WB and GS, respectively] compared to *ex post* financing through out of pocket payments [ $C_T = 0.3633$  and  $0.3488$ , in the WB and GS, respectively]. Intuitively, such results indicate that the distributions of payments for health care *per se*, and for each, and all, sources of finance, are most heavily skewed towards the upper-part of income distribution, and that the “better-off” pay for the largest “share” of health care finance in the two Palestinian regions.

However, as indicated above, aggregate values of the **CI**s can only indicate the direction and magnitude of overall income-inequality in the distribution of health care payments, and so, they do not tell whether the (aggregate) shares of health care payments born by the better-off were higher (or lower) than their (aggregate) shares of community’s income, and in comparison with the shares of received by the poor. The most interesting question of “who pay most as a *proportion* of income can, thus, be inferred through comparing the aggregate summary indices of concentration for health care payments (the  $C_T$ ) with the summary indices of income-inequality (the  $G_X$ ). Results on the degree of disproportionality of the three financing sources – as captured by the summary measure of progressivity (the  $KPI$ ) and presented in the upper panel of Table 1.2 – offer some insights on the deviation from proportionality in the payments structure of each source.

In the case of out-of-pocket means of financing, the estimated values of concentration indices of payments (the  $C_T$ ) appears to be fairly inferior, and statistically significantly different (at the 95 percent level), from the values of  $G_X$  in the two regions [ $C_T = 0.3633$  and  $0.3488$  vs.  $G_X = 0.4463$  and  $0.4124$ , for the WB and GS, respectively]. This resulted in significant negative values of  $KPI$

(at the 95 percent level), clearly indicating that, though out-of-pocket payments appeared to be more concentrated on the better-off, the share of payments born by the better-off – as a proportion of income – tend to fall as the income rises. This result suggests that the dominant direct out-of-pocket arrangements used to finance health care in these two regions are overall *regressive* on pre-payment income. The extent of regressivity in out-of-pocket payments emerges to be slightly more pronounced in the WB [ $KPI = -0.0831$ ] than in GS [ $KPI = -0.0636$ ].

Unlike the out-of-pocket financing arrangements, the estimated values of  $C_T$  for the *ex ant* schemes: both the GHI contributions and private insurance premiums, appear to be superior to that of  $G_X$  for pre-payment income in the two regions [ $C_T = 0.5076$  and  $0.4648$  vs.  $G_X = 0.4463$  and  $0.4124$ , for GHI in the WB and GS, respectively], whereas this was even far superior for private insurance premiums [ $C_T = 0.5558$  and  $0.5790$ , for the WB and GS, respectively]. This generally indicates that the contributions for both schemes are not only concentrated on the better-off, but also rise more than proportionately as income rises, and thus, contributions for public and private insurance schemes tend to be *progressive* on pre-payment income, overall. Interestingly, however, tests of statistical significance for the observed differences in the two summary indices (the  $C_T$  and  $G_X$ ) did not confirm the progressivity character of these financing arrangements over all the distribution of pre-payment income. This resulted in non-significant positive values of the  $KPI$  (at the 95 percent level) for the two sources of financing.

In total, health care financing burden, borne by the Palestinian households in the WB and GS, remains overall regressive, with the values of  $KPI$  [ $-0.0677$  in the WB and  $-0.0473$  in GS] for the total health care payments burden are both statistically significant (at the 95 percent level). It must, however, be noted that there is some variation in the extent of overall regressivity for the total payments compared to regressivity of out-of-pocket payments *per se*. Considered jointly, the overall regressivity indices in the two Palestinian regions turned out to be fairly less exacerbated in magnitudes. This may indicate that some *progressivity* in insurance contributions has partially compensated for the *regressivity* found in out-of-pocket payments. However, given the dominate role of the out-of-pocket payments in the overall financing-mix and the insignificant progressivity found in health insurance schemes, the overall regressivity observed in the total payments burden did not change to any great extent.

Regressivity of out-of-pocket financing arrangement and the total financing burden implies that the “poor” pay more as a proportion of income than the “better-off”, and so, the distribution of post-payment income is expected to be more uneven than that of pre-payment income. Results on the vertical income-inequality effect, as measured by the difference between the Gini coefficient of pre-payment income ( $G_X$ ) and the concentration index of post-payment income ( $C_{X-T}$ ), are presented in the lower panel of Table 1.2. Indeed, out-of-pocket payments tends to increase overall inequality in the distribution of pre-payment income, with  $C_{X-T}$  equal  $0.463$  and  $0.445$  for the WB and GS, respectively – both statistically significantly different from  $G_X$  at a significance level of  $0.05$ . This resulted in a significant negative value of the  $RS$  index, clearly indicating a “pro-rich” trend in the distributional impact associated with out-of-pocket financing arrangement. This was slightly more pronounced in the case of the WB, with [ $RS = -0.0163$ ] compared to GS [ $RS = -0.0117$ ].

By contrast, the vertical distributional impact associated with the GHI and private insurance schemes appear to be “pro-poor”, as demonstrated by the positive values of *RS* indices for the WB and GS. Table 1.2 shows, however, that the “equalising effects” associated with the two insurance schemes, and in the two regions, were both quite marginal in magnitude – in particular when compared with the regressive “disequalizing effects” of out-of-pocket payments [*RS* = 0.0012 and 0.0011 for GHI, and 0.00021 and 0.00013 for private insurance premiums, respectively], and statistically insignificant (at the 95 percent level). The *RS* for the overall health care financing burden remains, consequently, significantly negative, indicating a detrimental vertical redistributive effects against the poorest sections of the population. However, once again, in the two regions, the *RS* indices for the overall financing burden appeared to be quite less exacerbated in magnitude [*RS* = – 0.0153 and – 0.0091 for WB and GS, respectively] compared to that of out-of-pocket payments when assessed separately [*RS* = – 0.0163 and – 0.0117 for WB and GS, respectively], indicating the presence of some “equalising effects” associated with the other sources of financing. It is, however, important to note here that the *RS* indices assumed away the possibility of reranking in the distribution of post-payment income, and thus, to the extent that reranking has taken place in the process of payments, other “disequalizing effect” associated with health care financing might have been occurred.

The generalised, aggregate results on the *C<sub>T</sub>*, *KPI* and *RS* used so far to in the present analysis remain, however, generic ones that cannot be attributed to the entire parts of the distribution. The next section provides a more refined analysis that can enable to check whether the dominance relations observed overall are retained across the different subgroups of the population.

Table 1.2: Progressivity and Vertical Redistribution Indices of Health Care Financing in the West Bank and Gaza Strip

Region	Index	Pre-payment income	Out-of-pocket payments	Governmental Health Insurance	Private Health Insurance	Total Payments
<b>Kakwani Index of Progressivity (KPI)<sup>a,b</sup></b>						
West Bank	$G_X$ or $C_T$ [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]	0.4463(0.0074) [0.4339, 0.4601]	0.3633(0.0160) [0.3321, 0.3933]	0.5076(0.0207) [0.4330, 0.5452]	0.5558(0.0784) [0.3814, 0.6764]	0.3786(0.0138) [0.3542, 0.4066]
	KPI [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]		-0.0830(0.0149) [-0.1133, -0.0554]	0.0603(0.0193) [-0.0190, 0.0976]	0.1095(0.0779) [-0.0609, 0.2304]	-0.0677(0.0137) [-0.0906, -0.0425]
Gaza Strip	$G_X$ or $C_T$ [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]	0.4124 (0.0108) [0.3877, 0.4211]	0.3488(0.0322) [0.2863, 0.3643]	0.4648(0.0204) [0.4215, 0.4989]	0.5790(0.0950) [0.3793, 0.7339]	0.3651(0.0252) [0.3126, 0.4108]
	KPI [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]		-0.0636(0.0301) [-0.1200, -0.0078]	0.0524(0.0192) [-0.0119, 0.0895]	0.1666(0.0935) [-0.0315, 0.3270]	-0.0473(0.0228) [-0.0939, -0.0050]
<b>Reynolds-Smolensky Index of Redistribution (RS)<sup>a,b</sup></b>						
West Bank	$G_X$ or $C_{X-T}$ [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]	0.4463(0.0074) [0.4339, 0.4601]	0.4626(0.0008) [0.4610, 0.5691]	0.4451(0.0014) [0.4343, 0.4564]	0.4461(0.0006) [0.4311, 0.4576]	0.4616(0.0019) [0.4607, 0.5106]
	RS [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]		-0.0163(0.0021) [-0.0215, -0.0109]	0.0012(0.0002) [-0.0002, 0.0014]	0.00021(0.0001) [-0.0010, 0.0005]	-0.0153(0.0021) [-0.0201, -0.0102]
Gaza Strip	$G_X$ or $C_{X-T}$ [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]	0.4124(0.0108) [0.3877, 0.4201]	0.4241(0.0100) [0.4213, 0.4477]	0.4114(0.0110) [0.3989, 0.4311]	0.4123(0.0091) [0.3897, 0.4331]	0.4215(0.0011) [0.4204, 0.4402]
	RS [ $\hat{I}_{L1}^*$ , $\hat{I}_{L2}^*$ ]		-0.0117(0.0032) [-0.0221, -0.0071]	0.0011 (0.0002) [-0.0002, 0.00181]	0.00013(0.00002) [-0.00002, 0.00031]	-0.0091(0.0021) [-0.0143, -0.00091]

a. SE = Bootstrap Standard Errors of the estimate are in parenthesis.

b. [ $\hat{I}_{L1}^*$ ,  $\hat{I}_{L2}^*$ ] = the 95% bootstrap confidence intervals of the estimate are in the square-brackets.

### 1.5.3 Findings based on the Disaggregate Analyses of Progressivity and Redistribution of Health Care Finance in the OPT

In this section, the corresponding distributions of Lorenz and concentration curves are evaluated throughout the  $p$ -ordinates, using the individual hypothesis-testing framework. The analyses yield  $D(p)$ , which represent the estimated differences in (cumulative) shares of: pre-payment income  $L_X(p)$ , and, respectively, health care payments,  $L_T(p)$ , and post-payment income  $L_{X-T}(p)$ . The estimated results for the three sources of financing are presented graphically in Figure 1.5 (a to f) and Figure 1.6 (a to f), where the corresponding differences  $[L_X(p)-L_T(p)]$  and  $[L_X(p)-L_{X-T}(p)]$  are plotted against the decile-ordinates,  $p_i$ , for the three source of health care financing. The corresponding BTS confidence intervals at a significance level of 95% are thus presented by the intersecting lines at the ordinates of each decile.

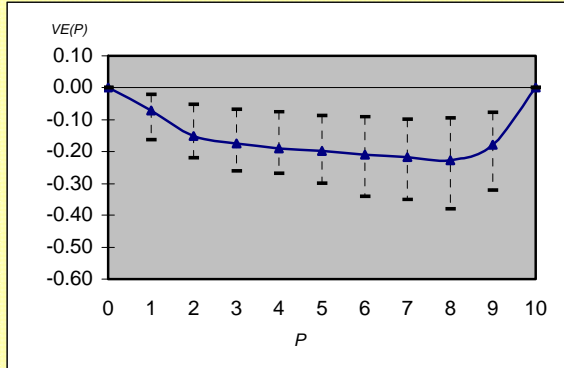
Graphs a-b in Figures 1.5 clearly show that the estimated differences  $[L_X(p)-L_T(p)]$  as per out-of-pocket payments are all invariably *negative* across all income deciles and in the two regions of the OPT. The statistical test of significance confirms (at  $\alpha = 0.05$ ) the regressive character of such source of financing over all the ordinates of the distributions. On the other hand, the estimated differences  $[L_X(p)-L_T(p)]$  corresponding to GHI contributions and private insurance premiums emerged to be consistently positive at all income deciles (Graphs c-f in Figure 1.5); generally indicating a progressive pattern of such financing sources with respect to individuals ATP. Interestingly, however, as soon as a statistical test of significance is applied, progressivity of the GHI contributions attests to be statistically significant for the four highest income deciles. By contrast, none of the estimated differences of progressivity of private insurance premiums in the two regions are found statistically significant (at  $\alpha = 0.05$ ).

The estimated results concerning the disaggregate analyses of the vertical redistribution effects  $[L_X(p)-L_{X-T}(p)]$ , confirm the above trends. Graphs (a-b) reported in Figure 1.6 shows that  $RE(p)$  associated with out-of-pocket payments are statistically significantly negative (at  $\alpha = 0.05$ ) in the WB and GS at all income deciles, confirming the negative distributional effects induced by out-of-pocket overall. As for GHI, the results presented in graphs (c-d) clearly show that at all income deciles  $L_{X-T}(p)$  dominates  $L_X(p)$ , indicating a “pro-poor” trend; however, once again, the estimated differences between  $L_X(p)$  and  $L_{X-T}(p)$  were only statistically significant (at  $\alpha = 0.05$ ) at the 6<sup>th</sup> and higher deciles of the distribution. Turning to the distributional impact of private insurance schemes, none of the estimated differences between  $L_X(p)$  and  $L_{X-T}(p)$  were statistically significant (at  $\alpha = 0.05$ ) at any of decile-ordinates. Similar results are obtained for the case of the WB and GS.

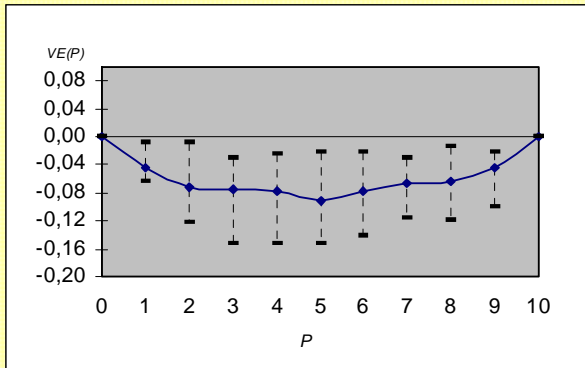


**Figure 1.4: Progressivity of Health Care Financing with 95% BTS Confidence Intervals**

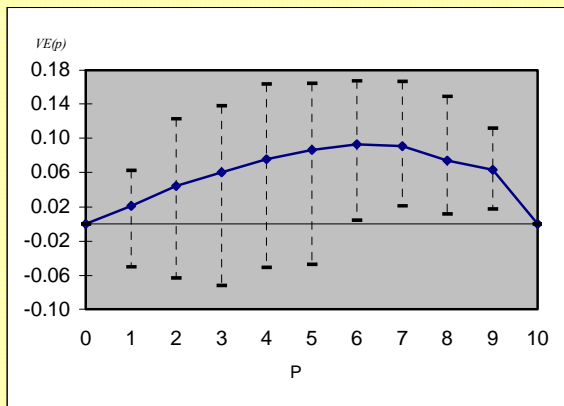
**a) Out-of-Pocket Payments – West Bank**



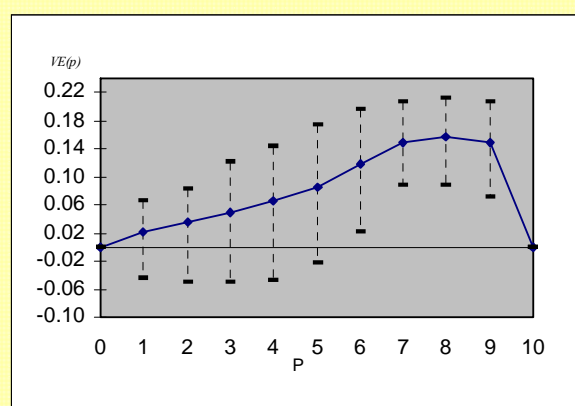
**b) Out-of-Pocket payments – Gaza Strip**



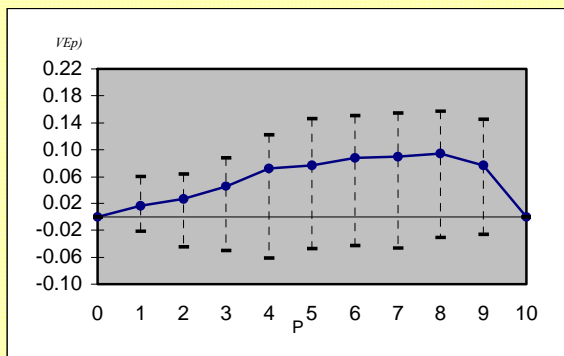
**c) Governmental Health Insurance – West Bank**



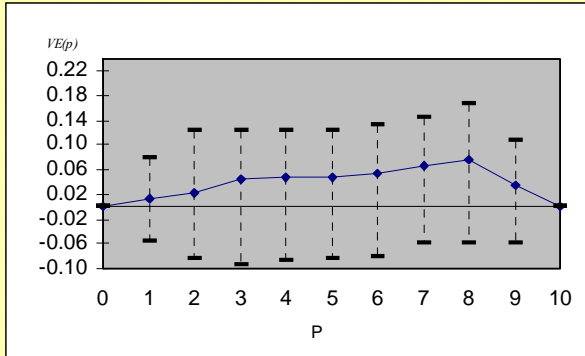
**d) Governmental Health Insurance – Gaza Strip**



**e) Private Health Insurance – West Bank**

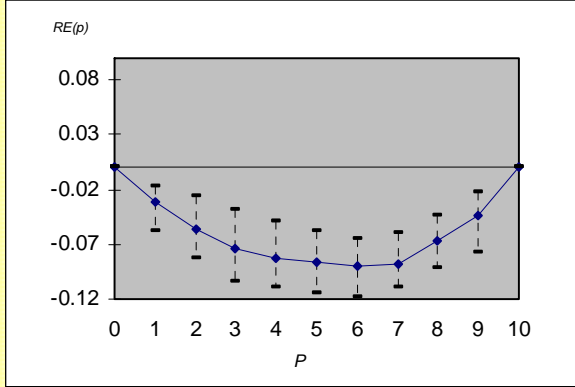


**f) Private Health Insurance – Gaza Strip**

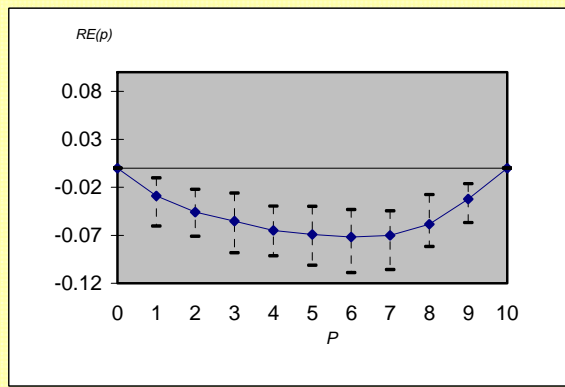


**Figure 1.5: Redistribution of Health Care Financing with 95% BTS Confidence Intervals**

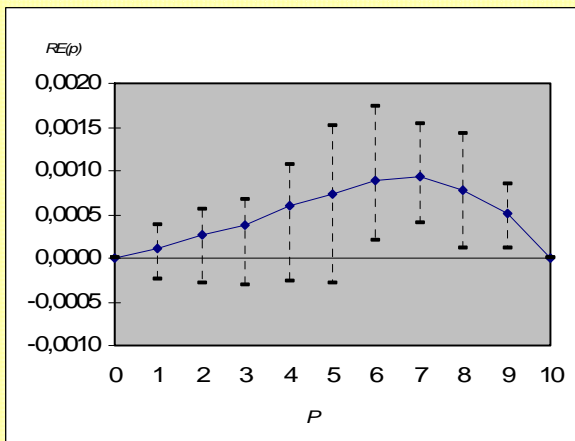
**a) Out-of-Pocket Payments – West Bank**



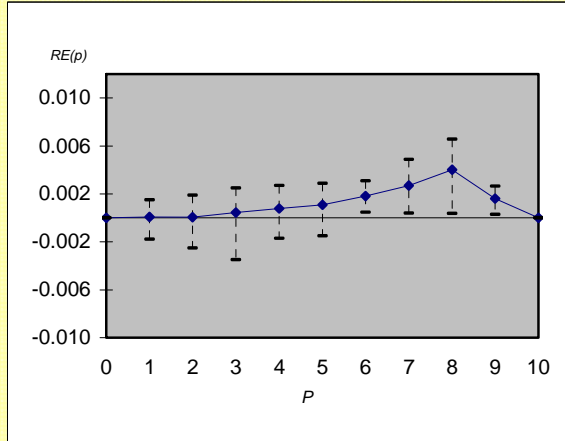
**b) Out-of-Pocket Payments – Gaza Strip**



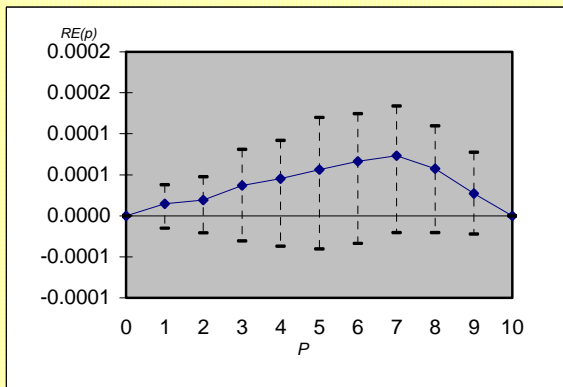
**c) Government Health Insurance – West Bank**



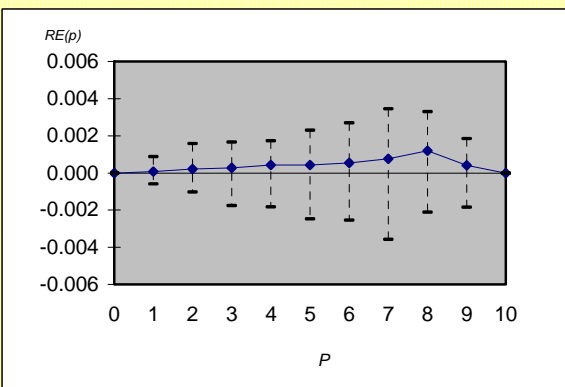
**d) Government Health Insurance – Gaza Strip**



**e) Private Health Insurance – West Bank**



**f) Private Health Insurance – Gaza Strip**



## 1.6 DISCUSSION

This essay sought to extend the distributional analysis of equity in health care financing beyond the commonly used aggregate summary approach, to implement a more refined disaggregate method that splits up summary measures of progressivity and distributional impact over specific income groups. Therefore, instead of merely relying on summary indices to infer (in-)equity characteristics of various financing schemes, the analysis considered the dominance relations between two distributions as a criterion for making inequality comparisons. In addition, statistical inference was apprehended using the bootstrap econometric method. The main contribution of this essay consisted therefore in the application of a new inference procedure that departs from the classical asymptotic methods. An interesting application of the bootstrap consists in the formulation of multiple hypothesis tests for the assessment of Lorenz (concentration) dominance relations. The latter provides a useful extension to the standard summary indices since it allows for a more refined (disaggregated) examination of the distributional outcome of a payment schedule. It has been argued that the bootstrap has the potential to significantly improve the reliability of statistical measures of precision for inequality and poverty measures (Casella and Berger, 1990; Giovanni et al., 2006). Indeed, when considering their sampling precisions, our results suggest that such methods can perform better in terms of their coverage probabilities. The inference procedures developed in this essay are quite general and clearly have other applications. For instance, the inference procedure being applied to Gini-based concentration indices can also be used for other decomposable inequality measures, such as those of Plotnick (1981) and Aronson et al. (1994) – explored in the next essay.

The essay presented and compared findings on the distribution of various sources of health care financing proper to the Palestinian context. Evidence is presented using the two common summary measures of progressivity and redistribution and at the disaggregate levels for the differences in  $p$ -ordinates. Results clearly suggest that although both the aggregate and disaggregate approaches identify similar trends the latter approach offers a more subtle diagnosis necessary to inform relevant and more “equitable” public policies. Some interesting features which emerged from our distributional analysis are worth making.

The overall picture is that the current financing of health care in which direct out-of-pocket payments absorb a sizeable share of households’ gross income, was significantly regressive, and appeared to be associated with a major negative impact on the prevailing income-inequality in the two Palestinian regions. The regressivity patterns of such source of financing were statistically supported by the disaggregate analysis at each specific decile of the income distribution, indicating a relatively high burden of direct health care expenditures on the most economically worse-off classes of the population. Importantly, given that the distribution of direct health payments is directly linked to the utilisation of health care services, such results may reflect a “pro-rich” trend in the distribution of health *per se*, and thus, a heavy use of, and need for, health care services at the lower-income levels. This, of course, calls for examining the distribution of health care use (by income) with respect to need [examined in the 3<sup>rd</sup> essay]. The regressivity of out-of-pocket payments in the WB and GS appear to contrast the findings reported for many lower-income countries [Figure 1.2], but remain in line with the findings reported for higher-income countries [Figure 1.1], and for four African countries (Cissé et al., 2007). Nonetheless, the extent to which out-of-pocket payments exacerbate income-inequality in the two Palestinian

regions appeared to be relatively high, especially when compared with findings reported for many countries. For instance, the disequalizing effects associated with out-of-pocket payments were found to be within the range of [-0.0011 and -0.0128] for the twelve OECD countries (van Doorslaer et al., 1997) and -0.0053 in Vietnam (Wagstaff, 2002), whereas these negative values were a lot higher in the two Palestinian regions [-0.0163 and -0.0117 for the WB and GS, respectively]. This calls for reconsidering the current financing mix wherein direct payments constitute the major source of financing.

The current structure of user-fees and direct out-of-pocket payments in the OPT is a rigid one, with generally no exemptions policies of user-fees are followed and the direct payments for health care remain unconnected to users' ATP. This is particularly pronounced in the case of the private-for-profit sector, which plays a non-negligible role in the provision of health care services. Indeed, a recent national survey (PCBS, 2006) found that about 22% of health care visits take place at health institutions belonging to this sector. With the expected (or realised) difficulty to implement pre-payment mechanisms of financing, or to move toward a universal system of health financing, a variety of measures could be used to reduce the degree of regressivity of out-of-pocket payments and to ensure a more equitable health care system. Techniques for differentiating financial contributions to account for users' respective ATP, as well as their preferences *vis-à-vis* health care, have been extensively discussed in the economic literature and recently explored in the particular case of the OPT (cf. e.g., Mataria et al., 2004; Mataria et al., 2006). In their papers, these authors suggested to base such pricing structure on users' stated willingness to pay values to benefit from various health care commodities, accounting for inter-individual differences in demographic and socioeconomic characteristics. On the other hand, government policies of: controlling prices – especially those practiced in the private sector; and directing foreign assistance toward services that are mostly needed by the poor, could also be of help in alleviating prevalent regressivity. For instance, the cost of medications and doctors' tariffs are found (PCBS, 2004) to absorb the biggest shares of health care expenditures, and might be key factors behind the regressivity. Subsidising the former and regulating the latter, as long as the poor are concerned, should be helpful.

It should however be noted that *ex post* mode of financing are linked to the direct use (benefit) of health care services, and thus, governed by the “*benefit principle*” – i.e., “consumers should pay for what they get” (McIntyre and Mooney, 2007). This implies that its redistributive implications would not be immediate even with a progressive payment structure. Furthermore, a stricter concept of *fairness* in health care financing requires not only relating the payment for health care to ATP but *de-linking* them from the direct health care utilisation (Chisholm and Evans, 2007; Le Grand, 1991). It is increasingly argued that in the context of developing countries a more “*equitable*” health financing system could only be acquired by a shift toward pre-payment schemes (Carrin, 2002; McIntyre, 2007). A growing body of literature has brought evidence in favour of *ex ante* modes of financing on the grounds that, beside its intrinsic risk-pooling characteristic, pre-payment schemes can be more easily designed to take into account individuals' ATP (WHO, 2005; Asfaw and Braun, 2004). The interest in these schemes also arises from their potential equalising effects on the post-payment distribution of income, and thus, the “pro-poor” income redistributive effects that they may generate (EQUITAP, 2005; Wagstaff and van Doorslaer, 2001). Health insurance schemes in the OPT – both public and private – though appeared progressive, their progressivity feature was not found statistically significant over the entire income distribution. Interestingly, when the analysis was conducted at the decile level,

results indicated a statistically significant progressivity of the GHI over the upper half of income deciles, suggesting that the financial contributions paid by the households in these deciles tend to be positively related to their ATP. While the waivers and the low-priced premiums – provided through the so-called “*Al-Aqsa insurance coverage*” – may play some role here, the insignificant progressivity found at the lower half of income deciles might be due to the use of fixed lump-sum payments for some voluntary affiliation coverage. In effect, such pricing policy was shown to limit the progressivity character of health insurance schemes overall (Wagstaff and van Doorslaer, 1997). Moreover, it was noted that the exemptions through the *Al-Aqsa insurance* are practically not necessarily always income-based (Schoenbaum et al., 2005). Such observations indicate a feeble role of the present GHI pricing policies in promoting progressivity, and hence, signal the need to reconsider the current structure of GHI contributions in order to strengthen its progressive capacities and the potential redistributive effects.

Clearly, insofar as the public insurance waivers and the low-priced premiums are targeted toward the lowest-income groups, this would suggest a “pro-poor” redistributive role of the GHI system. Such an interpretation hinges, however, on the fact that the poor are generally equally entitled to the same benefit of the GHI, and thus, do not deny access to insurance coverage as is typically the case of the private insurance schemes. Indeed, in the latter case, it would be more difficult to attribute to these schemes – which appeared to be highly concentrated on the better-off [*e.g.*,  $C_T = 0.56$  in the WB] – any redistributive effects. Even if the better-off were found to contribute (proportionately) higher of their incomes on these schemes, they also receive (proportionately) higher benefits compared with the poor. The latter group remains almost excluded from the benefits of the private coverage, mainly due to the unaffordable premiums. Extending coverage to include various socioeconomic categories of the population whilst appropriately relating contributions to their ATP seems to be a necessary condition if these schemes are to play any significant redistributive effects. More specific results with this regard could be obtained following a simulation exercise that assesses the impact of organisational factors on the “equity” performance of the current public and private insurance schemes, while taking into account the distribution of health care benefits in addition to the costs – this is being attempted elsewhere (Abu-Zaineh et al., 2008).

The objective of the analysis conducted in this essay was to infer equity features of the current health care financing schemes in the OPT, and to explore some of the conceptual and measurement aspects involved in the assessment of *equity in health care financing* under conditions of a predominantly *ex post* financing and the absence of adequate health coverage. It was shown that despite the “normative content” attached to the measurement of equity, the disaggregate approach adopted in this study was useful in illuminating potential differences across different groups of the population. This indicates that specific groups, *e.g.* income-deciles, might demonstrate features that would in effect be concealed by overall aggregate estimates. In effect, in the case of the GHI the disaggregate analysis was able to demonstrate significant progressivity trends at certain range of the income distribution. Comparable results, where the disaggregate analysis revealed hidden differences undetected by the summary indices, were found by Klavus (2001) in a study conducted to assess progressivity in the Finnish health care financing system. Indeed, in his paper the author found that: “the distributional outcome associated with the entire curve does not necessarily conform to individual parts of it, and consequently, the distribution of [some financing sources] may at certain income levels be exactly opposite to that indicated by a summary measure”. Similar results were also found in a

study conducted to assess progressivity of the Spanish tax system (Andres and Calonge, 2005). In that latter paper, it was found that the redistributive effect and progressivity of direct and corporate taxes sources of financing were not significant at all income levels.

Although the analysis undertaken in this study tried to use recent methodological developments in the field of inequality measurement, some practical limitations that might have influenced the study results are worth mentioning. Firstly, the absence of reliable data on taxes has made impossible to estimate the amount that would have been paid through taxation for health care in the OPT. Including such data offers the opportunity to assess equity implications of overall health care financing. However, it must be noted that the particular context of the OPT lacks a proper system of tax-transfer. In addition, given the chronic political crises in the region, that has considerably increased the proportion of the population living under the poverty (PCBS, 2006), and compromised the performance of the local economy, the level of general taxation remains low. Therefore, even if the higher income groups have additionally contributed to health care through the share of their taxes that the government allocates to the public health sector, it remains however unlikely that this contribution reverses our diagnosis of regressivity. Secondly, as in similar studies on inequality measurement in health care, our estimates concerning the direct out-of-pocket payments were based on survey data, and therefore, they may be subject to potential biases related to the particular nature of such source of financing. As indicated above, our analysis has made use of data derived based on the same reference period of time for all expenditure categories. Although, the latter – compared to a scenario where different recall periods are used – help minimise *recall bias*, data collected over a short period of time may be subject to “*eventual bias*” due to the stochastic and seasonal nature of illnesses and the infrequency with which some health care payments are made (Wagstaff et al., 2007). Annualising out-of-pocket payments in the presence of seasonality, by multiplying with some scaling factor might be associated with over – or under-estimations of total health expenditures. This may be avoided in future studies should health expenditure information be collected over a longer period of time, and using a *diary* approach.

Thirdly, it is worth noting that such direct measure of health care expenditures ignores some indirect costs, e.g., opportunity cost of time and the loss of income related to the time households’ members spend to seek care – which are shown to vary across income levels (Cissé et al., 2007). Considering such indirect costs – e.g., differences in waiting time at private-for-profit versus private-not-for-profit – allows assessing the extent to which *price-quality differentials* affect the magnitude of regressivity. Unfortunately, our survey did not offer data on these aspects, and in their absence it was impossible to incorporate such costs into our measure of total health care expenditures. A last, but important, limitation of the distributional analysis presented here is that its scope was restricted to *ranking-invariant measures of inequality* – the *KPI* and the *RS* – both of which examined the vertical stance of inequality in the distribution of health care payments and assumed *rank-preserving progressivity-transfer* (Bourguignon, 1979; Aronson and Lambert, 1994). There are other key aspects of *equity in health care financing*, namely *horizontal equity* and *reranking*, both are shown (e.g., Wagstaff and van Doorslaer, 1997) to be of particular interest in the context of health care financing, and especially the one relating heavily on the *ex post* out-of-pocket payments. Assessing the presence and extent to which these other two components affect the post-payment distribution might therefore be of interest from a policy perspective and would be tackled in the next essay.

## 1.7 CONCLUSION

Several dimensions have to be taken into account with regard to the feasibility and impact of any changes in the current financing mix for health care in Palestine. The special context of the OPT is characterised by an underdeveloped fiscal and managerial systems, extreme reliance on international aid in planning and financing and protracted history of occupation. All these factors have created conditions for an absence of coherent policy, and an accumulation of *ad hoc* operational plans driven by historical inertia with concentration on emergency agenda – something that might attest being irrational at many instances. This indicates the difficulties to be encountered if a change in the prevailing financing mix – even a positive one – is attempted.

In spite of their limitations, the results presented in this essay should however help shape policy toward building an equitable health care financing system for the OPT. Given the high share of households' income absorbed by out-of-pocket payments, and the pronounced adverse effect of such financing modality on the already unbalanced income distribution, a need is there to identify innovative financing mechanisms capable to reduce the financial burden of health care and to limit existing regressivity. Although proven to be promising, the current structure of the governmental health insurance system needs to be reconsidered to further enhance its "*progressive-transferring*" capacities. The latter seems to be crucial to the current situation in the OPT, given the lack of "adequate" and "self-governing" tax-transfer system (note that a major source of government tax revenues is controlled by Israel and was totally suspended following the second Intifada). In addition, the urgent need for additional tax funding for other social sectors; e.g., education, whose activities are essential to improving health status of the population and reducing health inequality, implies that the ability to significantly modifying the current financing mix by relying on tax remains in the short run constrained. At the immediate level, focus should be given to reconsidering the prevalent health care financing structure, starting from what is applied at the MoH level, but as well with reconsideration of what pertains to the private and other health care providers. Establishing a user-fee exemption system and reconsidering the available pricing policies of the various categories of enrolment in the GHI system are needed, should those promote a more equitable financing of health care in Palestine.





**ESSAY II: DECOMPOSING INCOME-RELATED INEQUALITY IN THE FINANCE OF  
HEALTH CARE: THE TRIPLE INVISIBLE EFFECTS<sup>42</sup>**

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<sup>42</sup> This chapter is essentially based to the following paper: Abu-Zaineh, M., Mataria, A., Luchini S., and Moatti, JP. Equity in Health Care Finance in Palestine: the triple invisible effects; [Journal of Health Economics](#), (Submitted on 12<sup>th</sup> June, 2007).

The paper was presented at: the 6<sup>th</sup> International Health Economics Association's Congress (iHEA), 8-11 July, 2007, Copenhagen, Denmark; and the 2<sup>nd</sup> International Symposium on Economic Theory, Policy and Applications, 6-9 August 2007, Athens Institute for Education & Research, Athens, Greece.



## SUMMARY

This essay attempts to extend the distributional analysis of progressivity in health care finance by applying a new methodology that allows unravelling the sources of inequality associated with the distribution of health care payments. In distinction with most previous studies in this area of analysis, the total inequality effect of various financing schemes is disentangled and estimated as sample statistics to reveal the vertical and horizontal inequalities, and reranking effects, using the measurement model recently proposed by Urban and Lambert (2005) to decompose income-inequality in the absence of equal-income groups, and where the financing system can reverse the ranking of the entire income groups. The latter effect, which cannot be elucidated by the standard decomposition method, is of particular interest in the context of health care financing relying heavily on the ex-post payment. In addition, an attempt is made to determine the statistical significance of each decomposable measure of inequality using the bootstrap econometric methods. The decomposition model is applied to three financing sources of health care particular to the specific context of the Occupied Palestinian Territory (OPT): out-of-pocket payments, private health insurance and governmental health insurance (GHI), using a recent household health expenditure survey. The general finding is that out-of-pocket payments are associated with a major negative impact on income inequality. Much of this impact stems not only from their regressivity but even more importantly from the associated horizontal inequality (*HE*) and reranking effect (*RR*). Results on the GHI show that the potential pro-poor impact of this public insurance scheme is also significantly limited by a quite high degree of *HE* and *RR*.

**JEL Classification:** C14; D63; I19

**Keywords:** Health Care Finance; Developing Countries; Income-Inequality; Decomposition, Vertical Equity; Horizontal Equity; Reranking Effect; Close-Income Equals.



## RÉSUMÉ

Cet article a pour objet d'évaluer l'intérêt d'une nouvelle méthodologie permettant de décomposer l'impact global du financement de soins sur la répartition des revenus. A l'inverse des travaux préexistants, cet impact est ici décomposé en effets verticaux et horizontaux, tout en tenant compte de l'hétérogénéité existante à l'intérieur de chaque groupe de revenu. Cette méthodologie permet ainsi d'identifier trois formes de reclassement (*reranking*) socio-économique potentiellement induites par le financement de soins : à l'intérieur d'un groupe, entre groupes et permutation de l'ensemble de groupes de revenu. L'apparition d'un tel reclassement remet en cause les principes d'équité verticale et horizontale. Ces effets ont été estimés en observant la distribution des revenus des ménages avant et après paiement des soins. Le modèle de décomposition a été appliqué à trois sources principales de financement de soins dans les territoires palestiniens occupés : les paiements directs, les cotisations au régime public d'assurance de santé et les cotisations aux assurances de santé privées à but lucratif. Les résultats montrent que l'effet redistributif négatif exercé par les paiements directs ne réside pas seulement dans leur caractère régressif mais plus encore dans l'effet conjugué de l'inégalité horizontale et du reclassement. Par ailleurs, l'impact vertical potentiellement positif du financement par l'assurance publique de santé est largement compensé par un degré élevé d'inégalité horizontale et d'effet de reclassement.

**JEL Classification:** C14; D63; I19

**Mots-clé :** Inégalités des revenus; Financement des Soins ; Décomposition ; Equité Verticale ; Equité Horizontale ; Effet de Reclassement, Pays en Développement.



## 2.1 INTRODUCTION

Assessing and decomposing the overall impact of health care finance on income distribution is a relatively new area of analysis in the context of developing countries (Wagstaff, 2002). Recent empirical evidence coming mainly from developed countries has already shown that different health care financing schemes may very differently affect the prevailing income distribution of a country, and consequently, the associated level of overall income-inequality (Gerdtham and Sundberg, 1998; van Doorslaer et al., 1999; Wagstaff and van Doorslaer, 1997; Wagstaff, 2002). The distributional impact of health care financing is generally addressed by analysing the *progressive* or *regressive* character of a payment scheme. Progressivity is a measure of *vertical effect* (*VE*) and refers solely to the extent to which individuals of unequal ability to pay (ATP) make appropriately dissimilar payments to health care financing scheme. It has been mostly assessed using aggregate summary measures of progressivity (e.g. Wagstaff et al., 1999; Cissé et al., 2007; Bishop et al., 1998), and less frequently at various levels of the income distribution; i.e. using a disaggregate approach (e.g., Abu-Zaineh et al., 2008; Klavus, 2001).

Though progressivity analysis – based on both aggregate and disaggregate approaches – is useful to assess the relative burden of health care financing distribution across different income groups, the distributional analysis of a payment scheme restricted to *VE* might not reveal the total impact of such scheme on the prevailing income distribution. Indeed, it was shown that the total *disequalizing effects* induced by health care financing may also include horizontal (inequality) effect (*HE*) and reranking (*RR*) (van Doorslaer et al., 1999; van de Ven et al., 2001). As Wagstaff and van Doorslaer (1997) point out: “*Depending on the extent of horizontal inequity and reranking involved in health care finance, a progressivity analysis can give a misleading impression about the income redistribution associated with the financing system*” [p. 501]. Applied to health care finance, *horizontal equity* refers to the extent to which, on average, individuals of equal ability to pay (ATP) make *equal* contributions to a health care financing scheme, irrespective of their non-income characteristics; whereas *reranking effect*<sup>43</sup> concerns the extent to which the ranking-order of individuals (by income) changes following the payments for health care (Wagstaff and van Doorslaer, 2000). The three dimensions of equity, *VE*, *HE* and *RR*, relate respectively to the normative principles of: unequal treatment of unequals, equal treatment of equals and proper treatment of unequals (Aronson and Lambert, 1994).

Empirical studies conducted in the context of developed countries to assess equity features of health care financing (e.g., Gerdtham and Sundberg, 1998; van Doorslaer et al., 1999; Wagstaff and van Doorslaer, 1997) have demonstrated that different forms of health care financing may indeed be associated with both horizontal inequality and reranking effect. This is even more likely in the context of developing countries, where income protection mechanisms are still far underdeveloped, and where high proportions of health care expenditures are funded by households’ direct out-of-pocket payments (Musgrove et al., 2002). Since illness is a stochastic

<sup>43</sup> The term “reranking” was considered by some authors as a measure of horizontal inequity of the tax system, and hence, they did not separate the two effects (e.g., Atkinson (1980), Plotnick (1981) and Kakwani (1984)), others have distinguished between them and empirically separated the pure horizontal effect, which refers to the extent to which there is inequality in payments to tax system when households are ranked within bands of similar post-payment income, from “reranking effect” which captures the extent to which the ranking order of households by income changes after payments (e.g., Lambert 1993).

event, the extent of discrepancies in actual payments born by individuals belonging to a similar income group, as well as the extent of changes in income status of individuals due to “catastrophic” health care payments, are likely to be exacerbated in these countries (Wagstaff and van Doorslaer, 2003; Xu et al., 2003). A simultaneous measurement of the three dimensions of equity may therefore be of particular interest to fully assess the overall income inequality impact of health care financing in the context of developing countries. Such assessment can indeed help inform the controversial policy debates about the extent to which reforms aimed at increasing the efficiency of health care systems do not simultaneously increase inequities in health care finance, and consequently, overall prevailing income inequalities in a country (James et al., 2006; Kidson, 1999; McPake and Mills, 2000.; Wagstaff et al., 1999).

How to decompose the overall income inequality associated with a payment scheme has attracted the attention of researchers for long time (Bhattacharya and Mahalanobis, 1967; Pyatt, 1976). The economic literature on public finance and taxation offers various methods to quantitatively measure  $VE$ ,  $HE$  and  $RR$  (e.g., Duclos et al., 2003; Kakwani, 1984; Atkinson, 1980; Jenkins and Lambert, 1999; Aronson and Lambert, 1994; Urban and Lambert, 2005; van de Ven et al., 2001). The standard approach that has been previously proposed and applied in the specific domain of health care finance (Wagstaff and van Doorslaer, 1997) is the one initially proposed by Aronson et al. (1994) – hereafter the AJL approach – to assess the impact of income taxation on the prevailing income distribution. Theoretically, the AJL approach allows to decompose the total (dis)equalizing effect of a financing scheme into  $VE$ ,  $HE$  and  $RR$  for a population that is composed of groups of true- or exact-income equals (hereafter EIEs) – i.e., a situation where the study sample consists of groups of individuals having *exactly* the same pre-payment income –, and for a distribution where the average post-payment income of each group increases with the respective pre-prepayment income level – i.e., a payment schedule, which does not produce any changes in the groups’ ranking-order. However, due to the absence of adequate EIEs in real surveys data, empirical implementations of the AJL approach have relied on the principle of “close-income equals” (hereafter CIEs) – i.e., by dividing the study sample into artificial groups of income based on certain definitions of income bandwidths –,  $HE$  is obtained as a residual term, whereas the measurement of total  $RR$  effect is conditioned by the choice CIEs (e.g., Wagstaff and van Doorslaer, 1997). It has been previously shown (van de Ven et al., 2001) that such practice can lead to misleading results: biases arise not only due to the arbitrary specification of CIEs, but also due, in large part, to the possibility of both intra-groups reranking – i.e. the extent to which the payment schedule induces changes in ranking-order of individuals within the specified groups of CIEs (hereafter  $R_{WG}$ ) – and entire-groups reranking – i.e., the extent to which the payment schedule induces changes in ranking-order of the whole groups of CIEs (hereafter  $R_{EG}$ ).

The need to consider the potential impact of  $R_{WG}$  and  $R_{EG}$ , as well as the sensitivity of the empirical estimations of  $VE$  and  $HE$  to the choice of income bandwidth for CIEs, has been advocated for the assessment of the redistributive effects (RE) of tax and transfer systems (van de Ven et al., 2001; Urban and Lambert, 2005). These aspects may also be relevant with regard to the assessment of the (dis)equalizing effects of different health care financing schemes. A methodological extension to the earlier work in tax literature has recently been provided by Urban and Lambert (2005) – hereafter the UL approach. In contrast to the classical AJL approach and its previous applications, the UL approach reset the measurement system of  $VE$ ,  $HE$  and  $RR$  using a conceptual model that is purposely designed to accommodate CIEs setting. The UL approach presents two complementary advantages: it is able to capture all possible reranking



effects, and it provides a more convenient identification of vertical and horizontal inequities by smoothing the actual effect of payments within each CIEs group. In such approach, the *VE* is measured by allocating to each individual the average payment paid by the respective group of CIEs, while *HE* is estimated directly based on person-by-person comparisons of actual and counterfactual; i.e., smoothed post-payment incomes within CIEs groups. Lastly, although there is no consensus in the empirical literature on an optimal procedure to identify the income bandwidth of CIEs (e.g., van de Ven et al., 2001; Duclos et al., 2003; Aronson et al., 1994), the UL approach, while computationally involves direct estimates of *VE*, *HE*, and *RR* as sample statistics, advocates an assessment of the relative importance of inequality effects given different choices of income bandwidth. This may, indeed, facilitate an appropriate specification of CIEs groups for policy purpose. The UL approach has been recently applied to investigate the *RE* of taxation in Slovenia and Croatia (Čok and Urban, 2007) and in the USA (Kim and Lambert, 2007). However, to our knowledge, there has been no previous attempt to explore the feasibility and application of such methodological improvement in the specific area of health care finance.

The purpose of this essay is to extend the distributional analysis of equity – considered in the pervious essay – to further elucidate the usefulness of such methodological advances – initially developed for inequality measurement of taxation – to the measurement issues of equity in health care financing, and to illustrate how these developments can significantly help clarifying debates about health care policies in the context of developing countries. Some of the methodological developments that we try to transfer to the field of equity measurement in the case of health care financing in the OPT may also be worthwhile for other contexts in developing countries. The remainder of the essay is organized as follows. Section 2 outlines the measurement model of decomposition; this is followed by describing the estimation procedures for inequality measures. Results are reported in Section 3. The last two sections contain our discussion and conclusions.

## 2.2 METHODOLOGY

### 2.2.1 Measurement Model

In the previous analysis, we focused on the vertical differences; i.e., the issue of vertical equity, with the important empirical question was to identify whether and how far the payments burden deviates from *proportionality* – in relation to individual income levels. The distributional impact of payments was assessed using rank-preserving measures of inequality; namely the so-called *Reynolds-Smolensky index of redistribution*, and thus, we assumed away any change in households' income status in the assessment. In the context of the mainly privately funded health care systems, health care payments may also give rise to people having different positions in the income distribution before and after health care payments, as soon as this takes place, the total dis(equalising) effects,  $\Delta I$ , can be measured as follows (Lambert, 1993),

$$\Delta I = 2 \int_0^1 \left[ L_{y(r')} - L_{x(r)} \right] dp$$

$$\Delta I = G_x - G_y \quad (1)$$

where  $LC_x$  and  $LC_y$  are the Lorenz curves of pre-payment and post-payment income distributions, and  $G_x$  and  $G_y$  are the associated Gini coefficients, respectively; whereas the  $r'$  and  $r$  in parentheses indicates household's *rank* in the post-payment (pre-payment) income distributions.

The  $\Delta I$  is positive when  $LC_x$  lies below  $LC_y$ ; i.e., when  $LC_y$  dominates  $LC_x$ . In this case, the health payments tend to reduce the inequality; and the payment scheme is qualified as *pro-poor*.  $RE$  is negative if  $LC_x$  lies above  $LC_y$ ; i.e., when  $LC_x$  dominates  $LC_y$ . This indicates that the health payment scheme increases inequality present in the distribution of pre-payment income. In the latter case, the payment scheme is qualified as *pro-rich*.

Segregating the total change in income inequality ( $\Delta I$ ) of health care payments into  $VE$ ,  $HE$ , and  $RR$  components requires, first, defining a set of concentration curves ( $CC$ 's) constructed by various orderings of income units within and among a set of groups of close-income equals  $k$  ( $k$  taking the values from 1 to  $K$ ) – where  $k$  is defined based on pre-assigned income bandwidth  $w$ .

Each group of close-income equals (CIEs) comprises  $N_k$  households with  $\sum_{k=1}^K N_k = N$ . If  $X$  and  $Y$  are set to represent households' pre-payment and post-payment income distributions respectively, then the following Gini and concentration indices ( $CI$ 's) can be defined over the entire income distribution of the sample population:

- $CI_1$  = the concentration index of  $CC_1$ , calculated from the post-payment income vector  $Y_1$  that would be obtained if each  $x \in k(w)$  reduced by  $\mu_{g,k}$  – where  $\mu_g$  is the mean payment of health care of the group  $k$ .
- $CI_2$  = the concentration index of  $CC_2$ , obtained from vector  $Y_2$ , where the observed post-payment income units are ranked by their *pre-payment income level* ( $r_x$ ).
- $CI_3$  = the concentration index of  $CC_3$ , obtained from vector  $Y_3$ , where the observed post-payment income units are ordered by *post-payment income within each group* ( $r_y$ ), and the groups are ranked by their *pre-payment group means*,  $\mu_x$ , so that  $\mu_{x,k} < \mu_{x,k+1}$ .
- $CI_4$  = the concentration index of  $CC_4$ , obtained from vector  $Y_4$ , where observed income units are ordered by *post-payment income within each group*, and the groups are ranked by their *post-payment group means*,  $\mu_y$ , so that  $\mu_{y,k} < \mu_{y,k+1}$ .

$VE$ ,  $HE$ , and  $RR$  effects of a payment scheme can be consequently assessed using appropriate transformations between the Lorenz curves of pre- and post-payment income distributions ( $LC_x$ ,  $LC_y$ ) and a set of the above post-payment Concentration Curves ( $CC_1, \dots, CC_4$ ).

The first transformation is derived from the application of Eq. (1) to a population consisting of  $k$  groups, each group  $k = 1, \dots, K$  contributing an average payment of  $g_k$  to a health care scheme, such that all households belonging to  $k$  ( $w$ ) face the average payment of health care of the respective group ( $k$ ). The resultant  $\Delta I$  in this case can be reflected by the transformation  $LC_x \rightarrow CC_1$ . Thus,

$$\Delta I = G_x - CI_1 = VE \tag{2}$$

Eq. (2) suggests that in the case where all households within a given income bandwidth contribute the same amount to financing health care – i.e. *equal treatment of equals* (ETEs) – and that such payments do not produce any changes in the ranking-order of income units – i.e. no difference whether income units are ranked in ascending order of their pre-payment or post-payment income level –, then the total amount of  $\Delta I$  associated with a payment scheme would

depend solely on the *progressive (regressive)* structure of the average payments made by each group (i.e.  $\Delta I = VE$ ). The latter is known as the *counterfactual vertical effect* since it is derived from an *effective payment schedule* where the variations in the actual payments for health care are smoothed within each specified groups of CIE's.

The presence of such variations among households belonging to the same group of income  $k(w)$  implies that payment for health care induces horizontal inequality (inequity) in the post-payment income period. These variations arise from the fact that households belonging to  $k(w)$  have contributed *unequally* to finance health care. This may be due to, among other factors, the stochastic nature of illness and/or the different institutional arrangements associated with a payment scheme (van Doorslaer et al., 1999). The extent to which these variations are present in the post-payment income distribution can be captured by the transformation  $CC_1 \rightarrow CC_2$ . Thus,

$$HE = CI_2 - CI_1 \quad (3)$$

where the horizontal inequality (inequity) present in the post-payment income period is measured by comparing person-by-person departures of the actual post-payment incomes from those generated by a reference schedule constructed, *counterfactually*, to be horizontal inequality-free within group of close-equals<sup>44</sup>. An alternative way of obtaining *HE* of a payment scheme can be specified by the transformation  $CC_1 \rightarrow CC_3$ . Thus,

$$HE = CI_3 - CI_1 \quad (4)$$

where *HE* is measured by comparing the inequality present in the actual post-payment incomes within each group  $k(w)$  to the counterfactual post-payment income of the respective groups, and the overall inequality as an aggregate of these within groups inequalities<sup>45</sup>. The extent to which the actual payments schedule generates *post-payment inequality* within *pre-payment close-equals* is described by Lambert and Romos (1997) as *pseudo horizontal inequity* since it characterises the process where the payment schedule acts to increase inequality within close-income equals.

Although, the two measures of *HE* in Eq. (3) and (4) are related (Urban and Lambert, 2005), a difference may arise due to the fact that horizontal inequality in Eq. (4) is captured within groups of *close* – rather than *exact-income equals*. This involves reranking by post-payment income within these groups<sup>46</sup>. The two measures can, therefore, vary to the extent that ranking-order of post-payment period within each group  $k(w)$  is different from the ranking-order of pre-payment period. Thus,

$$R_{WG} = [CI_3 - CI_1] - [CI_2 - CI_1]$$

<sup>44</sup> Such specification of horizontal inequity corresponds to the one already specified by King (1983) and Jenkins (1994).

<sup>45</sup> This is similar to the measure of horizontal inequity proposed by the AJL (1994), where *HE* is computed for exact-income equals setting; i.e., when groups contain exact pre-payment equals  $x$ , such that  $G_{k,x} = 0$  for all  $k$ . *HE* is then measured using the formula  $HE = \sum_{k=1}^K a_{k,y} G_{k,y}$ ; where  $G_{k,y}$  is the post-payment Gini coefficient of group  $k$  taken in isolation, and  $a_{k,y} = N_k^2 \mu_{k,y} / N^2 \mu$ , which is the product of the population and income shares of the group.

<sup>46</sup> Since in  $C_3$  post-payment incomes are ranked non-decreasingly within groups, whilst  $C_1$ , the smoothed values being derived directly from pre-payment income ( $x$ ), are also non-decreasing but non-reranked.

$$R_{WG} = CI_3 - CI_2 \quad (5)$$

Eq. (5) indicates that the application of “*pseudo horizontal inequity*” to CIE’s setting would comprise within-group reranking ( $R_{WG}$ ). Since  $R_{WG}$  measures rank reversals that occur within group  $k(w)$  – where  $k(w)$  contains a set of *unequals*, then the *HE* measure presented in Eq. (3) is, evidently, a better measure of the notion of “*pure horizontal inequity*” in the classical sense of the term (Aronson et al., 1994; Kaplow, 1989; King, 1983).

Considering further the case where group  $k(w)$  ends up with a mean post-payment income of  $\mu_{y,k}$ , such that  $\mu_{y,k} < \mu_{x,k}$ , while group  $k(w+1)$  ends up earning a mean of  $\mu_{y,k+1}$ , such that  $\mu_{y,k+1} > \mu_{x,k+1}$ , the ranking-order of groups  $k = 1, \dots, K$  from poorest to richest in terms of their mean post-payment income is no longer the same as the ranking-order of these groups in terms of their mean pre-payment income; consequently, the payment scheme induces changes in the income status of the whole group of CIE’s (i.e.,  $R_{EG}$ ). The transformation  $CC_3 \rightarrow CC_4$ , where groups  $k = 1, \dots, K$  are compared in terms of their pre-payment and post-payment income means, captures the effect of such reranking in the distribution of post-payment income. This gives,

$$R_{EG} = CI_4 - CI_3 \quad (6)$$

If health care payments, on the other hand, leave some of those belonging to group  $k(w)$  with lower incomes than households belonging to group  $k(w-1)$ , and others with higher incomes than households in group  $k(w+1)$ , then reranking is said to take place between-groups of CIE’s (i.e.,  $R_{BG}$ ). Where this occurs, the reranking measure is the one to be formulated based on the transformation  $CC_4 \rightarrow G_y$ . In this case, the post-payment Gini ( $G_y$ ) – where households are ordered from poorest to richest over the entire population – is being compared with a post-payment concentration coefficient in which households belonging to subset  $k(w)$  are ordered from poorest to richest in terms of post-payment income, and the groups  $k = 1, \dots, K$  are ordered from poorest to richest in terms of their mean post-payment income<sup>47</sup>. Thus,

$$R_{BG} = G_y - CI_4 \quad (7)$$

Adding to Eq. (7) the two reranking effects, already specified above in Eq. (5) and (6), an *aggregate measure* of all forms of reranking effects (call it  $RR$ ) that could occur in the transition from pre-payment to post-payment income period can be constructed as follows:

$$RR = R_{BG} + R_{WG} + R_{EG}$$

$$RR = [G_y - CI_4] + [CI_3 - CI_2] + [CI_4 - CI_3]$$

and thus,

$$RR = G_y - CI_2 \quad (8)$$

which is equal to the measure of reranking proposed by Atkinson (1980), Plotnick (1981) and Kakwani (1984).

Using the definition in Eq. (1) and the above specifications of  $VE$ ,  $HE$ , and  $RR$ , the

<sup>47</sup> This is the only form of reranking specified by AJL approach.

decomposition of the total *RE* can, now, be fully expressed as follows,

$$\begin{aligned} \Delta I &= \mathbf{G}_x - \mathbf{G}_y \\ &= [G_x - CI_1] - [CI_2 - CI_1] - [G_y - CI_2] \\ \Delta I &= VE - HE - RR \end{aligned} \tag{9}$$

where *VE* measures the “full” (counterfactual) vertical effect that would have occurred if: equals had been treated equally and unequals had been properly treated. Consequently, the terms *HE* and *RR* represent respectively, the increase (reduction) in income-inequality due to the presence of the unequal treatment of equals (i.e., horizontal inequity) and the improper treatment of unequals (i.e., the degree of reranking).

### 2.2.2 Estimation Procedures

The computation of inequality measures – defined above – can be conducted using either the convenient covariance methods (Jenkins, 1988) or the integration methods available in today’s software programs such as GAUSS, Stata and DAD (Lerman and Yitzhaki, 1985; Duclos and Araar, 2006; van Doorslaer et al., 1999). In this essay, we have chosen to compute all indices using propose-built procedures in MATLAB/SIMULINK statistical package (MATLAB, 2005). Such approach, while computationally more involved, enables us to simultaneously estimate the value of each particular measure of inequality along with the corresponding value of *BTS* standard errors and confidence intervals. The computations of Gini coefficients ( $G_x$  and  $G_y$ ) and the aggregate measure of reranking (*RR*) measures are relatively less demanding. This is because both indices are independent of the choice of income bandwidth ( $w$ ). As for *VE*, *HE*, and the various components of reranking ( $R_{BG}$ ,  $R_{WG}$ ,  $R_{EG}$ ), an income bandwidth must be defined in order to construct groups of *close-income equals*. Since there are different methods to specify income bandwidth of close-equals (e.g., van de Ven et al., 2001; Duclos et al., 2003; Aronson et al., 1994; Wagstaff, 2002), and since the relative importance of decomposition components are shown to be sensitive to different definitions of income bandwidth (Aronson et al., 1994; van de Ven et al., 2001; Urban and Lambert, 2005), we used an *annual income interval* ranging from 250 *New Israeli Shekel (NIS)* to 15000 *NIS*<sup>48</sup> to assess the sensitivity of the results to alternative groupings of income bandwidth. A bandwidth of 500 *NIS* of pre-payment income vector ( $x$ ) in the study sample – is then, picked up for the initial results<sup>49</sup>.

Having selected a bandwidth for CIEs, the decomposition measures are all computed directly as a sample statistic – each according to the measurement model specified above. The decomposition method is applied to three sources of health care financing: out-of-pocket payments, government health insurance contributions (GHI), and the private health insurance premiums – assessed against the measurement of living standard – as defined in the previous essay. Lastly, statistical significance of observed variations in the computed values of each of the above measures was tested using the bootstrap methods – described in the previous essay.

<sup>48</sup> At the time of the study 1 NIS was equivalent to 0.23 US\$.

<sup>49</sup> This is in line with the optimal bandwidth suggested by van de Ven et al. (2001), in which they advocate a bandwidth that maximizes the vertical contribution of the RE.

## 2.3 EMPIRICAL RESULTS AND MAIN FINDINGS

The results are presented in sub-sections 2.3.1, 2.3.2, and 2.3.3. The first presents the results on the overall income inequality effect for each, and all, source(s) of health care financing; the second presents the decomposition results; and the third focuses on evaluating the sensitivity of these results to alternative groupings of income bandwidths for CIEs.

### 2.3.1 Overall Income Inequality Effect of Health Care Finance

Table 2.1 presents the estimated values of  $G_x$  and  $G_y$  for each, and all source(s) of health care financing in the WB and GS, along with the corresponding values of *BTS* standard errors and 95% *BTS* confidence intervals. It should be noted that due to the relatively large sample size, the estimated values of *BTS* standard errors for both pre-payment and post payment Gini coefficients are quite small compared to the estimated coefficients – they are always smaller than 3% of the estimated coefficient – generally indicating a good precision in the estimated results.

The estimated results, as presented in Table 2.1, show that the Gini coefficient for the income distribution before paying for health care ( $G_x$ ) is 0.45 and 0.41, in the WB and GS respectively. This relatively high degree of income inequality is significantly aggravated through direct health care expenditures with post-payment Gini coefficients ( $G_y$ ) of 0.48 and 0.44 for the WB and GS, respectively – both are statistically significantly different from  $G_x$  as demonstrated by the lower and upper bounds of the 95% confidence intervals, where the value of  $G_y$  falls well outside the confidence interval of  $G_x$  in both regions. The estimated *BTS* confidence intervals give, therefore, evidence in favour of  $H_A: G_x < G_y$  (or equivalently;  $H_A: RE < 0$ ), clearly indicating that the out-of-pocket payments are *pro-rich* in their redistributive effect. The magnitude of such *pro-rich RE* appears to be slightly higher in the WB with *RE* being 0.04 compared to *RE* of 0.03 in GS.

By contrast, the contributions of GHI and the premiums of private insurance schemes appear to be *pro-poor* in their redistributive effects, as reflected by the positive values of *RE* in both regions ( $RE > 0$ ). Table 2.1 shows, however, that the magnitudes of *RE* associated with the two insurance schemes are quite *marginal* with *RE* of 0.0007 and 0.0001 for GHI and private insurance schemes, respectively. Nonetheless, the Gini coefficients of post-insurance premiums ( $G_y$ ) appear to fall within the 95% confidence interval of the pre-payment Gini coefficients ( $G_x$ ) in both regions, and for both insurance schemes. This indicates that the difference between the two indices,  $G_x$  and  $G_y$ , is statistically insignificant, and therefore the sign of *RE* remains indeterminate; the zero value is bracketed by the tail of the computed confidence interval of the *RE*. Consequently, one cannot reject the  $H_0: RE = 0$  in favour of  $H_A: RE \neq 0$ . Overall, the *RE* associated with the total health care payments confirms the *pro-rich* nature of the current financing structure; the results exhibit a significant increasing inequality in the prevalent income distribution following the overall health care payment ( $RE = -0.04$  and  $-0.03$  in the WB and GS, respectively).

Table 2.1: Decomposition of Income-Inequality Effects of Health Care Finance in the OPT<sup>a, b, c</sup>

Indices & Measures	The West Bank (WB)			
	Out-Of-Pocket Payments	Governmental Health Insurance	Private Health Insurance	Total Payment
$G_x$	0.446300 (0.007400)	0.446300 (0.007400)	0.446300 (0.007400)	0.446300 (0.007400)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.433900, 0.460100]	[0.433900, 0.460100]	[0.433900, 0.460100]	[0.433900, 0.460100]
$G_y$	0.483304 (0.007800)	0.445602 (0.007400)	0.446159 (0.006800)	0.484203 (0.007900)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.469600, 0.499100]	[0.430300, 0.459400]	[0.432100, 0.460600]	[0.469500, 0.500600]
$RE$	-0.037004 (0.002600)	0.000698 (0.000401)	0.000141 (0.000121)	-0.037903 (0.002820)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[-0.041700, -0.031300]	[-0.000100, 0.001600]	[-0.001400, 0.000401]	[-0.043010, -0.032710]
$VE$	-0.015801 (0.002610)	0.001201 (0.000401)	0.000181 (0.000150)	-0.014701 (0.002800)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[-0.020920, -0.010510]	[0.000498, 0.001887]	[-0.000101, 0.000480]	[-0.019601, -0.009430]
$HE$	0.000601 (0.000110)	0.000038 (0.000010)	0.000002 (0.000004)	0.000602 (0.00009)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.000410, 0.000710]	[0.000011, 0.000073]	[0.000001, 0.000005]	[0.000401, 0.000803]
$RR$	0.020602 (0.001501)	0.000465 (0.000100)	0.000038 (0.000010)	0.022600 (0.001721)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.017651, 0.023542]	[0.000303, 0.000631]	[0.000002, 0.000101]	[0.019220, 0.025910]
$R_{WG}$	0.002400 (0.000120)	0.000169 (0.000011)	0.000022 (0.000010)	0.002600 (0.000142)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.002220, 0.002760]	[0.000120, 0.000204]	[0.000012, 0.000033]	[0.002301, 0.002990]
$REG$	0.000271 (0.000231)	0.000001 (0.000001)	0.000000 (0.000000)	0.000200 (0.000204)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.000200, 0.000630]	[0.000000, 0.000006]	[0.000000, 0.000000]	[0.000130, 0.001312]
$R_{BG}$	0.017931 (0.001420)	0.000295 (0.000070)	0.000016 (0.000008)	0.019800 (0.001502)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.015000, 0.020300]	[0.000190, 0.000430]	[0.000006, 0.000033]	[0.015900, 0.022500]

Table 2.1 (Continued)

Indices & Measures	Gaza Strip (GS)			
	Out-Of-Pocket Payments	Governmental Health Insurance	Private Health Insurance	Total Payment
$G_x$	0.412400 (0.010800)	0.412400 (0.010800)	0.412400 (0.010800)	0.412400 (0.010800)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.387705, 0.421120]	[0.387701, 0.432700]	[0.387700, 0.421100]	[0.387700, 0.421100]
$G_y$	0.437170 (0.011000)	0.4116581 (0.011100)	0.412275 (0.010902)	0.437800 (0.011610)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.425800, 0.459700]	[0.387920, 0.432100]	[0.388700, 0.432670]	[0.436610, 0.461222]
$RE$	-0.024770 (0.003851)	0.000742 (0.000410)	0.000125 (0.000110)	-0.025400 (0.003710)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[-0.032110, -0.017800]	[-0.000100, 0.001630]	[-0.000041, 0.000301]	[-0.032320, -0.018200]
$VE$	-0.008400 (0.004051)	0.001101 (0.000410)	0.000142 (0.000080)	-0.007300 (0.003641)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[-0.015110, -0.000800]	[0.000300, 0.001945]	[-0.000022, 0.000320]	[-0.014300, -0.000430]
$HE$	0.000610 (0.000201)	0.000083 (0.000030)	0.000004 (0.000003)	0.000700 (0.000200)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.000300, 0.000920]	[0.000030, 0.000245]	[0.000003, 0.000014]	[0.000200, 0.001102]
$RR$	0.015760 (0.001810)	0.000276 (0.000051)	0.000013 (0.000006)	0.017400 (0.001920)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.013016, 0.019550]	[0.000200, 0.000454]	[0.000003, 0.000260]	[0.013700, 0.021110]
$R_{WG}$	0.003001 (0.000200)	0.000150 (0.0000101)	0.000010 (0.000004)	0.003100 (0.000300)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.002601, 0.003540]	[0.000121, 0.000180]	[0.000003, 0.000017]	[0.002600, 0.003700]
$REG$	0.000210 (0.000201)	0.000000 (0.000000)	0.000000 (0.000000)	0.000200 (0.000104)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.000071, 0.000930]	[0.000000, 0.000000]	[0.000000, 0.000000]	[0.000110, 0.000951]
$R_{BG}$	0.012550 (0.001600)	0.000126 (0.000040)	0.000003 (0.000002)	0.014100 (0.001700)
$[\hat{I}_{L1}^*, \hat{I}_{L2}^*]$	[0.010100, 0.016100]	[0.000110, 0.000220]	[0.0000002, 0.000010]	[0.010701, 0.017100]

a. Income bandwidth for CIE's set at 500 NIS.

b. Bootstrap standard errors of the estimate are in parentheses.

c. Bootstrap confidence intervals of the estimate at 95% are in brackets.



### 2.3.2 Vertical and Horizontal Inequities, and Reranking Effects

Results presented in Section 4.1.1 on *RE* emphasise the magnitudes of the total (*actual*) redistributive effects of each source of health care financing. In this Section, the total *RE* for each source of health care financing is disentangled in terms of *VE*, *HE*, and *RR* following the UL decomposition approach. The estimated values of *VE*, *HE*, and *RR* are presented in Table 2.1 – along with the corresponding values of BTS standard errors and the BTS confidence intervals at a significance level of 95%. A *positive (negative)* value of *VE* represents the (*counterfactual*) redistributive effect on overall income inequality produced by an *effective progressive (regressive)* payment schedule which includes no *differential treatment* (i.e., when *HE* and *RR* = 0). Consequently, *non-zero* values of *HE* and *RR* indicate respectively the presence of *unequal treatment of equals* and *improper treatment of unequals* in the health care payment scheme in question.

Results on the *counterfactual VE* associated with out-of-pocket payments confirm the regressive role of such financing modality in the total *pro-rich RE* of health care financing. This is demonstrated by significant negative values of *VE* ( $VE < 0$  at  $\alpha = 0.05$ ) when computing *RE* in the absence of any *HE* and *RR*. The *regressive VE* of out-of-pocket payments appears to be much more pronounced in the case of WB [ $VE = -0.0158$ ] than in GS [ $VE = -0.0084$ ]. As for GHI, although the magnitude of the total (*actual*) *pro-poor RE* did not reach the statistical significance at  $\alpha = 0.05$ , the estimated values of the (*counterfactual*) *VE* emerge, by contrast, to be significantly positive in the two regions ( $VE > 0$  at  $\alpha = 0.05$ ), with GHI being slightly more *progressive* in the WB [ $VE = 0.0012$ ] than in GS [ $VE = 0.0011$ ]. This clearly indicates the potential role of *pro-poor RE* of GHI when *HE* and *RR* effects are eliminated. Turning to private health insurance scheme, no significant (*counterfactual*) *VE* could be identified in the two regions; the positive values of the (*counterfactual*) *VE* appear to be statistically insignificant (at  $\alpha = 0.05$ ). This indicates that the (*counterfactual*) *RE* that might have been induced by such source of financing, in the absence of both *HE* and *RR*, remains, in fact, of no consequence. However, such results may be due to the very small proportions of households having private insurance across different income levels. Overall, the regressive *VE* of total health care payment remains significant (at  $\alpha = 0.05$ ) with  $VE = -0.0147$  and  $-0.0073$  in the WB and GS, respectively; confirming the overall *regressive* nature of the total health care payment burden in both Palestinian regions.

With regard to *HE*, results exhibit different trends of *horizontal inequality* associated with each source of health care financing. As shown in Table 2.1, out-of-pocket payments emerge to be associated with a significantly *non-zero* value of *HE* ( $HE > 0$  at  $\alpha = 0.05$ ). This indicates that, given out-of-pocket payments are a *regressive* source of health care financing, the effect of *horizontal inequality* associated with such financing modality is to further exacerbate the degree of *pro-rich RE*. The magnitudes of such *HE* appear to be similar in the WB and GS [ $HE = 0.0006$ ]. Likewise, both GHI and private health insurance scheme appear to be associated with significantly *non-zero* values of *HE* ( $HE > 0$  at  $\alpha = 0.05$ ). Table 2.1 shows, however, that the extent of *horizontal inequality* associated with GHI is relatively high [ $HE = 0.00004$  and  $0.00008$  in the WB and GS, respectively] compared to private insurance scheme [ $HE = 0.000002$  and  $0.000004$  in the WB and GS, respectively], and it is always more pronounced in GS compared to the WB. Consequently, given GHI in the WB and GS presents similar positive trends of *VE*, the adverse effect of such *horizontal inequality* would be higher in the case of GS. As for total health care payment, *HE* remains significantly high with slightly more adverse effect of *horizontal inequality* in GS [ $HE = 0.0007$ ] compared to the WB [ $HE = 0.0006$ ] – both being statistically significant at  $\alpha = 0.05$ .

Turning to  $RR$ , out-of-pocket payments for health care emerge to be associated with a quite high degree of total *reranking effect* on the distribution of households' pre-payment incomes in the two regions ( $RR > 0$  at  $\alpha = 0.05$ ), with out-of-pocket payments in the WB being associated with more reranking effect [ $RR = 0.0206$ ] than those in GS [ $RR = 0.0157$ ]. Given that such financing arrangement is highly *regressive* in both regions, the effect of  $RR$  appears to be detrimental and considerably increases the degree of *pro-rich RE*. GHI and private health insurance schemes also appear to be associated with a high degree of *reranking* in the distribution of households' pre-payment incomes, as represented by significant *non-zero* values of  $RR$  for the two insurance schemes in the WB and GS. Table 2.1 exhibits, however, considerable variations in the extent of  $RR$  induced by each insurance scheme and between the two regions:  $RR$  is more pronounced in the case of GHI [ $RR = 0.00046$  and  $0.00028$  in the WB and GS, respectively] compared to private insurance scheme [ $RR = 0.00004$  and  $0.00001$  in the WB and GS, respectively] – all are statistically significant at  $\alpha = 0.05$  –, while it is always higher in the WB than in GS. Once again, given that GHI has a significant positive  $VE$ , the effect of such *reranking* is relatively high, and consequently, reduces the degree of potential *pro-poor RE*. When considering the total health care payment, the adverse effect of *reranking* on income distribution emerges significantly high [ $RR = 0.0226$  and  $0.0174$  in the WB and GS, respectively].

The contributions of  $VE$ ,  $HE$ , and  $RR$  to the total  $RE$  may be better reflected by expressing them as a percentage of the *total redistributive effect (RE)* (Wagstaff and van Doorslaer, 1997). To get more sense of the magnitude of these effects, Table 2.2 presents the *percentage* contributions of the  $VE$ ,  $HE$ , and  $RR$  to the total  $RE$ . A value of  $VE/RE$  (or  $VE^{100}$ ) indicates the total amount of *counterfactual income inequality change* that would be achieved by *progressivity* (or *regressivity*) of an *effective* payment schedule; i.e., when  $(HE+RR)/RE\% = 0$ . This reflects how much *more* (or *less*) redistributive a financing scheme would have been in the absence of  $HE$  and  $RR$ . Consequently, the terms  $(HE/RE)\%$  and  $(RR/RE)\%$  would represent respectively the *decrease* – in case of *pro-poor RE* – (or the *increase* – in case of *pro-rich RE*) in *counterfactual income inequality* due to the presence of *unequal treatment of equals* and *improper treatment of unequals*.

In the case of the *regressive* out-of-pocket payments the values of  $VE$  [ $-0.0158$ ] and [ $-0.0084$ ] would account for about 42.70% and 34.91% of the total *pro-rich RE* in the WB and GS, respectively, indicating that the out-of-pocket payments would have been about 57.30% and 65.09% *less pro-rich* redistributive in the absence of *differential treatment* (or both  $HE$  and  $RR$ ). The value of  $VE$  for GHI of [ $0.0012$ ] and [ $0.0011$ ] would account for 172.06% and 149.38% of the total *pro-poor RE* in the WB and GS, respectively; indicating that GHI would have been 72.06% and 49.38% *more pro-poor* redistributive if there had been no  $HE$  and  $RR$ .

Turning to the private insurance schemes, the value of  $VE$  of [ $0.0002$ ] and [ $0.0001$ ] would account for 128.37% and 113.60% of the total  $RE$  in the WB and GS, respectively, indicating that the private insurance scheme would have been *more* redistributive by 28.37% and 13.60% if there had been no  $HE$  and  $RR$ . However, once again, the positive values of  $VE$  of private insurance prove to be rather indeterminate and insignificant (at  $\alpha = 0.05$ ).

**Table 2.2: Percentage Decomposition of Income-Inequality Effects of Health Care Financing Schemes in the OPT<sup>a</sup>**

Measure	Out-Of-Pocket Payments	Governmental Health Insurance	Private Health Insurance	Total Payment
<b>West Bank (WB)</b>				
<i>RE</i>	100.0%	100.0%	100.0%	100.0%
<i>VE</i>	42.70%	172.06%	128.37%	38.79%
<i>HE</i>	-1.62%	5.44%	1.42%	-1.59%
<i>RR</i>	-55.68%	66.62%	26.95%	-59.63%
<i>R<sub>WG</sub></i>	-6.49%	24.21%	15.60%	-6.86%
<i>R<sub>EG</sub></i>	-0.73%	0.22%	0.00%	-0.53%
<i>R<sub>BG</sub></i>	-48.46%	42.26%	11.35%	-52.24%
<b>Gaza Strip (GS)</b>				
<i>RE</i>	100.0%	100.0%	100.0%	100.0%
<i>VE</i>	33.91%	148.38%	113.60%	28.74%
<i>HE</i>	-2.46%	11.19%	3.20%	-2.76%
<i>RR</i>	-63.63%	37.20%	10.40%	-68.50%
<i>R<sub>WG</sub></i>	-12.11%	20.22%	8.00%	-12.20%
<i>R<sub>EG</sub></i>	-0.85%	0.00%	0.00%	-0.79%
<i>R<sub>BG</sub></i>	-50.67%	16.98%	2.40%	-55.51%

a. With income bandwidth of CIE's set at 500 NIS.

These results suggest that despite the importance of *vertical differences* (*progressivity* or *regressivity*) in the redistribution of income, there is a fairly high degree of *differential treatment* – *HE* and *RR* – associated with each source of financing. Table 2.2 shows, however, that there are considerable variations in the relative importance of these two effects in generating *more* (or *less*) redistributive effect. Unexpectedly, the value of *HE* of [0.0006] in the case of out-of-pocket payments appears to account for only less than -2.5% of the total *pro-rich RE* in the two Palestinian regions<sup>50</sup>. This indicates that *horizontal differences* are responsible for only a quite small amount of the total *pro-rich RE* associated with out-of-pocket payment, and therefore, the total *RE* induced by direct payment for health care would have been marginally *less* redistributive in the absence of *horizontal inequality*. In the case of GHI, the values of *HE* [0.00004 and 0.00008, respectively] appear to be more important and clearly *reduce* the redistributive *pro-poor* effect of this scheme compared to what it would have been in the absence of *horizontal inequality* by about 5.44% and 11.19% in the WB and GS, respectively. By contrast, the value of *HE* for private insurance scheme is rather small and accounts for only 1.42% in the WB and 3.20% GS of the total *RE*. By considering, lastly, the overall health care payment, the contributions of *HE* to the total *pro-rich RE*, remains

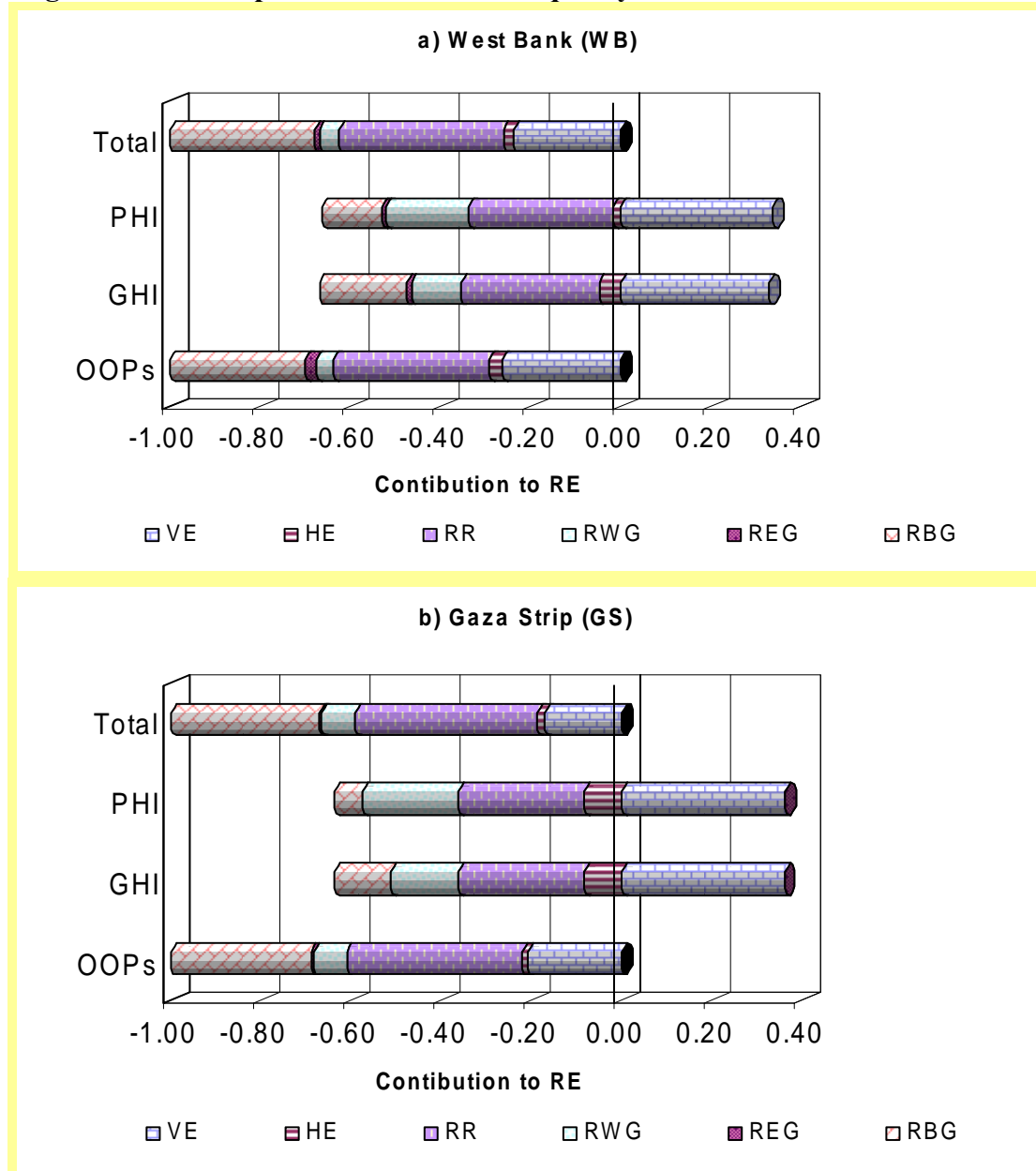
<sup>50</sup> Note that *HE* appears to be negative when expressed as a percentage of *RE* since the out-of-pocket is a *regressive* source of financing, and therefore, *HE* increases the *RE*.

fairly small, being about  $-1.59\%$  and  $-2.76\%$  in the WB and GS, respectively.

These results indicate that the majority of the additional *decrease* (or *increase*) in the *RE* that is not due to *pure horizontal inequality* (*HE*) is due to *reranking effect* (*RR*). Hence, in the two cases: the *regressive* out-of-pocket payments and the *progressive* GHI, *RR* is responsible for the largest amount of additional variation in the *RE*. Table 2.2 shows that more than half of the *additional increase* in the *pro-rich RE* associated with out-of-pocket payments in the two regions are due to *total reranking effect* rather than *pure horizontal inequality*. Similarly, *RR* appears to be responsible for a substantial portion of the *additional decrease* in the *pro-poor RE* associated with GHI. These results suggest that, given that GHI is significantly *progressive*, it would have been 66.62% and 37.20% more *pro-poor* redistributive, in the WB and GS respectively, if there had been no *RR*. Similarly, the private insurance schemes would have been 26.95% and 10.40% more *pro-poor* redistributive if there had been no *RR*. Overall, the total health care payment would have been 59.63% and 68.50% *less pro-rich* redistributive in the absence of such *RR* in the WB and GS.

As shown in Tables 2.1 and 2.2, our methodological approach further decomposes *the total reranking effect* (*RR*) into three distinct sub-components:  $R_{WG}$ ,  $R_{EG}$  and  $R_{BG}$ . This decomposition is useful to ascertain the sources of reranking and the contribution of each of them in the total *RE*. By so doing, the *inter-group reranking* ( $R_{BG}$ ) emerges to be responsible for the majority of the *total reranking effect* induced by out-of-pocket payments and by the total health care payment, and would alone account for about half of the *additional increase* in the *pro-rich RE* in the two regions (see Table 2.2). On the other hand, *intra-group reranking* ( $R_{WG}$ ) would account for  $-6.49\%$  and about  $-12.11\%$  of the *additional increase* in *RE* in the WB and GS, respectively. The contribution of *entire-group reranking* ( $R_{EG}$ ) is quite small and would slightly *increase* the regressive *RE* of out-of-pocket payments (by less than  $-1.0\%$ ) in both regions.

In the case of GHI, the relative importance of the  $R_{BG}$  and  $R_{WG}$  are significantly different between the two regions: in the WB the  $R_{BG}$  appears to be responsible for the majority of the *additional decrease* in the *pro-poor RE* [42.26%] compared to [24.21%] attributed to  $R_{WG}$ , whereas in GS the majority of reranking-induced *decrease* is attributed to  $R_{WG}$  [20.22%] compared to [16.98%] due to  $R_{BG}$ . Regarding the private insurance scheme, the  $R_{WG}$  constitutes the largest share of reranking-induced *decrease* in *RE*, whilst  $R_{BG}$  comes in the second place. Lastly, in the two regions and for the two insurance schemes, the  $R_{EG}$  remains zero. The following figure give a visual sense on the above the effects.

**Figure 2.1: Decomposition of Income-Inequality Effects of Health Care Finance**

### 2.3.3 Sensitivity of Decomposition Results to Income Bandwidth of CIE's

The results presented in the above Section highlight the *relative* importance of the *vertical* and *horizontal inequalities*, as well as that of the different forms of *reranking*, in the total variation of *income inequality (RE)* for an income bandwidth ( $w$ ) of 500 *NIS*. The concentration indices (*CI's*) – used to decompose the total *RE* – are *bivariate* measures of *inequality* – i.e., they measure *inequality* in one variable; e.g., *post-payment income* ( $y$ ), in relation to *ranking* of another; e.g., *pre-payment income* ( $x$ ) – (Koolman and van Doorslaer, 2004). Since the *ranking* is variant with respect to the definition of  $w$ , changing the size of income bandwidth ( $w$ ) – used to group  $x$ -values – is likely to affect the relative *magnitudes* and *significance* of the *VE*, *HE*, as well as the relative contributions of each of the three reranking components,  $R_{BG}$ ,  $R_{WG}$ ,  $R_{EG}$  to the total *RE*. This Section explores the sensitivity of the decomposition components to different choices of income bandwidths ( $w$ ).

Results are presented in Figures 2.2 (a – f) where the relevant values of decomposition

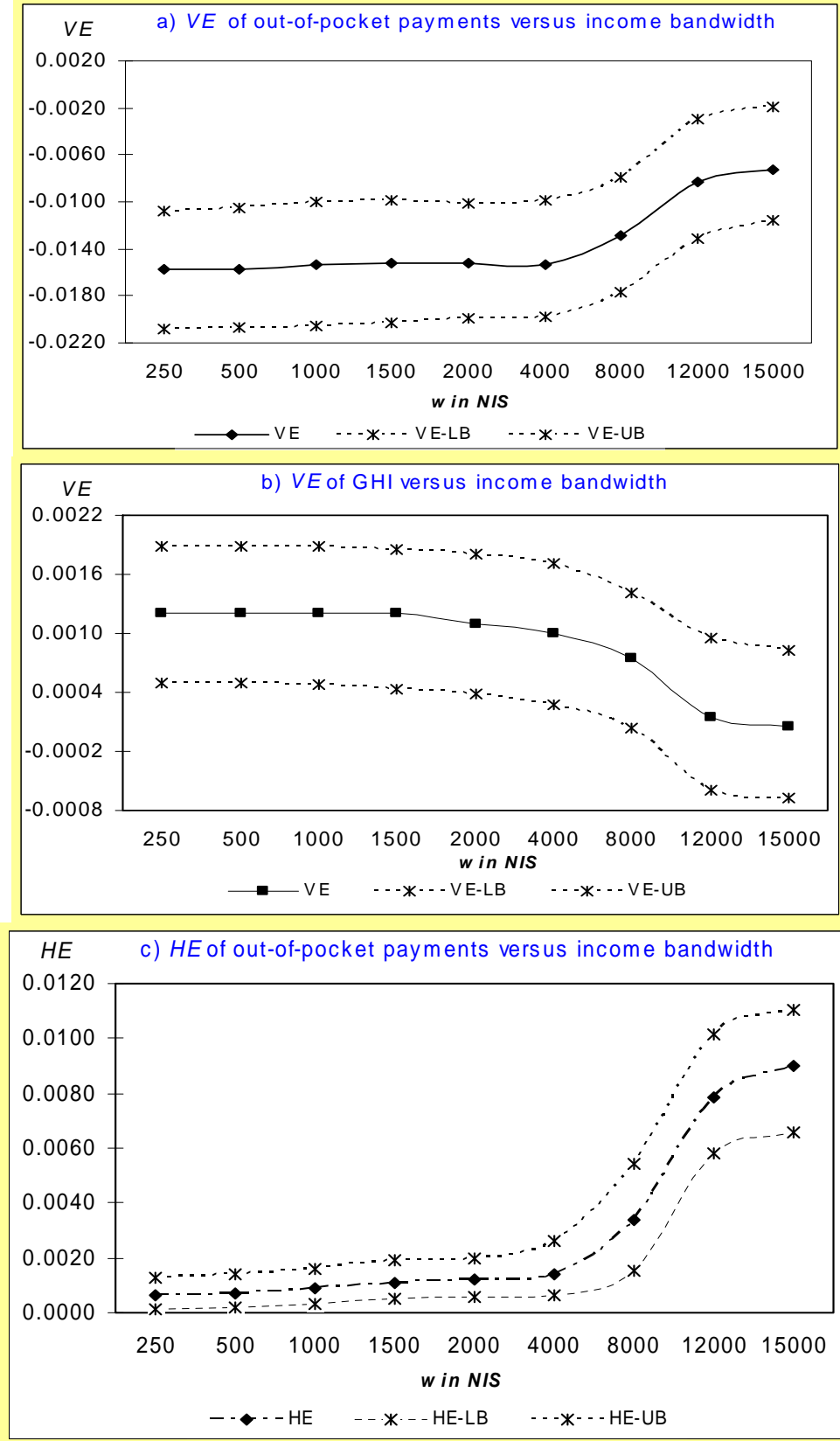
components are plotted against a large range of income bandwidths ( $w$ ) –  $w$  taking the values from [250 to 15,000 NIS] – for both out-of-pocket payments and GHI in the case of WB<sup>51</sup>. The corresponding BTS confidence intervals at a significance level of 95% are presented as *dashed lines* along the income bandwidths ( $w$ ). Figures 2.2.a and b indicate that the  $VE$  in the two cases: the (*regressive*) out-of-pocket payments and the (*progressive*) GHI tend to *fall* as income bandwidth ( $w$ ) *increases*; this clearly implies *lower* contributions of  $VE$  in the total  $RE$ . As shown in Figures 2.2.a and 2.2.b, the *lower* and *upper* bounds of the confidence intervals of  $VE$  associated with out-of-pocket payments are both *negative* along all income bandwidths ( $w$ ), while in the case of GHI they are *positive* along income bandwidths ( $w$ ) except for the very large bandwidth in excess of 8000 NIS where the *lower* bound turns to be *negative*. This indicates that the counterfactual  $VE$  is always significantly *negative* ( $VE < 0 \forall w$  at  $\alpha = 0.05$ ) in case of out-of-pocket payments, and significantly *positive* ( $VE > 0 \forall w < 8000$  NIS at  $\alpha = 0.05$ ) in the case of GHI.

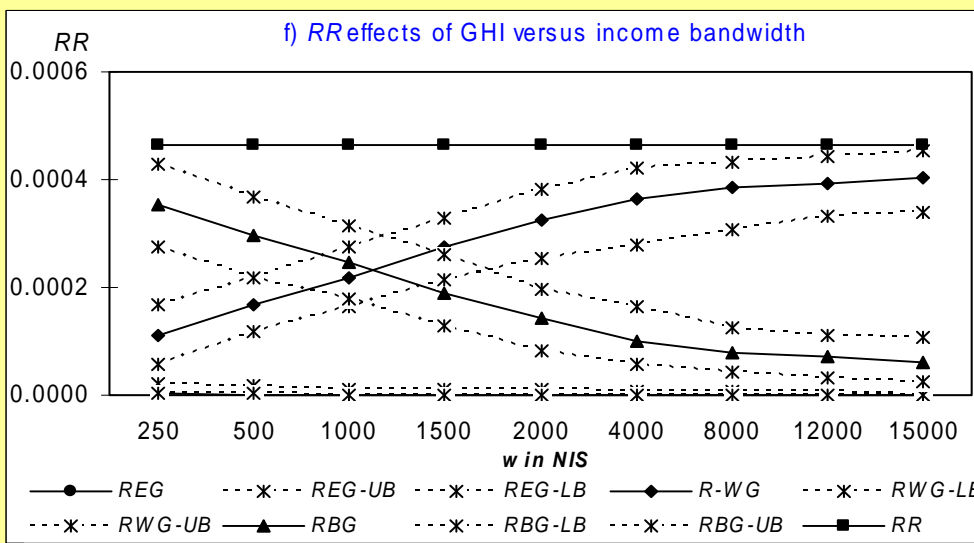
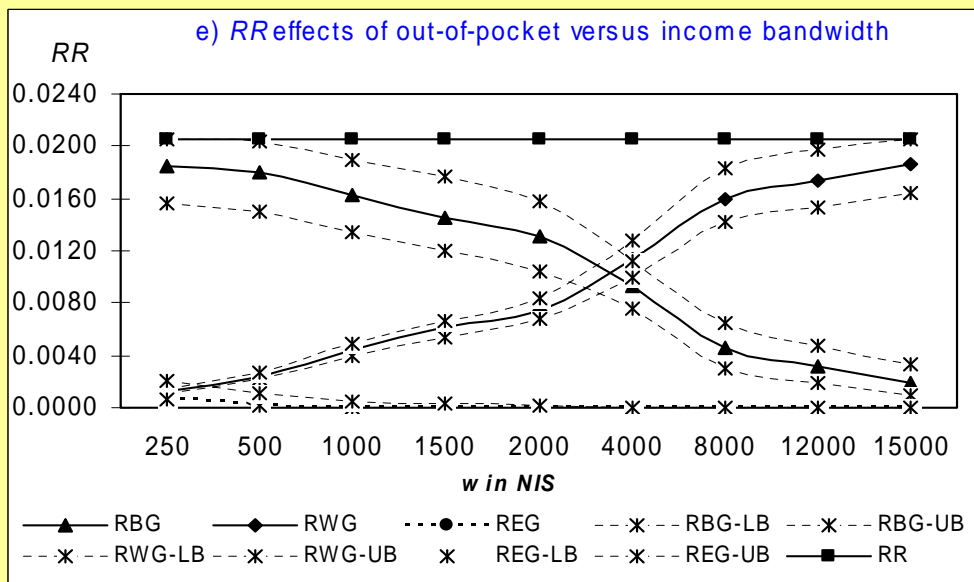
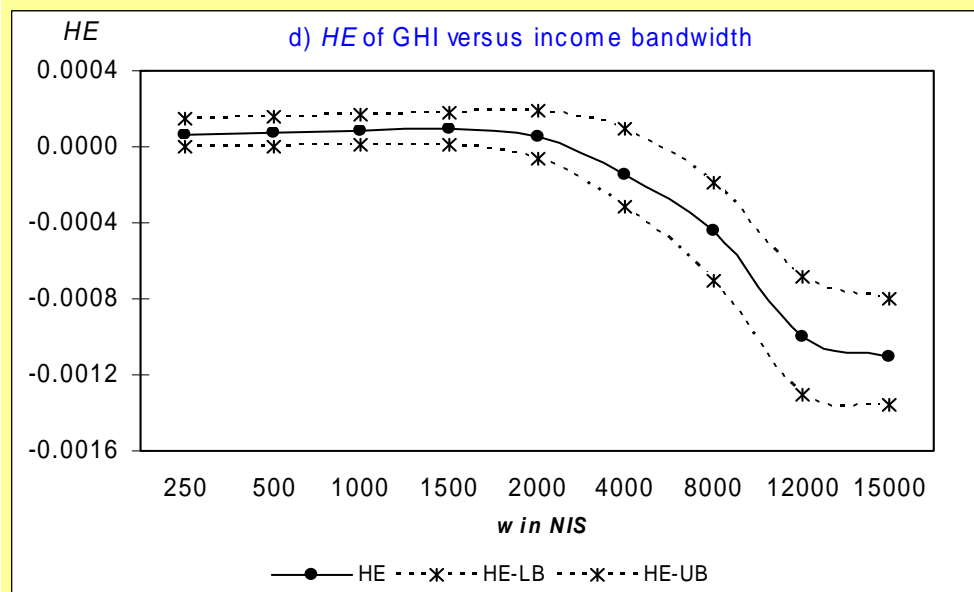
Results concerning *horizontal inequality*, as represented in Figure 2.2.c and 2.3.d, show that in the case of out-of-pocket payments the values of  $HE$  tend to *rise* as income bandwidth ( $w$ ) *increases*, suggesting *higher* contributions of  $HE$  in the total  $RE$ . The lower and upper bounds of the confidence intervals in this case confirm that  $HE$  is always significantly *positive* ( $HE > 0 \forall w$  at  $\alpha = 0.05$ ). In the case of GHI, the estimated values of  $HE$  tend to *rise* and are found to be significantly *positive* only in the small income bandwidths ( $HE > 0 \forall w < 2000$  NIS at  $\alpha = 0.05$ ). Figure 2.2.d shows, however, that  $HE$  turns to be significantly *large* and *negative* in the large income bandwidths ( $HE < 0 \forall w > 2000$  NIS at  $\alpha = 0.05$ ).

Regarding, the relative importance of different forms of *reranking effects*, Figure 2.2.e and 2.2.f suggest that the values of  $R_{BG}$  and  $R_{EG}$  get *inferior* and even approach zero, while the values of  $R_{WG}$  get larger as the income bandwidth increases. To sum up, the *general trend* of each decomposition component contribution to the  $RE$  appears as follows: the larger the income bandwidth ( $w$ ) that is used to construct *close-income equals* (CIE's), the lesser the contribution of vertical effect ( $VE$ ), the higher the contribution of horizontal effect ( $HE$ ) and within-group reranking ( $R_{WG}$ ), and lastly, the lesser the contribution of both *inter-groups* and *entire-groups* reranking ( $R_{BG}$  and  $R_{EG}$ ) in the total  $RE$ .

<sup>51</sup> Similar analysis was also conducted for GS; however, since the analysis demonstrates similar magnitudes of the sensitivity of decomposition components to the choice of bandwidth, we have chosen to include in this paper the results for the WB case only and for two financing sources: out-of-pocket payments and GHI premiums.

Figure 2.2: Sensitivity of Decomposition Results to Income Bandwidth of CIE's







## 2.4 DISCUSSION

This essay has attempted to transfer recent methodological development in inequality measurement of taxation to the specific domain of health care finance. The analysis of the redistributive impact of health care finance on the overall income inequality has been extended beyond the partial analysis of progressivity and the commonly used **AJL** approach. A modified decomposition approach that disentangles the total *RE* of health care payment into vertical, horizontal and reranking effects has been implemented, using the measurement model proposed by Urban and Lambert (2005). Such approach provides appropriate measures of inequality that can be *normatively* distinct in the context where households' incomes are regrouped into *close* – rather than – *exact* income-equals, and where the actual payments made by households belonging to these groups may further affect their intra- and entire-group ranking-order. In addition to simultaneously estimate each measure of inequality as *sample statistics*, the analysis presented in this essay has attempted to examine the statistical inference of each particular measure of inequality using the bootstrap method. Such method provides a basis for assessing the extent of sampling error associated with estimated inequality measures and allows testing statistical significance of each of them within the dominance framework. The analysis was conducted for the three main health care financing schemes proper to the Palestinian context, which has recently experienced sudden and severe impoverishment effects imposed by the chronic political crises.

The decomposition analysis clearly confirms that the *differential treatments* – as reflected by both “*unequal treatment of equals*” and “*improper treatment of unequals*” (*HE + RR*) – are together fairly more important in determining the degree of income redistribution, and consequently, the overall income inequality induced by health care financing than the *progressivity (regressivity)* contribution that had previously attracted the most attention in the literature. Indeed, the effect of *reranking* appears to be even more important than the “*pure horizontal inequality*” and represent the major factor behind the adverse effect of *differential treatment* on income inequality. The factors underlying the “*improper treatment of unequals*” are therefore, of considerable interest. The decomposition approach was able to identify sources of *reranking* in terms of *inter-*, *intra-* and *entire-groups* reranking. The latter two forms of reranking (*R<sub>WG</sub>* and *R<sub>EG</sub>*), that were not explicitly envisaged in previous research where the **AJL** approach has been applied to *close income-equals* (CIE's) scenario, proved to be prevalent sources of reranking induced by health care payments. Although far less important than the effect of reranking, the analysis also reveals a significant effect of the *pure horizontal inequality* – as identified by *person-by-person* comparisons of *actual* and *counterfactual* post-payment income distributions – in the overall variation of income inequality.

The detailed analysis of the impact of different health care financing schemes on income inequality reveals even more interesting information. In the case of out-of-pocket payments – which constitute the major source of health care financing in the OPT (PCBS, 2004) – the results on overall income inequality variation strongly suggest that such financing modality has a significant *dis-equalising effect* on the prevailing income distribution ( $RE < 0$  at  $\alpha = 5\%$ ). This is not a surprising result and remains in line with previous findings reported in the international literature about health care financing. Though, in contrast to the estimated results for several developed countries, where *RE* associated with out-of-pocket payments was estimated to be within the range of  $-0.0005$  and  $-0.0128$  (van Doorslaer et al., 1999; Wagstaff and van Doorslaer, 1997), the impact of out-of-pocket payments on pre-existing income inequalities in the two Palestinian regions appears to be far greater [ $RE = -0.0370$  and  $-0.0247$  in the WB and GS, respectively].

The decomposition analysis, however, revealed that the impact of out-of-pocket payments on income inequality not only derives from their *regressivity* but also from *differential treatment* due to horizontal inequality and reranking. Indeed, *horizontal inequality* and *total reranking* combined were responsible for more than half of the *pro-rich* income redistribution associated with out-of-pocket payments [57.3% and 66.0% in the WB and GS, respectively]. These figures are far greater than those reported for the OECD countries by van Doorslaer et al. (1999) – *HE* and *RR* were estimated, using somewhat different definitions, to be between 3 and 30% of the total *RE*, but remain close to others estimated for Vietnam – 61.5% and 70.8% of the total *RE* in 1993 and 1998, respectively (Wagstaff, 2002). Quite interestingly, the decomposition approach shows that the overall reranking effects are more important in terms of their redistributive effects than the vertical and horizontal differences. This is again consistent with previous results found for out-of-pocket payments in Vietnam (Wagstaff, 2002), Nigeria (Ichoku, 2005), and Netherlands (Wagstaff and van Doorslaer, 1997) even if the extent of *RR* in the two Palestinian regions appears to be higher than in these other countries. This indicates that in the context of the predominantly “market-driven” health care financing in the OPT, out-of-pocket health care payments tend to force households not only to buy health care disproportionately to their income but also to affect their income status and, therefore, to exacerbate poverty.

Further examination of the sources of reranking reveals that the so-specified “*inter-groups reranking*” ( $R_{BG}$ ) is responsible for the most part of reranking-induced variation in income inequality associated with out-of-pocket payments [with  $R_{BG}\%$  = – 48.46% and – 50.67% of the total *RE* in the WB and GS, respectively]; this indicates that out-of-pocket payments for health care affect households’ incomes status regardless of their income-group membership. Although their impacts are less important than  $R_{BG}$ , reranking of both *entire-group* ( $R_{EG}$ ) and *intra-group* ( $R_{WG}$ ) also appear to be significant determinants in the total variation of income inequality associated with out-of-pocket payments. This suggests that the out-of-pocket payments for health care also affect the income status of the whole groups of close-income equals (CIE’s) – as captured by the lower (higher) mean of their post-payment income relative to their mean of pre-payment income [ $R_{EG}$  = – 0.73% and – 0.85% of the total *RE* in the WB and GS, respectively]. Moreover, the income status of households is altered within their original groups of close-equals [ $R_{WG}$  = – 6.5% and – 12.2% of the total *RE* in the WB and GS, respectively]. Health care expenditures seem, therefore, to have an impoverishing effect across and within all socio-economic classes of population. Undoubtedly, by considering the disproportionate structure of health care expenditures, such effects are logically more harmful on the poorest segments of the population.

On the other hand, the relatively small value of *intra-group reranking* ( $R_{WG}$ ) compared with *inter-groups reranking* ( $R_{BG}$ ) may, however, reflect quite small disparities in the actual payments within the specified group of close-income equal. The same is true when considering the disparities between the *actual* and *counterfactual* income distributions. The latter resulted in relatively small values of “*pure horizontal inequality*”, which account for – 1.6% and – 2.5% of the total *pro-rich RE* in the WB and GS, respectively. These figures appear to be quite small when compared to those previously obtained for developed countries; e.g., 11.3% for Netherlands (Wagstaff and van Doorslaer, 1997), and developing countries; e.g., 25% for Vietnam (Wagstaff, 2002). It should be noted, however, that some of these differences may reflect, in part, the different methodologies used to account for “*pure horizontal inequality*”; in previous studies, *horizontal inequality* was measured using the **AJL** approach (Aronson et al., 1994) as a “residual term” (Wagstaff and van Doorslaer, 1997; van Doorslaer et al., 1999; Wagstaff, 2002). It is, as noted earlier, where the **AJL** approach is

applied to close-income equals (CIE's) setting, the *HE* component tends to be *overestimated* by *de facto* incorporating the  $R_{WG}$  term [cf. Eq. 4 and 5 in Section 4.2.1]. Therefore, accounting for *horizontal inequality* as in Eq. (4), its contribution to the total *RE* would increase by  $R_{WG}\%$ ; i.e.  $HE\% = 8\%$  and  $14.6\%$  in the WB and GS, respectively. However, in both cases – where *HE* is accounted for as in Eq. (3) or Eq.(4) – its contribution to the *pro-rich RE* remains somewhat small, and therefore, *RR* continues to be the main source of the additional pro-rich income redistribution associated with out-of-pocket payments.

By pointing out that the “*improper treatment of unequals*” (*RR*) may be a more serious problem associated with out-of-pocket payments than the “*differential treatment of equals*” (*HE*), our results raise an *important question from a policy perspective, regarding the potential causes of such RR*. In the context of developed countries a number of factors, in addition to the randomness incidence of illness – were identified to be responsible for the presence of *differential treatment of equals*, which may consequently generate reranking; e.g., variations in private insurance coverage against public sector co-payments, variations in health services utilisation and institutional arrangements of public insurance systems (van Doorslaer et al. 1999). In the context of OPT – where no universal insurance coverage exists, and where private insurance is so far limited, the *randomness of illness* and the *size of payments* involved seem to be the most likely factor behind such *differential treatment*. Yet, another potential explanatory factor may be the variability in practical difficulties to access health care facilities according to different locations and political realities (e.g., refugee camps, effects of Israeli military occupation, etc.).

In addition, it must be noted that the current structure of out-of-pocket payments in the OPT is a rigid one, with generally no price-discrimination policies that may take into account inter-households' contributive capacities and no exemptions or reduction in the amount of payments that may account for non-income criteria, such as age, pregnancy, disablement, etc. This is especially the case of the private health care delivery sector, which plays a non-negligible role in health care provision and finance: about 21.4% of total health care visits take place at private health care institutions, and result in 40.5% of total national health care expenditures (PCBS, 2006). In this context, the relatively small observed variations in payments at each income level, as reflected by both the “*pure horizontal inequality*” and the “*intra-group reranking*” terms in our estimations, may be due to such rigid payment structure of out-of-pocket payments in the OPT, while the randomness of illness remains the most probable source of this *inequality*. It seems, therefore, evident to consider the “*improper treatment of unequals*” as **a more serious policy concern** than the “*differential treatment of equals*”.

Results on the overall inequality variation associated with health insurance schemes – both the governmental and private schemes in the two Palestinian regions – appear to be less conclusive. The two schemes appeared to have *equalising effects* on the overall income distribution, but these effects seem *marginal* and *statistically insignificant* (at  $\alpha = 5\%$ ). However, in the case of GHI, the decomposed measures of inequality revealed a statistically significant *counterfactual vertical effect* ( $VE > 0$  at  $\alpha = 5\%$ ). This indicates the potential capacity of GHI to generate positive (vertical) redistributive effect, given that GHI affiliates contribute according to an *effective contribution schedule* – where each individual's premium is adjusted to the average premiums of her respective income group (i.e. *equal treatment of equals and proper treatment of unequals*). Previous studies about health care financing had also identified positive *vertical effect* for social health insurance schemes (Gerdtham and Sundberg, 1998; van Doorslaer et al., 1999; Wagstaff and van Doorslaer, 1997). However,

and quite surprisingly, our results reveal that government insurance contributions would have been a lot more *pro-poor* redistributive if there had been no *horizontal differences* and *reranking* [ $HE + RR$ ]. These latter effects were more pronounced for GHI than for both private sources of financing, out-of-pocket payments and private health insurance scheme. Such finding contrasts with results regarding social health insurance schemes in developed countries where  $HE$  and  $RR$  were found to be fairly lower compared to private sources of financing (van Doorslaer et al., 1999).

The substantial values of  $HE$  and  $R_{WG}$  observed in the case of GHI are certainly related to the way premiums are established at each income level, resulting from households of *similar* equivalent incomes making *dissimilar* equivalent contributions. They may also reflect variations in insurance coverage at each income level in relation to the fact that GHI is compulsory for public sector employees only, whereas it is of a voluntary nature for others. Comparable results were found in some developed countries where social health insurance schemes are also compulsory for public sector employees only, like Portugal and Switzerland (van Doorslaer et al., 1999). In addition, the large observed values of *inter-group reranking* ( $R_{BG}$ ) reflect the great diversity of GHI institutional arrangements that may also result in households of *similar* equivalent incomes making different contributions through their insurance premiums.

Indeed, the governmental insurance scheme (GHI) in the OPT involve four different types of enrolments: the public sector employees are compulsory enrolled and pay a fixed percentage (5%) of their basic income up to a ceiling of 75 *NIS*; self-employed individuals and wage-earners in the OPT can be voluntary enrolled by paying respectively a monthly premium of 75 *NIS* and of 50 *NIS* – i.e. lump sum payment regardless of individual incomes –; the last category concerns the exempted households, e.g., hardship cases, who are covered by the ministry of social affairs with minimum premiums of 45 *NIS* being paid on their behalf (Lennox and Shubita, 1998; Schoenbaum et al., 2005). On the other hand, a recent extension of GHI coverage has been achieved through the so-called “*Al-Aqsa Intifada*” insurance scheme, which was set up by the Palestinian ministry of health (MoH) following the current crises in 2000. The Ministry has offered an almost “*free of charge*” coverage to the mostly affected classes of population, and a very low-premium insurance was later introduced to offer coverage for a high percentage of uninsured households in the WB and GS.

It is well-known that introducing exemptions can enhance the *progressivity* of a financing scheme to the extent that lower income deciles are concerned (Wagstaff and van Doorslaer, 1997; Wagstaff, 2002). Although the extension of GHI coverage under “*Al-Aqsa Intifada insurance*” was initially decided on some *income-related criteria*, like the loss of jobs due to the strict closure, as well as non-income related criteria, like disablement or injuries during the Second Palestinian uprising (*Intifada*), the latest extension in coverage has randomly opened the enrolment in GHI regardless of these criteria. Moreover, although the aim of such extension was to promote equity in the provision of publicly financed health care, the recent increase in the number of households entitled for public services through the “*Al-Aqsa Intifada insurance*” has not been associated with a parallel improvement in the capacity of health services delivery. This has led to: a further deterioration in the quality of care provided (MAS, 2000); a significant decrease in voluntary enrolment, and consequently in GHI total revenues (PMoH-MHIS, 2002; PCBS, 2004). Our results strongly suggest that these unplanned evolutions have undoubtedly affected the magnitude of progressivity of GHI contributions and resulted in households on different equivalent incomes making disproportionate equivalent contributions and in households with relatively high equivalent

incomes to contract out of this public scheme. These evolutions have clearly limited the potential positive effects of such insurance scheme in protecting poor people from the impoverishing effects of catastrophic health care payments, and in reducing the adverse impact of health care payment on the overall generalised income inequality in the OPT.

As regards private insurance scheme, the results suggest that the (*progressive*) vertical effect associated with private insurance premiums is rather negligible in magnitude. This, however, reflects the fairly low proportion of private insurance in the overall health care financing-mix. Differential treatment appears in contrast to be much more pronounced than the vertical differences, the most part being attributed to reranking, in particular, *intra-group reranking* ( $R_{WG}$ ). In *van Doorslaer et al. (1999)*, two main factors were identified to generate a non-zero value of  $HE$  and  $RR$  in private insurance schemes in the context of OECD countries: the proportion of households having private insurance at a given level of income and the size of premiums paid by them. In the context of the OPT only around 12 percent of the population are enrolled in a private insurance scheme, while the average premiums are nearly three times higher than GHI premiums (*PCBS, 2004*). The high  $R_{WG}$  associated with these private insurance schemes suggest a huge variation in the premiums paid at each income level. This is related to the fact that members of private insurance schemes in the OPT are mostly private organisations that contract different private insurance plans to cover their employees (*Hamdan et al., 2003*). Private insurance scheme in the OPT is, therefore, far from inducing any major redistributive effect and is characterised by a relatively high differential treatment.

Our methodological approach also confirms previous findings about the sensitivity of the decomposition results in the measurement of  $RE$  according to different choices of income bandwidths (*Aronson et al., 1994; van de Ven et al., 2001*). These results raise the question of the appropriate bandwidth used to construct the groups of close-income equals (CIE's). It has been previously suggested (*van de Ven et al., 2001*) that "*the best procedure*" to form the CIE's is to choose a bandwidth that would maximise the vertical component ( $VE$ ) of the decomposition. In our results, this can be observed for bandwidths of approximately 250  $NIS$  and 500  $NIS$  in the case of out-of-pocket payments – where  $VE$  would account for around 43% of the total  $RE$  [cf. Figure 4.2.a], while in the case of GHI,  $VE$  would be maximised, as a percentage of  $RE$ , for all bandwidths of less than 2000  $NIS$  [cf. Figure 4.2.b]. This suggests, on the one hand, that our chosen bandwidth of close-income equals (CIE's) of 500  $NIS$  did not substantially affect the resultant values of the counterfactual vertical effect ( $VE$ ), and highlights, on the other hand, the importance of appropriately defining close-income equals for policy purposes.

Another important aspect, which is worth to be considered, is whether  $HE$  differs from  $RR$ . In the case where the  $AJL$  decomposition has been used, Wagstaff and Doorslaer (1997) argued that "the distinction between the relative values of  $HE$  and  $RR$  remains less informative from policy perspective, not at least, because in the absence of tax (payment) rate in excess of 100% horizontal inequity (or differential treatment of equals) remains the solely source of reranking, but also for the reason that the relative values of  $HE$  and  $RR$  – i.e., the relative subdivision between them and not their sum – are sensitive to the choice of bandwidth for defining equals". This conclusion is, however, linked to the way  $VE$ ,  $HE$ , and  $RR$  were adapted and computed by these authors. In the adapted  $UL$  approach the total reranking effect is, in fact, unaffected by the choice of income bandwidth, whilst the *pure horizontal inequality* and the *vertical effect* are both *sensitive* to the choice of income bandwidth. The trade-off between the relative values of the decomposition components is, then, observed between  $VE$  and  $HE$  – but not their difference since it equals to  $(RE + RR)$ , which is not

conditioned by the choice of income bandwidth, – and between the constituent parts of the total reranking effect –  $R_{WG}$ ,  $R_{EG}$ , and  $R_{BG}$  (but again not their sum).

Indeed, the *UL* decomposition approach proves to have several advantages over the classical *AJL* approach in capturing the full range of determinants of *RE*. This is basically because the approach has been designed based on *close-* rather than exact-income equals setting. Consequently, the components *VE*, *HE*, and *RR* are all re-defined in such a way that all possible reranking effects (inter-groups, intra-groups, and entire-groups) can be specified and disentangled. In addition, a more appropriate measure of *HE* is proposed based on “person-by-person” comparison of actual and smoothed post-payment incomes. Finally, the *VE* is measured by ‘*smoothing*’ the actual effect of payment within each close-income equals group – i.e., by introducing a distributionally *proportional payment schedule* within-groups of close-income equals – rather than equalizing the income of close-equals and thus creating some “artificial” vertical effects within these groups. The *UL* approach allows to measure *HE* directly and separately from *RR*, and not as a residual term as was the case in the previous *AJL* applications; it therefore provides a far more accurate measure for “*pure horizontal inequality*” in the classical sense of the term (the extent to which those of (*average*) equal abilities to pay have contributed unequally to health care financing) (Lambert, 2003; Urban and Lambert, 2005). The *UL* approach also allows to, decompose the reranking effect into three components; it shows that  $R_{BG}$  and  $R_{EG}$  may still have *distinct normative* differences than the *HE* term and can help assess the extent to which health care financing can affect people regardless of their specified socio-economic classes (in the former) and the extent to which the entire group’s position on the scale of income is also affected (in the later). Lastly, given that our results indicate substantial reranking effects associated with health care financing and the fact that the total reranking measure is unaltered with the choice of income bandwidth. There may be a good reason to consider reranking effect as a more serious problem than horizontal inequality from a policy perspective. This finding may be relevant in the context of other developing countries.

## 2.5 CONCLUSION

The results presented in this paper provide a useful and detailed picture of the overall inequality variation associated with the current Palestinian health care financing structure. Such results should help shape policy toward building an equitable and efficient health care financing system for the OPT. Firstly, given the finding that out-of-pocket payments are associated with pronounced adverse effects on the already unbalanced income distribution, an urgent need is there to identify innovative financing mechanisms capable to reduce the financial burden of health care expenditure and to limit the existing strong regressivity in the system. Among the potential policy measures is a reduction in the real cost of health care (e.g., medications and health professionals' tariffs). Indeed, in the current context, the cost of medications and health professionals' tariffs – especially those charged by specialists – absorb the biggest share of health care expenditures (PCBS, 2004).

Secondly, although the above mentioned policy shall enhance vertical equity in the system, it would not *per se* be able to significantly reduce the considerable amount of differential treatment (horizontal inequality and reranking effect), which was found to be the most important factor behind the adverse effect of health care payments on households' incomes. It is well-established that the bulk of this differential treatment is largely driven by the stochastic nature of illness and the size of direct payment involved. Therefore, a far bigger reduction would only be possible through a shifting from “*ex-post*” payments to “*ex-ante*” mode of financing. This might be accomplished by introducing properly designed community-based insurance arrangements.

Although proven to be promising, the current structure of the Governmental Health Insurance scheme needs to be reconsidered to further enhance its positive intrinsic capacities. Indeed, this public insurance scheme, which includes various enrolment arrangements, appears to have a considerable potential vertical effect when horizontal inequality and reranking effect are eliminated or reduced. Given that the sizable amount of such differential treatment is associated with the current insurance arrangements, it seems vital to reconsider the structure of insurance contributions that are associated with various enrolment arrangements. This also requires reconsidering the unplanned extension of insurance coverage through the so-called “*Al-Aqsa Intifada insurance*”. In addition, despite the fact that private health insurance schemes are far limited in the OPT and cater for a very small proportion of the population, it was found that such financing modality could still play a positive role in protecting households against the adverse effects of *ex-post* payments, should enrolment's premiums be suitably linked to households' various abilities-to-pay (Pauly et al., 2006).

Finally, although this paper attempted to shed the light on the sources of inequality associated with the current health care financing arrangements in the OPT, a number of issues still call for further research. Among these are the determinants of health care seeking behaviour in the OPT, not only the classical socio-economic factors but also the political realities (i.e. locality types and regions), which might affect the horizontal inequality and reranking. This is germane to the Palestinian situation where access to health care is highly influenced by Israeli measures of security (e.g., Separation Wall, checkpoints, etc). Another interesting area of research would be to examine the value-added of extending health insurance coverage and the possibility of making insurance available for poor people without increasing inequalities.





**ESSAY III: MEASURING AND DECOMPOSING INEQUALITY IN HEALTH CARE  
DELIVERY: A MICROSIMULATION APPROACH <sup>52</sup>**

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<sup>52</sup> This chapter is essentially based on the following paper: Abu-Zaineh, M., Mataria, A., Ventelou B., Luchini, S., and Moatti, JP. Equity in Health Care Delivery in Palestine: A Micro-simulation Approach (submitted). The paper was presented at: The 13<sup>th</sup> Annual Conference of Economic Research Forum (ERF), December 26<sup>th</sup> & 28<sup>th</sup>, 2007, Cairo, Egypt; and the 7<sup>th</sup> European Conference on Health Economics, 23-26 July, 2008, Faculty of Economics, University of Rome, Rome, Italy.



**SUMMARY**

Income-related inequalities and horizontal inequity in health care utilisation have recently been widely studied using *linear additive models of decomposition*. This essay applies new methods of decomposition “*by factors*”, based on the *microsimulation technique*. Besides avoiding the “*unavoidable price*” of linearity restriction that is imposed by the “*standard*” method, the *microsimulation-based decomposition* enables ducking the potentially contentious role of heterogeneity in *genuine individuals’ behaviour* in the analysis of inequality, as well as the institutional features and practices driving inequity. The decomposition method is applied to *two-stage utilisation* (the probability of usage and the conditional usage – using the combined *Logit–zero truncated Negbin models*) for three levels of health care delivery: primary, secondary and tertiary, particular to the specific context of the two occupied territories of Palestine (OPT): the West Bank (WB) and Gaza Strip (GS). The data are taken from the first national survey on health care expenditure and utilisation (HCEU-2004), which provide detailed information about utilisation and morbidity. Our empirical results suggest that the worse-off *do* have disproportionately greater need for all levels of care, but with the exception of primary-level, access to – and utilisation of – all levels of care appear to be significantly higher for the better-off. The *incremental* examination through microsimulation has made it possible to separately identify the relative contributions of factors driving such pro-rich patterns. While much of this *inequity* appear to be caused by omnipresent socio-economic inequalities (by income), detailed analysis attributes a non-trivial part (*circa* 30% of the observed *horizontal inequities*) to *heterogeneity in behaviour* with respect to the rank of individuals in the income distribution. The latter finding, which cannot be explicitly elucidated by the *standard* decomposition, corroborates earlier evidence on the importance of considering such axis in order to provide a more convincing decomposition, and for judging the equity performance of health system. Several *policy-relevant factors*, which have to be taken into account for any future attempt aiming at limiting the existing inequalities in the current health care delivery systems of the OPT, are discussed and identified.

**JEL Classification:** C15; C34; D63. I11; I19

**Keywords:** Health Care Utilisation; Two-Part Model; Microsimulation; Horizontal Equity.



## RÉSUMÉ

Les inégalités socio-économiques en matière d'accès aux soins ont récemment fait l'objet de nombreuses études, dans le cadre de *modèles de décomposition linéaires additifs*. Cet article tente d'appliquer une nouvelle méthode de décomposition « *par facteurs* » basée sur une technique de microsimulation. À l'inverse de la méthode standard, la méthodologie appliquée ici permet de révéler le rôle de l'hétérogénéité des comportements des groupes socio-économiques, de même que l'impact des caractéristiques institutionnelles du système de santé sur les inégalités observées dans le recours aux soins. Ce modèle de décomposition est appliqué à trois niveaux de prise en charge médicale -primaire, secondaire et tertiaire – dans le contexte de deux territoires palestiniens occupés : la Cisjordanie et la bande de Gaza. La probabilité de recours aux soins et la consommation conditionnelle ont été estimées pour chacun de ces trois niveaux à partir d'un modèle en deux équations indépendantes : l'une avec une spécification Logit et l'autre avec une spécification GLM. Les données utilisées sont issues de la première enquête palestinienne nationale sur les dépenses de santé des ménages, qui fournit des informations détaillées sur les pathologies et la consommation de soins. Nos résultats indiquent que les besoins de prise en charge médicale sont concentrés parmi les individus les plus démunis. Or, l'accès comme le recours aux soins sont significativement plus élevés pour les individus les plus privilégiés, et ce pour tous les niveaux de prise en charge considérés, à l'exception de la prise en charge primaire. La mise en œuvre de l'approche incrémentale par microsimulation a rendu possible l'identification des facteurs contextuels expliquant les inégalités observées en matière de recours aux soins. Alors qu'une grande partie de ces inégalités peut s'expliquer par l'omniprésence des inégalités socio-économiques (ex. : le revenu), l'analyse détaillée attribue une part non négligeable de l'inéquité horizontale (environ 30% de l'indice) à l'hétérogénéité des comportements. Ces résultats, que l'on ne pourrait obtenir en appliquant la décomposition standard, viennent confirmer l'intérêt de considérer une telle hétérogénéité pour expliquer les inégalités observées et juger du caractère égalitaire du système de santé. Cela suggère que les politiques qui se donnent pour objet de réduire les inégalités de santé devraient viser à limiter à la fois les inégalités socio-économiques (en matière de revenu) dans l'accès aux soins et l'hétérogénéité des comportements qui en sont à l'origine.

**Mots-clé** : Utilisation des soins, Modèles en deux parties, Microsimulation, Équité Horizontale.



### 3.1 INTRODUCTION

Although huge literature has been accumulated over the last two decades to assess inequalities in access to – and utilisation of – health care services in the context of developed countries (Wagstaff et al., 1991; Waters, 2000; van Doorslaer et al., 1992; van Doorslaer et al., 2000; van Doorslaer and Masseria, 2004; Wilkinson and Pickett, 2006; Wagstaff et al., 2003), little efforts were devoted to assess inequalities in health care delivery in the context of developing countries. In addition, the very few studies (e.g., Cissé et al., 2007; Pannarunthai and Mills, 1997; Baker and Gaag, 1993) that attempted to incorporate this endeavour have resorted to a “classical” approach that serves, at its best, to provide aggregate “descriptive” results on the degree of inequalities prevailing in a given distribution, with no attempts being made to unveil the latent factors that may possibly contribute to these inequalities. Furthermore, while the available literature offers a variety of tools and methods for assessing inequalities in health care delivery (e.g., Gravelle, 2003; Waters, 2000; van Doorslaer et al., 1992; Wagstaff and van Doorslaer, 2000; van Doorslaer et al., 2006; Huber, 2006), the variability of available approaches, the inconsistency of presented results, and the controversial policy debates characterising this field of research, all call for more attention to identifying and endorsing the appropriate approach for studying inequalities in health care delivery.

Undeniably, the variability in the approaches used may be due, in large part, to the diverse dimensions chosen to appraise inequalities, the specific indicators used to apprehend these dimensions, and the different theories of “distributive and social justice” underpinning the adopted approach (Le Grand, 1991; Macinko and Starfield, 2002; Gerdtham et al., 1999; Culyer and Wagstaff, 1993; Mooney, 1987; Gauthier, 1983). Indeed, considerable disagreement exists among economists (cf. Wagstaff and van Doorslaer, 2000, for a review) on how inequalities in health care utilisation can be identified, measured and valued, something which resulted in an ample amount of theoretical and empirical literature – originated for most part from developed countries – however, with few consistent findings. These findings suggest possible pathways by which inequality in health care use might be generated and perpetuated (Macinko and Starfield, 2002). The extent of inequalities in access to – and utilisation of – health care services has shown to differ according to the measurement of need (e.g., subjective self-reported *vs.* objective indicators of ill-health), the types of health care services (e.g., medical specialists *vs.* general practitioners), and due to the inclusion or not of potential confounding factors related to demographic and socioeconomic characteristics of users (Shi and Starfield, 2000; van Doorslaer et al., 2006; van Doorslaer et al., 2000; Gakidou et al., 2000). Yet, in spite of such divergence, recent empirical studies conducted in the context of developed countries continue to demonstrate persisting inequalities in health care delivery (van Doorslaer et al., 2004). Moreover, such inequalities have been recorded in several European countries, where the majority of health care services are channelled on the basis of some “*egalitarian*” principles that entail health services allocation based on needs rather than abilities-to-pay (van Doorslaer and Wagstaff, 1993). This finding was frequently attributed to some contextual characteristics and systemic features (Navarro, 1999; Gravelle and Sutton, 2001; van Doorslaer and Masseria, 2004).

It is, on the other hand, true that even if all obstacles (financial and non-financial) to access health care were completely removed, there would be no guarantee for inequalities in health and health care use to be completely removed; i.e., achieving perfectly equal distribution of health care

(McIntyre and Mooney, 2007; Bole and Bondeson, 1991). This is because another reason behind the omnipresent inequalities can be related to alternate individual behaviour vis-à-vis health and health care that might result from disparate genuine preferences and choices (Le Grand, 1987). Therefore, defining and operationalising the notion of *Horizontal Equity* (**HE**), i.e., *equal treatment for equals*<sup>53</sup>, without taking into account potential confounding factors related to the individual's own characteristics would result in inconsistent findings (Schokkaert and van de Voorde, 2004; Gravelle, 2003)<sup>54</sup>. Indeed, those individual characteristics are known to influence the preferences of individuals, and hence, are reflected in their behaviour in demanding health care; over and above the additional role played by the intrinsic characteristic of the health care system in influencing individual demand. Consequently, observed behaviours can be the direct result of genuine individual preferences rather than an inequality feature embedded in the system. The latter two factors as related to the demand and supply sides of the health care market were usually not taken into account in the current literature on assessing horizontal inequity in health care demand.

Ideally, one would like to study equity in health care use by taking into account individual preferences that are explained by *utilitarian* economic theory (Stiglitz, 1982), or through placing the full empirical analysis in the context of a social welfare maximisation models (Gravelle et al., 2006)<sup>55</sup>, however, without opposing distributional *egalitarian* objectives (Culyer, 1980; Kaplow and Shavell, 2002). The equity literature contains, at least on the face of it, some useful pointers in this respect (Culyer et al., 1992; Wagstaff and van Doorslaer, 2000). One explanation commonly put forward is that, unlike efficiency, equity is a *value-laden* concept, and therefore, not easily amenable to positive economic analysis (Le Grand, 1984; Le Grand, 1987). In effect, the difficulty of drawing an explicit link between *positive* analysis of the distribution of health care and equity as a *normative* objective has frequently been translated into a conceptual and measurement system for *Horizontal Inequity* (**HI**), whereby *individual preferences* are assumed *not* to influence the use of health care. As stated by Culyer (1980): "...the source of value for making judgment about equity lies outside, or is extrinsic to, preferences" [p. 71]. Accordingly, equity in health care delivery is interpreted independently of individual utility and refers distinctly to "*normative principles*" of "*what ought to be*": health care *ought to be* allocated according to need, and "*what an individual ought to have as of right*": equal access to health care

<sup>53</sup> In this context "equals" is defined in terms of "need" exactly, prompting the elaboration of the distinction between *equality* and *equity*. This implies that the latter has to be defined and measured in appropriate way, since that is one of the most important factors affecting the measure of *HE*. There is, however, no consensus with respect to the notion of "need", which remains a rather "elusive" concept (For a discussion cf. Sen, 1992; Culyer, 1995).

<sup>54</sup> An interesting illustration can be found in the literature of risk adjustment (e.g., Schokkaert and Van de Voorde, 2004). In the latter study, the authors have shown, based on the theory of fair compensation, that non-inclusion of "responsibility variables" (which do not need to be compensated for in the capitation formula) in the equation used for estimating the effect of "compensation variables" (which do need to be compensated for) may give rise to the "omitted variable bias" for the determination of the 'appropriate' capitations (or fair compensations). They advocate the inclusion of "omitted variables" in the estimated equation and to "neutralise" their impact by setting these variables equal to their means in the need-prediction equation. Their main argument was that "the unavailability of certain variables cannot be used as an excuse for not including what is available".

<sup>55</sup> A contribution in placing the full empirical analysis of equity in health care in the context of a social welfare maximisation models was recently attempted by Gravelle, Morris, and Sutton (2006). This study attempts to make explicit the links between normative and positive analysis of the distribution of health care; a point that has also been emphasised by O'Donnell et al., (2007).



for a given health status<sup>56</sup>. This implies that an equitable health care distribution is the one that would reflect exactly the health care needs across different groups of population (Wagstaff and van Doorslaer, 2000). The latter, so conceived, should serve towards reducing *inequalities of health*, though *irrespective of individuals' preferences* vis-à-vis health and/or health care consumption (Mooney, 1987; McIntyre and Mooney, 2007).

The methods developed by ECuity group (cf. e.g., Wagstaff et al., 2003; van Doorslaer et al., 1992; van Doorslaer et al., 2000; van Doorslaer and Masseria, 2004), and later extensively used in inequality literature (e.g., Hosseinpoor et al., 2006; van Doorslaer et al., 2006; Lu et al., 2007), are based on the concept of Concentration Curve (CC) and the associated Concentration Index (CI). The proposed index of inequality is thus the one that measures inequality in the distribution of health variable relative to individual incomes – a measure of socio-economic status (SES). This index has appropriate properties and can be decomposed in a linear way (Clarke et al., 2003; Koolman and van Doorslaer, 2004). Two aggregate (summary) measures of HI are proposed: the  $HI_{WVP}$  index (Wagstaff et al., 1991) and the  $HI_{WV}$  index (Wagstaff and van Doorslaer, 2000), which utilise similar conceptual foundation (standardisation through regression technique), however, with the latter index being advocated on the grounds that the use of direct standardisation, upon which the former is constructed, requires the use of grouped data, which loses precision if individual data have to be grouped<sup>57</sup>. More recently, an elaborated decomposition method was advanced to disentangle inequality of health, as captured by the CI, using a linear arrangement of factor components (Wagstaff et al., 2003)<sup>58</sup>. The proposed decomposition allows HI to be both measured and explained in a convenient way. The method involves disentangling the overall inequality into a set of CI's that can be associated with a selected number of explanatory variables. The above is approximated through an explanatory model specified as a *single-linear equation* model that is estimated using a standard OLS regression technique. The procedure culminates in a decomposition of observed inequality into two main components, reflecting the part of inequality attributed to differences in need for health care, and hence, deemed “*justifiable*”, and the part due to ‘other’ non-need characteristics (or

<sup>56</sup> Once again, a conventional interpretation of HI in terms of “*equality of access*” implies that the latter has to be measured in an appropriate way. However, *access to treatment* is not easily observable. Furthermore, no consensus on what the term “*access to treatment*” means. For a discussion cf. sub-section 0.3.5.2 of the General Introduction.

<sup>57</sup>  $HI_{WVP}$  is the index proposed by Wagstaff, van Doorslaer and Paci (1991) based on the (direct) standardisation method. This method involves estimating a health regression equation for each SES group (g). Estimates of group-specific coefficients; sample means of the confounding variables, and group-specific means of the non-confounding variables are then used to generate the directly standardised estimates of the health variable. More recently, Wagstaff and van Doorslaer (2000) advocated the  $HI_{WV}$  based on the (indirect) standardisation method. Accordingly, a measure of need for health care is obtained for each individual as the predicted use of a regression on need indicators. This implies that in order to statistically equalise needs for the groups or individuals to be compared, one is effectively using the *average* relationship between need and treatment for the population as a whole as a norm and HI is measured by systematic deviations from this norm by income level. Wagstaff and van Doorslaer (2000) have compared the two indices; the general finding is that both are conceptually similar and provide comparable results, though the former is advocated as it is computationally easier and does not rely on the number of groups. By contrast, Gravelle (2003) shows that direct standardisation can be performed on individual data, and that there are theoretical arguments for preferring the direct over the indirect standardisation method.

<sup>58</sup> The Decomposition “by factors” is initially proposed by Wagstaff, van Doorslaer and Watanabe (2003) for analysing *health inequality* and *not* health care *use-inequality*. However, the method is presented as being appropriate for the decomposition of inequality of any health variable (For a recent application, cf. Lu et al., 2007).

policy-relevant variables), and hence, deemed “*unjustifiable*.”<sup>59</sup>

Although more illuminating than the aggregate (summary) measures; e.g.,  $\mathbf{HI}_{WV}$ , the decomposition method – as currently employed – may reveal incomplete and suffer from several limitations. Firstly, the *linear* character of decomposition is far from being consistent with the peculiar nature of health care use data, commonly in the form of number of visits (integer or discrete variable with skewed distribution – both implies intrinsically the use of non-linear models. Indeed, it has been shown (van Doorslaer et al., 2004) that while it is practically feasible to use non-linear specifications, the nature of proposed decomposition necessitates a re-linearisation of the model through approximation, which, in turn, introduce a bias due to approximation errors. Secondly, complication may also arise because of the *single-equation model* upon which the proposed decomposition is advanced. The probability and count interpretations of data on health care use may better be specified by a model of two-equation (e.g. a TPM). Indeed, while the latter specification is shown (Green, 2000; Jones, 2000) to be more appropriate and enables estimating the total (unconditional) amount of use within a *single-model*, the above decomposition can only be performed in terms of *single-equation of the model*; i.e., by decomposing separately the probability of use (estimated by *probit* or *logit*), the conditional use (estimated by *OLS* or *GLM*) and the unconditional amount of use (estimated by *zero-inflated* or *generalized negbin* models). Such a practice may raise serious concerns about the robustness of the decomposable results. Given the variant modelling used in each step of analysis and the re-linearisation imposed for each of which, there would be no guarantee of the coherence of the results, nor would it be possible to ensure that the fraction of *inequity* due to a certain factor can be partitioned into a part due to participation behaviours and another due to conditional consumption behaviours (Huber, 2006). Thirdly, the proposed decomposition involves estimates over the entire population, calling for potential “*masking effect*”, where the behaviour of some classes of the population would cover that of others; i.e., resulting in aggregate results that might not reflect the reality associated with certain sub-groups. In effect, the decomposition of inequality into its *justifiable* and *unjustifiable* parts is interpreted in terms of *average behaviour*; i.e., the use-need mean relation as observed over the entire sample. The inter-personal variations in use are thus assumed to derive solely from variations in its (non-need) determinants, where the model implicitly presumes, given (non-need) estimates, the amount of care that ought to be allocated on average for that need; provided that average behaviour being regarded as if it was a norm (van Doorslaer et al., 2006)<sup>60</sup>.

An appealing method of decomposition is the one based on microsimulation technique (e.g., Dormont et al., 2006; Gupta and Kapur, 2000; Harding, 1996; Huber, 2006)<sup>61</sup>. While it offers a

<sup>59</sup>There is, of course, a considerable debate on the meaning of need and the value judgment involved in distinguishing between need and non-need variables (e.g., Culyer, 1995; Gravelle et al 2006). In the current paper, we follow the standard approach in the empirical literature, and define need variables as those ought to affect the use of health care (e.g., morbidity indicators), whereas non-need variables are those ought not to affect current health care use (e.g., location of residence).

<sup>60</sup> The norm-based assumption is embedded in the derivation of  $\mathbf{HI}_{WV}$  measure, where the comparison is between the distributions of an actual (observed) use and (a statistically) need-adjusted use by income. The average relationship between them refers to the “norm” of what treatment is needed and of which any systematic deviations is considered as inequitable.

<sup>61</sup> For a detailed description of the history and developments of microsimulation in economic analysis, cf. Atkinson & Sutherland (1988); Citro & Hanushek (1991), and Gupta & Kapur (2000).

way out to overcome the above shortcomings of the *standard* methods, such approach proves to provide several conceptual and practical advantages over the commonly used ECUity group methods. First, it allows (the unconditional) use of an appropriate regression model specification of health care utilisation. Therefore, it avoids the linearity restriction or the “*inevitable price... for the linear approximations*” (O’Donnell et al., 2007) that is imposed by the standard decomposition method. In fact, the latter was essentially developed for a single-linear additive model (Wagstaff et al., 2003), which is not directly amenable to an analysis of health care utilisation. However, despite being conceptually unsatisfactory, linear specification based on OLS technique was advocated (van Doorslaer and Masseria, 2004), and implemented (e.g., van Doorslaer et al., 2006; Lu et al., 2007) for the measurement of inequality in health care utilisation, on the grounds that these measures are not, particularly, sensitive to linear OLS specifications. Otherwise, linear approximations to the non-linear models, using the “marginal effects evaluated at the means”, was proposed (van Doorslaer et al., 2004) as a way to deal with the inherent non-linearity problem in health care utilisation. Though this solution has the advantage of using appropriate specifications (such as TPM combining a logit and a truncated negbin) the proposed decomposition, which remains only an “*approximation*”, with a bias due to approximation error, was computed separately for each single equation of the model – i.e., by decomposing separately the **CI** of participation, conditional consumption, and the unconditional consumption. By contrast, the microsimulation technique applied in the present study, while allowing the use of TPM specifications, the relative importance of each explanatory factors as per participation and conditional consumption are disentangled within a single-model explaining the total consumption of health care. It, therefore, avoids the limitation to “*single-equation*” decomposition. Besides convenience, the advantage of this is that it enables to identify the contribution of each explanatory factor to the overall inequality in utilisation, while ensuring that the fraction of inequality due to a certain factor can be partitioned into a part due to participation behaviour and a part due to conditional consumption behaviour.

Secondly, the microsimulation-based decomposition allows for estimating separately a model of health care utilisation for each socio-economic status (SES) groups (e.g., income quintile). As result, it enables for a more transparent and convincing decomposition, whereby the relative contributions of heterogeneity in behaviours – as captured by differences in parameters across SES groups – to the observed inequality are revealed. Indeed, differentials in behaviour by income quintiles was early shown (Oaxaca, 1973) to be of inherent interest, as they enable to duck the potentially contentious role of genuine individuals’ preferences, which may indeed be related to the rank of individuals in the income distribution. In fact, while the measurement of **HI** in health care utilisation was essentially examined and statistically tested by comparing the behaviours of SES groups – i.e., differences in the regression coefficients (cf. van Doorslaer et al., 1993)<sup>62</sup>, such a feature was absent in the standard decomposition method where the explanatory model was only estimated for the entire sample population, and thus, individuals’ preferences were neglected. By contrast, the adapted microsimulation-based horizontal inequity (**HI**) index presented here depends on both the distribution of variables ( $z_k$ ) by income and the heterogeneity in parameters ( $\beta_k$ ) with respect to income (or SES). This method provides, therefore, a way of detecting *patients’ preferences* as well as *providers’ behaviour*, which is not

<sup>62</sup> For example, statistical inference has focused on testing the significance of differences in the regression coefficients across income groups, and used to compute the (directly) standardised health care values underlying the **HI<sub>WVP</sub>** index (van Doorslaer, Wagstaff, A., Calonge, S. et al 1992).

possible with the standard decomposition<sup>63</sup>.

While microsimulation method has been recently deployed and successfully applied for the decomposition of health expenditure growth (e.g., Dormont et al., 2006), they have hitherto not been used to fully disentangle the sources of inequality in the health care delivery. To our knowledge, only one similar study (Huber, 2006) has been done earlier to examine inequalities in the context of French health care system. This essay attempts, therefore, to apply the above methodological advances and to illustrate how these developments can significantly help clarifying debates about health care policies in the context of developing countries, using the particular case of the Occupied Palestinian Territory (OPT). First, we use data from a recent household health use and expenditure survey (the HCEU-2004). The survey, which was carried out by the Palestinian Central Bureau of Statistics (PCBS), covered a national representative sample of Palestinian households residing in the West Bank (WB) and Gaza Strip (GS), and provide detailed information on households' incomes and expenditures, individuals' health care seeking behaviours and morbidity patterns, insurance coverage, and other relevant socioeconomic characteristics. Consequently, the survey offers a unique opportunity to assess, for the first time, inequity features of health care delivery system proper to the OPT. Second, we present separately disaggregated results for three levels of health care: primary, secondary and tertiary care. This allows us to examine whether patterns of inequality differ across the levels of health care. Finally, we perform statistical inference based on bootstrapping (BTS) methods. The latter provides the statistical basis for testing for inequality dominance between concentration curves in order to reduce the risk of biased interpretations due to sample structures. The chapter is organised as follows: Section 2 reviews the main institutional and contextual features of health care delivery in the OPT, which are of relevance to understand the functioning and the characteristics of the specific health care system under consideration. Section 3 sets out the methods used to measure and decompose inequality. This is followed by describing the data requirements, the variables used, in addition to the model choice and estimation procedures (Section 4). Section 5 presents the results of the analysis. The penultimate section discusses the results and the value-added of methodological developments, as well as study limitations (Section 6). We end with conclusions and policy recommendations in the last section (Section 7).

## 3.2 HEALTH CARE DELIVERY IN THE OPT: AN OVERVIEW

### 3.2.1 Structure and Distribution

Four health care providers are currently responsible for the provision of health services for the population residing in the OPT: the public sector (the Palestinian MoH), the UNRWA, a group of Palestinian not-for-profit organisations (PNGOs), and a rapidly developing private for-profit sector (PNA-MoH, 2008). Despite the variable nature of the four health care providers, a certain

<sup>63</sup> Indeed, in order to implement the *standard* decomposition, the estimation of model is made on the whole sample: parameters ( $\delta_k$ ) relative to the need variables ( $m_k$ ) reflect the mean relationship between need and health care, observed in the whole sample. Any deviation from this mean relationship is taken into account by the variables ( $z_k$ ) and their coefficients ( $\gamma_k$ ). One cannot, therefore, distinguish different  $\delta_k$  by income level, and presumably different behaviours according to income level. Therefore, the “standard” decomposition takes only into account the distribution of explanatory variables by income, and does not take into account any potential heterogeneity in the coefficients with respect to income. For any indicator of health care need ( $z_k$ ), the estimated coefficients ( $\delta_k$ ) represents what amount of health care the society as a whole allocates on average for that need. In the works of the ECuity group, this average behaviour is taken as a *norm*, whose relevance is yet a topic of discussion (Huber, 2006).

degree of “*complementarity*” has been identified (Hamdan et al., 2003). For instance, following the political predicament and economic hardships resulting from military closures, bantustanisation, and impoverishment, there have been substantial patient transfers from one provider to another (Mataria et al., 2008). As elsewhere, health care provision in the OPT follows a pyramidal structure, with primary care at the bottom level, secondary and tertiary care at the middle and top levels, respectively. Each of the four providers operates its own facilities at almost all the three levels. Primary-level represents the first level of contact for the individuals, family and community with the health care system (WHO/UNICEF, 1978), and refers to basic health care that is provided by physicians (general practioners – GP) trained in family practice, internal medicines, or pediatrics, or by nonphysicians such as nurses. Secondary-level refers to care provided by speciality providers (e.g., urologists and cardiologists) who generally do not have the first contact with patients. These providers usually see patients after referral from a primary or community health professional. Tertiary-level refers to care provided by highly specialised providers (e.g., neurologists, cardiac surgeons, and intensive care units) in facilities equipped for special investigation and treatment (Schoenbaum et al., 2005).

The Primary health care (PHC) was considered as the backbone of the Palestinian health care sector, and a strategy towards the achievement of affordable and accessible health care for the entire population (NHP, 1994; NSHP, 1999). In the context of the OPT, PHC services comprise public health activities<sup>64</sup>, reproductive health and front-line diagnosis and treatment. These are provided by a pool of PHC centers and a number of sole and group medical clinics (MOH-MHIS, 2002). Following the establishment of the Palestinian MoH, the number of PHC centers in the OPT has increased from 454 in 1994 to 654 in 2005 (+44.1%). Today, the OPT count about 1.9 PHC center per 10,000 individuals (MOH-MHIS, 2002). Table 3.1 summarises the distribution of PHC centers between the WB and GS, as stratified by the type of provider. On the other hand, secondary and tertiary care services are provided through a limited number of general and specialised hospitals, mainly, located in the urban areas. There is clear shortage in tertiary health care services, with those available being concentrated in *inaccessible* Jerusalem areas, due to Israeli restrictions prohibiting Palestinian from accessing the holy city (HPU, 2008). Hospitals distribution by region and type of provider are also summarised in Table 3.1. Beside these three levels of health care provision, a number of general and specialised medical and paramedical practices, pharmacies, and diagnostic units – e.g., medical laboratories, radiology and imaging centers – are also available and distributed across the WB and GS. The role played by each of the four health care providers is summarised below.

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<sup>64</sup> Immunisation, childcare and health education are mainly provided by the MoH and UNRWA free of charge.

**Table 3.1: Distribution of Health Care Services by Regions and Providers, 2005**

	MoH		UNRWA		NGOs		Private		Total
	WB	GS	WB	GS	WB	GS	WB	GS	
<b>Primary Care Centers*</b>	360	56	35	18	130	55	--	--	654
<b>Secondary and Tertiary Hospitals**</b>	12	10	1	0	20	10	21	2	76
<b>Hospital beds per provider**</b>	1,316	1,499	63	0	1,196	485	432	34	5,025
<b>Market share based on number of visits***</b>	46.1%		19.7%		12.8%		21.4%		100%
<b>Rate of utilisation as percentage of total patients ****</b>	47.0%		24.6%		11.7%		16.7%		100%

\*Ministry of Health. Health Status in Palestine, 2005 Annual report, Palestine, October 2006 (p.14)

\*\* Ministry of Health. Health Status in Palestine, 2005 Annual report, Palestine, October 2006 (p.34, 38)

\*\*\* PCBS. Health Care Providers and Beneficiaries Survey-2005, Main Findings, June 2006 (p.57)

\*\*\*\* World Bank, BCRD. The Role and Performance of Palestinian NGOs in Health, Education & Agriculture, December 2006 (p.46)

-- Reliable data about the private for-profit sector is lacking, however, it is estimated that there are about 370 self-employed GP clinics in the WB, and about 80 in the GS (MOH, 1999)

### 3.2.1.1 The *Public* Sector

The public sector comprises the MoH and the Military Medical Services (a network of basic health services reserved for employees of the Palestinian security services) (Hamdan et al., 2003). Currently, the MoH is the main provider of health care for the Palestinian population in the WB and GS (MOH-MHIS, 2002). It owns and manages the majority of PHC centers, with a total of 416 centers, representing about 63.6 percent of all PHC centers scattered all over the WB and GS (Tables 3.1). In 2004, about 46.1 percent of total health care visits took place at Ministry of Health facilities, 21.4 percent in the private for-profit sector, with the remaining 32.5 percent shared between UNRWA and non-governmental organizations (PNGOs) in a ratio of 60:40, respectively (PCBS, 2006). Lately, the share of the MoH in overall service delivery has risen significantly, mainly due to the extension of GHI coverage after the outbreak of the second Intifada (end 2000), and the accompanying massive impoverishment of the population (HPU, 2008).

Of the 76 hospitals in the OPT (1.3 beds per 1000 capita: 1.2 in the WB and 1.4 in GS), the MoH operates 22 hospitals with a total of 2,815 beds, representing 56.03 percent of total hospital beds. Most of MoH hospitals are over-utilised, with average occupancy rate of 80 percent. Consequently, the MoH hospitals frequently have to reject cases due to the “*full occupancy*” (Mataria et al., 2008). The average number of patients admitted to hospitals per year is estimated by 11 percent of the total population and this is a high percentage for a young population of which the percentage of the population over 65 years old is around 3 percent (PCBS, 2006). The high rate of admissions to hospitals and short length of stay may indicate either unnecessary admissions or early discharge (Mataria et al., 2008). It is important to indicate that the MoH does not operate any health services in the Palestinian East Jerusalem, contrary to other health care providers, since Israel considers it as part of its State, taking control of health care in that area. On the other hand, the MoH is outsourcing specific tertiary health care and advanced diagnostic services with local and overseas providers. The total number of referred cases for hospitalisation (57.5% of the cases) and consultation (42.5% of the cases) amounted up to 10,764 cases in 2001

(MOH-MHIS, 2002). Patients are mainly referred to other local providers, including PNGOs and the private sector (61.6% of the cases), and to Egypt, Jordan and Israel with 17.6%, 12.3% and 8.5% of the cases, respectively (MOH-MHIS, 2002).

### 3.2.1.2 The United Nations Relief and Works Agency (UNRWA)

UNRWA provides a variety of social services of education, health care, and social relief and support to registered Palestinian refugees in the WB and GS (including East Jerusalem), as well as, in the neighbouring Arab countries (UNRWA, 1995). The existence of the organisation depends on reaching a solution to the Palestinian refugees' problem. Today, UNRWA counts 4.1 million of registered Palestinian refugees of which 1.6 million living in the WB and GS (about 45 percent of the OPT population). Consequently, almost half the OPT population should be, in principle, entitled to UNRWA services. However, only a segment of the registered refugees receives health services at UNRWA facilities, while the rest seek health care elsewhere (Hamdan et al., 2003). UNRWA primarily focuses on basic health services, such as disease prevention and control, primary care, family health, health education, physiotherapy and psychological support and environmental health (Schoenbaum et al., 2005). UNRWA's health services are provided through a network of PHC centers throughout the WB and GS; 35 centers in the WB and 18 in GS, representing about 8.1 percent of all PHC centers in the OPT (Table 3.1). In addition, UNRWA provides some secondary care services – for which patients must pay 10-25 percent of the cost – through a limited number of contractual agreements for hospital care with NGOs providers, besides its hospital in the WB (63 beds).

### 3.2.1.3 The Private *not-for-profit* Sector (NGOs)

The private not-for-profit sector is represented by a network of Palestinian Non-Governmental and private voluntary organisations (PNGOs). PNGOs had a central role in providing health care before the creation of the Palestinian MoH in 1994. Currently, there are about 49 non-governmental not-for-profit health societies providing health services for the Palestinian population (Hamdan et al., 2003). PNGOs contribute to the provision of all levels of health care, and have a tendency to provide PHC services to communities under-served by the other agencies, especially in rural areas of the WB. The number of PHC centers run by PNGOs fell from 242 in 1992 to 177 in 1994 (Barghouthi and Lennox, 1997), and from 214 in 2004 to 185 in 2005, which represent about 28.3% of the total PHC centers in the OPT (Table 4.1). While the decline in recent years was attributed to a new classification system (MoH-PHIC, 2006), the early decline following Oslo accords was mainly due to abrupt changes in donors' aid policies and the PNA budget allocation strategy (Barghouthi and Lennox, 1997). It is important to note that this decline was more than made up for by the increase in the number of the MoH's PHC centres, where about 170 new PHC facilities were opened (mostly in the WB) in under 13 years (HPU, 2008). The average population per facility has, however, grown from 5,294 persons per facility in 2000 up to 5,752 persons per facility in 2006 (HPU, 2008). It is noteworthy that some facilities' services have been integrated and coordinated between the MoH and some non-governmental organisations, where joint clinics are now available (HPU, 2008). In addition to PHC centers, the non-governmental sector operates some 1,681 beds in 30 hospitals (representing 33.5% of the total beds). Compared with those run by the MoH, the non-governmental hospitals are found under-utilised, with substantial part of their working load being cases referred by the MoH (Mataria et al., 2008).

### 3.2.1.4 The Private *for-profit* Sector

A wide range of private practices including those of self-employed physicians and dentists, hospitals, diagnostic centers, and pharmacies represent “the for-profit private” health care sector. The private sector has expanded rapidly in the past few years, with phenomena such as group practices and private health insurance schemes beginning to develop. However, the extent to which its practices are monitored and regulated, as well as, the implications of its rapid growth for the public sector remain unclear (Giacaman et al., 2003). A comprehensive system of adequate and reliable data about the private for-profit health sector is lacking. Table 3.2 summarises some of the available figures on the different kinds of these practices. A prominent aspect of the private for-profit services is their concentration in the urban areas of the WB.

**Table 3.2: Private for-profit Health Practices by Type of Services and Region, 2005\***

Type of Services	Region		OPT	
	WB (%) **	GS (%) **	#	%
General Clinics	15.0	3.3	372	11.4%
Specialist Clinic	33.2	53.3	1,273	39.3%
Dentist Clinic	34.6	28.1	1,031	31.8%
Medical Labs and Others ***	16.4	14.9	537	13.6%
Specialist Hospital	0.8	0.4	25	0.8%
<b>Total</b>	100	100	3,238	100

\* Source of data: PCBS. Health Care Providers and Beneficiaries Survey-2005, Main Findings, June 2006.

\*\* Figures represent percentage distribution of sampled health institutions.

\*\*\* Include radiology and imaging centers; physiotherapy centers; dental labs; optics centers and midwives.

### 3.2.2 Availability, Accessibility and Quality of Health Care Services: A Portrayal

Availability of, and accessibility to, various types/levels of health care services are key elements in analysing *equity* in health care delivery in a given country (Mooney et al., 1991). *Availability* refers to the extent to which various types of health care services do exist, and if so, whether the distributions of these services throughout the different areas in a country are appropriate, an issue related to the supply side of health care market (Nia and Bansal, 1997). *Accessibility* to health care is concerned with the ability of a population to obtain a specified set of health care services; i.e., the degree to which individuals are able to contact/reach the needed health services (Hamdan et al., 2003). In this context, geographic accessibility, referred to as spatial or physical accessibility, is concerned with the complex relationship which exists between the spatial separation of the population and the supply of health care facilities (Ebener et al., 2005). Therefore, accessibility reflects the appropriateness of the distribution and organisation of health care in a country. It is mainly affected by the way in which health care is delivered (the structure of service, the physical allocation, means of transport, etc), and funded (insurance coverage, ability to pay, etc), as well as by socioeconomic elements (Ebener et al., 2005). A number of recent studies commenting on the delivery of health care in the local context of the OPT raised serious concerns about both issues of availability and accessibility to health services (Heilskov et al., 2006; Mataria et al., 2008; Hamdan et al., 2003; Giacaman et al., 2008). The following sub-section provides a brief review of the concerns raised by these studies.



### 3.2.2.1 Spatial Distribution of- and Physical Accessibility to- Health Care

Overall, the distribution of health care facilities between and within the two Palestinian regions: the WB and GS, was described as inappropriate and inadequate in terms of the number, level and type of services (Hamdan et al., 2003). In fact, the *special-inequalities* in the distribution of health care are, especially, pronounced in the case of secondary and tertiary health care services rather than the primary services, which are almost available throughout different areas. For instance, of the 22 hospitals in GS, 14 are located in Gaza City, with the others located in the remaining 4 areas. Similarly, while the centre of the WB has 20 hospitals, the Northern and Southern areas include 18 and 16 hospitals, respectively (HPU, 2008). The *unequal* distributions of health facilities in favour of the central areas can be better marked in terms of number of beds per capita: while Ramallah district and Gaza City have 1.1 and 2.1 beds per 1000 capita, respectively, Salfet district in the WB and Rafah City in the GS have only 0.2 and 0.5 bed per 1000 capita, respectively (HPU, 2008). Overall, the GS possesses 1.4 beds per 1000 capita whereas the WB has 1.2 beds per capita. This contradicts with the distribution of PHC facilities, where the number of population per PHC facility in the GS is much higher than in the WB: 11,106 versus 4,692 individuals per PHC facility (HPU, 2008).

While the above patterns indicate unequal distribution of secondary and tertiary facilities in favour of the centre areas in both regions, and in favour of the WB in case of PHC facilities, *special-inequalities* can, in fact, matter more – as a factor that contribute to *inequity* in the health sector – in the context where the country's area is rather large and transportation are costly or unavailable (Fortney et al., 2000). Overall, the OPT is a combined area of 6165 km<sup>2</sup>, divided into two geographically distinct territorial regions: the WB (5800 km<sup>2</sup>) and the GS (365 km<sup>2</sup>), separated throughout by areas of Israeli jurisdiction (PASSIA, 2005). For comparison, the total area of the WB and GS represents only one-fifth the area of the French administrative region Provence-Alpes-Côte-d'Azur (PACA), and 2.4 times the area of Luxembourg (Mataria, 2004). In principle, therefore, since the country is rather small and transportation is available, services are within rather easy access. For instance, most of the population, especially in GS, live within a short distance of the health care services. Yet, the problematic issue is the physical accessibility to the available services. Indeed, when considering the current geopolitical realities, the special distribution of health care can be a significant factor, given the imposed discontinuity between the "autonomous" Palestinian agglomerations, which were attributed as a "*mosaic of islands*" (Pourgourides, 1999), and today are further "enclosed" by the "*separation wall*" [See: Box 0.1].

In effect, there is limited physical accessibility to health care due to mobility restrictions imposed by multiple manned and non-manned military checkpoints and the separation wall that prevent patients and medical staff, and sometimes ambulances, travelling from rural to urban localities and between urban centres from accessing needed care (Mataria et al., 2008; Giacaman et al., 2008). A national survey (PCBS, 2004) conducted at the end of 2003 reported that the number of people needing an hour or more to reach the appropriate health facility was increased *tenfold* by Israeli restrictions on travel (4.0% vs. 0.4%). The compromised access to health care has led to the introduction of a network of mobile clinics to cater for the needs of people living in remote and isolated localities, the adaptation of many PHC centres to provide more than basic services, and the increase in the number of referrals for treatment abroad, with a consequent additional cost burden for both the system and the patients (Mataria and Khouri, 2008). Despite that the unavailability and the limited physical accessibility to the needed health care have been recently

documented in several studies (Horton, 2007; Qato, 2004; Miranda, 2004; ICRC, 2007), and in a series of reports prepared by the WHO's mission in the WB and GS (WHO, 2007; WHO, 2008). All showing an emerging lack of medications, medical supplies and functioning equipments, particularly, during 2006 and 2007. For instance, "At the end of July 2007, 77 drugs related to reproductive health care were depleted in GS including those for antenatal care, safe delivery and management of risk factors such as hypertension for pregnant women, and maternal outcomes are likely to be threatened" (WHO, 2007). Besides, the lack of anaesthetic gas needed for surgery in some hospitals (WHO, 2007), a recent WHO report documents the cases of 32 patients who died while between October 2007 and March 2008 due to denied permission to access specialised referral health services from outside the GS (WHO, 2008).

### 3.2.2.2 (In-) Equalities in Quality of Health-Care: *Still Matter?*

In principle, an analysis of equity in health care delivery should take into account not only reported *accessibility* or *quantities* of health care received but also potential differences in *quality* of these services (Fiscella et al., 2000). Indeed, some (van Doorslaer and Masseria, 2004) go so far to argue that: "inequities in quality may be just as relevant health-care or perhaps even more so health-care than inequities in quantity", while others (Jappelli et al., 2004) show that differentials in the quality of health care can have an impact on economic-inequalities and saving behaviours. The quality aspect in the analysis of equity has, however, received relatively little attention. While it seems more relevant to distinguish between services delivered by different agencies (e.g., public vs. private sectors whose services may not be of same quality), the common practice (Wagstaff et al., 1991; van Doorslaer et al., 2004) in the direction of allowing for quality differences in equity has focused on the distinction between general practitioner and specialist.

Some recent health sector reviews conducted in the local context of the OPT (Abed, 2007; World-Bank and BCRD, 2006) indicate that despite various projects addressing quality improvement at the MoH public sector, the quality attributes of its services are generally perceived as inferior, with only two-thirds of users being "very satisfied" or "satisfied" about the quality of services, compared to 93 and 89 percent in the private-for-profit and non-governmental sectors, respectively (World-Bank and BCRD, 2006). Indeed, it has been recently noticed (Abed, 2007; Mataria et al., 2008) that quality issues at the public sector has often been addressed by designing protocols and guidelines without appropriate supervision of compliance. Furthermore, it has been shown (Mataria et al., 2006) that the process of massive impoverishment of the population have directly reduced *financial accessibility* to health care, particularly for the most deprived segments of the Palestinian population, up to the point that *preferences* expressed by individuals toward *quality* improvements of health care have shifted toward immediate fulfilment of the most urgent basic needs. While such pattern seems to reflect Amartya Sen's hypothesis about "adaptive preferences": populations confronted with massive material constraints for survival have difficulty in expressing what their "true preferences" would be if they had more opportunities and capabilities in their daily lives, *quality* aspects should however be addressed in all health systems. Therefore, in the present analysis, an attempt is made to distinguish between services delivered at different health care providers (public, private for-profit and not-for profit).

### 3.3 METHODOLOGY: MEASURING AND DECOMPOSING INEQUALITY IN HEALTH CARE DELIVERY

The method we adopt in this essay to measure and decompose inequality in health care utilisation involves several steps. First, an appropriate explanatory model of health care utilisation (demand) is specified, and estimated for the entire sample population, and for each specific SES group. Regression parameter estimates are, then, used in conjunction with the sample means of the *variables* – for which we want to control for – to simulate various distribution of health care utilisation. Finally, for each simulated distribution, a **CI** is estimated. This allows us to identify the contribution of each factor to the overall degree of inequality observed for the variable of interest. These steps are fully illustrated in the following subsections.

#### 3.3.1 Econometric Technique and Model Specifications

Given the typical features of health care utilisation data such as physician visits – commonly in form of nonnegative *integer* values with a high *skewed* distribution – *nonlinear* econometric specifications that allow modelling the determinants of use/nonuse probability separately from the number of visits are advocated (Jones, 2000). The regression analyses considered in the present essay are based on the so-called “two-part econometric model” (TPM): the first part of which models the determinants of individuals’ decision to seek health care, whereas the second part models the determinants of the amount of health care received, given that a contact has been made (Manning et al., 1981). The appropriate specification of the TPM consists of a *probit* or a *logit* model for the contact/participation decision, which is specified as a *binary choice outcome* [0, 1], and a *GLM* for the frequency of the visits, which is specified as a *truncated positive count* [1, 2, 3, ...]. The literature on health care utilisation offers, of course, a variety of alternative econometric specifications. The choice of using a TPM specification is further discussed in the Section entitled “Estimation methods”.

Consider that  $y_i$  are linked to two sets of explanatory variables ( $z_k$ ) – where  $k \in (1, 2)$  – the two-equation model of health care utilisation ( $y_i$ ) can be specified as follows,

$$P_i = I_{P_i^*} > 0 \quad \& \quad E(P_i^*) = G(z_1 \gamma_1) \quad \text{with} \quad G(p) = \frac{1}{1 + e^{-p}} \quad (1)$$

$$y_i = I_{(P_i=1)} \cdot [y_i^*] \quad \& \quad E(y_i^*/P_i = 1) = F(z_2 \gamma_2) \quad \text{with} \quad F(p) = e^p \quad (2)$$

and,

$$E(y_i) = E(P_i^*) * E(y_i^*/P_i = 1) \quad (3)$$

where  $P_i$  in Eq. (1) is a dichotomic variable that describes the decision to use health care services,  $y_i$  in Eq. (2) is the level of conditional usage – being specified as a *zero-truncated negative binomial distribution* with a *log link* relationship (Grogger and Carson, 1991). Eq. (3) provides the unconditional usage – i.e., the combined TPM predictions of overall utilisation obtained by multiplying the predictions from Eq. (1) and (2) (Buntin and Zaslavsky, 2004).

Let each set of explanatory variables ( $z_1, z_2$ ) be split into two sub-sets of variables, such that,  $(m_1, x_1) \in z_1$  and  $(m_2, x_2) \in z_2$  – where  $m_j$  and  $x_j$  represent measures associated with two distinct spheres of influence: medical-need (e.g., morbidity variables) and non-need variables (e.g., socio-economic variables), respectively. The explanatory model can then be rewritten as:

$$E(P_i) = G(x_{1,i}b + m_{1,i}d) \quad (4)$$

$$E(y_i/P_i = 1) = F(x_{2,i}\beta + m_{2,i}\delta) \quad (5)$$

and estimated over the entire-sample, for  $\forall i \in [1, \dots, N]$  as,

$$\hat{y}_i = \underbrace{G(x_{1,i}\hat{b} + m_{1,i}\hat{d})}_{\text{participation}} * \underbrace{F(x_{2,i}\hat{\beta} + m_{2,i}\hat{\delta})}_{\text{conditional use}} \quad (6)$$

where the parameter estimates ( $\hat{b}, \hat{\beta}, \hat{d}, \hat{\delta}$ ) represent *average behaviour* (or *practice*) for the population as a whole. For instance, the parameter estimates  $\hat{b}$  and  $\hat{\beta}$  represent, other things being equal, the observed *practices* – as they relate, respectively, to *participation* and *conditional usage* determinants – for a given level of morbidity or health status. However, since these estimates are obtained for the entire-sample, they represent the “*population-wide*” effects of these determinants and cannot, therefore, reveal group-specific differences in the effects of these determinants – e.g., *heterogeneity in practice* across income groups. In order to take into account potential *heterogeneity in practice* over the spectrum of income, Eq. (6) can be estimated for each SES group ( $g$ ) as follows,

$$\hat{y}_g = \underbrace{G(x_{1,i}\hat{b}_g + m_{1,i}\hat{d}_g)}_{\text{participation}} * \underbrace{F(x_{2,i}\hat{\beta}_g + m_{2,i}\hat{\delta}_g)}_{\text{conditional use}} \quad (7)$$

where Eq. (7) is a group-specific version of Eq. (6), and  $\hat{b}_g, \hat{d}_g, \hat{\beta}_g,$  and  $\hat{\delta}_g$  are the group-specific parameters. Thus, in the case  $g$  is set to represent income-quintile ( $Q$ ), Eq. (7) is estimated for each  $q$  – where  $q \in [1, \dots, Q]$ , with  $Q = 5$ . The group-specific parameters will differ to the extent that there is heterogeneity in practices (or behaviour) across income groups. Such a “*disaggregate*” approach of estimating a separate model for each income group is inspired from [Oaxaca’s methods \(1973\)](#). It has also been applied in previous literature seeking to test for inequity, rather than measuring its extent (cf. e.g., [Benham and Benham, 1975](#)). Note that testing for inequity in this case – i.e., the differences in the regression coefficients – can be performed using a *likelihood ratio test*, which involves a comparison of the sum of the *log-likelihood* values for the models of the various income groups with *log-likelihood* of the entire-sample model. An obvious limitation of such regression-based testing approaches is that they do not lend themselves to the *quantification* of the degree of **HI**, nor clearly to the decomposition of its causes ([van Doorslaer et al., 1993](#)).

The regression analysis can, of course, be extended to allow for such *quantification* and to derive an index of **HI**. Therefore, similar to the work of ECuity group, we employ the familiar *Concentration Index (CI)* as our measure for quantifying and decomposing *income-related inequality* in utilisation. The **CI** of a variable  $y$  (hereinafter  $C_y$ ) is typically defined using the underlying concept of *Concentration Curve, CC<sub>(y)</sub>*. The latter plots the cumulative proportion of the population – ranked by SES, beginning with the lowest income – against the cumulative proportion of  $y$  – where  $y$  is, as before, a measure of access to health care. If  $CC_{(y)}$  coincides with the diagonal, everyone enjoys the same access to health care. If, by contrast,  $CC_{(y)}$  lies below the

diagonal, inequalities in access exist and favour the richer members of society. The further  $CC_{(y)}$  lies from the diagonal, the greater the degree of inequality. The  $C_y$  index, is defined as twice the area between  $CC_{(y)}$  and the diagonal, and thus, a minimum and maximum values of  $C_y$  are  $[-1; 1]$ ; with a positive (negative) sign indicating pro-rich (pro-poor) inequality in the variable  $y$ .

Typically, the use of, and need for, health care tend to be correlated with SES such as income, as well as other individual socioeconomic characteristics (Wagstaff and van Doorslaer, 2004). Such use/need correlation with SES might be stronger in the context of low-income countries, providing the lack of universal coverage and the high discrepancies in living standard across SES groups, both of which imply inverse use/need correlations with SES. This means that the utilisation of health care by the poor may be less than that of the better-off despite their greater need (Gwatkin et al., 2003). In this case, a non-zero value of the  $C_y$  index, being obtained from an (*actual*) distribution of health care by SES, provides us with a rude diagnosis of *inequality*, which might not fully reflect *inequity*. To quantify the latter, the above regression analysis can be used to either (partially) *standardising* the distribution of health care utilisation for the correlations with the confounding variables (need) – holding non-confounding variables (non-need correlates) constant, or, more revealing, *decomposing* the non-standardised value of  $C_y$  into the partial contributions of each of which.

However, since the parameters estimates in Eq. (4) and (5) are obtained from intrinsically nonlinear functions, the standardisation and decomposition methods proposed by the ECuity group cannot immediately be applied. These methods involve linear additive relationships of the actual utilisation, and can only be rescued when relationships are represented linearly. However, while it is possible to *approximate* the decomposition analysis through a *re-linearisation* – as already proposed (van Doorslaer et al., 2004), such an approach, has its own limitations (discussed in Section 3.1). Alternatively, we opt to employ an *incremental* approach using microsimulation technique. Thus, in contrast to previous work, our decomposition of the total non-standardised value of  $C_y$  into its constituent parts proceeds using the above TPM regression-estimates – obtained from both models: the entire-sample model's estimates ( $\hat{b}, \hat{\beta}, \hat{d}, \hat{\delta}$ ) and the single-group model's estimates  $\hat{b}_g, \hat{d}_g, \hat{\beta}_g, \hat{\delta}_g$  – to define a set of **CI**'s associated with various *simulated-distributions*. Such approach shall enable us to properly identify the relative contribution of various *factors* to inequality, and to derive an index of **HI**. This is performed through a multiple-step transition process – fully described in the following sub-section.

### 3.3.2 Microsimulation Technique, Inequality Measurement and Decomposition

The microsimulation-based decomposition technique involves simulating various distributions of health care utilisation that would be emerged under different *hypothetical* scenarios. For each simulated distribution, a  $C_y$  is estimated using the convenient (weighted) covariance methods (cf., Lerman and Yitzhaki, 1989) and tested using bootstrapping inference methods as described in chapter one (cf., e.g. Abu-Zaineh et al., 2008). This enables us to identify the degree of inequality associated with each specific-distribution, and to disentangle the overall degree of observed inequality for the variable of interest.

The technique takes as its *starting point* the notion of perfectly equal (*egalitarian*) distribution of health care utilisation. This is defined as the counterfactual distribution of health care that would be observed if all individuals (groups) in the population, irrespective of their SES, had the same

characteristics (e.g., the same morbidity-level and age-structure), and where the effects of these characteristics were the same across SES groups (e.g., the same influence of morbidity and aging) and with respect to both: participation and conditional consumption behaviours. Hence, if  $\forall i, \forall j \in (1, 2): x_{j,i} = \bar{x}_j$  &  $m_{j,i} = \bar{m}_j$  – where  $\bar{x}_j$  and  $\bar{m}_j$  are the sample's means – and if  $\forall g: b_g = b; d_g = d$  &  $\forall g, \beta_g = \beta; \delta_g = \delta$  – then,

$$\forall i, \hat{y}_i^0 = \underbrace{G(\bar{x}_1 \hat{b} + \bar{m}_1 \hat{d})}_{\text{participation}} * \underbrace{F(\bar{x}_2 \hat{\beta} + \bar{m}_{2,i} \hat{\delta})}_{\text{conditional use}} = \text{constant} \quad (8)$$

The distribution of  $\hat{y}_i^0$  (e.g. across income) can be interpreted as the distribution of health care that would be expected to observe, irrespective of the differences in the distribution of the  $x$ 's and  $m$ 's across income. The **CI** associated with this distribution is logically zero ( $C_{\hat{y}_i^0} = 0$ ), since it is computed from a distribution of health care (**Eq. 8**) that is simulated in such way that all individuals with comparable characteristics and at any income levels have the same (*average*) utilisation of health care. This *counterfactual* distribution constitutes the *reference* or the *baseline-distribution* with which a *one-by-one* comparison of each explanatory factor of utilisation is carried out so as to identify its contribution to the degree of inequality that is observed for the variable  $y_i$ . The different steps of simulations can then be sketched as follows:

The first transformation can be derived from the application of Eq. (8) to a distribution of care utilisation that would be observed if all individuals in the sample had comparable characteristics and behaviours – i.e., the *population-wide effect* as embodied in the parameters estimates – but different health care needs. This can be obtained as:

$$\forall i, \hat{y}_i^1 = G(\bar{x}_1 \hat{b} + m_{1,i} \hat{d}) * F(\bar{x}_2 \hat{\beta} + m_{2,i} \hat{\delta}) \quad (9)$$

where the sample means of the morbidity variables ( $\bar{m}_1, \bar{m}_2$ ) in Eq. (8) are replaced with the specific-individual values ( $m_{1,i}, m_{2,i}$ ). The resultant **CI** associated with this distribution ( $C_{\hat{y}_i^1}$ ) measures, therefore, the degree of inequality in health care utilisation that is attributed to heterogeneity in medical needs. This part of inequality corresponds to “**Need Index**” of the ECuity group methods, since it is derived from a distribution where solely differences in need with respect to income and with respect to both parts of Eq. (9) are allowed to vary compared with our *baseline-distribution*, while the impact of individuals' characteristics, and the variations in the behaviours toward medical care are smoothed – i.e., averaged – across income levels. The transformation  $C_{\hat{y}_i^0} \rightarrow C_{\hat{y}_i^1}$  gives the contribution of *heterogeneity in medical need* to care use-inequality. Thus,

$$\Delta I^{(N)} = C_{\hat{y}_i^1} - C_{\hat{y}_i^0} = C_{\hat{y}_i^1} \quad (10)$$

The presence of variations in the *actual participation* across income groups implies that individuals belonging to different SES groups have heterogeneous practice with respect to the utilisation of health care. The heterogeneity in the practice or the behaviour of the groups – as related to *participation* part – can be obtained as:

$$\forall i, g \quad \hat{y}_{i,g}^{2,a} = G(\bar{x}_1 \hat{b} + m_{1,i} \hat{d}_g) * F(\bar{x}_2 \hat{\beta} + m_{2,i} \hat{\delta}_g) \quad (11)$$

where the “population-wide effect” – as embodied in  $\hat{d}$  in Eq. (9) – is replaced with the *specific-group* estimate ( $\hat{d}_g$ ). The resultant simulated distribution in Eq. (11) will therefore differ from the one obtained in Eq. (9) to the extent that there is heterogeneity in the coefficients ( $\hat{d}_g$ ) across SES groups. The extent of inequality that is attributed to heterogeneity in behaviour associated with *participation* part, for a given need, can be captured by the transformation  $C_{\hat{y}_i} \rightarrow C_{\hat{y}_{i,g}^{2,a}}$  – where the latter is the *CI* of the simulated distribution from Eq. (11). Thus,

$$\Delta I_{(PP)} = C_{\hat{y}_{i,g}^{2,a}} - C_{\hat{y}_i} \quad (12)$$

Likewise, heterogeneity in the behaviour as per *conditional usage* (the second part) can be obtained as,

$$\forall i, g \quad \hat{y}_{i,g}^{2,b} = G(\bar{x}_1 \hat{b} + m_{1,i} \hat{d}_g) * F(\bar{x}_2 \hat{\beta} + m_{2,i} \hat{\delta}_g) \quad (13)$$

where Eq. (13) is analogous to Eq. (11) but being restored with the specific-group parameter estimate for the *conditional usage* ( $\hat{\delta}_g$ ). The degree of inequality due to heterogeneity in practice in *conditional usage part* for a given need can be captured by the transformation  $C_{\hat{y}_{i,g}^{2,a}} \rightarrow C_{\hat{y}_{i,g}^{2,b}}$

– where the latter is the *CI* of the simulated distribution of Eq. (13). Thus,

$$\Delta I_{(CC)} = C_{\hat{y}_{i,g}^{2,b}} - C_{\hat{y}_{i,g}^{2,a}} \quad (14)$$

Considering further the effect of *socioeconomic* characteristics, the distribution of health care utilisation in Eq. (13) can be reproduced such that socioeconomic variables (e.g., income) are allowed to vary amongst the population. Thus,

$$\forall i \quad \hat{y}_i^3 = G(x_{1,i} \hat{b} + m_{1,i} \hat{d}_g) * F(x_{2,i} \hat{\beta} + m_{2,i} \hat{\delta}_g) \quad (15)$$

where the sample means of the *socioeconomic* variables ( $\bar{x}_j$ ) in Eq. (13) are replaced with the individual specific-values ( $x_{j,i}$ ). The part of inequality due to the distribution of *socioeconomic*

variables can be captured by the transformation  $C_{\hat{y}_{i,g}^{2,b}} \rightarrow C_{\hat{y}_i^3}$ . Thus,

$$\Delta I_{(SEV)} = C_{\hat{y}_i^3} - C_{\hat{y}_{i,g}^{2,b}} \quad (16)$$

Note that the simulated distribution obtained from Eq. (15) employs the individual specific-socioeconomic characteristics ( $x_{j,i}$ ) and the “population-wide effect” (as embodied in  $\hat{b}$  and  $\hat{\beta}$ ).

The measure in Eq. (16) would, therefore, capture the part of inequality that is caused by the *distribution of socioeconomic variables* – i.e., the degree of inequality due to inequalities in *socioeconomic variables* – but impose *homogeneity* in the impact of these variables across income groups. To take into account potential heterogeneity in the impact of these variables by SES, Eq. (15) is then restored with the group-specific parameters ( $\hat{b}_g, \hat{\beta}_g$ ). Thus,

$$\forall i, g \quad \hat{y}_i^4 = G(x_{1,i}\hat{b}_g + m_{1,i}\hat{d}_g) * F(x_{2,i}\hat{\beta}_g + m_{2,i}\hat{\delta}_g) \quad (17)$$

and the transformation  $C_{\hat{y}_i^3} \rightarrow C_{\hat{y}_i^4}$  gives the degree of inequality due to heterogeneity in behaviour with respect to socioeconomic characteristics, thus,

$$\Delta I_{(SEC)} = C_{\hat{y}_i^4} - C_{\hat{y}_i^3} \quad (18)$$

Yet, a last transformation is the one that captures the effect of variables not included in the model. This can be obtained by  $C_{\hat{y}_i^4} \rightarrow C_{y_i}$  – where the latter is the **CI** of the overall observed inequality ( $I_y$ ). Thus,

$$\Delta I_{(R)} = C_{y_i} - C_{\hat{y}_i^4} \quad (19)$$

Eq. (19) would capture the part of inequality that is induced by *unobserved heterogeneity*. This part of inequality corresponds, therefore, to the “*Residual term*” in the ECuity group’s decomposition. Defining the overall use-inequality in terms of *medical-need* ( $\Delta I_{(N)}$ ) and *non-need* ( $\Delta I_{(NN)}$ ) parts gives:

$$I_y \equiv \Delta I_{(N)} + \Delta I_{(NN)} \quad (20)$$

Substituting the corresponding decomposition components (captured all above through Eq. 10 – 19), the overall use-inequality can, now, be fully revealed as:

$$I_y = \Delta I_{(N)} + \Delta I_{(PP)} + \Delta I_{(CC)} + \Delta I_{(SEV)} + \Delta I_{(SEC)} + \Delta I_{(R)} \quad (21)$$

$$I_y = [C_{\hat{y}_i^1} - C_{\hat{y}_i^0}] + [C_{\hat{y}_i^{2,a}} - C_{\hat{y}_i^1}] + [C_{\hat{y}_i^{2,b}} - C_{\hat{y}_i^{2,a}}] + [C_{\hat{y}_i^3} - C_{\hat{y}_i^{2,b}}] + [C_{\hat{y}_i^4} - C_{\hat{y}_i^3}] + [C_{y_i} - C_{\hat{y}_i^4}]$$

and defining **HI** as the part of inequality that is not due to *heterogeneity in need* gives:

$$\begin{aligned} \mathbf{HI} &= I_y - \Delta I_{(N)} = \Delta I_{(NN)} \\ \mathbf{HI} &= \Delta I_{(PP)} + \Delta I_{(CC)} + \Delta I_{(SEV)} + \Delta I_{(SEC)} + \Delta I_{(R)} \\ &= [C_{\hat{y}_i^{2,b}} - C_{\hat{y}_i^1}] + [C_{\hat{y}_i^{2,b}} - C_{\hat{y}_i^{2,a}}] + [C_{\hat{y}_i^3} - C_{\hat{y}_i^{2,b}}] + [C_{\hat{y}_i^4} - C_{\hat{y}_i^3}] + [C_{y_i} - C_{\hat{y}_i^4}] \end{aligned} \quad (22)$$

A positive value of **HI** indicates inequity favouring the better-off, whilst a negative value has the opposite interpretation, indicating inequity favouring the worse-off. Lastly, a zero value of **HI** indicates that the use of, and need for, health care are proportionally distributed across SES groups. However, it is worth noting that the latter case provides a sufficient but not necessary condition for no inequity (van Doorslaer et al., 2004).

The **HI** index derived in Eq. (22) approaches the *index* of **HI** previously proposed by ECuity group. However, the decomposition approach adapted in Eq. (21–22), while disentangling the overall socioeconomic-related inequality in health care utilisation in terms of *need* and *nonneed* factors, allows unravelling the effect of *heterogeneous practice*, as associated with both parts of



behaviour, *participation* and *conditional usage*, across SES groups. Indeed, the **HI** index, as defined in Eq. (22), can be disentangled into two meaningful parts: (i) the part that results from the (unequal) distributions of the variables by SES – i.e., their degree of inequality across income distributions, and (ii) the part that is due to heterogeneity in behaviour (or practice) of SES groups for a given need – as measured by heterogeneity in the coefficients corresponding to the need and nonneed factors. The part of **HI** due to the distributions of variables (by income) can thus be defined as:

$$\mathbf{I}_V = \Delta I_{(SEV)} + \Delta I_{(R)} = [C_{\hat{y}_i^3} - C_{\hat{y}_{i,g}^2,b}] + [C_{y_i} - C_{\hat{y}_{i,g}^4}] \quad (23)$$

while the part due to the heterogeneity in behaviours for a given need can be defined as:

$$\mathbf{I}_B = \Delta I_{(PP)} + \Delta I_{(CC)} + \Delta I_{(SEC)} = [C_{\hat{y}_{i,g}^2,a} - C_{\hat{y}_i}] + [C_{\hat{y}_{i,g}^2,b} - C_{\hat{y}_{i,g}^2}] + [C_{\hat{y}_{i,g}^4} - C_{\hat{y}_i^3}] \quad (24)$$

where the degree of *inequity* due to the *heterogeneity in behaviour* with respect to SES is decomposed into three distinct effects, which stem, respectively, from the variations in the influence of: (a) need (morbidity) factors on *participation* behaviour ( $\mathbf{I}_{(PP)}$ ); (b) need (morbidity) factors on *conditional consumption* behaviour ( $\mathbf{I}_{(CC)}$ ); and (c) “other” socioeconomic factors ( $\mathbf{I}_{(SEC)}$ ) on the (total) consumption behaviour. Such approach allows us to detect, for a given level of need, the role of differences in practices in generating inequity. Broadly interpreted, these variations in practices can be linked to factors related to demand and supply sides of health care market and reflect differences in patients’ preferences and providers’ behaviour in relation to SES (Dormont et al., 2006). Of course, this interpretation crucially hinges on the role of principal-agent relationship between patients and physicians in the underlying economic model (Manning et al., 1981; Pohlmeier and Ulrich, 1995), and this brings us to the interpretation of these components.

Indeed, having sketched these effects, some may, for instance, argue for, and prefer to, exclude the contributions of participation ( $\mathbf{I}_{(PP)}$ ) – term (a) in Eq. (24) – from the *unjustifiable* sources of inequality, on the grounds that, after having controlled for need differences, differences in practices for a given morbidity – in and of themselves – do not reflect inequity features embedded in health care delivery system, and hence, the  $\mathbf{I}_{(PP)}$  contribution should be subtracted from **HI**. At the other extreme, it could be argued that these differences mainly capture variations in opportunity costs of ill-health across SES. Even if morbidity-levels were invariant with respect to income, the *effects* of these would likely to vary. For instance, even if the nominal value of illness costs were the same for every one, the sacrifice in terms of forgone utility, and hence, the “deterrent effect” would probably be greater for the poor than for the rich (Le Grand, 1982; Van Ourtia, 2004). Nonetheless, one may argue that the residual contribution  $\mathbf{I}_{(R)}$  – in Eq. (23) – may capture unobserved needs for health care, and hence, needs not to be attributed to “*unjustifiable*” sources of inequality. In our approach, we have decided to classify both terms:  $\mathbf{I}_{(PP)}$  and  $\mathbf{I}_{(R)}$  under “*unjustifiable*” variation. However, the decomposition method presented above makes clear how, and to what extent, each component contributes to inequality, and policy makers can learn where the greatest opportunities lie for reducing inequalities in health care utilisation.

### 3.4 DATA REQUIREMENTS, VARIABLES DEFINITIONS AND ESTIMATION METHODS

#### 3.4.1 Data Requirements and Variables Definitions

The empirical analysis presented in this essay is based on data taken from the [HCEU](#)– Household Health Care Expenditure and Utilisation – survey carried out in the OPT in 2004. For the purpose of this analysis, individuals were taken as the unit of analysis. The [HCEU](#) survey covers a total of 25,180 individual observations: 13,619 in the WB and in 11,561 in GS. The survey questionnaire offers detailed information concerning individual’s recent health experiences: morbidity and health status, utilisation of, and expenditures, on various types of health care. Data on demographic and socioeconomic characteristics include, among others, number of household members, income and expenditures, insurance coverage, as well as respondent’s age, sex, education, marital status, employment status, location of residence (Urban, Rural, and Camp). Data on health care utilisation are gathered based on self-reported utilisation (measured by number of visits/days) of three levels of health care: primary, secondary and tertiary-level. The recall period was 12 months for the secondary-level (for which a distinction was made between outpatient-clinic and inpatient-hospital admission), but this was shorter for tertiary-level (6 months), and primary-level (one month). For both levels of care: primary and secondary (outpatient-clinic), no distinction was made by type of health professional providing care (i.e., GP vs. SP). However, for each level of care, a distinction was made in terms of type of sector/provider used (Public, Private, and NGOs) and type of services/treatments sought/received (e.g., referral, follow-up, diagnostic tests, medications, surgery, etc.). Data on health care expenditures incurred as per level of care, type of care, and services providers were also reported in the [HCEU](#) survey. For the purpose of this analysis, health care utilisation (the dependent variable) is proxied by the physical units of utilisation – i.e., number of visits. The latter is separately computed for each level of health care: primary, secondary and tertiary. Utilisation of the secondary-level are distinguished and separately computed as outpatient-visits vs. inpatient-admissions. Lastly, no attempt is made in this essay to aggregate the various types and levels of care into one measure counting overall volume of utilisation. The latter is not preferred, since it involves “*adding apples and oranges*” by *pro rata* scaling up or down the different types of medical care ([van Doorslaer and Masseria, 2004](#)).

The measurement of need for health care used in this study is apprehended through a wide set of explanatory variables including morbidity indicators and demographics (age and sex). As for morbidity variables, the [HCEU-2004](#) survey offers a detailed list of illnesses (up to 20 diseases and health problems) declared by respondents, at the beginning of the reference period, based on self-reported morbidity. From this detailed data, a set of dummy variables are constructed to indicate the presence of each type of morbidity/health problems as per individual case. These include: chronic and long-standing diseases (e.g., cancer, diabetes, obstructive pulmonary disease, heart disease and kidney disease, etc.); acute diseases; injury/accident; mental and psychological problems. In addition, the number of diseases is computed from the list of illnesses declared by the respondents. Finally, four age groups and dummies for gender are included in the measurement of “need” to reflect the variations in the above indicators across demographic groups.

As for non-need indicators, a number of explanatory variables, which are shown to affect utilisation patterns, are integrated in the analysis ([van Doorslaer et al., 2004](#)). Among the

potential list of variables incorporated in the regression analysis are: education (level of education completed); activity status (employed, unemployed, retired etc.); marital status (married, separated/divorced, etc.); insurance coverage (public/private cover), and location of residence (urban/rural). Lastly, concerning the measurement of living standards (i.e., the ranking variable), the HCUE-2004 offers two direct measures: total household income and total consumption expenditures. However, since the latter is commonly advocated as a more reliable measure of households' living standard in the context of developing countries (Deaton and Grosh, 2000), we have used this variable to define average adjusted income per equivalent adult. This was computed – as in previous essays – using the WHO/FAO equivalence scale proposed for the case of developing countries (Deaton and Grosh, 2000; Aho et al., 1997).

### 3.4.2 Estimation Methods, Model Choice, and Statistical Inference

Measures of health care utilisation used in this study are binary variables – taking the value of one or zero depending on whether the individual uses health care or not – and count variables – taking non-negative integer values. Both of these variables are typically characterised by highly skewed distributions with a non-negligible proportion of the survey respondents reporting zero utilisation, and a very small proportion reporting frequent utilisation far above the mean during a given period of time (O'Donnell et al., 2007). Indeed, as in similar studies on the utilisation of health services (e.g., Morris et al., 2005; van Doorslaer et al., 2004), a non-negligible proportion of our survey respondents did not use primary-level of health care during the relevant recall period (about 45.6 percent), whereas the proportions of non-users of secondary- and tertiary-levels are even much higher (about 59 percent and 87 percent of non-users, respectively).

Clearly, features such as these make OLS estimation biased and inefficient, and call for specific-estimation techniques (Buntin and Zaslavsky, 2004). Theoretical analysis of health care utilisation offers a variety of alternative econometric specifications (cf. e.g., Jones, 2000; Jones and O'Donnell, 2002, for a review). Among the other possible candidates are: two-part model (TPM) (Manning et al., 1981); sample-selection model (SSM) (Heckman, 1979); hurdle model (HM) (Mullahy, 1986), and finite-mixture model (FMM) (Deb and Trivedi, 2002). Many empirical studies addressed the issue of choice between alternative econometric specifications suggest that the choice depends on both theoretical and statistical considerations regarding health care demand. For instance, Leung and Yu (1996) show that the SSM is susceptible to collinearity between the inverse Mill's ratio and the explanatory variables in the second-step equation. They suggest using a t-test of the coefficient of the inverse Mill's ratio to choose between the two specifications: if there is collinearity, the TPM is more reliable, given that it performs better than the SSM in terms of mean-squared error. Indeed, our data is characterised by a quite high correlation between the inverse Mill's ratio and the explanatory variables of the second-step equation (the correlation coefficient ranges between 0.86 and 0.89). On the other hand, although the HM and TPM are often regarded in the count data literature as being synonymous, Pohlmeier and Ulrich (1995) show that a limitation of the HM is that it treats the measure of frequent visits as being related to a single-spell of illness/treatment. This attests to be problematic, providing that health care use data are usually specific to a period of calendar time during which the first visit is not necessarily the initial one in a course of treatment.

An alternative modelling to count data was proposed by Deb and Trivedi (2002), who argue that counts data are sampled from a mixture of populations that differ with respect to their underlying

latent health (severely-ill vs. perfectly-healthy), and thus, in their demands for health care (high-frequency-users vs. non-users). To suitably capture this feature of data, the authors propose using the so-called “latent class models”; e.g., the FMM. [Jimenez-Martin et al \(2002\)](#) compare FMM with TPM using three waves of data for 12 European countries. Their empirical results show that the FMM may perform better than the TPM, but this was only true when parameter homogeneity is imposed (across countries) and for GP visits. For homogeneous parameter specification and SP visits, the TPM was preferred to the FMM. The authors explain the difference in the preferred specification for GP and SP by the fact that over a period of one year multiple-spells of illness/treatment are more likely to be observed for GP, whereas SP visits are more likely to represent a single-spell. Thus, the TPM, with its rationalisation through principal-agent story, should be more suited to representing (annual) SP visit data. Furthermore, a problem with the FMM, apart from the fact that its specification is not derived from an economic theory of health care demand, is that it involves estimating a large number of parameters; something that can lead to non-convergence of likelihood and to over-parameterisation problems.

Given the above suggesting that the TPM may perform better when compared with others, we have chosen to adopt for the purpose of this analysis a TPM, distinguishing between the probability of positive usage and the conditional amount of usage given positive use in the reference period. Various specifications of the TPM have been proposed in the literature ([Jones and O'Donnell, 2002](#)). The choice depends mainly on statistical considerations regarding health care use (cf. e.g., [Pohlmeier and Ulrich, 1995](#)). The TPM specifications we have used are based on a logit for the first-part equation (i.e., the probability of contact) and a generalised linear model (GLM) with a log link and a zero-truncated negative binomial distribution for the number of visits contingent on participation ([Pohlmeier and Ulrich, 1995](#)). The choice of *log* link is motivated by the observation that the non-zero values for  $y_i$  are highly skewed (the skewness varies between 5.30 and 16.54 depending the level of care used). The log transformation can thus help lessen the degree of skewness observed in a distribution ([Dormont et al., 2006](#)).

In addition, since our dataset is characterised by a relatively high-dispersion – i.e., the variance of the dependent variable is greater than its expectancy – a *Poisson* distribution, which has a variance equal to its mean, is not suitable in such context. We have, therefore, used a *zero-truncated negative binomial* distribution, which was shown (e.g., [Grogger and Carson, 1991](#)) to have more appropriate characteristics. Like others (e.g., [Huber, 2006](#)), our explanatory variables to be included in the analysis are selected based on their significance-level – global nullity test – in a regression explaining the total number of visits. We have, thus, chosen to select comparable variables for all levels of health care to facilitate the comparison. Among the selected variables are those whose exogeneity might be questionable; e.g., morbidity indicators and insurance coverage. For instance, certain types of morbidity are likely to be altered by the utilisation of health care ([Dormont et al., 2006](#)). Similarly, while the inclusion of a dummy variable indicating coverage by insurance allows estimating the insurance-effect, the latter may not be exogenous, given that some (in particular the purchase of voluntary insurance) may result from individual's decision, which is related to the likelihood of future consumption. Although the main purpose of this exercise is to ascertain to what extent the unequal distribution of such coverage affects the degree of inequity, we have chosen to include only exogenous regressors to reduce the risk of bias due to endogeneity. An exogeneity test, following the methodology of [Rivers and Vuong \(1988\)](#), has been performed to select the variables that were proved to be exogenous. Since the implemented test enables examining exogeneity of all variables incorporated in the analysis, the

risk of omitted variable bias is not a concern (Huber, 2006).

The model is estimated for three levels of health care: primary, secondary, and tertiary. The regression-estimates are, then, used to simulate various distributions of health care, and to apply the full decomposition analysis, as described in Section 3.3, to each level. The *CI* of each simulated-distribution is estimated using the convenient (weighted) covariance method, which allows taking into account the sampling weight of each individual. The weighted covariance between the health care variable ( $y_i$ ) and the relative fractional rank ( $R_i$ ) is thus computed as:  $C_y = 2 / \bar{y}_i \text{cov}_w(y_i, R_i)$  – where  $\text{cov}_w$  represents the weighted covariance (Lerman and Yitzhaki, 1989). In addition, we also separately investigate primary-level (outpatient-clinic) and secondary-level (hospital-inpatient admissions) by type of health care sectors/providers: Public, Private, and NGOs. This is done by deriving a probability-based outcome of any use during the reference period. Simple quintile distributions and *CI*'s based on the *actual probability of use* for each level of care and care providers are thus computed.

Lastly, statistical significance of observed variation in the computed values of each of the above contribution terms of decomposition were tested using bootstrap (BTS) method (Efron and Tibshirani, 1993). For the case of a complex multi-stage sampling design such as the one we deal with in this essay, the appropriate bootstrap procedure involves, first, randomly drawing, with replacement, a large number ( $R$ ) of random sub-samples of size  $n$  – with  $n$  equal to the original sample size – out of the original dataset – the so-called BTS re-samples. For each BTS re-sample, the sampling weights are normalised to a mean of one, and then the entire (weighted) procedure are applied to obtain the factor contributions, including the regressions, fractional rank construction and covariance computations. The procedure is replicated to the generated BTS re-samples, yielding for each of them the contributions estimates – BTS replications. Lastly, by using these datasets, an estimate of the standard error of each factor's contribution and for the *HI* index can be computed (cf., e.g. Abu-Zaineh et al., 2008; van Doorslaer and Koolman, 2004).

### 3.5 EMPIRICAL RESULTS AND MAIN FINDINGS

The results are presented in sub-Sections 3.5.1 and 3.5.2. The first presents simple (unstandardised) quintile distributions and estimates of concentration indices (*CI*'s) for the (actual) probability of use for each level of care and care providers; and the second presents the decomposition results based on microsimulation method proposed above.

#### 3.5.1 Quintile Distribution of Health Care Utilisation and Income-Related Inequality Indices for the Probability of a Visit/Use

The level of health care utilisation in both regions of the OPT, the WB and GS, are quite high: the proportions of individuals who have sought for a primary-level treatment (during the last month) are about 59.1% and 45.2% in the WB and GS, respectively, whereas about 41.4% and 40.7% have been admitted to a hospital within the last year. Table 3.3 presents income-quintile distributions of health care utilisation for primary, secondary, and tertiary-levels. Results for each level of care are presented based on the *actual probability* of any use/visit. The probability of use of primary (outpatient) and secondary (inpatient) are also presented as per sub-categories of health care sectors/providers: Public, Private and NGOs.

Results show that in the case of **primary-level** and in both regions of the OPT lower-income groups are, in general, more intensive-users. This is demonstrated by the negative gradients by quintile and the significantly negative values of CIs [CIs  $< 0$  at  $p < 0.05$ ], indicating a *pro-poor inequality* in the probability of using primary-level of care. The *pro-poor inequality* in the probability of using primary-care appears to be greater in the case of WB [CI =  $-0.214$ ] than in GS [CI =  $-0.131$ ]. This indicates that the poor in the WB are generally more likely to use primary-care than their counterparts in GS.

The quintile distributions of primary-care as Public, Private or NGOs patient are also presented in Table 3.3. The distributions of primary-care by income vary significantly across the three sectors (providers). In the two regions (the WB and GS), lower-income groups appear to be more intensive-users of primary-care in the Public and the NGOs sectors: the probability of seeking primary-care in a public facility in the bottom-income quintile is about 2 times higher in the WB, and 3 times higher in GS, than that of seeking primary-care in the private sector. The reverse is true in the top-income quintile: the probability of seeking primary-care in the private sector is about 3 times higher in the WB, and 2 times higher in GS, than that of seeking primary-care in public sector. Concerning the NGOs sector, results demonstrate higher probability of utilisation among the poor with the probability of seeking primary-care in the bottom-income quintile being about 2 times higher in the WB, and in 3 times higher in GS, than that of seeking primary-care in private sector. Estimates of the CIs for sub-categories of primary-care users – presented in Table 3.3 – confirm the above trends: the CIs for both public and NGOs sectors appear to be significantly negative [CI  $< 0$  at  $p < 0.05$ ], whereas the CI of private sector is significantly positive [CI  $> 0$  at  $p < 0.05$ ].

With regards to **secondary-level** – both outpatient and inpatient type of care – higher-income groups appear to be more intensive-users – as shown by the positive gradients of quintile in the two regions. However, when the CI of the actual probability of use is estimated, the positive sign appears to be statistically significant [CI  $< 0$  at  $p < 0.05$ ] for outpatient type of care but not inpatient. This indicates a significant *pro-rich inequality* in the probability of using secondary-care as outpatient. The distributions of secondary-care (as inpatient admissions) by type of sector/provider are also presented in Table 3.3. Results demonstrate that the distributions of hospital-admissions as public or private patient differ considerably by income: the probability of being admitted as a public-patient is about 4 times higher in the WB, and 5 times higher in GS, than that of being admitted as a private-patient in the bottom-quintile. The reverse is true at the high end of spectrum: the probability of private-admission in the top-income quintile is about 2 times higher in the WB, and 3 times higher in GS, than the public-admission probability. Turning to the NGOs sector, results demonstrate higher probabilities of (inpatient) use among higher-income quintiles with a probability of admission to NGOs' hospital in the top-income quintile being about twice the probability in bottom-income quintile in the two regions.

**Table 3.3: Quintile Distribution and Income-related Inequality Indices for the Actual Probability of Health Care Use by Level of Care and Type of Providers\***

<b>West Bank (WB)</b>						
<b>Pro. of any use/admission</b>	<b>Q1 poorest</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5 richest</b>	<b>CI</b>
<b>Primary level</b>	0.484	0.471	0.417	0.227	0.209	<b>-0.214</b>
Public sector	0.319	0.312	0.201	0.203	0.103	<b>-0.127</b>
Private sector	0.141	0.197	0.231	0.242	0.283	<b>0.260</b>
NGOs sector	0.258	0.107	0.091	0.087	0.077	<b>-0.133</b>
<b>Secondary (outpatient)</b>	0.109	0.167	0.316	0.405	0.439	<b>0.151</b>
<b>Secondary (inpatient)</b>	0.601	0.603	0.613	0.648	0.621	0.274
Public sector	0.363	0.342	0.341	0.308	0.085	<b>-0.033</b>
Private sector	0.101	0.111	0.124	0.186	0.187	<b>0.651</b>
NGOs sector	0.103	0.112	0.171	0.126	0.137	<b>0.163</b>
<b>Tertiary level</b>	0.036	0.059	0.061	0.066	0.077	<b>0.761</b>
<b>Gaza Strip (GS)</b>						
<b>Pro. of any use/admission</b>	<b>Q1 poorest</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5 richest</b>	<b>CI</b>
<b>Primary level</b>	0.421	0.411	0.301	0.211	0.111	<b>-0.131</b>
Public	0.310	0.308	0.241	0.203	0.103	<b>-0.121</b>
Private	0.106	0.119	0.131	0.162	0.233	<b>0.126</b>
NGOs	0.298	0.187	0.141	0.137	0.131	<b>-0.121</b>
<b>Secondary (outpatient)</b>	0.089	0.092	0.096	0.106	0.119	<b>0.107</b>
<b>Secondary (inpatient)</b>	0.653	0.601	0.803	0.840	0.811	0.274
Public	0.517	0.482	0.471	0.413	0.104	<b>-0.291</b>
Private	0.097	0.126	0.154	0.166	0.291	<b>0.645</b>
NGOs	0.108	0.143	0.144	0.146	0.187	<b>0.167</b>
<b>Tertiary level</b>	0.010	0.019	0.021	0.025	0.037	<b>0.676</b>

\*Note: A positive (negative) CI indicates a *pro-rich* (*pro-poor*) distribution. Index in bold type indicates statistical significantly different from zero at  $p < 0.05$ .

Also, from Table 3.3, substantial differences are found in the bottom-income quintiles and in the top-income quintiles in the patterns of **inpatient-admission** between public and NGOs sectors: the probability of admission to a public-patient is about 3 times higher in the WB, and 5 times higher in GS, than that of being admitted to NGOs hospital in the lowest-quintiles, while the probability of being admitted as NGOs in the top-income quintile is twice the public admission probability in the two regions. The estimated **CI**s for each type of admission confirm the above patterns: for all types of admissions, except public-admissions, indices are significantly positive [ $CI > 0$  at  $p < 0.05$ ], suggesting inequalities favouring the rich in the probability of utilisation of secondary (inpatient) care in both private and NGOs sectors and in the two regions. By contrast, the **CI**'s of public-admission in the two regions are positive and significantly different from zero [ $CI > 0$  at  $p < 0.05$ ], suggesting inequality in admission to public sector favouring the poor. Turning, lastly, to **tertiary-level**, significant *pro-rich* inequalities are detected in both regions: results clearly show that the probabilities of utilisation of tertiary-care are higher in the higher-income quintiles – as demonstrated by the positive gradients by quintile – and the significantly positive values of **CI** at  $p < 0.05$ . Lastly, no significant differences are found in the *pro-rich* patterns of utilisation of tertiary-level between the two regions: the **CI** of tertiary care in the WB [ $CI = 0.761$ ] is only slightly higher than that of the tertiary care in GS [ $CI = 0.676$ ].

The results presented above are all based on the actual distribution of health care utilisation (the probability of any use). The reported **CI**s summarise, therefore, the degree to which there is inequality (in the probability of use) with respect to income. The degree of inequalities detected in the distribution of each level of health care may, however, reflect differences in need by income – i.e., *justifiable inequalities* –, and therefore, can not be interpreted as *inequitable*. In the following sub-Section, the overall income related-inequality for the total number of visits are measured and fully decomposed following the methods described in Section 3.3.2.

### 3.5.2 Decomposition Results

The full decomposition results based on microsimulation exercise are presented in Table 3.4. The overall measured inequality in the utilisation of different levels of health care (called  $I_y$ ) is split, first, as per the identity defined in Eq. (20), into two broad categories of *inequality*: the first measures the contributions of need factors (as captured by morbidity and demographic indicators) – i.e., the justifiable part of inequality – (called  $I_N$ ), and the second measures the contribution of other non-need factors – i.e., the unjustifiable part of inequality – (called  $I_{NN}$ ). The latter, which also provides us with a measure of the **HI**, is, then, disentangled, as per Eq. (23) and (24), in terms of two meaningful parts: (a) the part of *inequity* due to the (unequal) distributions of socio-economic variables by income (called  $I_V$ ), and (b) the part of *inequity* due to heterogeneity in behaviour across SES groups (called  $I_B$ ) – i.e., the variation in the parameter estimates across income groups. The findings on the heterogeneity in behaviour for a given need are also decomposed *by parts* of the demand process; i.e. for the probability of participation (called  $I_{PP}$ ) and the conditional number of usage (called  $I_{CC}$ ).

As shown in Table 3.4, with the exception of **primary-level**, the estimated values of the concentration index ( $C_y$ ) of the overall income related-inequality in the utilisation of each level of health care in the two regions are significantly positive [ $C_y > 0$  at  $p < 0.05$ ]. This indicates that the utilisation of primary-care is generally concentrated among the poor [ $C_y = -0.0527$  and  $-0.0415$  for the WB and GS, respectively], whereas the utilisation of **secondary-level** – both



outpatient and inpatient services – and **tertiary-level** are concentrated amongst the better-off, with the  $C_y$  index being *more pro-rich* in the case of secondary-inpatient [ $C_y = 0.0617$  and  $0.0313$  for the WB and GS, respectively] compared to secondary-outpatient case [ $C_y = 0.0511$  and  $0.0247$  for the WB and GS respectively], while they appear to be even a lot more pronounced in the case of tertiary-care [ $C_y = 0.1311$  and  $0.1204$ ] compared with both types of secondary-care.

The estimated values of *Need index* (the  $I_N$ ) – i.e., the aggregation or the combined effects of *all morbidity and demographic variables* included in the model – emerge, on the other hand, invariably significantly negative [ $I_N < 0$  at  $p < 0.05$ ] for all levels of care. This clearly means that need for health care are always concentrated in the lowest-part of income distribution, and that the poor are, in general, in a poorer health status than the rich. Indeed, the (partial) contribution of heterogeneity in need (by income) to the measured degree of inequality in utilisation is captured, as in the previous research (e.g., van Doorslaer et al., 2004), by adjusting the distribution of utilisation for a set of morbidity and demographic variables (age and sex).

However, as shown in Table 3.4, the values of *Need Index* ( $I_N$ ) not due to demographics – i.e., the degree of “*need-expected*” inequality estimated by allowing for morbidity differences, while keeping the distribution standardised for demographic differences – account for the bulk of the  $I_N$  value [*circa* 90% of the  $I_N$  index value]. The *partial* contributions of age-sex differences to the  $I_N$ , although push the distribution of need further in a pro-poor direction, remain comparatively small and account for only 10% of the  $I_N$  index value. This indicates that, although demographic differences play some role in shaping need for health care, the overall value of our  $I_N$  is mainly accounted for by the distribution of morbidity across income, which is significantly more prevalent amongst the poor.

Overall, the extent to which the distribution of need by income drives use-inequality differs by the levels of care and between the two regions. While the *actual* distributions of all levels of care utilisation ( $C_y$ ) are barely, if ever, distributed to match the *pro-poor* distributions of need, some diverse trends emerge: in the two regions, the *actual pro-poor* distribution of primary-care appears to be much “*less pro-poor*” than that expected on the basis of needs [ $C_y = -0.0527$  and  $-0.0415$  vs.  $I_N = -0.0925$  and  $-0.0772$  for the WB and GS, respectively], whereas the opposite is true for all other cases: the *actual pro-rich* distributions of both secondary-care (outpatient and inpatient services) and tertiary-care appear to be a lot “*more pro-rich*” compared to what would be required on the basis of needs (e.g., for inpatient-care,  $C_y = 0.0617$  and  $0.0313$  vs.  $I_N = -0.0377$  and  $-0.0171$ , and for tertiary-care,  $C_y = 0.1311$  and  $0.1204$  vs.  $I_N = -0.0815$  and  $-0.0741$  for the WB and GS, respectively). This clearly suggests that if the utilisation of each level of health care were driven by need factors alone, *pro-poor* inequalities would have been merged. This also suggests that the overall measured inequality in the utilisation of each level of care ( $I_y$ ) is about 50 % *lower* than it would have been, if need had been distributed equally by income – i.e., if  $I_N$  was equal to zero.

**Table 3.4: Decomposition of Income-related Inequality and Horizontal Inequity in Health Care Utilisation by Levels of Health Care \***

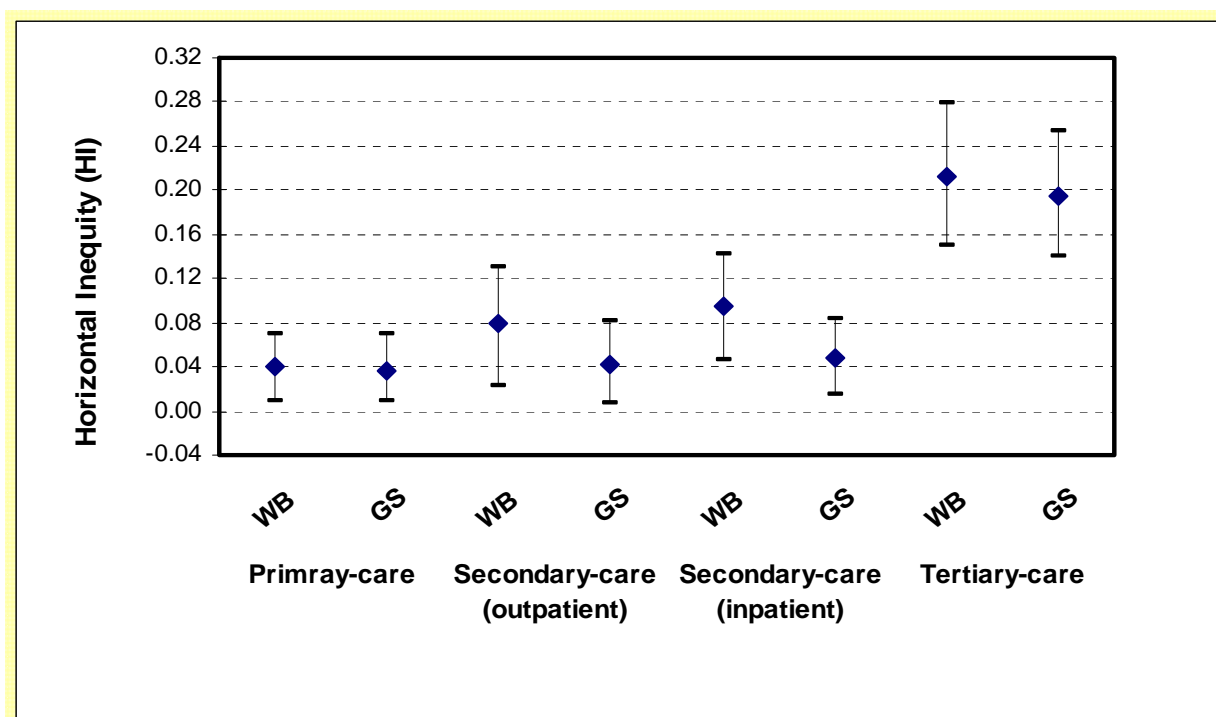
Measure	Description	Primary Care		Secondary Care- Outpatient		Secondary Care- Inpatient		Tertiary Care	
		WB	GS	WB	GS	WB	GS	WB	GS
$I_y$	<b>Total income-related inequality (<math>C_y</math>)</b>	<b>-0.0527</b>	<b>-0.0415</b>	<b>0.0511</b>	<b>0.0274</b>	<b>0.0617</b>	<b>0.0313</b>	<b>0.1311</b>	<b>0.1204</b>
$I_N$	<b>Inequality due to need factors (all)</b>	<b>-0.0925</b>	<b>-0.0772</b>	<b>-0.0278</b>	<b>-0.0139</b>	<b>-0.0337</b>	<b>-0.0171</b>	<b>-0.0815</b>	<b>-0.0741</b>
	partial contribution of:								
$C_k$	Morbidity Var.	<b>-0.0829</b>	<b>-0.0679</b>	<b>-0.0247</b>	<b>-0.0125</b>	<b>-0.0298</b>	<b>-0.0149</b>	<b>-0.0749</b>	<b>-0.0684</b>
$C_k$	Demographic Var.	<b>-0.0096</b>	<b>-0.0093</b>	<b>-0.0031</b>	<b>-0.0014</b>	<b>-0.0039</b>	<b>-0.0022</b>	<b>-0.0066</b>	<b>-0.0057</b>
$I_{NN}$	<b>Inequality due to non-need factors (all)</b>	<b>0.0398</b>	<b>0.0357</b>	<b>0.0789</b>	<b>0.0413</b>	<b>0.0954</b>	<b>0.0484</b>	<b>0.2126</b>	<b>0.1945</b>
$HI$	<b>Horizontal Inequity Index</b>	<b>0.0398</b>	<b>0.0357</b>	<b>0.0789</b>	<b>0.0413</b>	<b>0.0954</b>	<b>0.0484</b>	<b>0.2126</b>	<b>0.1945</b>
$I_V$	<b>Inequity due to socioeconomic var.(all)</b>	<b>0.0256</b>	<b>0.0240</b>	<b>0.0531</b>	<b>0.0273</b>	<b>0.0640</b>	<b>0.0306</b>	<b>0.1494</b>	<b>0.1315</b>
	partial contribution of:								
$C_k$	Income	<b>0.0142</b>	<b>0.0141</b>	<b>0.0302</b>	<b>0.0168</b>	<b>0.0361</b>	<b>0.0181</b>	<b>0.0961</b>	<b>0.0891</b>
$C_k$	Education	<b>0.0047</b>	<b>0.0041</b>	<b>0.0104</b>	<b>0.0054</b>	<b>0.0105</b>	<b>0.0050</b>	<b>0.0172</b>	<b>0.0170</b>
$C_k$	Insurance	<b>0.0004</b>	<b>0.0003</b>	<b>0.0022</b>	<b>0.0011</b>	<b>0.0018</b>	<b>0.0008</b>	<b>0.0152</b>	<b>0.0135</b>
$C_k$	Activity status	<b>0.0028</b>	<b>0.0026</b>	<b>0.0019</b>	<b>0.0009</b>	<b>0.0051</b>	<b>0.0023</b>	<b>0.0003</b>	<b>0.0010</b>
$C_k$	Marital status	<b>0.0026</b>	<b>0.0024</b>	<b>0.0017</b>	<b>0.0009</b>	<b>0.0038</b>	<b>0.0018</b>	<b>0.0002</b>	<b>0.0004</b>
$C_k$	Location of residence	<b>0.0010</b>	<b>0.0005</b>	<b>0.0067</b>	<b>0.0021</b>	<b>0.0067</b>	<b>0.0026</b>	<b>0.0204</b>	<b>0.0105</b>
$I_B$	<b>Inequity due to heterogeneity in behaviour</b>	<b>0.0127</b>	<b>0.0107</b>	<b>0.0247</b>	<b>0.0135</b>	<b>0.0312</b>	<b>0.0164</b>	<b>0.0605</b>	<b>0.0589</b>
	partial contribution of:								
$I_{PP}$	Participation	<b>0.0114</b>	<b>0.0095</b>	<b>0.0161</b>	<b>0.0081</b>	<b>0.0201</b>	<b>0.0105</b>	<b>0.0427</b>	<b>0.0388</b>
$I_{CC}$	Conditional usage	<b>-0.0049</b>	<b>-0.0033</b>	<b>0.0069</b>	<b>0.0022</b>	<b>0.0099</b>	<b>0.0051</b>	<b>0.0128</b>	<b>0.0142</b>
$I_{SEC}$	Other socio-econ.(all)	<b>0.0062</b>	<b>0.0045</b>	<b>0.0016</b>	<b>0.0032</b>	<b>0.0012</b>	<b>0.0008</b>	<b>0.0050</b>	<b>0.0059</b>
$I_R$	<b>Residual term</b>	<b>0.0015</b>	<b>0.0010</b>	<b>0.0011</b>	<b>0.0005</b>	<b>0.0002</b>	<b>0.0014</b>	<b>0.0027</b>	<b>0.0040</b>

\*Note: A positive (negative) value of the index indicates a *pro-rich* (*pro-poor*) distribution. Index in **bold** type indicates statistical significantly different from zero at ( $p < 0.05$ ).

As shown above, although the distributions of need serve to push the distribution of utilisation of the three levels of health care in a *pro-poor* direction, the divergence between overall use-inequality index ( $I_y$ ) and the distributions of need ( $I_N$ ) is, however, remarkable. The discrepancies between the “*actual*” and the “*need-expected*” distributions of utilisation indicate, therefore, the direction and magnitude of *Horizontal Inequity* ( $HI$ ) index – defined as inequality *not* due to income-related differences in need, and computed as in Eq. (22) – i.e., by subtracting the contribution of need factors from the total inequality. Results on the  $HI$  index, which are also presented in Figure 3.1 with the corresponding 95% BTS confidence intervals, show that in all the cases, the values of  $HI$  index appear to be positive, in the range of [0.039; 0.213], and statistically significantly different than zero at  $p < 0.05$ . For all levels of health care, the WB region of the OPT shows significantly higher  $HI$  index values than GS. However, in the two regions, the magnitudes of  $HI$  index across the three levels of health care show generally similar patterns: the  $HI$  values are greater (i.e., *very pro-rich*) in the case of tertiary-care [ $HI = 0.2126$  and  $0.1945$ , for the WB and GS, respectively] and secondary-inpatient case [ $HI = 0.0954$  and  $0.0484$ , for the WB and GS, respectively], while they appear to be smaller (i.e., *less pro-rich*) in the case of primary-care [ $HI = 0.0398$  and  $0.0357$  for the WB and GS, respectively], and secondary-outpatient case [ $HI = 0.0789$  and  $0.0413$  for the WB and GS, respectively].

The above suggest that, for a given level of need, the better-off make greater use of, and receive in proportion more, health care than the “poor”. Results, which hold true for all levels of health care, clearly indicate significant contributions of “*other*” non-need factors ( $I_{NN}$ ) in generating the total level of inequality in utilisation. As illustrated above, the observed *non-zero* values of  $HI$  index can be mechanically disentangled in terms of two parts,  $I_V$  and  $I_B$ , reflecting, respectively, two distinct channels of influence: the effects (on  $\hat{y}$ ) operating through the inter-personal variations in the  $x_k$ ’s across income (the  $I_V$ ), and the effects operating through the inter-group variations in the estimated parameters across income range (the  $I_B$ ). Detailed results on each part of the decomposition are also presented in Table 3.4. Broadly interpreted, the  $I_V$  would tell us – for all  $x_k$  combined (or for each  $x_k$  in turn) – the extent to which the observed inequality (in  $\hat{y}$ ) is due to *socioeconomic* inequalities, whereas, the  $I_B$  show – for a given level of need – the extent to which inequalities in  $\hat{y}$  are due to heterogeneity in behaviour (or *practice*) of the *socioeconomic* groups.

**Figure 3.1: Horizontal Inequity Indices by Levels of Health Care and Regions, with 95% BTS Confidence Intervals**



Overall, in the two regions and for all levels of health care, the estimated values of  $I_V$  index – i.e., the aggregation or the combined effects of *all socio-economic variables* – appear to be invariably significantly positive [ $I_V > 0$  at  $p < 0.05$ ], and account for a significant and sizeable contribution: between 63% and 70% of all measured  $HI$ . This suggests that the measured income-related *inequity* – defined as inequality *not* due to need – in the utilisation of the three levels of health care in the OPT are mainly driven by omnipresent socio-economic inequalities.

In effect, the (aggregate) positive contribution of  $I_V$  indicates that some (or all) of the significant socio-economic regressors included in our model do have a “*pro-rich bias*” in their distributions by income, and consequently, act to push the distribution of utilisation in a “*pro-rich*” direction. It may be of interest, therefore, to consider the (*partial*) contribution of each  $x_k$  in turn. However, before going through these contributions, it is worth bearing in mind their interpretations. As explained above, these are computed by the  $CI$  of several simulated-distributions through going from a distribution, one in which the relevant explanatory variable in whose the effect and distribution by income we are interested is neutralised (i.e., assumed be equally distributed across income by setting it equal to its means), to one in which this variable is allowed to vary across income, keeping all else constant. Therefore, the contribution of the variable ( $x_k$ ), as measured by the  $C_k$  and expressed in *percentage* terms of the overall measured inequity (the  $HI$ ), may be interpreted as in (van Doorslaer and Koolman, 2004): “*income-related inequity in health care utilisation would, ceteris paribus, be X% lower, if variable x were equally distributed across income range – or if  $\Delta$  in  $C_{\hat{y}}$  due to  $x_k$  were equal to zero*”.

Table 3.4 presents the *partial* contribution of six sources of inequalities attributed to distribution of *socioeconomic* variables<sup>65</sup> and Figure 3.2 (a-b) visualise the contribution of each of which to the total inequality. A closer look at these variables reveals that eventually all show positive and significant role in generating inequality in the utilisation of various levels of health care. However, the most influential variable is the (*log of*) household income: the partial contributions of income are always significant and sizeable<sup>66</sup> – between 0.0141 in case of primary-care and 0.0961 in case of tertiary-care, but in all cases, they account for about 40% of the *HI* values – being significantly more important in the case of tertiary-care [*circa* 45 % of the *HI*]. Basically, this means that, *ceteris paribus*, the *pro-rich inequality* in the utilisation of each levels of health care would be about 40% [45% in the case of tertiary-care] *lower* than that observed, if income were distributed equally. Quite interestingly, with the exception of primary-care, the *pro-rich* contributions of income are found alone sufficient to counterbalance the *pro-poor inequality* from the distribution of need (note that the *pro-rich* contributions of income in these cases are fairly higher than that of need), but not sufficiently so to offset the “*very pro-poor*” distribution of need in the case of primary-care.

Despite the importance of income contribution in generating the measured inequity in the utilisation of all levels of care, the observed discrepancies between the *HI* and the income contribution to inequity suggest that other socioeconomic characteristics (factors) play also an important role in generating inequity. Indeed, apart from income itself, Table 3.4 shows that “other” important variables contributing to *pro-rich* distribution of care utilisation are education attainment, insurance coverage, activity and marital status, and urban residency. In all cases and in the two regions, **education** variables emerge to be invariably the second source of the generated inequity with a (partial) *pro-rich* contribution being in the range [0.0041; 0.0172]. The partial contributions of education to the *HI* appear to be relatively slightly more important in the case of primary- (*circa* 12%) and secondary-level (13 %) compared to tertiary-level (about 8%). Similarly, for almost all levels of health care and in the two regions, the dummy variable indicating any coverage by **insurance** appears to be a significantly positive contributor to the *pro-rich* distribution of care utilisation in the range [0.0004; 0.0152;  $p < 0.05$ ]. However, the extent to which differences in insurance coverage by income contributes to inequity appears to vary significantly by the levels of care, but not between the two regions: they appear to be relatively a lot *more* important in the case of tertiary-care [7% of the *HI*] compared to secondary-care [*circa* 3% and 2% of the *HI* for inpatient and outpatient, respectively], whereas they appear to be *less* important contributor for primary-care [1% of the *HI*]. Yet, in the latter case, the *pro-rich* contribution of insurance appears only significant [at  $p < 0.05$ ] in the case of WB, but not GS.

The partial contributions of **activity status** and **marital status** to the measured degree of inequity are generally more important than the insurance coverage *per se*. However, once again, some

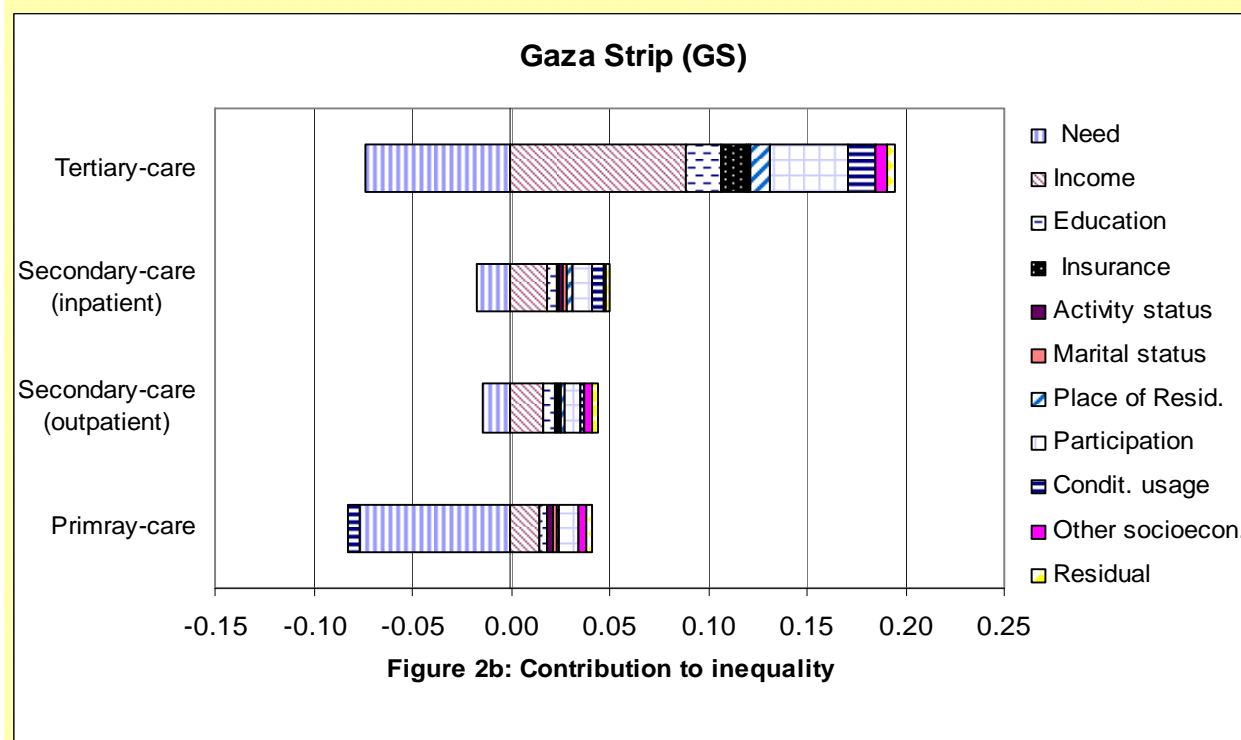
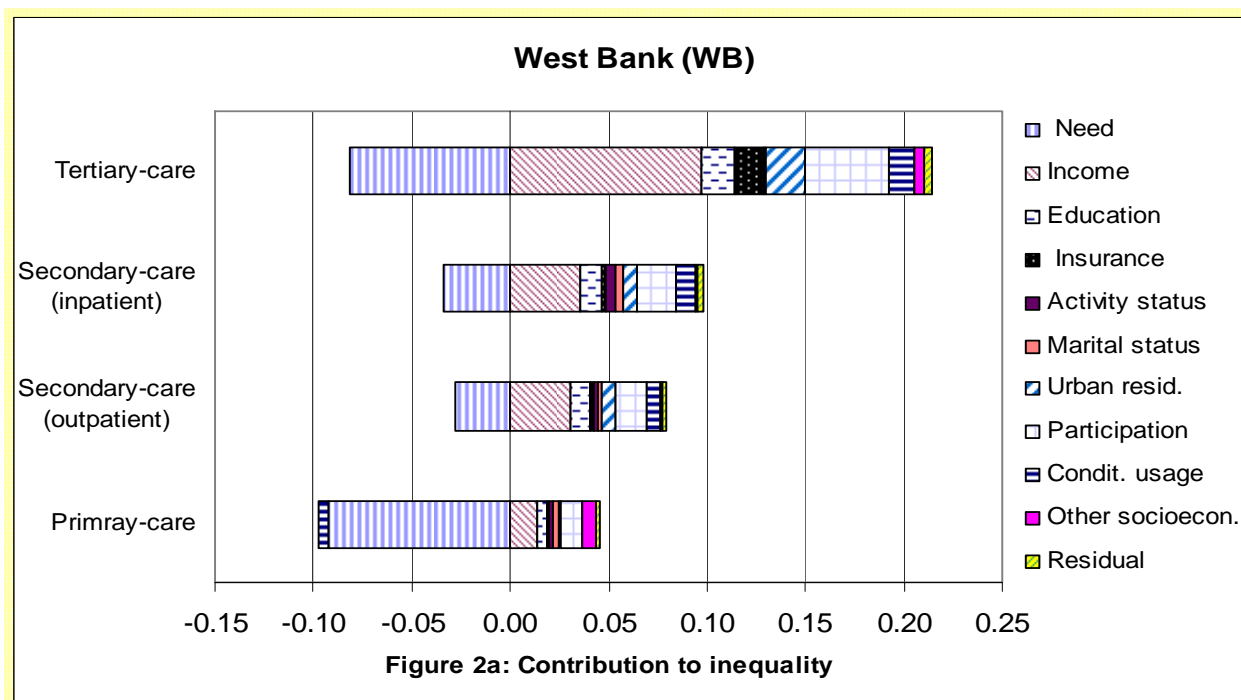
<sup>65</sup> Note that in the case of categorical (dummy) variables such as education, activity and marital status, this still represents the (*aggregated*) contribution of the respective variables in the category. The sub-decomposition showing each single variable’s contribution is not presented here in order to simplify the presentation and interpretation of the decomposition.

<sup>66</sup> Note that the main difference between income-related inequity (the *HI* index) and the partial contribution of income *itself* is that the latter is based on the (marginal) effect (keeping all else constant) while the former is based on the need-controlled association (i.e., keeping only need constant). As a result any discrepancy between the *HI* and the income contribution to inequity must be due to the contribution of the other non-need variables included.

variations in the extent to which these two factors drive inequity in the utilisation of the three levels of care emerge: the relative contributions of activity and marital status are *larger* and significant [at  $p < 0.05$ ] for the case of primary-care [*circa* 7% of the **HI**] and secondary-inpatient care [*circa* 5% and 4% for activity status and marital status, respectively] compared to secondary-outpatient [*circa* 2% of the **HI**, and both are only significant in the case WB at  $p < 0.05$ ], whereas they appear to be trivial for tertiary-care [*less* than 0.5%], with the partial contribution of marital status being insignificant at  $p < 0.05$ . Lastly, the contributions of the dummy variable indicating (urban) **residency** appear to play an important role in generating the measured degree of inequity for the three levels of care and in the two regions. However, the differences in the relative importance of such factor between the two regions and across the levels of care are equally noteworthy: while there are some substantial differences between the two regions – for all levels of care, urban residency in the WB contribute roughly twice as much as the urban residency in GS – their partial contributions are particularly more important in the case of tertiary-care [10% and 5% of the **HI** in the WB and GS, respectively] and secondary-care [8.4% and 5.2% for outpatient case and 7% and 5% for inpatient-case in the WB and GS, respectively] compared to primary-care [where they only constitute about 2.4% and 1.4% of the **HI** in the WB and GS, respectively], and appear to be insignificant at  $p < 0.05$  in the case of GS.

To sum up, the (aggregate) contribution to the measured *pro-rich* inequity, which is *not* due income *per se* constitute about 30% of the total measured inequity (**HI**) index (being always slightly higher in the WB than in GS, and lower in the case of tertiary-level), suggesting that if these socioeconomic variables were distributed equally across income range, income-related inequity in the utilisation of health care (the **HI** index) would be, in general, about 30% lower than that observed. Also, it is worth noting that, although the *pro-rich* contributions of all these socioeconomic variables push further the “*pro-poor*” distribution from need in a “*pro-rich*” direction, this remains *less* than offset by the “*very pro-poor*” distribution of need in the case of primary-care, and therefore, income-related inequality in that case remains, overall, *pro-poor*.

**Figure 3.2: Decomposition of Overall Income-Related Inequality and Horizontal Inequity by Levels of Health Care**



Turning to the second part of our decomposition, results, which are also presented in Table 3.4 and Figures 3.2 (a-b), clearly show that, in all the cases, the contributions to inequity attributed to heterogeneity in behaviour with respect to the SES of groups are far from being negligible: the  $I_B$  index, which emerges globally “*pro-rich*”, amounts to nearly 30% of the total measured inequity (the  $HI$  index). Generally, this means that, given need and other individual characteristics, SES groups do behave differently with respect to both the “*initial*” decision of seeking health care, and the conditional “*subsequent*” contacts, and that this behaviour has a “*pro-rich bias*”. Indeed, the (*partial*) contribution of heterogeneity in behaviour (the  $I_B$  index) to the total measured inequity is captured – separately from the distribution of explanatory variables by income – by the transition from a distribution where *all* SES subgroups, irrespective of their rank in the income distribution, are assumed to face the same *parameter* vectors (i.e., by imposing *homogeneity in behaviour as embodied in parameters*) to a distribution where these *parameters* are allowed to vary by income level. Therefore, the results on the estimated values of the  $I_B$  index, as measured by the *systematic deviations of the specific-group parameters from the population-wide effect*, clearly reveal, not only the prevalence of *heterogeneity in practice* for a given need, but also a “*pro-rich*” character of such practice. Hence, this may also be interpreted, as before: *inequity in utilisation of health care would, ceteris paribus, be about 30% lower, if there were no heterogeneity in behaviour across income – or if the effects of both need and non-need factors did not vary by SES.*

A further breakdown of the  $I_B$  into its respective components, as per Eq. (24), show that heterogeneity in practice associated with *participation behaviour* (the  $I_{PP}$ ) is invariably responsible for most of the “*additional*” generated inequity by the  $I_B$  index: for the three levels of health care, the (*partial*) contribution of  $I_P$  is always significant and in a “*pro-rich*” direction, being in the range [0.010; 0.043 at  $p < 0.05$ ], which amount to nearly 29% and 27% of the  $HI$  in case of primary-care, and about 20% of the  $HI$  index in all other cases. This suggests that for a given need and other individual characteristics, the wealthier groups are more likely to seek health care than the disadvantaged SES groups. The picture is somewhat different for heterogeneity in behaviour related to *conditional usage* part (the  $I_{CC}$ ). Although, they appear to be fairly modest compared to the  $I_{PP}$ , the *partial* contributions of the  $I_{CC}$  index are significantly negative in the case of primary-care [–0.005 and –0.003 at  $p < 0.05$ ], whereas they remain significantly positive for all other cases, within the range [0.022 and 0.0142 at  $p < 0.05$ ]. This indicates that, given the decision of seeking health care treatment being made, the wealthier groups appear to be more users (or receive more) of both secondary and tertiary-care, whereas the disadvantaged SES groups appear to be more users (and receive more) of primary-care. However, the pro-poor contribution of the  $I_{CC}$  in the case of primary-care remains fairly small to counterbalance the *pro-rich* contribution of the  $I_{PP}$ . In addition, as soon as the “*other*” variables’ parameters are allowed to vary, the pro-poor contribution of the  $I_{CC}$  in the latter case is more than offset by a *pro-rich* contribution of heterogeneity in behaviour related to the “*other*” socioeconomic factors (the  $I_{SEC}$ ). Indeed, the contributions of heterogeneity in behaviour linked to the “*other*” socioeconomic factors (the  $I_{SEC}$ ) emerge without exception significantly positive, within the range [0.001; 0.012 at  $p < 0.05$ ] and account for about 16% and 13% of the  $HI$  in the case of primary-care. But they appear much less in all other cases: between [8% and 1.3% of the  $HI$ ]. Lastly, it is worth noting that the contribution of the residual terms (the  $I_R$ ), which is defined as inequity due to *unobserved heterogeneity*, appear to be quite small compared with all other estimates: for all the cases we study, they are between [0.0002; 0.0040]. While the  $I_R$  captures the remaining discrepancies between the (observed) measured inequality in the utilisation



distribution (the  $I_y$ ) and those obtained from *all* the simulated-distributions of utilisation, the small values of the  $I_R$  indicate a considerable precision in the decomposition framework, as well as a high explanatory power of the regression model we used to get the parameter estimates.

### 3.6 DISCUSSION

This essay seeks to extend the analysis of inequality in the specific area of health care delivery beyond the *standard* methods that have hitherto dominated the literature. A more elaborated decomposition approach that allows disentangling the total observed inequality in the utilisation of health care into its “justifiable” and “unjustifiable” parts has been attempted. The method applied in this paper allows to rectifying the commonly used standard decomposition methods of inequality. Firstly, by using an appropriate TPM-regression approach to estimating more fully specified equations of health care demand, it achieves more consistent and reliable estimates of the determinants of health care use, while the theoretical distinction between an initial and subsequent contact makes practically sense should the decision of initiating usage is more patient-driven and the decision about the continued-use is more physicians-driven. Secondly, by using a new microsimulation-decomposition technique, it allows to decompose inequality in the (total) consumption (e.g., total number of visits) into the relative contributions of determinants, while ensuring that inequality attributed to a certain factor can be partitioned into a fraction due to participation behaviours and another due to conditional consumption behaviours. Thirdly, by separately estimating a model of health care utilisation by income-quintile, an “Oaxaca-type” of counterfactual decomposition analysis enables the identification of the relative contribution of “*heterogeneity in practice*” in each of the determinants compared to the rank in the distribution of income. Finally, by bootstrapping the entire estimation for decomposition components, it is possible to not only estimate but also statistically test for differences in the factors driving inequality.

The microsimulation-based decomposition was applied to three levels of health-care, primary, secondary and tertiary-care, proper to health-care delivery in the two Palestinian regions (the WB and GS). Results presented in this essay shed lights on the overall degree of (observed) inequality associated with each level, as well as the factors underlying the (measured) degree of horizontal inequity. Some general findings emerged from the decomposition analyses are worth making. First, in the two regions of Palestine, the distributions of “need-expected use” of each level of health care were found to be heavily concentrated amongst the worse-off [the  $I_N$  values  $< 0$  at  $p < 0.05$ ], indicating that if *Need* were the solely source of *inequality* in the utilisation of each level of health care, then *inequalities* favouring the poor would be obtained. The basic question to our analysis is therefore: ***whether and to what extent the distributions of health care were sufficiently skewed towards the bottom end of the income distribution to compensate for the higher needs of the worse-off?*** Amongst the distributions of health-care we study, only the distribution of primary-care was found to be skewed towards the bottom-end of income distribution, but not sufficiently so to meet the “*very pro-poor*” distribution we found on the basis of need. Consequently, after controlling for the greater needs of the poor, a significant degree of *horizontal inequity* favouring the better-off was found in the two regions. The picture was dramatically different for all other cases: while needs for health-care were always greater among the poor, health-care distributions for secondary – both outpatient and inpatient types– and for tertiary-care were found to be skewed towards the upper-end of the income distribution, resulting in substantial degrees of *horizontal inequity* favouring the better-off. Quite noteworthy, all of the

*inequity* indices we estimated were found to be statistically significant [at  $p < 0.05$ ]. However, the magnitudes of *pro-rich horizontal inequity* were found to be strongly correlated with the level of health-care: the *HI* values tend to increase as we go from primary [*HI* = 0.0398 and 0.0357] to secondary-outpatient [*HI* = 0.0789 and 0.0413] and inpatient-case [*HI* = 0.954 and 0.0484] up to tertiary-level of care [*HI* = 0.2126 and 0.1945, respectively, for the WB and GS]. This is not a surprising result and remains in line with previous findings in the international literature about health care delivery<sup>67</sup>.

Secondly, given that the estimated *inequity indices* for all levels health care demonstrated a comparatively high degree of *income-related inequalities* that are *not* due to *inequalities in need*, it is clear that these (remaining) inequalities in the distribution of each of which would stem from inequalities in the distribution of “other” factors affecting health care utilisation. The more interesting question to our diagnosis of inequity is therefore: ***what are the factors responsible for the pro-rich inequity observed in all levels of health care, and what is the relative contribution of each of these in generating the measured degree of inequity?*** Detailed results on the factors underlying the (measured) degree of horizontal inequity revealed that “*socioeconomic inequalities*” attributable to the distributions of variables by income – as reflected by the  $I_V$  index – were jointly responsible for the majority of *inequity* in the utilisation of the three levels of health care [between 63% and 70% of all measured *HI index*]. The relative contributions of the *socioeconomic variables* to inequity are, thus, of considerable interest. Using *microsimulation* exercise, the decomposition approach was able to identify the (partial) contribution of each *socioeconomic variable* integrated in the model. Given that most of the *partial concentration indices* of inequality (the  $C_k$ ) associated with these variables were found to be statistically significant [at  $p < 0.05$ ], it seems wise to discuss the role of each one in generating the (measured) horizontal inequity in health care utilisation.

On the whole, income variable itself was found to be invariably the most important “*contributor*” to the *pro-rich inequity*, resulting in a positive contribution of [about 40 % all measured *HI index*]. We know that income is more likely to have an impact on utilisation in countries where either financial or non-financial access costs differ by income levels (van Doorslaer et al., 2000). In addition, the more “*unequally*” the income is distributed across population, the stronger its contribution to *inequality* in utilisation would be – as we also know from the results of international comparisons of equity in health and health care use (e.g., van Doorslaer et al., 2006; van Doorslaer and Koolman, 2004). The degree of income inequality in the two Palestinian regions were found in (Abu-Zaineh et al., 2006) to be quite high, with a *Gini coefficient* of 0.45 in the WB and 0.41 in GS. The *pro-rich* contribution of the *unequal* distribution of income to inequity in utilisation of various levels of health care in the OPT is not, therefore, surprising. Perhaps equally noteworthy, but unsurprisingly, is the variation in the direct contribution of income by levels of care, which was found to be large enough to counterbalance the *pro-poor* distribution of need for the *costly* care – secondary and tertiary-levels – compared to primary-care for which the *pro-rich* contribution of income was *less* important and not *sufficiently* so to offset the *pro-poor* distribution of need.

Education variables were found to be invariably and significantly the second contributor (source

<sup>67</sup> Note that comparing our results to findings of others is difficult. This is not only due to the many differences in approaches used, but also because of the common distinction in the literature between GP and SP services.

of) to the *pro-rich inequality*, with a positive contribution being in the range [8%; 13% of the *HI index*]. The “*very pro-rich*” contribution of education variables to the distribution of health care utilisation was mainly due to the *unequal* distribution of higher education across income levels – both found to be more concentrated in the highest-part of income distribution – and the fact that, at any given level of need, better-educated individuals – who tend to be also richer – are generally more *inclined* to seek health care than lower-educated individuals. This is too not a surprising finding and remains in line with the previous research on decomposing inequality in health and health care. For example, [van Doorslaer & Masseria \(2004\)](#) found the contribution of education to be almost in a *pro-rich* direction, and particularly, more important in the case of SP and dental-care compared to GP care. According to these authors the influence of education may capture differences in communication skills or may simply reflect differences in taste.

Besides education, marital status variables, which were previously shown to affect the propensity to seek health care, emerged to be a positive contributor to *pro-rich* inequality in the OPT. The contribution of marital status to inequality appeared to come from the relatively *more* use of married persons – compared to non-married groups (separated/divorced) and their *unequal* distribution by income, resulting in a positive contribution to *pro-rich* inequality in the range of [0.1%; 6.7%] of the measured *HI index*. The contributions of activity status variables were generally not less important. The “additional” inequality produced by activity status emerged to be predominantly positive. This was mainly due to variation in two categories: the employed and self-employed. Compared to the unemployed and the housework (not in the labour force) both groups tend to use significantly *more* health care (i.e., positive use effects), and rank higher in the income distribution. This resulted in a *positive* contribution to inequality, being in the range of [0.2%; 7.3%] of the measured *HI index*.

On the other hand, insurance coverage emerged to be a positive contributor to *pro-rich* inequality. Expectedly, however, the degree of *pro-rich* inequality of tertiary- and secondary-care emerged to be a lot lower – i.e., *less pro-rich* – [*HI* would be 7.0% and 3.0% lower] than that of primary-care [*HI* would be only 1.0% lower] if insurance coverage were more equally distributed across population. Clearly, the result on the role of health insurance in generating inequality while reflecting differences in the coverage by income, also confirms the fact that the utilisation of some types of health care (the costly ones) are more likely to be affected by the presence of coverage. Indeed, these results appear to be in accordance with previous findings on the effect of insurance on the observed degree on inequality. For example, in their search for an explanation of cross-country differences in the degree of horizontal inequality (the *HI<sub>WV</sub>* indices), [van Doorslaer, Koolman, & Puffer \(2002\)](#) found that inclusion of health insurance in the “standardisation” did reduce the degree of *pro-rich* inequality in SP care utilisation. They interpreted this as evidence that health insurance do play a role in explaining the occurrence and degree of horizontal inequality.

Turning to locality differences, results clearly demonstrated that in the two Palestinian regions urban residency was found to impose a significant *pro-rich bias* to the utilisation of all types of care services. Findings such as these seem to reflect, in part, the fact that urban residency is closely correlated with income (compared to other localities as rural and refugee camps, people living in urban areas tend to rank higher in the income distribution). Some, though, is undoubtedly due to the fact that the distribution of health care recourses (such as secondary and tertiary services) is more concentrated in urban areas. Indeed, compared to these levels of care, the partial concentration index for the utilisation of primary-care appears to be less sensitive to

locality differences. Equally noteworthy was the variation between the two Palestinian regions on the importance of “*locality differences*” in generating *pro-rich inequity*: there appears to be relatively more reasons for concern about access to all levels of health care in the WB compared to GS. This variation can, however, be attributed to differences in the *geopolitical realities* of each territory: access to health care in the WB is compromised by the numerous checkpoints as well as the separation wall [see Box 0.1], which do not actually exist inside GS. Indeed, given the considerable restrictions on movement of people inside the WB agglomerations that are imposed by the intensity of the checkpoints, “additional” direct costs – such as transportation costs, which constituted about 13% of total household health care expenditures burden in the WB (PCBS, 2003) – and indirect costs – such as queues and waiting time on checkpoints – for accessing care facilities, though are confronted by almost all socioeconomic groups, they can differ significantly according to different locations – e.g., refugees camps, in-out side the separating wall.

Thirdly, the decomposition analysis clearly confirmed the importance of “heterogeneity in behaviour” for a given need with respect to socioeconomic status – as reflected by the  $I_B$  index – in generating the measured *pro-rich inequity* in utilisation of various levels of health care. In effect, by estimating separately the model for each SES group of the population, the micro-simulation exercise was able to detect potential differences in utilisation behaviour amongst different sub-groups of population. By so doing, we have shown that about 30% of the total *horizontal inequity index* was due to heterogeneity in behaviour with respect to the rank in income distribution. As noted earlier, this *feature of inequity* could not be elucidated in previous research where the *standard* methods of decomposition were applied<sup>68</sup>. Interestingly, the breakdown of *behaviour* by “*parts*” (participation and conditional usage) demonstrated that, without exception, the probability of participation (i.e., the initial visit) was much more important than the *conditional usage* (i.e., the subsequent visits) in generating the observed patterns of horizontal inequities [of the total  $HI$ , the  $I_{PP}$  constituted about 28% for primary-care and 20% for all other cases]. Also of note, the decomposition by “*parts*” revealed almost similar patterns across levels of care regarding the direction of each part’s contribution: the *behaviour* associated with both *participation* and *conditional usage* emerged to be in a *pro-rich* direction. Notable exceptions to this prevalent *pro-rich behaviour* were observed in the case of primary-level of care in the two regions, where a *pro-poor behaviour* stems from the *conditional usage* part. Though, this was too modest to compensate for any *pro-rich* diagnoses associated with the utilisation of this level of care.

Generally interpreted, the results on “heterogeneity in behaviour” may signal differences in *genuine individuals’ preferences*, at a given need, lower-income groups may have lower *preferences* toward health than the better-off, and in the *perceptions* towards the benefits associated with treatment: the better-off may have a better perception toward wellbeing (Huber, 2006; Dormont et al., 2006). This would suggest that *some* of our measured *inequity* in access to health care was rather driven by *heterogeneity in preferences* by income level, at a given level of

<sup>68</sup> In previous studies (see e.g., van Doorslaer, E., et al, 2003), the  $HI$  index is decomposed into the sum of the effects of the distribution of the explanatory variables, and does not take into account any potential heterogeneity in the impact of these variables on health care utilisation, with respect to income. Thus, by applying the ECuity group decomposition using (Eq. 3 in Wagstaff, A., et al, 2003), the overall inequality index is decomposed into the sum of the concentration indices of the various explanatory variables of the model, weighted by the coefficient of each variable and estimated on the whole sample. The heterogeneity of behaviours with respect to income cannot, therefore, be identified.

need. Indeed, technically speaking, the behaviours of the groups were captured here through the systematic deviations of the *specific-group parameters* (of need variables) from the *average* behaviour of population (O'Donnell et al., 2007). These parameters, which measure the influence of need on probability of participation and conditional usage, were estimated when other differences in individual characteristics (including income) were controlled for. Therefore, this demonstrated that the (*influence*) of need for health care not only significantly differs across groups, but also *positively* correlated with individuals' rank in the income distribution: for a given need, and other characteristics, individuals belonging to higher-income groups were more likely to seek health care, and received more care (except in the case of primary-care) than the poor.

As illustrated above, our results indicating the presence of heterogeneity in behaviour have been generated using a two-part model (TPM). Given the *two-stage* character of the decision process underlying such modelling for health care demand (Manning et al., 1981; Manning et al., 1987) – where the first-stage (the contact decision) is commonly interpreted as being determined by demand side (i.e., the patients), and the second-stage (the frequency decision) as being more likely influenced by supply side (i.e., physicians' practice and institutional features)<sup>69</sup> – , an issue that is arguably of interest in its own right is: ***whether and to what extent any of the observed inequity features resulting from these differences (in behaviour) can be traced back to institutional features of the health care delivery system (e.g., physicians practices, gatekeeping aspect of the referral system) rather than genuine individuals' preferences (patients behaviour)?***

The first study to explicitly incorporate the two-stage decision process to the analysis of equity in the delivery of health care was conducted in the context of European countries, using the *standard* decomposition method (van Doorslaer et al., 2004). Study's findings with respect to differences in the degree of inequity – being decomposed separately as first-stage and second-stage inequity – demonstrated the presence of *some (pro-poor)* horizontal inequities in the conditional (subsequent) number of visits in the case of GP, but *substantial (pro-rich)* horizontal inequities in the probability of an (initial) visit and to less extent in the conditional (subsequent) visits in the case of SP. These findings were broadly interpreted, given features of health care systems in these countries (e.g., gatekeeping roles for GPs, specialist-self referral patterns), in terms of behaviour as “*doctor-driven vs. patient-initiated*” inequity, depending on the extent to which the decision is more likely to be influenced by the physician than the patients. However, it must be noted here that these findings were generated by imposing *homogeneity in behaviour* across income range. They did not, therefore, take into account any differences in *patients' preferences* by income levels, nor presumably could they reveal potential differences in *physicians' behaviour* vis-à-vis different groups of income<sup>70</sup>.

<sup>69</sup> Many studies have emphasised the principal-agent relationship between doctor and patient and stressed the distinction between patient initiated decisions, such as the first contact with a GP, and decisions that are influenced by the doctor, such as repeated visits, prescriptions, and referrals (e.g., Pohlmeier and Ulrich, 1995).

<sup>70</sup> Indeed, once again, using the “standard” methods of ECuity group, inequity interpretations can only be made in terms of “average behaviour”. The average relationship between need indicators and utilisation, as embodied in the regression coefficients of need indicators ( $\delta$ ), represents therefore the amount of health care society allocates, on average, to that need, and irrespective of income level (Cf. also, footnote 72 and 75). This average behaviour, which constituted a norm for assessing equity in health care system in the work of ECuity group, may yet be questionable.

By contrast, the analysis presented in this essay was more capable of shedding light on this issue. While the broad inequity interpretations in terms of patients-physicians behaviour in the first-stage and second-stage of the analysis would ultimately depend, as before, on: who take (or influence) the decision for treatment, by revealing the differences in behaviour across SES groups, the microsimulation method adopted here can lend itself better to such interpretations. Indeed, this method, which is in the spirit of the work by Oaxaca (1973), has been recently applied to assess: differences in income distributions in middle and high-income countries (e.g., Bourguignon et al., 2002); the threat of aging on health care expenditure (e.g., Dormont et al., 2006), and inequality in the delivery of health care in France (e.g., Huber, 2006). In the latter paper, a microsimulation exercise was conducted to assess the effects of *heterogeneity in behaviour* on the use of GP and SP care services, using a two-stage decision process. The author has shown that about *half* of the *horizontal inequity index* in the utilisation of both types of care, GP and SP, were due to *heterogeneity in behaviour* relative to the rank of individuals in the income distribution. Furthermore, findings with respect to first- and second-stage inequity, and for both cases of utilisation, demonstrated the presence of (*pro-rich*) inequities in the probability of participation, but (*pro-poor*) inequities in the conditional use. By linking these findings to patients' and physicians' behaviour, Huber (2006) speculated that while the finding on the *pro-rich* inequity in participation might be a sign of *low preferences* of the poor vis-à-vis health, the behaviour of physicians being invariably in favour of the poor, compensate for the former behaviour. She interpreted this as evidence that the “egalitarian” French health care system perform quite well in terms of promoting equality in treatment.

Turning to our health care delivery system, the general findings on the importance of *heterogeneity in behaviour* (the  $I_B$ ) in the measured degree of *horizontal inequity* are to some extent consistent with the simulations reported by others (Huber, 2006), even if the extent to which *heterogeneity in behaviour* induce *horizontal inequity* in the two Palestinian regions appears to be comparatively lower than those reported for France – the  $I_B$  index was shown, using somewhat similar definition, to account for about 50% of the total  $HI$  index, whereas this accounts for only about 30% in the WB and GS. This indicates that the bulk of inequitable patterns of accessibility to health care services among different socioeconomic groups in the OPT are due to the “other” explanatory factors. Nevertheless, some other important differences, which dramatically contrast the findings reported in the above study, arise. In the two Palestinian regions, heterogeneity in behaviour attributed to the second-stage of the decision process for the utilisation of all levels of health care, except primary-care, are shown to have a *pro-rich* character. It is, as noted earlier, as far as the supply side is concerned, such a *pro-rich bias* in the (subsequent) utilisation of both levels of secondary and tertiary-care may be related to specific characteristic of delivery system proper to these services (e.g., provider practices, self-referral, etc.). The opposite can be said with respect to access to primary-care. By far the *pro-poor* behaviour of (subsequent) utilisation is more influenced by provider practices than the patients this may be interpreted as some sort of “positive discrimination” by the primary-care providers of lower-income groups.

In effect, a proper interpretation of our findings requires a thorough understanding, not only of health care delivery structure, but also of the operation of health care market and the prevailing funding arrangements. As already stated in Section 3.2, primary-level of care has long been considered (NHP, 1994) as the backbone of the Palestinian health care system, and a strategy towards the achievement of affordable and accessible health-care for all of segments of the

population was put in place (NSHP, 1999). Nonetheless, the majority of primary health care centres are managed by the MoH sector (about 63.6 % of total centers), where low co-payments and user-fees are applied for certain types of services such as drug prescriptions and laboratory tests, while about 28.3% are operated by the NGOs sector, where low-income and vulnerable groups are given priority to such services, with the user-fees are waived in cases of extreme poverty (Hamdan et al., 2003). Indeed, such practices in favour of the poor were partly reflected in our results demonstrating a *pro-poor* behaviour with respect to (conditional) usage of primary-care. However, as shown above, such a *pro-poor* practice at the supply side was incapable to reverse our diagnosis of *pro-rich* inequity for this level of care. This suggests that barriers to access these services, such as the extent of public cover and the use of direct out-of-pocket payments, continue to persist. The current health care financing arrangements in the OPT was shown (Abu-Zaineh et al., 2008) to be regressive, with payments comprising a decreasing share of individuals' abilities-to-pay. This regressive character is particularly reflected in the private sector which plays a non-negligible role in health care provision (around 21.4% of health care visits), and where no price-discrimination policies that would take into account differences in individuals' ATP are applied.

Other potentially “inequity-relevant” practices at the supply side may help explain why higher and lower-income groups appear to be treated differently at the same level of need and across different levels of care. First, the Palestinian health care system is characterised by heterogeneity of providers and high fragmentation of structures, compounded by complex public and private provision arrangements. The multiple providers contributing to the provision of health care at the three levels were found (Mataria et al., 2007) to cope with “*de facto complementarity*”, with substantial patient shift transfer from one provider to another, following suboptimal referral and re-referral schemes that lack appropriate follow-up and continuity. Obviously, in so far as these referral patterns differ by socioeconomic groups, providers practices would be main driver in the “differential treatment for equal needs” observed at secondary and tertiary levels. It is quite possible that the better-off are getting different referrals (preferential or quicker access to certain services of care) than those oriented towards the needy and the worse-off segments of population.

On the other hand, given the three-tiered pyramidal structure of health care delivery, where providers at secondary and tertiary levels may not always have the first contact with the patients, it is also possible that some of the *pro-rich* patterns observed at these levels of care stems from the (initial) contact at the primary-level, and may, therefore, be related to (unequally) bottom-top referral patterns for patients belonging to different socioeconomic groups. Indeed, our simulation results demonstrate a *pro-rich* participation behaviour for primary-level but a *pro-poor* behaviour corresponding to conditional usage of primary-services, and a *pro-rich* behaviour for secondary- and tertiary-levels. If such heterogeneity in the two-stage behaviour taking place at primary-level were due to referring the better-off patients to a more sophisticated-care provided at higher-levels – which involves higher costs burden – then this would suggest that the *pro-rich* inequities emerged at the secondary- and tertiary-levels may be primary-level-initiated<sup>71</sup>. It has been noted before (Schoenbaum et al., 2005) that the delivery system of health care in the OPT lacks an

<sup>71</sup> For example, practioners at the primary-level can refer patients to a better speciality care just by assessing their ATP. Other factors, of course, relate to the asymmetric information, whereby practionners know better than the patients about the availability of services and their quality at governmental services compared to private and NGOs sectors. So if the patients can afford to pay, they are likely to be referred without delay to a better care.

effective role of “gatekeeping” for higher-levels of care: patients seeking referrals for speciality-care are generally entitled to receive one, regardless of the assessment of the actual needs. Moreover, the governmental health care sector, and the associated health insurance scheme, does not comprise “any systematic review of utilisation such as requiring primary-care-referral for speciality-care” (Schoenbaum et al., 2005).

Secondly, secondary and tertiary-care are provided through a limited number of general and specialised hospitals, with significant differences in the utilisation patterns by providers. While hospitals run by the MoH [22 hospitals representing 56% of total hospital beds] are over-utilised, with occupancy rate of 80% and average length of stay 3 days, those run by the non-governmental and private sector [53 hospitals] are found under-utilised (HPU, 2008). These differences may reflect (unequally) “inter-referral” patterns or (unequally) access for patients belonging to different income groups: for a given need, better-off patients are referred to other (non-governmental) hospitals, where higher costs are incurred. Thirdly, in the two Palestinian regions, there is a clear shortage in tertiary-care services. Consequently “abroad-referrals” are pursued for several cases (Mataria et al., 2008). Given the fact that patients may not all be equally entitled, some of the inequitable patterns observed at the tertiary-level may be due to the (unequal) accessibility to abroad-referrals services for different income groups. Indeed, the current arrangements lacks a *modus operandi* for the referrals abroad, which usually acquired using one’s clout, connections and influence in places of power (Shalabi and Ladadwa, 2007)<sup>72</sup>.

Although the analysis undertaken in this study attempted to use recent methodological developments in the field of inequality measurement, some practical limitations must however be acknowledged. Firstly, like similar studies on inequality measurement in health care delivery (e.g., Lu et al., 2007), our analysis was based on the assumption that “*a visit is a visit*”. The potential caveat of this is that it only takes into accounts *quantitative* differences in health care utilisation, with no adjustment being made for *qualitative* ones. Considering the latter – e.g., differences in the available medications, tests, equipments and waiting time at different providers facilities – allows assessing the extent to which *quality differentials* affect the magnitude of inequality (van Doorslaer et al., 2004)<sup>73</sup>. Unfortunately, our survey did not offer data on these aspects, and in their absence it was impossible to adjust for *quality differentials*. Furthermore, although an attempt was made in the present analysis in the direction of distinguishing health care utilisation by providers (public, private and NGOs), the available data did not permit to go beyond simple (*unstandardised*) quintile and concentration indices comparisons. For instance, we were not able to estimate coefficient specific to each SES group (i.e., income-quintile) as per sub-category of providers (e.g., private-users) in order to apply the full decomposition analysis. Further investigation with larger samples and appropriate data shall allow studying this question.

Secondly, given that a more proper medical diagnosis of morbidity is hardly feasible in the context of household surveys, our indicator of health care need was based on self-reported illnesses. Although, the latter is often regarded as a good predictor of “effective morbidity” at

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<sup>72</sup> The local term that is used to describe such practice is “Wasta”.

<sup>73</sup> In the context of the OPT, the question of quality of care is a crucial one for the assessment of equity. This is because quality aspects of care, including the availability of some treatments, medications and tests are shown to differ substantially across different providers: patients who do not find the required treatment or medication at public facilities can go private should they afford the costs.



least in the context of developing countries (O'Donnell and Propper, 1991; Idler and Benyamini, 1997; Benyamini et al., 1999), it must be noted that such measure remains “subjective”. It cannot, for instance, preclude that the possibility that cultural differences related to socioeconomic status may have influenced respondents’ willingness to declare some episodes of illnesses. Therefore, it can be argued that some variation in self-reports may rather reflect differences in propensity to report illness than “true” differences in morbidity across socioeconomic groups (Cissé et al., 2007). To the extent that this might be reported, an over- or under-estimations of our measure of horizontal equity might have been occurred.

Lastly, as indicated above, our analysis of health care utilisation has made use of data derived based on different reference periods for the three levels of care. Though, the relatively shorter periods – compared to a scenario where longer periods are used as is the case for secondary-care – help minimise the problem of under-reporting due to recall errors, data collected over a short period may be subject to “eventual bias” due to the stochastic nature of illnesses, and the infrequency with which some health care utilisations are made. Nonetheless, we acknowledge that the short recall period used in the case of primary-care has inevitably reduced the explanatory power of the model, since it is harder to explain short term than longer (e.g., annual) term with the typical covariates used here. This can be avoided in future studies should data be collected over a longer period of time and using a diary recording approach.

### 3.7 CONCLUSION

This essay provides the first analysis of income-related inequality and inequity of health care utilisation in the two Palestinian regions. While the analysis of inequality provides some interesting information and policy-relevant findings, it seems wise to echo Van Doorslaer et al. (2004) emphasis on the fact that: “*the usefulness of inequity measurement crucially hinges on the acceptance of the horizontal equity principle as an explicit policy goal*”. So far as “*equal treatment for equal need*” is approved upon as an integral part of health policy, the results presented here can indeed help formulate appropriate interventions towards building an equitable health care delivery system for the case of the OPT. Indeed, whereas equity objective was frequently incorporated in the subsequent National Health Plans for the OPT (NSHP, 1999; NHP, 1994), there has been, however, no evidence against which to evaluate the equity performance of the health system of the OPT. Therefore, in addition to applying new methods of measuring and decomposing inequality in health care sector, our aim in this paper has been to present some evidence on the degree to which health care use is unequally distributed by income, and to unravel the sources of such inequality in the particular context of the OPT.

Our empirical results, whilst subject to the usual caveats regarding the causal interpretation of cross-sectional results, offer a useful and detailed picture of the overall inequality and inequity associated with the current health care delivery structure in the OPT. They suggest that the poor have disproportionately greater need for health care. This finding corroborates earlier results for European health care systems and the United States (e.g., van Doorslaer et al., 2000; van Doorslaer et al., 2002; Huber, 2006) and for Canada (e.g., McIsaac et al., 1997). But they also suggest that given income-related differences in need, the access to – and utilisation of – primary, secondary and tertiary services in the two Palestinian regions are greater amongst the higher-income groups: *either higher-income groups are over-utilising these services, or some access barriers for those on lower-incomes do persist*. The careful modelling and decomposition

through microsimulation technique has made it possible to fully identify the relative contributions of factors responsible for the prevalence of such “*inequitable*” patterns. Several *policy-relevant factors*, which have to be taken into account for any future attempt aiming at reforming health sector, are identified.

Firstly, it was shown that “*socio-economic inequalities*” resulted primarily from the “*very pro-rich*” contribution of income itself, and further exacerbated through its correlation with “*other*” health care utilisation determinants (e.g., education), were responsible for the greatest part of *horizontal inequity* in the utilisation of the three levels of health care. This finding has very important policy implications. It reveals that significant *financial barriers in access* to various health care services (albeit to differing degrees: smallest for primary and greatest for tertiary) persist. Of course, this implies that it is not only *income-inequality per se*, but also the partial association between income and the use of health care that matters for income-related use-inequity. Reducing the latter appears, therefore, to be a matter of *financial barriers* but also of *income-redistribution*. Among the potential policy measures to reduce the *financial barriers* is the reduction in direct cost burden associated with the provision of these services. This might be achieved through gradually shifting from the *regressive* ex-post payments structure towards a more equitable ex-ante mode of financing. A proper tax-transfer system (e.g., *pro-poor* redistributive policies), which can reduce *income-inequality*, may also help ensure a more equitable health care financing and delivery system.

Secondly, the paper also sheds light on the role of other indicators of “*social disadvantage*” in generating *pro-rich* inequities, such as low-education, non-participation in the labour force and living in non-urban areas. This is again an important finding because, as before, it implies that reducing use-inequity seems to be also a matter of reducing these associations through appropriate health related policies than only redistributing income (e.g., van Doorslaer and Koolman, 2004). Therefore, among the factors potentially amenable to policy intervention, education, labour force participation and location of residence stand out as important contributors to pro-rich inequity. Indeed, where the *partial contribution of education* was substantial, as in the case of secondary and tertiary services, it was mainly a consequence of both the unequal distribution of *education* by income and higher inclination of the *higher-educated groups* for seeking health care. In so far as the influence of education captured differences in the *communication skills* or *knowledge gap* among income groups, this implies that it is not so much the inequality in education by income *per se*, but the partial association between higher-education and access to health information that matters for use-inequity. The same observation does hold for all other variables. Yet, it may be worthwhile, for policy makers in the OPT, to highlight the fact that the partial contributions of location of residence, which seems to reflect not only the disparities in the availability of health care services, but also the geopolitical situation following the “*bantustanisation*” in the two occupied territories (Giacaman et al., 2003), do play a significant role in explaining the occurrence and degree of horizontal inequity (particularly for the case of secondary and tertiary services in the WB). Although, we need to point out that under the current conditions of “*bantustanisation*” the issue of accessibility to the available services remains here a political one, a critical need is there to identify appropriate policies capable of achieving a more balanced-geographical allocation of health care services in terms of the number, levels and types of services. Inter-providers and inter-sectors interactions can also play an important role in reducing the adverse impact of such situation on health care use-inequity.

Lastly, our findings on the *heterogeneity in behaviour* with respect to socioeconomic groups, whilst generally corroborate earlier evidence (e.g., Huber, 2006) on the importance of taking into account such axis for judging equity performance of health systems, are rather less important compared to the contribution by *socioeconomic factors*, and appear to further reinforce the *pro-rich inequitable* trends in the case of the OPT. The fact that it shows up in very different levels of health care (albeit to differing degrees) suggests that it may have more to do with systematic differences in (*participation*) *behaviour* between higher- vs. lower-income individuals than with the characteristics of health care delivery system *per se*. A crucial question is, of course, whether the “remaining” systematic differentials in behaviour are irrelevant from an equity point of view because they may merely reflect differences in individuals’ genuine preferences and tastes vis-à-vis health care, or whether these use patterns do reflect important preferential practices by providers, which may translate into the less well-off receiving lower standards of care than the better-off.

As shown elsewhere (e.g., van Doorslaer et al., 2002), this seems to depend largely on the extent to which “*differential treatments of equals*” were *patient-initiated* rather than *provider-driven*, but also on whether they translate into better treatment, and thus, differences in *health gains*. Given the two-stage interpretation, our analysis was indeed able to signal potentially discriminatory practice by providers in favour of the poor for primary-care and in favour of the rich for other cases. Having identified that, it is an important one and the results in this paper do extend our knowledge about this issue.

Nonetheless, our analysis was not capable of shedding light on whether and to what extent any inequities in health care usage, *do* translate into *differences in health gains*, and consequently, into *inequities in health outcomes*. Evidence available in the literature (e.g., Alter et al., 1999; van Doorslaer and Koolman, 2004) suggests that they often do. Indeed, it seems likely that the “*excess-use*” of the better-off would not merely reflect quicker accessibility, but also higher quality of treatment, and apparently, better *health gains* compared to poor. In addition to address the latter issue, future research may focus on developing, implementing and evaluating policy interventions to reduce the observed unequal distributions in these three levels of health care in the two parts of the OPT, and to look into health outcomes after having received health care.



**GENERAL CONCLUSIONS AND RECOMMENDATIONS**



As noted at the outset, the issue of “*equity or fairness in health*” has received recently a conspicuous attention, and a fairly considerable progress in the direction of identifying and quantifying various aspects of inequities in the health care sector has been made over the last few years. The present study has sharpened its focus on various dimensions and measures of equity related to the finance and delivery of health care in a very particular context of developing countries: the Occupied Palestinian Territory. Without getting into the specific details of the empirical analyses and the valuation results contained in this scholar work, it is perhaps advisable to conclude by reconsidering some key issues, which emerged from the different problems studied here. A general conclusion section shall also provide an ideal opportunity to draw further hopeful remarks about health policy involved in the issue, as well as some prospects for research which fall under the general rubric of “*equity in health*”. Also without getting overwhelmed by the nuts and bolts of the quantitative measurement of equity, I shall try to allude to some limitations of the subject as it is currently understood and studied.

### **Main Contributions of the Study**

On theoretical grounds, the points of departure of the present study were virtually analogous to those of the majority of previous empirical work in the field to date. Specifically, the egalitarian “twin principles” of “financing according to ATP” and “delivering according to need” have provided the notional basis for the empirical assessment and the normative judgement of equity conducted in this study. Adopting the egalitarian mainstream was, essentially, motivated by the fact that its general notions have been receiving a continuing support from academia (O’Donnell et al., 2007), and are increasingly being acknowledged by both scholars and policy-makers in developing countries (EQUINET, 2008). This study did not, therefore, take part in the long-standing and vigorous philosophical debate about the alternate theories of justice, nor did it involved in the latest ideological debate surrounding this area of research. The current debate (which I regrettably neglected in this study) is promising, though remains so far tentative in character, seeking to establish alternate views of *fairness* that build on, and blend, ancient and contemporary theories of social and distributive justice; e.g., Aristotle’s political theories, Rawls’s theory of “justice as fairness” and Sen’s theories of “capability deprivation” and “adaptive preferences” (Ruger, 2004; Roemer, 1994). Nonetheless, an attempt was made [Section 0.3 and other relevant places] to briefly explore some alternate definitions and interpretations, and the kinds of “equity” implications that they could generate. The aim of such exploration was, however, to provide a critical synthesis of the literature and to locate this work in that intellectual space. There are, of course, other different, though not unrelated, grounds for broadening the trawl through the different definitions and interpretations of “equity”. These have been outlined earlier [Section 0.3] and do not need repeating here, other than to draw some general concluding remarks. By its very nature, the subject of equity is a much-debated one. Even if the highly philosophical debate has often been reduced, in practice, to one ideological stream with some “guiding principles”, a lack of agreement on the meanings and interpretations of fairness for the health care sector persists and marked the literature of the last decade. Though, it is, as noted by Wagstaff and van Doorslaer (2000), “unrealistic to expect economists who are, after all, not noted for their ability to agree with one another, to agree on them” [p.1855], one of the general conclusions to emerge from reviewing the different definitions in the literature is the need for liberating the “*analysis of health equity*” from elusiveness and contentious conceptions. The concepts and definitions of equity in the health sector ought not to be “demand-driven”, even if these are often taken to gain political commitments and to promote some intervention strategies for reforming the health sector. At least, scholars in related field should not deliberately leave the conceptual issues overwhelmed by vague generalities, which may fuel unnecessary misinterpretations and controversies in the public and health policy debates.

It is those standard established techniques, which are currently being used to quantifying and judging equity features in the health care sector, that were the subject of further investigation in the present study. One of the major study objectives was, thus, to elucidate the utility of some recent methodological developments in the field of equity measurement. Specifically, the work presented in this thesis sought to take the standard measures of equity and their interpretations one step further to improve their capacity for measuring and explaining various aspects of equity in the finance and delivery of health care, and with a focus on the particular context of developing countries. Some novelty features, which have distinguished the present work from the previous studies may worth to be highlighted here. One is that, in contrast to most previous empirical work, where the analysis and judgment of equity was based on the aggregate summary measures, such as progressivity indices, the present study employed micro-data to generate evidence on the value-added of going beyond these measures. The use of disaggregate analyses, especially in the context of developing countries, can allow for a more refined examination of the structure of inequality and the distributional impact of health care payments, and so, makes comparisons more rigorous. Such assessment is in line with very recent recommendations urging the need of examining the summary indices in conjunction with the underlying distribution (O'Donnell et al., 2007). A second feature of the present study is that it sought to establish statistical inferences for inequality measures at both the aggregate and disaggregate levels of analysis using non-standard bootstrap-based techniques. These techniques were recently explored (Davidson and Flachaire, 2007) to improve the reliability of statistical inference for a variety of inequality and poverty measures. Indeed, while providing a more subtle treatment for several statistical problems involved in the context of inequality measurement and comparisons of dependent distributions of finite samples, the bootstrap method has the potential to provide a great relieve for researchers who have had to tackle with a rather complex composition of variance-covariance matrices associated with the classical asymptotic approximations approach.

A third feature of this study is that it attempted to apply new methods of decomposition that can overcome the measurement pitfalls of the standard methods commonly used in the literature of health equity. As for the specific field of health care finance, a new method of decomposition, which has recently advocated in the literature of public finance, was applied. Thus, contrary to previous studies in this area of analysis where measures of vertical and horizontal inequities were approximated in the context of hypothetical exact-equals groups, this study applied more appropriate techniques that accommodate real survey data, where exact-equals are hardly if ever exist. Besides allowing for accurate and normatively distinct measures of vertical and horizontal inequities, such approach provides a more reliable measure of the reranking index. The latter is of particular interest to accurately assess the distributional impact of health care payments, particularly in the context where the magnitudes of payments for health care may further affect individual status in the distribution of income. Methodological extensions to previous work on equity in health care delivery are also considered. This is done by addressing the limitations of standard techniques used to derive a summary index of equity and the linear decomposition methods used to explain inequalities in health and health care. A new method of decomposition is, then, explored and applied using appropriate non-linear estimation methods and microsimulation techniques. Besides, revealing the factors contributing to the observed inequality, the microsimulation-based decomposition enabled to unpack the potential genuine role of individuals' behaviour, as well as the features of health care delivery system in the analysis of equity. These features, which cannot be elucidated in the standard methods, ought to be considered in order to provide a more convincing decomposition of inequalities in health care and for judging equity performance of health care system.



### Main Findings and Policy Recommendations

The above concepts and methods have provided some interesting and useful information upon which a number of recommendations for reforming health care sector in the OPT can be advanced. However, before going through the main results and policy recommendations, an important policy issue, may deserve notice. Clarifying the definitions of equity is not merely an academic exercise, nor is it confined to scholars and researchers in the field. Governments and policy-designers should also clarify what they meant and want by “equity”. This brings us to one of the important findings to emerge from the review of the subsequent “National Strategic Health Plans” for reforming health care sector in the OPT [Section 0.4.1]. While all these Plans (including the latest of 2008) have identified an “equitable health care” as a “guiding principle” for reforming the health sector, clear and detailed specifications were missing. Evidently, the lack of a “thorough” policy statement on the part of policy-makers often renders the assessment and judgment of equity by researchers more difficult and moot. Vague policy avowals and good intentions are not enough. A *scrupulous* and *coherent* definition— rather than *microcosmic* statements – of equity objectives for health sector reform are again required, should these objectives be operationalised and formulated into workable strategies which can overcome prevalent and targeted inequalities. In addition, to stating the measurements to be monitored and supported from a country’s limited resources, this can help evaluate the potential equity implications of reform measures. It is perhaps important to point out here that one of the particularities of the Palestinian health care sector is its rapid changing and active reforming. Though, it has been argued that these reforms have repeatedly “*missed the forest for the trees*”, and thus, resulting in wasted resources, frustrated expectations and exacerbated inequities (Giacaman et al., 2008; Mataria et al., 2008).

It is, as noted at the outset, debate on health policy should be evidence-based, and for this to be realised, an accurate and empirical evaluation to support the on-going policy dialogue was in order. One of the major objectives of this study was, thus, to provide some empirical evidence and policy-relevant findings on various equity features of the Palestinian health care sector, using the first national survey on health care expenditures and utilisation. Obviously, the usefulness of those hinges on the approval of the underlying equity notions by the policy-makers, and that call not only for integrating explicit equity goals for the expected reform initiatives, but also for more attention to the evidence we already have to improve the development of equitable and efficient health policies and programmes<sup>74</sup>. Thus, as far as policy recommendations are concerned, the findings reported in this study while offering detailed diagnoses of the prevalent inequities and their “genuine” and provoking causes, call for concrete and systematic efforts to remedy the current inequitable structure of health care financing schemes. In order for this to be achieved, there is an urgent need to reconsider the current regressive financing mix, wherein out-of-pocket payments are the single largest source of health care finance in the two Palestinian regions. The current structure of such source of finance worsens the already uneven income-inequality, imposes a very heavy and unequal burden on households and is associated with high financial risks, particularly on the poorest and vulnerable classes. Consideration should be given to examining different possible sources of health care financing and their applicability in the local context.

Yet, several dimensions ought to be taken into account with regard to the feasibility and impact of any alteration in the current financing mix for health care in the OPT. The eccentric context of the WB and GS was shown to be characterised by an underdeveloped fiscal

<sup>74</sup> I’m also referring here to previous empirical evidence reported in the PhD. Thesis of my colleague Awad Mataria (2004): “Contingent valuation and health sector reform in developing countries: the Palestinian case. University of the Mediterranean, Aix-Marseille II”

systems, extreme reliance on foreign aid, and protracted history of colonialisation, other than the severe measures of “capability deprivation”, resulting from unceasing military occupation. All these factors should indicate the difficulties to be encountered if a change in the prevailing financing mix is attempted. General tax funding is critical component of health care financing in almost all developing countries. Despondently, however, in the local context, the capacity to dramatically increase allocations from this source to the health sector remains in the short-term highly constrained. This is not only due to the Israeli control on major source of tax transfer to the PNA, but also the equally urgent need for additional tax funding for other social sectors; e.g., education (noting that many of the activities in such sectors eventually contribute to improve health status and reduce inequity). Government should not however take this as an apology to reduce its involvement in the financing of health care sector. Rather a proper tax-transfer system based on pro-poor redistributive policies, which can reduce income-inequality, may help ensure a more equitable health care system. On the other hand, government policies of controlling prices – especially those practiced in the private sector, and directing foreign assistance toward subsidising services that are mostly needed by the worse-off, could also be of help in alleviating prevalent regressivity.

Efforts to reforming the financing mix should therefore start with the institutionalisation of a genuine social insurance system, with a view toward “an effective universal coverage”. This will entail transforming the current health insurance (the GHI) scheme into an independent legal entity with control over its own revenues, which can then be utilised to purchase services, using appropriate financing methods. An appropriate and planned extension of coverage requires identifying a sliding scale of payments that takes into account individuals’ willingness and ability to pay. This would, in turn, help boost the performance of *ex ante* financing schemes and guarantee the fulfilment of an equitable source of financing. The latter can also help reduce prevalent income-inequality through the likely pro-poor redistributive effect. Perhaps, it goes without saying that redistribution role should not be attributed to these schemes as if it was their principal function. Yet, a pro-poor redistribution resulting from their progressivity seems to be germane to the current situation where the capacity of tax system to play its main role of redistribution attest limited (bearing in mind that a partial coverage of risk-pooling mechanism, even a progressive one, is not automatically pro-poor in its redistributive effects). At the immediate level, independence should be given to the GHI system by establishing a self-sufficient financial body that recognises the burden of care and accepts the notion of self-reliance. In addition focus should be given to evident regional inequalities, with priority be given to the northern and southern regions in the WB and to GS. Here, community-based insurance schemes are promising to enable equitable and efficient resources mobilisation. In the local context, evidence exists that individuals are willing to pay to benefit from an “optimal” health insurance scheme that satisfies their need, with willingness to pay values rise significantly as individuals incomes rise (PCBS, 2006). There is also evidence that patients are willing to pay to benefit from improved “structural” attributes of quality of care, with willingness to pay values fluctuating in function of the extent of quality improvement and patients’ ATP (Mataria, 2004). Such information should be used to help inform an equitable pricing structure in the adopted financing schemes, including those based on *ex post* payment.

Equally important, significant efforts should be made to remedy the malfunctioning of the current health care delivery system, especially those which result in avoidable and unjustified inequalities in the distribution of health care. An effective role of “gatekeeping” should be put in place, so that patients can only be entitled to higher levels of health care upon their actual medical needs, rather than their unequal ability to reach, to influence or to pay. This begs for

reforming the unjust “referral” system: bottom-up referral, inter-sectors referral and referral abroad. Though important, primary level of care, even an “affordable” one, has not met the highly unequal “pro-poor” distribution of need. The “poor” appeared to have disproportionately greater need also for the higher levels of health care. Therefore, secondary and tertiary treatments ought not only to be *accessible* but also *locally available*. The latter can be realised by ensuring an adequate and equitable involvement of the other non-governmental stakeholders and partners in providing the services that the MoH cannot afford. This, in turn, can help find a solution for the high costs of secondary and tertiary treatment; especially those to which the access is denied due the Israeli measures (e.g., Jerusalem), or sought abroad, which are disproportionately expensive and involve complicated bureaucracy and travel, and thus, favour a minority of population in a resource-constrained context. Here, both the NGOs and the private sectors can play an important role in “substituting” for the burdensome expenditure of treatment abroad (Mataria and Khouri, 2008).

Health care systems do not operate in a vacuum, and thus, a variety of other factors, which seemed to have significantly contributed to the observed inequity in the health care sector, should be taken into account in the reform initiatives premised on “equal access”. Indeed, besides the relative impotence of the “intrinsic-characteristics” of health care delivery system, and those associated with individuals socioeconomic characteristics in producing and maintaining inequalities in the utilisation of different types of health care, the results reported in this study demonstrated a link between the continuing measures of military occupation and the observed inequity in different agglomerations of the WB and GS. While this reveals so odd and “uncharacteristic”, with people are deprived of their “right to access health care” due to strict closures or route-fence, it calls for the removal of all physical obstacles imposed by the occupation. Yet, in so far the *status quo* scenario persists; the MoH and the relevant stakeholders must address the issue by reworking their policies towards more geographically-balanced allocations of health care facilities. Inter-providers coordination can also play a crucial role in reducing the adverse effects of such situation on equity to access health care.

### Some Reflections and Prospects for Future Research

The research on “health equity” has been motivated by the underlying proposition that measuring inequities in health care, like income-inequality, is an important area of research. Though considerable methodological developments have taken place to quantifying them, these are found, so far, to drawing-out threads from the cultural inertia in the field of income-inequality analysis and its axiomatic insights. Obviously, analysing inequity in health care sector in this sort of way continues to be promising, since it offers a distinctive angle and useful information on how to think about justice – at least in economic sense – and reform of the health care systems. Yet, a broader way of looking at the matter might also be required. Indeed, the assessment of equity of the type undertaken in this study, as in the empirical literature to date, leaves behind a number of issues unsolved, or sidestepped, and thus, open for future work by scholars in related fields. In order to draw some hopefully useful remarks on these issues, I shall advance a line of arguments inspired principally from the theories put forth by the philosopher economist Amartya Sen (2000; 1997; 1987) about “social justice and economic-inequality”, “adaptive preferences” and “capability deprivation”, which I find compelling as an account of justice quite apart from their usefulness as an approach to the health care issues. One is that, the analysis of health equity may need not to be confined to the narrow space of incomes. To borrow Sen’s terminology: *incomes and commodity holdings are only contingently important as instruments to ends and the freedom to achieve ends*. Suffice to note that, even in the context of universal health coverage and equal access to health care the link between *health-inequality* and *income-inequality* has not so far been broken. The

answer is likely to be found in other spheres of “capability deprivation” and in the “adaptive preferences” of individuals following an extreme deprivation in the levels and conditions of their livings. Future research on health equity shall address the policy interventions needed to reduce relative inequalities and absolute deprivations in other spheres than the direct measures of incomes, and to evaluate the impact of these policies on equity in health outcomes. A need is there to develop methods for eliciting individuals’ *actual needs* and *preferences* in the context of deprivation, which can enable a *link* to be made to the allocation of limited resources, and hence, to the equity objectives of the health care system. An evaluation of equity performance of the health care system shall then be based on the need-preferences-derived equity objectives. This will also guarantee a non-conflicting relation between “equity” and “efficiency” objectives of the health care system, since it can inform areas where cost-savings could be realised to enable the provision of services of more relevance to population needs and preferences.

Lastly, the concept and measurement of fairness in health care may also need to incorporate recent developments in the area of benefit incidence analyses and information on the distributions of risk across different groups of the population. This is particularly relevant if we seek to establish rigorous arguments about the “genuine” welfare-effects associated with different health care financing modalities. Particularly, under conditions of partial coverage of risk-pooling insurance-based mechanisms and the extreme reliance on private sources of finance, it seems reasonable to evaluate redistributive effects of a financing scheme while incorporating into the measurement of wellbeing the distribution of benefit incidence, besides the incurred costs. This is because, as argued earlier, a financing scheme, even a progressive one, might not reveal “pro-poor”, or “welfare-enhancing” in its relative “cost-benefit-adjusted” effects. The rationale for integrating such assessment holds true for the arguments grounded on some “ideologically opposite” viewpoints that “one must pay for what she/he receives”. Individuals can, then, pay for what they get but the better-off may still receive more not only in terms of quantity, but also quality of treatment, and thus, the ultimate health benefit incidence. On the other hand, including baseline information about the distributions of risk across different groups of population can enable drawing conclusions about the societal risk-inequality averseness, and the welfare implications of risk-transfer schemes.

*For me again, I will enjoy the scientific trawl...*



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**APPENDICES**



## Appendix A: Survey Description \*

### A.1 Sample Design, Scope and Coverage

The HCEU-survey commenced field enumeration throughout the OPT on August 3<sup>rd</sup> 2004 and completed it on September 4<sup>th</sup> 2004. The target population consisted of all Palestinian households that usually reside in the two regions of the OPT: the WB and GS – including the remaining part of Jerusalem (East Jerusalem). The sample design of the survey was based on a two-stage stratified cluster-random sampling. In the first stage, a master sample of 481 enumeration areas (EAs) of relatively equal size, with average size for each EA of about 150 households was constructed. These EAs were used to construct the Primary Sampling Units (PSUs). The second sampling stage involved a systematic random sample of 16 households, which was selected from each cluster (the Secondary Sample Units – SSUs). The stratification was done by: governorates; type of locality (comprising urban, rural, and refugee camps); a proxy for wealth (ownership of durable goods) into three strata outside governorate centers, and size of locality (number of households). The sample covered a total of 4,496 Palestinian households residing in the WB and GS: 3,056 in the WB and 1,440 in GS. Of the 4,496 households selected in the sample, 4,014 were *effectively* interviewed. The WB sub-samples contained 2,663 households whereas the GS sub-samples contained 1,351 households. Collected data on individual basis constituted a total of 25,181 individual observations, of which 16,042 individuals were from the WB and 9,139 individuals were from GS (Table A.1). The survey data have been collected throughout a personal interview conducted by well-trained enumerators, and using a well-designed questionnaire developed by the PCBS (see latter). The data are characterised by a remarkably high rate of response, since the rate of total refusal was lower than 15 per cent in the two Palestinian regions: being about 13 per cent in the WB and even lower than 7 per cent in GS. This low rate of refusal reflects a weak refusal of the households (in fact of the heads of households) and the individuals (members of households) to be taken part in the investigation. The rates of abandonment during the course of the interview and/or failures to *reply per question* were also remarkably low; indicating a good understanding and high acceptance of the survey questions.

### A.2 Sample Representativeness and Weights

A crucial assumption for the statistical inference is that the sample should be representative of the parent population from which it is drawn. If this was not the case, then it would become difficult to make prediction about the behaviour of the general population based on the observed characteristics of the sample (Deaton, 1997). For the sample to be representative of the population, every element of that population must have equal probability of being included in the sample (Kalton, 1983). In generating the sample used for this study, particular attention was paid to the issue of *sample representativeness*. The objective was largely achieved in designing the survey and in the actual sampling procedures. Indeed, as shown above, the EAs as designed by the PCBS were demarcated into roughly equal number of households. The sample selection was also designed to reflect this fact, involving sampling of equal number of households from each EA, selected through a systematic random process. These EAs were selected based on the 1997 Palestinian Population, Housing and Establishment Census (PHEC-1997). The latter represents the first and the only “*effective*” census of population in the OPT<sup>75</sup>. Indeed, all previous estimations of the Palestinian

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\* Many of the information presented in this section are base on author’s personal communications and interviews with the head of the project technical team Mr. Khaled Qalalweh (taken place in Ramallah-OPT between the 5<sup>th</sup> and 12<sup>th</sup> of January, 2005).

<sup>75</sup> During the year 2007, a second Census of the Palestinian population living in the OPT was carried out by the PCBS. Results from this new census will help re-construct new EAs that take into account any variations in the population structure and composition that had taken place between the two censuses.

population living in the OPT were projections based on approximations (PCBS, 1999). The PHEC-1997 has therefore enabled the PCBS to identify and construct a set of representative EAs for the entire Palestinian population living in the WB and GS. These EAs are regularly used by the PCBS to sample out representative samples for the different households surveys conducted in the OPT. A sample of these EAs was updated regularly and latest of these took place in 2003. Results from the latest “update” have, thus, been used to adjust the weights used in ascertaining the representativeness of the study sample *ex-post*.

Although, the implemented sampling procedures should usually culminate in a “*self-weighted*” sample – where there might be little or no need for re-attaching weights to reflect the population – the HCEU-2004 data have been re-weighted to compensate for non-response cases, and to recover the population profile as per the PHEC-1997. The weight is defined as the *inverse* of the probability of selecting a subject from the study population to be included in the study sample. It is interpreted as the number of subjects in the population that are represented by a particular subject in the sample (Deaton, 1997). In the present study, the weighing procedure considered the total Palestinian population in the beginning of the second quarter of the year 2004. The weights have been estimated taking into account the distribution of population by age; gender; region. Estimated weights have also been *adjusted* to account for non-response and uncompleted questionnaires during the fieldwork. Indeed, adjustments of *a priori* estimated weights remain an important step to avoid any potential bias due to non-respondents and to account for changes in the post census period.

### A.3 Quality of Survey Data and Reliability of Sample Estimates

As with all sample surveys, the estimates provided in the HCEU-2004 survey may be subject to two types of errors: *non-sampling error* and *sampling error*. The *non-sampling error* can occur at the various stages of the survey implementation (during data collection and data processing); regardless of whether the estimates are derived from a sample or from a complete collection such as a census. Potential sources of *non-sampling error* include: non-response, errors in reporting by respondents or recording of answers by interviewers, and errors in coding and processing the data. Although, *non-sampling errors* are difficult to quantify in any data collection process, particular effort was made by the PCBS to reduce such type of error and to ascertain good quality data. This is done by: carefully designing and testing of the survey instrument; training enumerators and data entry staff, and by extensive editing and quality control procedures at all stages of data processing. In particular, the quality control strategy that is followed by the PCBS consists in:

- Collecting all filled in questionnaires from the fieldworkers on daily basis.
- Checking each questionnaire for completeness of all sections and ascertaining that all question items were precisely filled in.
- Returning back all questionnaires with missing responses or doubtful information.
- Checking the accuracy of some of the data by phone interviewing the respondent by the project coordinator or the supervisor.
- Double-checking the data entry.

In addition, several quality control measures were used to ensure the collection of high quality data for this survey. These include: recruiting a group of doctors to deliver lectures on different parts of the questionnaire for the interviewers; periodic sudden visits by the professional staff to the field team; adequate documentation of the flow of the questionnaire through control sheets and limiting call backs to three visits per household; re-interviewing about 10 per cent of the sampled households by the supervisors, and distribution of written memos to the field when confusion arose. On the other hand, since the estimates are all based

on a sample of possible observations, they may be subject to *sampling variability* (the second type of *error*); and therefore, they may differ from the figures that would have been obtained if information had been collected from all households. However, given the fact that sampling errors are due to the statistical distribution of estimated variables; they are random outcomes of the sample design, and therefore, are easily measurable. A measure of sampling error for main survey estimates was provided by the standard error, which may give an idea on the reliability and precision of the data estimates.

#### A.4 Description of the Survey Questionnaire and Key Variables

This section presents an overview of the survey instrument and the main data items collected. The instrument for the HCEU-2004 data generation was the survey questionnaire. The questionnaire basically attempted to generate information on the relevant variables of the study, specifically on the nature and the “extent” of health care need, the use of, and expenditures on various types of health care services, which undertaken by all household’s members during a specific period of time (the so-called reference period). The survey questionnaire was developed by the PCBS after revision and adaptation of some neighbouring countries’ questionnaires, in addition to the standard manual for calculating the national health accounts (NHAs) that was previously developed by the World Health Organisation (WHO).

The questionnaire was divided into six main sections, along with a control sheet, which included items related to quality control, sample identification, interview schedule and outcome. Section one collected some general but detailed *background* information on individuals’ socio- demographic and socio-economic characteristics. *The available classifiers* include person’s sex, age, educational status, marital status, occupational and employment status, and place of residence (localities: urban, rural, camp). The second section dealt with health insurance coverage and utilisation. Data include: type of health insurance scheme; reason(s) for being enrolled/ covered in health insurance scheme; who pays for insurance premium (which helps to determine over the incidence of payments/contributions – see latter): amount of (monthly) premium for insurance; utilisation of health insurance during the last six months, reason(s) for not using health insurance. This section also contained a detailed list of individual’s health status; with a full description of health problems and illness episodes; and the amount spent on health care for each case (e.g., monthly cost of treatment in case of needing a regular treatment, and reason(s) if not getting the required/sought treatment. The third section concerned with the utilisation patterns of *primary health care level* (PHC) during the household’s most recent illness episode (last four weeks). Following a description of their health problem (acute, chronic, injury/accident, dental, psychological, etc), and the type of health care facility used (governmental, private clinics, UNRWA, PNGOs), patients/users were asked to identify:

- The number of visits made to a PHC level provider.
- Type of health care services sought/received during each visit and health care provider.
- The amount paid for the received services, including transportation cost and any other related expenses. Data are available in total and for the following items: doctor fees, medications, X-rays/lab tests, transportation, other.
- For those insured, the percentage of their payments covered by the insurance (percentage of reimbursement).
- Cost shared by *third-party*, other than health insurance companies; e.g., MoH, PNGOs or charitable society.
- And for those who did not received health services for the recorded health problem(s), the main reason(s) for not receiving the required health services.

The fourth and fifth Sections asked similar questions but with respect to the utilisation of, and expenditures on: Secondary Health Care Level, during the *past six months* preceding the survey for out-patient clinics (sub-section 4-A), and during the past year for in-patient hospital admissions (sub-section 4-B), and during the *past six months* for the Tertiary Health Care Level (Section 5). The last section of the questionnaire was devoted to provide specific information related to *household's socio-economic characteristics and direct health expenditure*. Data in this section was only provided at *households-level*, and included data on: households' mean monthly income over the last year; income over the last month; sources of household's income (up to three sources); mean monthly expenditure over last month; expenditure on various items of health care services (up to 25 medical items) during the last month, and households ownership of durable goods. The next section provides detailed information on the basic data items collected from the survey and its main findings.

### A.5 Study Sample Characteristics

The main sample characteristics of the study survey are summarised in Table A.1. Respondents were nearly equally distributed in terms of gender (Female = 48.8%). The majority of the respondents were young-aged (with the respondents' average age being 21 years old); married (52.8%); more than half residing in urban areas (56.2%); students engaged in study (41.6%), and a considerable part were refugees, in particular in GS (67.6%). The distribution of the respondents by education levels reflects the fact that the Palestinian population is generally characterised by high level of educational attainment, with average years of completed formal schooling being 8 years, while about 20% of the respondents attained at least secondary school education and higher. The distribution of the respondents according to the type of occupation/profession – classified using the profession coding book of the PCBS – showed that, of those in labour force, about half were qualified workers (51.6%). This high proportion of a category including skilled workers represents one of the salient features of the Palestinian labour market (Cobham and Kanafani, 2004).

**Table A.1: Study Sample Characteristics**

Variable	West Bank (WB)	Gaza Strip (GS)	OPT
	N (%) or Mean ( $\pm$ S.D.)	N (%) or Mean ( $\pm$ S.D.)	N (%) or Mean ( $\pm$ S.D.)
Sample size (% response rate)	3,056 (%87.1)	1,440 (%93,8)	4,496 (89.3%)
Sample size (net) number of HHs	2,663 (63.3%)	1,351 (36.7%)	4,014 (100%)
Total number of observations	16,042 (63.7%) [15,931] (63.3%)	9,139 (36.3%) [9,250] (36.7%)	25,181 (100%)
Total number of obs. (weighted)	2,417, 052 (%63.3)	1,403,630 (36.7%)	3,820,412 (100%)
Gender (Female)	7,839 (48.9%)	4,448 (48.7%)	12,287 (48.8%)
Age (Years)	21.9 ( $\pm$ 18.1)	19.9 ( $\pm$ 17.3)	21.0 ( $\pm$ 17.9)
Education (Formal scho. years)	7.5 ( $\pm$ 4.5)	7.7 ( $\pm$ 4.7)	7.6 ( $\pm$ 4.6)
Education status:			
Illiterate	706 (%5.3)	354 (4.7%)	1061 (5.1%)
Primary	6,823 (51.4%)	3,598 (48.1%)	10,421 (50.2%)
Elementary	3,131 (23.6 %)	1,699 (22.7%)	4,831 (23.3%)
Secondary	1,555 (11.7%)	1,201 (16.0%)	2,756 (13.3%)
Univ. degree	985 (7.4%)	584 (7.8%)	1,568 (6.2%)
MA & higher	71 (0.4%)	46 (0.6%)	118 (0.6%)
Marital status:			
Married	5,399 (53.4%)	2,841 (51.7%)	8,240 (52.8%)
Widowed/ Widower	332 (3.3%)	172 (3.1%)	504 (3.2%)
Divorced/Separated	72 (0.7%)	56 (1.0%)	128 (0.8%)
Single	4,311(42.6%)	2,423 (44.1%)	6,734 (43.1%)
Locality type (living zone):			
Urban	8,399 (52.7%)	5,746 (62.1%)	14,145 (56.2%)
Rural	6,484 (40.7%)	551 (6.0%)	7,035 (27.9%)
Refugee Camp	1,048 (6.6%)	2,953 (31.9%)	4,001 (15.9%)
Refugee status (refugee)	4,696 (29.5%)	6,257 (67.6%)	10,953 (43.5%)
Employment (activity) status:			
Unemployed	1,249 (9.8%)	670 (9.2%)	1,919 (9.6%)
Housework	2,770 (21.6%)	1,490 (20.5%)	4,260 (21.2%)
Students	5,333 (41.6%)	3,571 (49.3%)	8,904 (44.4 %)
Retired or Disabled	588 (4.6%)	317 (4.4%)	905 (4.5%)
Working (in labour force)	2,866 (22.4%)	1,203 (16.6%)	4,069 (20.3%)
Occupational group (profession):			
Intellectual prof.*	568 (15.7%)	243 (15.0%)	811 (15.3%)
Intermediary prof.**	318 (8.8%)	219 (13.5%)	537 (10.3%)
Qualified workers***	1,943 (53.8%)	756 (46.7%)	2,699 (51.6%)
Unqualified workers****	786 (21.7%)	401 (24.8%)	1,187 (22.7%)

\* This category includes: legislators; senior officials and managements; specialists and other professions that require higher educations (first university degree or higher).

\*\* This category includes: professions that require associated professional diploma or higher school.

\*\*\*\* This category includes skilled agricultural workers; workers in services, retail and markets.

\*\*\*\* This category includes basic professions and elementary occupations that do not require any educational level; e.g., farmers; artisanal professions and crafts.



### Appendix B: Calculation of Conditional Number of Health Care Visits

A negative binomial distribution of mean  $\mu$  has the following density function (Huber, 2006)(Grogger and Carson 1991):

$$f(y) = P[Y = y] = \frac{\Gamma(y + \theta)}{\Gamma(y + 1) \Gamma(\theta)} \left(\frac{\mu}{\theta}\right)^y \left(1 + \frac{\mu}{\theta}\right)^{-\theta(y+1)} \quad (1)$$

with,

$$E[Y] = \mu \quad (2)$$

$$V[Y] = \mu \left(1 + \frac{\mu}{\theta}\right) \quad (3)$$

where,  $\theta$  is the over-dispersion parameter, and the function  $\Gamma(\cdot)$  is defined by  $\forall \alpha, \Gamma(\alpha) = \int_0^{+\infty} t^{\alpha-1} e^{-t} dt$ .

From (1), we get (given that  $\Gamma(1) = 1$ ):

$$P[Y > 0] = 1 - P(Y = 0) \quad (4)$$

$$= \frac{\Gamma(\theta)}{\Gamma(1) \Gamma(\theta)} \left(\frac{\mu}{\theta}\right)^0 \left(1 + \frac{\mu}{\theta}\right)^{-\theta} \quad (5)$$

$$= 1 - \left(\frac{\theta}{\theta + \mu}\right)^\theta \quad (6)$$

Using Eq. (6), the zero-truncated negative binomial has the following density function:

$$h(y) = P[Y = y | Y > 0] = \frac{P[Y = y]}{P[Y \geq 0]} = \frac{\Gamma(y + \theta)}{\Gamma(y + 1) \Gamma(\theta)} \left(\frac{\mu}{\theta}\right)^y \left(1 + \frac{\mu}{\theta}\right)^{-\theta(y+1)} \frac{1}{1 - \left(\frac{\theta}{\theta + \mu}\right)^\theta} \quad (7)$$

The **GLM** approach models  $\mu$  as,

$$\mu = \exp(xb) \quad (8)$$

Parameters  $b$ , and the over-dispersion parameter  $\theta$  are estimated by the maximum likelihood, where the likelihood of the model can be written using Eq. (7), thus, we have,

$$E[Y | Y > 0] = \frac{\mu}{P(Y \geq 0)} \quad (9)$$

The mean of a negative binomial of mean  $\mu$  and parameter of over-dispersion  $\theta$  but truncated at zero can be written as:

$$E(Y | Y > 0) = \frac{\mu}{1 - \frac{\theta}{(\theta + \mu)^\theta}} \quad (10)$$

The conditional expectancy of  $y$  can then be expressed as follows:

$$E(y_i | P_i > 1) = \frac{\exp(xb)}{1 - \frac{\theta}{(\theta + \exp(xb))^\theta}} \quad (11)$$

The above expression in Eq. (11) is estimated by the following expression, which is used when implementing the simulations:

$$\hat{E}(y_i | P_i = 1) = \frac{\exp(xb)}{1 - \frac{\hat{\theta}}{(\hat{\theta} + \exp(xb))^{\hat{\theta}}}} \quad (12)$$

where  $\theta$  is the over-dispersion parameter, and  $\hat{\theta}$  is an estimator of  $\theta$  found by the estimation. When simulating the distributions, the estimator  $\hat{\theta}$  used for the computations is the one estimated on the whole sample (and not on income quantiles), for reasons of comparability.