Erasmus School of Economics

Socioeconomic disparities in unmet need for health care: a common pattern in low- and middle-income countries

Research report

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ABSTRACT

This thesis was conducted to investigate the incidence and distribution of unmet needs for health care, to complement traditional approaches of measuring inequity. I asses the level of inequity based on socioeconomic factors such as income and education. Then, I compare these findings using self-reported assessments versus more objective, need-predicted measures of unmet needs. Data from the World Health Organization's Study on Global Ageing and Adult Health (SAGE) were used in this analysis, which focused on six low- and middle-income countries: China, Ghana, India, Mexico, Russian Federation, and South Africa. The survey included 34124 respondents aged 50 and older. Higher levels of education and income showed an association with lower odds of facing unmet need in all countries. This finding was consistent in all six measures of unmet need. Furthermore, the magnitude of the socioeconomic gradient is often smaller or less significant when measured through the subjective approach, indicating that the poorer and lower-educated tend to underestimate their health needs. Future research should focus on understanding which specific barriers are causing unmet need, to better comprehend what is behind this established inequity, and to motivate policy action.

Keywords

Unmet need; Health care access; Equity in utilization; Low- and middle- income countries

TABLE OF CONTENTS

1. INTRODUCTION

The study of how socioeconomic status (SES) affects health care use is a broad topic in health economics. Most of these studies take place in Western scenarios, with a predominance of OECD countries, where policy-makers are mostly expected to deliver and guarantee universal access to health care (UHC) (Poullier & Wilson, 1993, Elola, Daponte & Navarro, 1995). In fact, the public relevance of this topic is broad. Policy-makers devote considerable time and resources to the present and future of their systems and addressing matters of equity and fair allocation of resources (Oliver and Mossialos, 2004; Evans, 2001). Organizations meet this effort on a global scale – guaranteeing access based on need, instead of the ability to pay has become one of the priorities of the World Health Organization (WHO) towards improving health outcomes, as stated in the World Health Report 2000 (WHO, 2000).

Although empirical evidence on the socioeconomic distribution of access depends on the context, there are some commonly accepted findings. Firstly, general practitioner care is either equally distributed or pro-poor, while more specialized care and surgical procedures are frequently pro-rich (Van Doorslaer, Koolman & Jones, 2004; Roos & Mustard, 1997). Secondly, having a lower socioeconomic status has been associated with poorer access to preventive actions such as screenings and examinations, but also hospital care (Fiscella, Franks, Gold & Clancy, 2000). Furthermore, quality of care tends to be lower for the poorer when considering measures such as processes of care, length of stay, and mortality (Kahn et al., 1994).

In less developed countries, literature about the determinants of health care access is scarce (Arokiasamy, Kowal & Chatterji, 2016). It is urgent to fill this gap in settings where health care systems do not guarantee universal coverage, and where there are significantly more prominent obstacles to accessibility – physical, geographical, financial and cultural barriers (O'Donnell, 2007, Peters et al., 2008). To support WHO's

mission of attaining UHC in all communities by 2015, several waves of data collection have been implemented in developing countries. This constitutes the Study on global AGEing and adult health (SAGE), which covers six low- and middle-income countries (LMICs): China, Ghana, India, Mexico, Russian Federation and South Africa, some of which constitute the fastest-growing economies worldwide (IMF, 2018). Even so, their health systems lack in sophistication and coverage at distinct levels, especially when compared to developed countries (O'Donnell, 2007, Peters et al., 2008), which often leads to problems of access and subsequently to poor health outcomes (O'Donnell, 2007).

To appropriately measure inequity in access, one must separate use and need – inequality in access to care is not necessarily undesirable if we consider different preferences and needs (Garcia-Gomez, Hernandez-Quevedo, Jimenez-Rubio & Moreno, 2015; Kim, 2016). Conceptually, (involuntary) unmet need allows us to assess the breadth of potential improvements of access towards need satisfaction. In practice, unmet need is not a universally defined concept, and its study is often dependent on the available data. Authors have relied on different natures of unmet need, such as objective (constructed trough information on health status and health care use) and subjective (self-reported) unmet need. The latter is intrinsically linked to one's perception of their health needs, and it is common to find discrepancies between objective measures of health and self-reported health (Pinquart, 2001). For several reasons, individuals with a lower socioeconomic status might underestimate their health needs (Rossouw, Bago d'Uva & Van Doorslaer, 2018), which can lead to an overall underestimation of the magnitude of the existent inequity in access to health care (Garcia-Gomez et al., 2015; Allin & Masseria, 2009). In fact, Garcia-Gomez et al. (2015) found higher socioeconomic inequity in health care use (long-term care) than in self-assessed unmet need. Allin & Masseria (2009) also observed a higher health care utilization to be associated with a higher reported unmet need, while individuals with the same health status who did not report unmet need had lower use of health care services.

In this thesis, I aim to fill the gap in microeconomic research in analyses of equity in health care for LMICs with information about how socioeconomic status affects the unmet need for health care services. The several dissimilarities of the countries mentioned above could lead us to heterogeneous results that would be masked in a pooled analysis. Thus, I will analyze those countries separately to allow for the distinction of the particularities of the patterns and results, and to make it a more proper tool for potential policy improvements. Because of these apparent discrepancies between perceived need and clinically-justified need, I will also compare socioeconomic gradients according to two different measures: a subjective, self-assessed indicator, and a more objective one based on need and health care utilization. Thus, the second aim of this thesis is to evaluate to which extent the conclusions differ when comparing measures of unmet need of different natures.

This thesis makes two main contributions. Firstly, it applies the concept of unmet need to LMICs. Secondly, it differentiates measures of unmet need to generate more robust patterns and to prevent underestimation of unmet needs. The literature on access and unmet need is limited in LMICs, increasing the relevance of these two points. Studying these aspects is a necessary bridge towards motivating public action to design policies which establish fairer, more equitable health care systems.

The next section sets forth a literature review and a brief definition of the fundamental concepts of this thesis. Further ahead, I explain the data and methodology used to answer the research questions. After the display and interpretation of the primary results, this thesis ends with a discussion of its limitations, gaps, and overall implications.

2. CONCEPTUAL FRAMEWORK

Unmet need in health care is the result of the interaction between the following concepts: access (or lack thereof) and, simultaneously, health needs. Thus, I first theoretically draw these terms and then analyze the emergence of unmet need in recent research – both conceptually and empirically.

2.1 Use of health care and barriers to access

The identification of concrete barriers to access allows for a more directed outlook on public policies and resource allocation. There is, however, a multiplicity of determinants to access to health care, which makes it difficult to pinpoint potential sources of failure. Allin & Masseria (2009) distinguish between supply and demand-side factors. Regarding supply, authors mention the design and coverage of the public health system, the distribution of health care resources (capital and labor), waiting times, booking systems, and the quality of care (Gulliford et al., 2002; Whitehead, 1991). On the patients' decision side, authors name factors such as socioeconomic status, demographic factors, perceptions, health history and past experiences (Dixon et al., 2007).

Hurley & Grignon (2006) find an unequal distribution of barriers to health care access, mainly depending on socioeconomic status. There may be a direct effect of income and education, such as the ability to bear health care expenses if we consider that better-educated people often benefit from a higher financial safety. We can name several other potential direct effects, such as the increased possibility of living in either an urban area or an area with more health suppliers (Todd et al., 2015). Another example could be the existence of discriminatory biases against more impoverished or lower educated individuals (Bao, Fox & Escarce, 2007; Balsa & McGuire, 2003).

2.2 Need-based inequity measures

Authors have often measured inequity as differences in health care use conditional on need (Bago d'Uva, Jones & Van Doorslaer, 2009; Kakwani, Wagstaff & Van Doorslaer, 1997; Van Doorslaer & Wagstaff, 1992). This has been initially aligned with the goal of analyzing horizontal inequity, often described as *"equal use for equal need"* (Wagstaff, Paci & Van Doorslaer, 1991). As advanced by Morris, Sutton & Gravelle (2005), the relevance of analyzing accessibility problems falls short by only looking at individuals with similar needs consuming different amounts of care.

The very definition of need changes the lenses through which inequity is addressed (Garcia-Gomez et al., 2015). In previous literature, authors have accepted the division of need as three different abstract types: normative need (defined by medical professionals), a person's felt need (subjective), and technical need (improvement of medical provision) (Vlachantoni et al., 2011). Furthermore, authors have also differentiated need variables (such as chronic, mental, or infectious diseases) from non-need variables (such as socioeconomic status), to be able to isolate inequity caused by exogenous variables to one's health status (Andersen, 1995).

Although widely used, some authors point to some limitations when analyzing horizontal inequity through traditional measures (discrepancies of use conditional on need). Firstly, differences in health care use may still derive from different preferences and deliberate choices (Garcia-Gomez et al., 2015; Koolman, 2007; Le Grand, 1991). Furthermore, it is challenging to address the adequacy, relevance or quality of the used medical care, beyond the number of visits (Thiede et al., 2007). Lastly, Allin, Grignon & Le Grand (2010) note that the measures of need may also not be entirely relevant: ill-health is often used to measure medical need, this brings up issues of subjectivity and reporting heterogeneity. Plus, they highlight that objective ill-health does not necessarily translate to need for medical care.

2.3 Unmet need and inequity

The concept of "unmet need" has emerged partially to address these limitations. It can be simply defined as "*the direct questioning of individuals as to whether there was a time that they needed health care but did not receive it, or whether they had to forgo health care"* (Allin & Masseria, 2009). This is an intrinsically undesirable feature of any health system, as it denies the premise of universal access (Garcia-Gomez, 2015). Several drivers can lead to unmet need, such as high waiting times or costs (Kim, 2016). More than quantifying the degree of inequality in access, this measure allows us to define to which extent there are issues which remain to be addressed (Newacheck et al., 2000). The complementarity that this indicator offers to conventional measures can be especially insightful for policy-makers. Although this approach can potentially solve some of the mentioned issues, measuring whether health/medical needs are met is still challenging. Again, the complexity and multidimensionality of the decision processes adjacent to seeking medical care are difficult to capture (Garcia-Gomez et al., 2015).

It is also relevant to note that unmet need is not necessarily undesirable if resources are scarce. Unwanted unmet need exists if its distribution is systematically associated with variables such as socioeconomic status, gender, age, or ethnicity (Allin et al., 2010). If one wants to establish the principle of horizontal (mentioned above) equity using unmet need, it would be specified such as the following: *"individuals in equal health, but unequal in unrelated or 'irrelevant' characteristics, have unequal probabilities in 'unmet need' for health care"* (Koolman, 2007).

Because of methodological restrictions, previous literature has focused on the empirical study of the concept of "subjective, not chosen unmet need" (Allin et al., 2010), which allows for the identification of barriers to access to formal health care that disrupt the intention to seek it. In general, it consists of relying on self-reported unmet needs, by asking a question of the same nature of the one stated above. Other authors (Garcia-Gomez et al., 2015; Kemper et al., 2008; Shea et al., 2003; Tennstedt, McKinlay

& Kasten, 1994) choose to build objective measures of unmet need, which do not depend on self-reported (subjective) unmet need. These authors establish an expected level of utilization of health care services based on commonly considered need variables (e.g., age, sex, health conditions). Then, they compare this estimated utilization with actual utilization of health services. Deriving the difference between them, they reach a more objective measure of unmet need.

In either one of these measures, information about the source of the impediment to access (e.g., financial, physical) should be provided for increased policy relevance (Kim, 2016). This aspect is lacking in the used questionnaire, which will be discussed later on. It is relevant to note that the definition of the concept of (unmet) need is not a purely theoretical matter, as it will set the criteria for policy-making, operating as a threshold for public resource allocation (Vlachantoni et al., 2011). Liddiard (2007) illustrates this idea: *"definitions of need, whether they are explicit in policies and eligibility rules, or implicit in the decisions made by welfare providers, are rationing devices: they determine who gets what"*

2.4 Distinction between subjective and objective measures

Some authors have aggregated unmet need into two other broad categories: "subjective" and "clinical"/"objective" (Garcia-Gomez et al., 2015; Allin et al., 2010; Carr & Wolfe, 1976). Again, the first one is based on the individuals' self-reported unmet need, when asked *"the last time you needed care, have you received it?"* Advantages of this approach are its straightforward interpretation and analysis, as well as the practicability of including a question of the same nature in similar questionnaires. Besides, it has been noted that people are often aware of their health status and medical history (Kim, Kim, Park & Cho, 2015; Idler & Benyamini, 1997). However, this is a highly subjective assessment, as it depends on both respondents' perception of need and on whether they consider having received the adequate/expected care. This subjacent subjectivity brings

up problems of reporting heterogeneity. In contexts where we study socioeconomic inequality, the potential for this type of bias to arise is considerable, as reporting has been shown to being linked to socioeconomic status (Bago d'Uva, O'Donnell & Van Doorslaer, 2008).

Considering that empirical works often show an underestimation of reporting of health needs by the poorer and less educated (Balsa & McGuire, 2001, 2003; Rossouw et al., 2018), the use of subjective measures to study socioeconomic gradients of unmet need could underestimate inequalities. In a sample of three Asian developing countries, it was observed that distinct socioeconomic groups tended to evaluate their needs differently, according to their possibilities and surroundings (Bago d'Uva, Van Doorslaer, Lindeboom & O'Donnell, 2008). More examples of heterogeneity are found in India (Sen, 1993; Sen, 1998), where the state with the highest levels of literacy and longevity also registered the highest rate of reported morbidity. In fact, the better-off are often more capable of diagnosing and perceiving their health state (Sen, 2002). The distinction this analysis makes between subjective and objective measures difference between definitions is also essential due to a matter of preferences and social norms. O'Donnell (2007) exemplifies that in developing countries it is common to observe lower socioeconomic groups demanding less of orthodox medical services in favor of traditional approaches.

Garcia-Gomez et al. (2015) find that the socioeconomic gradient in the use of long-term care is broader than the inequity found in reported unmet needs, showing that different socioeconomic groups do not assess their needs homogeneously. The perception of unmet needs is driven by previous experiences with the health system/health care and the expectations of it, which likely differs systematically across and within countries (Garcia-Gomez et al., 2015; Kemper et al., 2008). When dealing with different cultural and historical contexts, as will happen in this thesis, it is especially relevant to be aware of how the direct comparison of results might suffer from this bias.

It is noteworthy that it is practically unfeasible to reach completely objective measures, as they invariably depend on self-reporting of health statuses and needs. Thus, some of the mentioned limitations also apply to these more objective concepts.

Ultimately, the rationale of the "objective" measures previously described is to overcome these limitations to the possible extent, as they depend less on the respondents' self-assessment. Not considering the potential differences between "objective" and "subjective" unmet needs will most likely lead to an underestimation of the needs of the worse-off, which could result in inefficient public policies and misallocation of resources (Rossouw et al., 2018).

2.5 Previous findings on unmet need, socioeconomic inequity, and common barriers to access

Most of the existing publications on unmet need are from the United States. Authors have found unmet need to be mainly affected by socioeconomic factors. The leading aspects associated with unmet need seem to be related to poverty, low-income, being uninsured, and a low level of education attainment (Diamant et al., 2004; Litaker & Love, 2005; Pagan & Pauly, 2006). This consistent correlation corroborates the relevance of the analysis of socioeconomic gradients in this thesis.

Research is less extensive in countries where the economic and political significance of unmet need might be smaller, due to fewer impediments to access. In Europe and Canada, for example, the presence of universal healthcare systems often reduces cost barriers (Allin & Masseria, 2009). Nevertheless, Koolman (2007) finds an association between unmet need and lower income in European countries, exposing the increased vulnerability of the worse-off. Furthermore, when it comes to the nature of access obstructions, authors have shown that the cost and unavailability of services appear to be the two most aggravating barriers for lower income groups across European countries (Mielck et al., 2009).

Although research is scarce in the countries covered in this thesis, the existent literature does not paint an optimistic picture. In India, it is estimated that more than 67% of the population faces unmet need for outpatient care services in the public health sector (Dilip & Duggal, 2004). Prinja, Kanavos & Kumar (2012) analyzed two States in Northern India and observed that the poor had both a lower hospitalization rate and a higher unmet need, as theory predicts, mainly due to high out-of-pocket payments. In China, over 80% of those with moderate and severe mental disorders reported they lacked adequate treatment (Shen et al., 2006). Although this value could still be underestimated as a result of methodological issues such as reporting bias due to stigma, the authors still consider that the allocation issues of the Chinese health system are to blame (Shen et al., 2006). In the South African Stress and Health Study, over 70% of the respondents with a serious/moderate mental disorder reported having not received any care (Seedat et al., 2008). Unlike in similar studies, the authors find sociodemographic factors to be independent of unmet need, pointing at a generalized existence of barriers to treatment.

The nature of the most common barriers to access varies across the studied countries. Although it is unfeasible to empirically corroborate them in this study, this type of awareness is helpful to form a picture of each country's context and assist the interpretation of results. In China, catastrophic health expenses and lack of risk protection are still identified as weaknesses of the health system (Meng et al., 2012). Similarly, in India, the financial burden of health care accounts is overwhelming for private households and often result in falling into poverty (Balarajan, Selvaraj & Subramanian et al., 2011). Financial constraints also play a role in access of some forms of health care in Russia (Bobrova et al., 2006). In Ghana and South Africa, although high out-of-pocket payments are a relevant barrier, other restrictions occur, mainly indirect costs, such as that of traveling or skipping work (Harris et al., 2011; Bosu et al., 1997). Despite the gradual introduction of *Seguro Popular* in Mexico (a UHC initiative

which offers increased financial protection), geographic availability and inopportune access remain common barriers (Gutiérrez, García-Saisó, Dolci & Ávila, 2014).

2.6 Research expectations

Based on previous empirical findings and corresponding economic theory, one would expect to find a negative correlation between unmet need and income (and education), if we consider costs as a significant access barrier (Koolman, 2007). When looking at developing countries, however, any *a priori* expectations regarding empirical results might be fragile. The discrepancies in access to healthcare seem to be larger across the socioeconomic ladder, especially because of the absence of universally available health systems and the existence of more prominent obstacles to health care accessibility – physical, geographical, financial and cultural barriers (O'Donnell, 2007; Peters et al., 2008). On the other hand, reporting heterogeneity is expected to play an even more significant role in LMICs, due to accentuated differences in culture, education, access to information, and, consequently, in the perceptions and expectations (Rossouw et al., 2018; Bago d'Uva, O'Donnell, et al., 2008; Sen, 2002).

There are a few scenarios in which we can potentially come across counter-intuitive results. For example, self-reported unmet need might be negatively correlated to need if individuals are not aware of their medical condition for not having been diagnosed in the first place. If we assume poorer and less educated people to have more barriers to formal care, this might underestimate their needs. Additionally, even if they are aware of their ill-health, it could be the case that they directly underestimate the severity of their conditions. This could be because they tend to compare themselves to peers in similar or worse situations, or because they might not have the time or resources to prioritize their health needs (Bago d'Uva, O'Donnell, et al., 2008).

Although I expect to find similar conclusions across countries, I will also assess and discuss on the differentiation of the patterns and magnitude of the results, to identify specific particularities and increase the policy relevance of this research.

3. DATA AND VARIABLES OF INTEREST

This analysis relies on the World's Health Organization's *Study on global AGEing and adult health* (SAGE), which has been developed by the WHO Evidence, Measurement and Analysis unit. Generally, SAGE aims to "*address the gap in reliable data and scientific knowledge on aging and health in low- and middle-income countries*" (Kowal et al., 2012). Since 2002, they have gathered household and individual level micro- and meta-data, conducting four waves of data collection thus far (Wave 0, Wave 1, Wave 2, Wave 3). This longitudinal study focuses on adults aged 50 years and older and assembles data from China, Ghana, India, Mexico, Russian Federation and South Africa. This study is a fundamental tool towards monitoring the achievements and challenges towards Universal Health Care (UHC), one of United Nations' goal on the Post-2015 Development Agenda. The WHO aims to be able to have information on essential coverage, the distribution, and equity of access, but also on financial risk protection, especially against catastrophic expenses (WHO, 2015).

Overall, the questionnaire benefits from its completeness and comprehensiveness. Regarding the longitudinal analysis of health and aging implications in LMICs, SAGE is a pioneer study. Furthermore, it relies on the collaboration of national research institutions, which allows for more in-depth contextualization of the study, and works as an advantage in reassuring the continuity of the data collection. This represents a unique opportunity to evaluate the equity of access to health care in these countries.

3.1 Study setup and design

The implemented survey is extensive. The individual questionnaire comprises eleven sections, with questions vis-à-vis respondents' socio-demographic characteristics, work history and corresponding benefits, health state descriptions, anthropometrics and biomarkers, risk factors and preventive behaviors, chronic conditions, health care use, social cohesion, subjective quality of life, and impact of caregiving.

In this context, I will use Wave 1 (2007-10) and perform a cross-section analysis across the six different countries. Wave 2 (2014/15) is incomplete, and Wave 3 (2017) is still ongoing. The data of interest was collected through face-to-face interviews in China (2008–10), Ghana (2008–09), India (2007–08), Mexico (2009–10), the Russian Federation (2007–10) and South Africa (2007–08). There were different methods of data collection in the survey, such as face-to-face paper and pencil interviews (PAPI) and face-to-face computer-assisted personal interviews (CAPI) (Kowal et al., 2012).

In light of the studied questions, the focus will be on the information about health care use and need, as well as the sample's economic and social status. I will only focus on the individual questionnaire, as the household questionnaire does not provide relevant information towards the research questions. Although this questionnaire provides information on the household income, the individual one places the respondents in a specific income quintile, which is more straightforward for this analysis.

Wave 1 includes 34124 respondents aged 50+ and 8340 aged 18-49. Some studies have included the younger population on their analysis for comparison purposes (Arokiasamy et al., 2016). However, I do not recognize the relevance of this point to this thesis. SAGE's primary purpose is to study the health implications of an aging population, which is expected to have a crucial impact on future health policies. To remove noise from the outcomes and keep the sample uniform, I have removed all observations of individuals which are not at least 50 years old.

Concerning the sample sizes, there is some heterogeneity across countries. However, as shown in Table 1, there is a reasonably acceptable number of observations and satisfactory response rate, except for Mexico, with a value which falls short relative to the other studied countries (Kowal et al., 2012).

Table 1 – Dataset information

Country	***Number of respondents (+50)***	***Response rate (overall)***
China	13,408	93%
Ghana	4,732	80%
India	7,150	68%
Mexico	5,008	51%
Russia	4,530	83%
South Africa	3,842	77%

3.2 Definition of the variables of interest

This thesis aims to measure the level of socioeconomic inequity in the unmet need for health care services, and to compare the breadth of inequity between objective and subjective measures of need. Thus, the studied variables can be grouped into three broad categories: use variables; (unmet) need variables; socioeconomic variables. These were mostly generated based on the available data.

3.2.1 Use variables

In the implemented survey, there were several questions regarding health care use. Concerning formal health care use, the main ones are listed below.

Inpatient care use:

- *"In the last three years, have you ever stayed overnight in a hospital or long-term care facility?"*
- *"Over the last 12 months, how many different times were you a patient in a hospital or long-term care facility for at least one night?"*

Outpatient care use:

- *"Over the last 12 months, did you receive any health care NOT including an overnight stay in a hospital or long-term care facility?"*
- *"In total, how many times did you receive health care or consultation in the last 12 months?"*

Distinguishing between inpatient and outpatient care does not seem relevant for this analysis. It would be arbitrary to assign a particular level of use to a certain type of care as ideal – any established threshold would vary according to context and health needs. Although it would be interesting to compare general care (GP) with specialist care, such as other studies have done (Bago d'Uva & Jones, 2009; Van Doorslaer, Koolman & Jones 2004; Wagstaff & Van Doorslaer, 2000), the available data do not provide this information. Thus, to build the variable of "healthcare use," I consider an individual who has received any formal care (inpatient or outpatient) in the last 12 months. As previously mentioned, this time frame is generally accepted in the literature (Garcia-Gomez et al., 2015, Allin et al., 2010; Koolman, 2007). Explicitly, I construct a joint variable of formal care use, which respects the following criteriaj: *"In the last 12 months, this individual has stayed overnight in a hospital or long-term care facility, or received some health care not including an overnight stay".*

3.2.2 Definitions of need

Several definitions of need were considered, to assess the robustness of results and assess gaps for different types of health needs.

Need definition (**1**) defines an individual as being in need of healthcare when they report having (at least) one chronic illness. Following a similar approach to Saeed et al. (2012), I group chronic conditions into six categories: 1) asthma and chronic lung disease; 2) angina and hypertension; 3) diabetes; 4) stroke; 5) arthritis other forms of rheumatism, and 6) depression. Most of these chronic conditions are self-reported, except for hypertension, which is derived from the blood pressure measurement conducted in the survey. As a threshold of hypertension, I have considered 140/90 mm Hg, a widely consensual value for individuals in this age category (Carretero & Oparil, 2000). This is expected to reduce any potential reporting biases, which would lead to the underestimation of needs for the worse-off, as they are more likely to be underdiagnosed in chronic diseases, due to lack of access to medical care in the first place.

Need definitions (**2**) and (**3**) define an individual as being in need when they report having some or severe movement limitations. I have created two distinct levels of severity on these limitations, to assess whether the results are robust. To build the activities of daily living (ADL) index, I used the variables: bathing/washing, getting dressed, moving inside the house, eating, getting up from bed, and using the toilet (Noelker & Browdie, 2013). I also considered the degree of severity of that inability and the number of categories where people reported inabilities. For each activity, there is a scale of inability from none (1) to extreme (5). The approach to defining whether a person has any limitation was the following: I have summed up the "scores" of the answers for each individual. If someone reports none (1) in all six activities, he or she will have a cumulative value of six (1+1+1+1+1+1). This allows for the consideration of both the number of activities and the severity of the limitation.

- Limitations (level 1): sum of ADL is at least 8. This could mean, for example, having no difficulties in five categories, but having a moderate difficulty in one of the activities. Alternatively, it could be having no difficulties in four activities

and having mild difficulties in two. Any combination of more severe limitations than the ones mentioned is included, as this establishes the lower limit.

- Limitations (level 2): sum of ADL is at least 10. For this case, it could be having moderate difficulties in two categories, or having mild difficulties in all daily movements except for one. Again, this refers to the lower limit, and more severe limitations are included.

The establishment of these thresholds is arbitrary, but they help us attribute robustness to our results. The pattern of unmet needs is expected to be similar independently of the definition used.

Need definition (**4**) defines an individual as being in need when they either report having a chronic illness or report having some or severe movement limitations. This is an indicator of poor health. For this approach, I considered the second definition of the limitation variable (level 2). This definition aggregates the several natures of health problems, allowing for a broader overview on distribution matters.

Need definition (**5**) defines an individual as being in need when they report being dissatisfied or very dissatisfied with their health status. This cannot be considered as objective as the other definitions, as it relies (more) on the respondent's perception of their health status. Nevertheless, it can complement the other more objective measures.

3.2.3 Definitions of unmet need

The use of several alternative definitions of objective unmet needs will allow for the assessment of the sensitivity and robustness of the results.

Objective: for each of these need definitions, unmet needs definition (objective) defines an individual as having their needs unmet when they have not received any formal care in the past 12 months, and yet they report the existence of health problems

– either chronic diseases, movement limitations, or poor health. This includes both inpatient and outpatient care.

Subjective: unmet needs definition (subjective) defines an individual as having their needs unmet when they report so, being asked: "*the last time you needed health care, did you get health care?*" This approach does not consider a specific timeframe.

In the existing literature, the most common definitions are the unmet need based on ADL criteria (Garcia-Gomez et al., 2015; Kemper et al., 2008; Shea et al., 2003), as well as the subjective definition (Allin et al., 2010; Koolman, 2007). In this context, the construction of an indicator based on chronic diseases is particularly innovative, allowing us to acknowledge the impacts of the increased burden of these health complications in developing countries. For clarity, this thesis explores six definitions of unmet need, described below (Table 2).

Table 2 – Unmet need definitions

Unmet need 1 – Chronic diseases	An individual has at least one chronic disease and has not received formal care in the last 12 months.
Unmet need 2 – Movement limitations (1)	An individual has movement limitations (severity level: 1) and has not received formal care in the last 12 months.
Unmet need 3 – Movement limitations (2)	An individual has movement limitations (severity level: 2) and has not received formal care in the last 12 months.
Unmet need 4 – Poor health	An individual has at least one chronic disease or movement limitations and has not received formal care in the last 12 months.
Unmet need 5 – Self-assessed bad health	An individual reports being dissatisfied or very dissatisfied with their health status and has not received formal care in the last 12 months.
Unmet need 6 – Subjective; self-reported	An individual reports not having received formal care the last time they needed it.

3.2.4 Socioeconomic and demographic variables

For the education level, I use data from the question *"what is the highest level of education that you have completed?"* which can be 1) less than primary school, 2) primary school, 3) secondary school, 4) high school (or equivalent), 5) college/pre-university/university, or 6) postgraduate degree. Initially, I constructed a three-category variable, with a basic (up to primary school), medium (secondary or high school), and a higher level of education (college or postgraduate). However, I achieved a small number of respondents belonging to the third category. Thus, I have decided to consider only two different categories: basic education (up to primary school) and higher education (completed secondary school). Although this could be considered simplistic in more developed scenarios, it does not seem to be the case for these countries. The only exception to this is Russia. Due to the widespread access to high education in this country, it is reasonable to follow the initial reasoning and create the three traditional categories.

SAGE provides a variable corresponding to 5 income quintiles (designated Q1, Q2, Q3, Q4, Q5) within countries, which will directly be used in this analysis. This does not contemplate the magnitude of income but its distribution, allowing the comparison of compare groups within and across countries.

Furthermore, I also control for age and sex, as these can affect need (Aday & Anderson, 1974), to capture additional unmeasured variation.

3.3 Descriptive statistics

Table 3 and Table 4 display descriptive statistics for the variables incorporated in the analysis and for those which might provide insightful context.

Table 3 – Descriptive statistics (1)

Variables/Country	**China**	**Ghana**	**India**	**Mexico**	**Russia**	**South Africa**	***Mean***
Average age	63.16	64.21	61.85	68.39	65.05	62.73	64.232
Female	53.06%	50.32%	49.43%	60.49%	64.58%	57.37%	55.88%
High education	49.75%	53.51%	47.57%	21.11%	89.97%	34.28%	49.37%
Urbanity	49.11%	40.74%	26.03%	76.18%	75.34%	66.74%	55.69%
Chronic diseases	51.40%	44.97%	39.66%	26.88%	64.66%	66.03%	48.93%
Limitations (based on ADL – level 2)	5.87%	22.27%	24.96%	25.51%	22.82%	17.03%	19.74%

Table 4 – Descriptive statistics (2)

Variables/Country	**China**	**Ghana**	**India**	**Mexico**	**Russia**	**South Africa**	***Mean***
Use of formal care (last 12 months)	66.18%	68.33%	88.27%	44.79%	76.84%	65.23%	*68.27%*
Unmet need (1) – chronic	16.89%	13.87%	3.71%	32.95%	13.85%	20.99%	*17.04%*
Unmet need (2) – ADL1	3.42%	8.22%	3.49%	1.37%	22.27%	5.37%	*8.41%*
Unmet need (3) – ADL2	1.79%	4.59%	2.28%	14.57%	3.24%	4.78%	*5.21%*
Unmet need (4) – poor health	17.50%	16.15%	5.05%	38.01%	14.46%	22.43%	*18.93%*
Unmet need (5) – bad health (self-reported)	17.42%	4.64%	1.73%	5.72%	4.14%	4.77%	*6.40%*
Unmet need (6) - subjective	6.80%	14.95%	2.12%	1.37%	2.25%	1.15%	*4.77%*

The share of the population receiving any formal care in the previous 12 months ranges from 44.79% (Mexico) to 88.27% (India), with a mean of 68.27% when considering all countries.

Looking at the population with some type of health need, we observe some differences in unmet needs depending on the used definition/measure. Self-reported unmet need differs significantly across countries, which might indicate reporting discrepancies. Particularly, it varies from 1.37% (Mexico) to 14.95% (Ghana), indicating that lower health care use is not necessarily connected to a higher fraction of reported unmet need. On average, considering all countries, people report less than 5% of unmet need, which is below the reported numbers in developed countries, sometimes above 30% (Allin et al., 2010; Bryant, Leaver & Dunn, 2009). This disparity is consistent with the findings related to higher reported morbidity in more developed countries (Sen, 2002).

Overall, when looking at unmet needs through the chronic disease approach, the average figure is 17% in an aggregate approach. This number ranges from 3.71% (India) to 32.95% (Mexico). When considering those who suffer limitations in daily activities, the average unmet need varies from 5.21% to 8.41%, depending on the severity. For comparison, in the United States, studies focused on movement limitations show that the fraction of individuals reporting unmet need in support for activities of daily living ranges from 20% up to 58% depending on the studied population (Muramatsu & Campbell, 2002). Shea et al. (2003) find that this value is only roughly 4% in Sweden.

In most countries, individuals seem to underestimate their needs systematically. In India, Mexico, Russia, and South Africa, objective unmet need is always larger than the self-reported value, either when measuring objective need by the chronic disease or activities of daily living approach. Furthermore, the reporting issues are most likely not randomly distributed but related to the socioeconomic status of respondents. This idea will be further discussed in Sections 4 and 5.

About need variables, chronic diseases have a significant prominence, especially in medium-income countries. The proportion of people with at least one chronic disease is roughly 65% in Russia and South Africa and approximately 50% in China. The most common illnesses across the entire sample are hypertension (28% of the respondents over 50 years old) and arthritis or other forms of rheumatism (18%). The degree of movement limitations differs across countries, with barely any burden in China (5.87%), some severity in South Africa (17%) and more substantial prevalence on the other four countries, ranging from 22% to 25%. It is noteworthy that the incidence of chronic health problems does not follow the same pattern in all countries, with regard to the socioeconomic distribution (Table A.1). On the other hand, there is significant variation in the socioeconomic ladder regarding movement limitations – they mostly affect the poorer (Table A.2). In some countries, higher education translates to both lower incidence of chronic diseases and movement limitations (Mexico, India, South Africa) (Tables A.3 – A.4). This could be because of increased risk prevention or better health behaviors (Cutler & Lleras-Muney, 2010). In case incidence is very dependent on the socioeconomic ladder, this can potentially affect our analysis. If there is no medical need (either in the lenses of chronic diseases or limitations) in one group, there is fewer potential to find access issues and unmet need, and vice-versa.

Across all countries, most individuals report being "very satisfied or satisfied" with their health status (55.47%). On the other hand, 18.87% of individuals report some level of dissatisfaction with their health. Highest satisfaction is found in Mexico and South Africa (10% and 12% are very satisfied), while dissatisfaction is higher in Ghana and Russia (3.50% and 4.58% of people are very dissatisfied). In general, education and income are positively associated with a higher degree of reported satisfaction. So far, we observe a lack of correlation between reporting poor health and reporting unmet need for health care. This can result from two effects – either individuals interpret these

questions differently, or they have exhausted the health gains from additional formal care consumption.

With respect to sociodemographic variables, nearly half of the studied sample is comprised between the ages of 50 and 60 years old. The mean age when considering all the countries is roughly 64 years old. The oldest population is observed in Mexico (mean of 68.39). In general, the proportion of women is higher (55.88%), but there are some country discrepancies. In Mexico, over 60% of the sample is female, while in India and Ghana this proportion is roughly 50%. Consistent with demographic hypotheses, the proportion of women increases with age category in all countries.

High education is more prevalent in Russia (89%), a value far from which is the overall mean of roughly 50%. Despite its development level, only 21% of Mexicans have some form of high education. Overall, 56% of the respondents live in urban areas, with a low of 26% in India. The highest urbanity rates are observed in Mexico (76.18%) and Russia (75.34%).

These indicators will be interpreted in further depth when analyzing the results, as they will have compelling reflections on the discovered patterns.

4. METHODS

4.1 The model

This thesis aims to conclude wherein the socioeconomic ladder the most unmet need is concentrated. Another goal is to look into whether these gradients differ when we use objective or subjective measures of unmet need. As explained, I repeat the same procedure for each one of the studied countries to be able to distinguish different patterns amongst them.

The dependent variable in this model is a binary indicator, in which 1 refers to the existence of unmet need (forgone services) and 0 to access to the necessary health

services. I estimate a probit model for each definition of unmet need, both objective and subjective (Table 2), where the independent variables are the socioeconomic groups (ranked from lower to highest), and also a few control variables (age, sex). The proportion of individuals with unmet needs (SES groups), keeping age and gender fixed, are calculated by i) education level, and ii) income category.

The model used in this analysis is defined as follows:

$$Pr(Y_i = 1|X_i, SES_i) = \Phi(\beta_0 + \beta_1 X_i + \beta_i SES_i) \quad \text{(i)}$$

The use of a probit model allows for the estimation of the probability that an individual with particular characteristics falls into the category of facing unmet need. Since the dependent variable is binary in its nature, only a binary classification model would be suitable for this analysis.

One of the disadvantages of non-linear models, such as this one, is the lack of straightforwardness in the interpretation of the results since effects are not constant (Wooldridge, 2012). I will perform an analysis of the average marginal effects to be able to go beyond the sign and magnitude of the effects, as well as enabling an easier comparison of results.

4.1.1 Remarks about causality and empirical validity

The aim of this study is not to assess causality between socioeconomic indicators and unmet need. Instead, I intend to estimate the correlation between these variables. The results have relevance as a primary step towards acknowledging this association, especially in developing countries, where literature is scarce in this aspect. Nevertheless, policies should be based on causal relationships, to pinpoint the source of failure. Future research should attempt to tackle this aspect.

As previously mentioned, it is unfeasible to be fully aware of the extent of the asymmetry between individual assessments and the clinical reality. The next topic

illustrates a potential approach towards this measurement and explains how it can be incorporated on the interpretation of results.

4.1.2 Testing the magnitude of flawed reporting

Results might be affected by the lack of diagnostic of chronic diseases. If poorer, less educated people lack access to health care in the first place, this possibility should be considered. The construction of the hypertension variable can be used as a tool to address part of this issue, but this analysis still relies on the self-reporting of all other chronic diseases. Although reporting bias is expected to take place, it is relevant to assess to which extent.

Thus, to construct a proxy for misreporting, a possible strategy is to compare the gap between reported hypertension and observed hypertension. Particularly, it is relevant to calculate the proportion of the respondents who do not report hypertension, but in whom hypertension values are observed in the interview. Although this is an incomplete mechanism to evaluate the whole extent of misreporting, it does have some strong points. Firstly, unlike other diseases (e.g., depression), social stigma does not seem to play an important role in misreporting hypertension (Sartorius, 2007). Moreover, the awareness for the prevalence of this health issue in this age category is assumed to be well established in the medical community, and costs for its diagnostic appear to be low. In this sense, it might be safe to approximate the observed difference in reporting/having hypertension to lack of diagnosis or a lack of awareness of one's health status. Furthermore, it will be relevant to assess whether the percentage of misdiagnosed individuals varies throughout the socioeconomic ladder. If it is possible to assess that in a particular country, lack of diagnosis is more prevalent with people with lower socioeconomic status, this will indicate that the socioeconomic inequity gradient is underestimating the actual unmet needs of the worse-off. Through the following

analysis, although there might be other factors determining this gap between observed and measured hypertension, I will refer to it as "misreporting" for simplicity.

5. RESULTS

5.1 Access discrepancies as a function of income and education

Although countries have their specificities in the derived results, there mostly are common or similar outcomes. The first and more central one is that the initial hypothesis regarding the socioeconomic distribution of unmet need seems to hold. In fact, across most measures of unmet need, the groups which are higher in the socioeconomic ladder face a lower probability of having unmet need, compared to the worse-off. This is the case for the income and education analysis (Tables A.5 – A.17)

Through the income lenses, the highest discrepancies across economic groups are found in Ghana – concretely, when looking at unmet need (2) measured by movement limitations (Table A.17, row 2, column 2). In this context, belonging to the highest income quintile decreases the probability of facing unmet need 10.7 percentage points, on average, compared to belonging to the poorest group, ceteris paribus. This effect is significant at a 1% level. In general, the probability of facing unmet need decreases linearly through the several quintiles, which is why, for more simplicity and straightforward interpretation, I only present the relationship between the first and last quintiles.

When looking at education, the highest magnitude in the socioeconomic gradient is observed in Russia, in unmet need (4) (Table A.18, row 4, column 4). Here, being part of the wealthiest group decreases the likelihood of facing unmet need by 7.1 percentage points, on average, compared to belonging to the lowest socioeconomic ranking. This effect is also significant at a 1% level.

Generally, women and the eldest are more likely to face unmet need. Overall, the results are consistent with our initial hypothesis, but also with the presented literature on access distribution in the studied countries (Section 2.5).

In general, measures based on limitations are more consistently significant than the measure based on chronic diseases. The biggest magnitude is usually found in the objective measure of unmet need with self-assessed poor health. Despite these variations, these distinct measures offer the robustness I aimed for: the socioeconomic gradient is consistent across all measures, and the distinction between objective vs. subjective measures often follows a clear pattern.

5.2 Objective vs. subjective measures

This analysis revealed that the higher the SES, the lower both self-reported unmet needs and objective unmet needs. However, the comparison between objective and subjective measures is also equally relevant. Previous to this analysis, there were certain expectations about which pattern to expect. It has been hypothesized that the subjective approach should show a smaller degree of inequity than objective measures in general. The reasons for this expectation arises from underreporting of health needs by lower SES groups, compared to higher SES groups, which has been discussed in Section 2.4. In this sense, we can aggregate countries into specific groups.

- Category 1: Countries in the expected direction (objective measure bigger magnitude/significance than subjective);
- Category 2: Countries with no detected pattern (mixed indicators);
- Category 3: Countries with counter-intuitive direction (subjective measure bigger magnitude/significance than objective) – potential reporting issues.

In Table 5, it is possible to observe that not all objective measures surpass the magnitude of the subjective measure. Nevertheless, these are general and aggregated conclusions. If a country follows the expected direction, it means that the majority of

objective measures have a higher magnitude or significance than the subjective one. The interpretation of these findings follows in Section 6.

It is still relevant to highlight the most glaring of the cases. In Russia, for the cases of income and education, most objective measures have some magnitude and significance (Tables A.17 – A.18, row 5). On the other hand, the subjective measure is insignificant, meaning that the pattern that was found by relying on need-adjusted health care use is not showing through the individual's self-reporting. This might indicate that distinct education levels interfere with people's standards and perceptions of needs, as discussed in Section 2.4.

Table 5 – Comparisons between subjective and objective measures

	Income	***Education***
China	Not clear	Counter-intuitive direction
Ghana	Counter-intuitive direction	Expected direction
India	Not clear	Expected direction
Mexico	Expected direction	Expected direction
Russia	Expected direction	Expected direction
South Africa	Expected direction	Expected direction

5.3 Findings on reporting issues

As stated on Section 4.1.3, the gap between observation of hypertension in the interview context and the reporting of hypertension might give us useful input for the interpretation of the socioeconomic gradients of unmet need, as well as for the differentiation between objective and subjective measures.

The highest magnitude of (potential) lack of diagnosing occurs in South Africa (31.66% of the people who display values for hypertension do not report it) and in Ghana (27.76%), as shown in Table 6. Russia shows the lowest value (7.18%), possibly

due to more widespread access to health care. The mean percentage of the discrepancy between reporting and clinical observation exceeds 15% for hypertension, which is quite a significant magnitude. This can be an indication of discrepancies in the rest of the chronic conditions incorporated in this thesis, mainly in those diseases for which awareness is not widespread in society and the medical community.

Table 6 - Observed, but not reported hypertension

Country	
China	13.37%
Ghana	27.76%
India	10.07%
Mexico	8.42%
Russia	7.18%
South Africa	31.66%
Average	*16.41%*

Although this is expected to introduce some noise in the findings of this thesis, it is relevant to assess whether the magnitude of misreporting is variable across income and education levels. Regarding income, this discrepancy between reporting and observation changes when we compare the first and last income quintiles (Table 7). In all countries, the poorer misreport in a larger level (on average, considering all countries, the prevalence of misreporting in Q1 is 19%, vs. 14% in Q5). This gap is unusually large in South Africa (difference of 12.84 percentage points). We can observe a similar pattern when we analyze the percentage of people who misreport in the different education levels (Table 8) where, overall, we see a gap of 2.73 percentage points across the different groups, which is larger in China (difference of 4.47 percentage points).

Table 7 – Gap between observed and reported hypertension (by income)

	Q1	Q2	Difference (in pp.)
China	14.74%	12.39%	4.46
Ghana	27.49%	23.99%	3.50
India	14.03%	8.97%	5.06
Mexico	9.57%	8.19%	1.38
Russia	8.72%	6.31%	2.41
South Africa	37.33%	24.49%	12.84
Mean	*19.00%*	*14.06%*	*4.94*

Table 8 – Gap between observed and reported hypertension (by education)

	Low-educated	Better-educated	Difference (in pp.)
China	14.74%	10.27%	4.47
Ghana	28.70%	25.61%	3.09
India	9.98%	8.36%	1.62
Mexico	9.13%	6.94%	2.19
Russia	9.04%	7.03%	2.01
South Africa	32.18%	29.20%	2.98
Mean	*17.30%*	*14.57%*	*2.73*

6. DISCUSSION AND CONCLUSION

6.1 General relevance of this study

Access to health is a fundamental human right, and universal coverage is a core point of the agenda for the WHO and many national governments in LMICs (Nigenda et al., 2016; Liang & Langenbrunner, 2013). In the context of this thesis, achieving this goal

would be to conclude that unmet need is not only nonexistent but also unrelated to socioeconomic status. In general, access to health care should be strictly independent of income, education, or ethnicity, but instead be linked to people's health needs.

There is diverse literature on equity of access to health care services. Even if unmet need is not the most mainstream indicator, it has gained ground as a tool to detect gaps in people's demand for those services. Most empirical evidence so far is based on developed countries, with special predominance of the United States, Canada, and Europe (Section 2.5). The literature on unmet need (and equity concerns in access, in general) is scarcer in LMICs. In countries with unsophisticated health systems, people are often faced with large unexpected out-of-pocket expenses, sometimes catastrophic (Section 2.5), as well as other types of barriers (e.g., cultural, geographic). The increased vulnerability of the poorest and eldest population in developing countries attributes an increased relevance to this analysis. The availability of data from SAGE offers a unique opportunity to address these issues.

6.2 Overall findings

I focus on the distribution of unmet needs across socioeconomic groups for health care formal services (inpatient and outpatient care). For robustness, I use several different definitions of unmet needs, based on (i) four different concepts of need, (ii) two different natures of unmet need. I define (medical/clinical) need based on the existence of chronic diseases, movement limitations in activities of daily living, poor health, and self-assessed bad health. Furthermore, I define objective unmet need by crossing those health needs with health care services utilization. The variety of objective measures provides consistency to our results, allowing for a more complete analysis of such a complex and multidimensional reality, which has more than a unique angle. In contrast, I define subjective unmet need by merely relying on whether people report facing unmet need.

Overall, results corroborate the initial hypothesis – an increase in the probability of facing unmet need is positively associated with lower socioeconomic status, regardless of the used definition of unmet need. Thus, there is evidence of inequity in access to health care. This is consistent in all measures, which have been constructed to allow for some robustness in these findings. It is not a straightforward task to assess whether income or education have the most meaningful impact on the depth of socioeconomic gradients. As seen in these findings, this depends on the context. In a country where access to health care might involve lower costs, education might have more relevance than in a country where the population is exposed to financial risks and large out-of-pocket payments.

When comparing objective and subjective measures, the results are not uniform across countries, although the majority of them follows the expectations as well. Our initial hypothesis based on previous literature (Garcia-Gomez et al., 2015) was to observe a larger socioeconomic gradient in objective measures, indicating more inequity. This would be the consequence of systematic self-reporting bias in reported unmet need from the worse-off, which would lead to the underestimation of inequity. Looking at an estimation of misreporting constructed upon differences in observed and reported hypertension, we see that poorer and less educated individuals underestimate their reported unmet need, but also do not report their health status adequately. This could be a reason why the objective measures also underestimate the magnitude of horizontal inequity. As they are never entirely objective, there is some dependence on the same reporting biases we find in the subjective measure, even if to a smaller extent.

When analyzing the results, one should be aware that the interpretation of unmet needs is not straightforward. The findings should be contextualized in function of the different socioeconomic groups and types of need is necessary towards reducing underestimation of unmet need for the most vulnerable (Garcia-Gomez et al., 2015).

6.3 Validity and limitations

This thesis has its limitations. As mentioned throughout the study, the measuring of needs (and unmet needs) has several dimensions and depends on subjective preferences (Kemper et al., 2008). Even objective measures have their shortcomings. Firstly, without a complete medical assessment of individuals' clinical condition, it is unfeasible to measure unmet needs in a way that is wholly objective. Secondly, these measures fail to comprise a lack of satisfaction with health care services. Although the definitions of unmet need in this thesis fail to acknowledge the effects of receiving inappropriate care, authors consider unmet need to occur when someone is in need of formal care, receives it, but is unsatisfied with the given support (Vlachantoni et al., 2011). In Canada, higher educated respondents are more likely to report unmet need, as they commonly have higher standards for the received care, and thus manifest generalized dissatisfaction (Allin & Masseria, 2009). Future studies could incorporate measures of satisfaction to overcome this issue. Particularly, SAGE provides data on questions such as *"overall, how satisfied were you with the care you received during your last visit?"*. As advanced by Kim (2016), these types of studies also do not consider the increased exposure to inadequate care for the worse-off, regardless of their perception. This is likely to underestimate the disparity between socioeconomic gradients.

Ultimately, the chosen and implemented concepts of unmet need depend on the availability of data and are, in many cases, far from the ideal theoretical scenario. In this specific case, it also does not allow for the discrimination of different types of care (GP and specialist), neither for the identification of the specific nature of the barriers to access (e.g., financial constraints, physical unavailability, waiting times). In particular, researchers would also be able to assess whether the barriers depend or differ according to socioeconomic status. These incomplete points can limit the policy relevance of this study, as it lacks to provide enough guidance to direct the course of action. Other questionnaires already comprise this aspect, such as the Survey of Health, Ageing and

Retirement in Europe (SHARE). These are shortcomings of the survey itself, which this thesis could difficultly have addressed.

Other identified weaknesses of this dataset include the lack of responsiveness in the final sections of the questionnaire, likely associated with the duration of the survey (Kowal et al., 2012) – the mean time for Wave 1 interviews was 2.5 hours, which is the trade-off for such comprehensiveness. In this context, it would have been ideal to have more observations on the self-reported (subjective) unmet need. In Mexico, especially, only 40% of the total sample responds to this aspect.

Since this analysis is based on the eldest population, it is likely that some of the most vulnerable population is not being included in the study. As it is such a comprehensive and time-consuming questionnaire, two potential vulnerable groups are potentially and systematically excluded from this analysis. Firstly, lower-income individuals may be less willing to spare their free time. Secondly, people with very poor health (e.g., dementia, complex needs, communication inabilities) might not be physically fit to face the interview. These restrictions will likely underestimate the magnitude of unmet need.

Moreover, when analyzing the healthcare paradigm of each country and the SAGE National reports (INSP, 2014; UGMS, 2013; IIPS, 2013; RAMS, 2013; SCDC, 2012; URSC, 2012), it becomes clear that some countries are geographically heterogeneous regarding its healthcare provision. Plus, as seen in Table 3, urbanity levels vary throughout the countries. There might be certain regions where health care is structurally underdeveloped, compared to its more urban or industrialized counterparts, which can be informative towards the analysis of disparities in access, as the socioeconomic variables used in this study may not fully capture that variation. Thus, future research should rely on geographic province or urbanity indicators provided by SAGE to test whether this could affect the results.

Finally, the comparability of results across countries might not be as straightforward as desirable. Three main issues might play a role in multicountry surveys, particularly translation issues, cultural biases, and the sampling methods. Realistically, it is unreasonable to expect that none of these occur. Translation challenges have not been addressed by SAGE and might be especially relevant in this scenario, as "unmet need" is not a clear term in some non-English languages (Vega & Lopez, 2001). Finally, as mentioned before, there were different methods of data collection in the survey, PAPI, and CAPI, which could result in different levels of engagement in the interview. For future surveys, SAGE will solely rely on the second method, which might provide more heterogeneity to the results (Kowel et al., 2012).

6.4 Policy implications and conclusion

To which extent is this analysis suitable to support the development of policies to broaden access to health care? Can information about unmet need and the magnitude of forgone care be an instrument towards reducing socioeconomic inequalities?

The results of this analysis corroborate the need for the attenuation of barriers to access, either financial, geographic, social, or cultural. It motivates countries which have not yet established universal healthcare systems to justify its urgency and importance – this is the case for India and South Africa (STC, 2018). For those who recognize universal access (China, Ghana, Mexico, Russia) (STC, 2018), it can provide enough purpose to look further at reasons of failure and see what needs to be implemented to cover the rest of the ground in practical terms properly. Furthermore, researchers and policy-makers should be prudent when beholding these findings. Their evaluation must be done in the context of each country's health systems as much as achievable since the specificities of each context are sure to affect the interpretation of these results.

Regarding the observed inequity across different socioeconomic groups, it is relevant to reach causal results, as well as to isolate the role of specific barriers of access

in each country. As WHO and other entities release more recent and complete data, it will be relevant to perform panel-data analyses. This can be helpful to assess whether unmet need has responded to individual changes (income shocks or aging) or macro shifts (public policies or economic shocks). A more profound comprehensiveness in this field will be reached when policy-makers have the tools to, as described by Allan & Masseria (2009), *"link information on access problems, actual use of health services, and health outcomes in order to better understand the meaning and impact of unmet need on health, and health inequalities."*

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APPENDIX

Table A. 1 – Incidence of chronic diseases by income quintile

	1	2	3	4	5
CHINA	52.5%	50.5%	51.0%	51.8%	52.0%
GHANA	35.4%	42.9%	47.7%	49.6%	49.3%
INDIA	37.2%	38.7%	38.5%	42.3%	40.9%
MEXICO	39.8%	47.6%	41.2%	45.4%	43.8%
RUSSIA	66.4%	69.6%	66.3%	61.2%	59.9%
SOUTH AFRICA	60.8%	66.1%	72.4%	67.8%	63.4%
AVERAGE	*48.67%*	*52.56%*	*52.84%*	*53.01%*	*51.53%*

Table A.2 – Incidence of movement limitations by income quintile

	1	2	3	4	5
CHINA	10.3%	6.4%	6.1%	3.9%	2.5%
GHANA	21.5%	23.6%	28.0%	20.7%	17.6%
INDIA	30.1%	28.6%	27.7%	23.0%	18.5%
MEXICO	32.1%	30.2%	23.2%	21.4%	19.2%
RUSSIA	33.7%	27.7%	25.8%	16.2%	12.3%
SOUTH AFRICA	17.7%	18.4%	16.0%	19.8%	13.3%
AVERAGE	*24.2%*	*22.5%*	*21.1%*	*17.5%*	*13.9%*

Table A.3 – Incidence of chronic diseases by education level

	Basic education	High education
CHINA	52.29%	51.11%
GHANA	51.45%	51.70%
INDIA	47.16%	44.74%
MEXICO	62.37%	61,76%
RUSSIA	87.21%	72.76%
SOUTH AFRICA	70.80%	63.03%
AVERAGE	*61.88%*	*56.67%*

Table A.4 – Incidence of movement limitations by education level

	Basic education	High education
CHINA	5.16%	2.94%
GHANA	20.16%	15.74%
INDIA	23.06%	15.20%
MEXICO	26.04%	15.24%
RUSSIA	52.05%	19.16%
SOUTH AFRICA	18.16%	11.46%
AVERAGE	*24.11%*	*13.29%*

Table A.5 – Income regression for China

	objchronic	***objADL1***	***objADL2***	***objpoorhealth***	***selfpoorhealth***	***subjective***
age	0.004*	0.029***	0.034***	0.006***	0.003	-0.011***
	(-2.51)	(-10.91)	(-10.02)	(-3.78)	(-1.22)	(-4.87)
female	0.006	0.098	0.082	0.006	0.095*	-0.081*
	(-0.2)	(-1.89)	(-1.25)	(-0.21)	(-2.19)	(-2.07)
2.quintile_c	-0.052	-0.279***	-0.309***	-0.063	-0.126*	-0.087
	(-1.11)	(-3.96)	(-3.39)	(-1.37)	(-2.08)	(-1.53)
3.quintile_c	-0.152**	-0.361***	-0.311***	-0.170***	-0.341***	-0.214***
	(-3.24)	(-5.00)	(-3.47)	(-3.66)	(-5.23)	(-3.66)
4.quintile_c	-0.273***	-0.556***	-0.467***	-0.300***	-0.363***	-0.493***
	(-5.72)	(-6.91)	(-4.67)	(-6.35)	(-5.59)	(-7.71)
5.quintile_c	-0.256***	-0.781***	-0.770***	-0.290***	-0.558***	-0.489***
	(-5.33)	(-8.13)	(-5.88)	(-6.08)	(-7.75)	(-7.60)
_cons	-1.084***	-3.460***	-4.141***	-1.172***	-1.607***	-0.543***
	(-9.43)	(-18.04)	(-16.51)	(-10.29)	(-10.00)	(-3.62)
N	9825	9825	9825	9825	9825	9825

Table A.6 – Education regression for China

	objchronic	***objADL1***	***objADL2***	***objpoorhealth***	***selfpoorhealth***	***subjective***
age	0.004	0.023***	0.027***	0.005*	0.001	-0.017***
	(-1.75)	(-6.63)	(-5.86)	(-2.31)	(-0.19)	(-5.98)
female	0.004	0.116	0.026	0.006	0.079	-0.138**
	(-0.13)	(-1.76)	(-0.3)	(-0.16)	(-1.56)	(-3.00)
higheduc	-0.059	-0.265***	-0.181*	-0.069*	-0.181***	-0.186***
	(-1.68)	(-3.91)	(-2.04)	(-1.97)	(-3.54)	(-4.06)
_cons	-1.180***	-3.412***	-3.953***	-1.230***	-1.665***	-0.315
	(-8.81)	(-14.17)	(-12.36)	(-9.24)	(-8.61)	(-1.74)
N	7349	7349	7349	7349	7349	7349

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.7 – Income regression for Ghana

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	-0.002	0.011***	0.013***	0	0.011***	-0.004
	(-1.04)	(-4.22)	(-4.15)	(-0.15)	(-3.42)	(-1.53)
female	-0.019	0.051	0.017	-0.041	0.05	-0.083
	(-0.39)	(-0.85)	(-0.24)	(-0.84)	(-0.7)	(-1.68)
2.quintile_c	0.049	-0.292***	-0.249*	-0.042	-0.201*	-0.027
	-0.63	(-3.50)	(-2.53)	(-0.57)	(-2.07)	(-0.36)
3.quintile_c	-0.071	-0.463***	-0.497***	-0.204**	-0.399***	-0.219**
	(-0.89)	(-5.27)	(-4.55)	(-2.69)	(-3.79)	(-2.84)
4.quintile_c	-0.063	-0.662***	-0.624***	-0.207**	-0.539***	-0.203**
	(-0.80)	(-6.97)	(-5.34)	(-2.74)	(-4.79)	(-2.66)
5.quintile_c	-0.12	-0.665***	-0.514***	-0.255***	-0.572***	-0.371***
	(-1.50)	(-6.94)	(-4.64)	(-3.34)	(-4.95)	(-4.65)
_cons	-0.879***	-1.785***	-2.233***	-0.811***	-2.115***	-0.611***
	(-5.32)	(-9.55)	(-10.05)	(-5.14)	(-9.49)	(-3.79)
N	3929	3926	3926	3926	3926	3926

Table A.8 – Education regression for Ghana

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	-0.006	0.005	0.006	-0.005	0.01	-0.005
	(-1.30)	(-0.97)	(-0.91)	(-1.25)	(-1.55)	(-1.12)
female	0.021	0.214*	0.247	0.053	0.144	0.062
	(-0.27)	(-2.1)	(-1.92)	(-0.68)	(-1.2)	(-0.77)
higheduc	-0.029	-0.259*	-0.145	-0.047	-0.15	0.205**
	(-0.37)	(-2.51)	(-1.11)	(-0.63)	(-1.25)	(-2.58)
_cons	-0.746**	-1.919***	-2.367***	-0.726**	-2.448***	-0.986***
	(-2.65)	(-5.40)	(-5.26)	(-2.64)	(-5.82)	(-3.39)
N	1778	1778	1778	1778	1778	1778

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.9 – Income regression for India

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	0	0.015***	0.020***	0.007*	0.014***	0.006
	0.00	(-4.48)	(-5.3)	(-2.24)	(-3.47)	(-1.38)
female	-0.102	0.075	0.09	-0.007	-0.002	0.031
	(-1.65)	(-1.18)	(-1.21)	(-0.12)	(-0.03)	(-0.38)
2.quintile_c	-0.013	-0.07	-0.056	-0.049	-0.094	0.03
	(-0.12)	(-0.72)	(-0.48)	(-0.55)	(-0.80)	(-0.24)
3.quintile_c	0.00	-0.152	-0.005	-0.123	-0.22	-0.082
	0.00	(-1.52)	(-0.04)	(-1.36)	(-1.78)	(-0.64)
4.quintile_c	0.026	-0.237*	-0.142	-0.137	-0.526***	-0.124
	-0.26	(-2.37)	(-1.20)	(-1.56)	(-3.70)	(-0.98)
5.quintile_c	-0.035	-0.384***	-0.270*	-0.146	-0.375**	-0.336*
	(-0.36)	(-3.78)	(-2.26)	(-1.71)	(-3.04)	(-2.49)
_cons	-1.734***	-2.617***	-3.206***	-1.928***	-2.789***	-2.386***
	(-7.54)	(-11.52)	(-12.21)	(-9.68)	(-9.87)	(-8.28)
N	5798	5798	5798	5798	5798	5798

Table A.10 – Education regression for India

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	-0.002	0.009	0.013*	0.003	0	0.004
	(-0.43)	(-1.73)	(-2.1)	(-0.73)	(-0.01)	(-0.63)
female	-0.045	-0.205	-0.134	-0.115	-0.188	-0.148
	(-0.47)	(-1.77)	(-1.04)	(-1.28)	(-1.34)	(-1.08)
higheduc	-0.1	-0.233*	-0.270*	-0.086	-0.322*	-0.033
	(-1.13)	(-2.25)	(-2.25)	(-1.05)	(-2.47)	(-0.28)
_cons	-1.554***	-2.348***	-2.716***	-1.769***	-1.981***	-2.339***
	(-4.80)	(-6.52)	(-6.71)	(-5.94)	(-4.44)	(-5.39)
N	2827	2827	2827	2827	2827	2827

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.11 – Income regression for Mexico

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	0.003	0.021***	0.029***	0.009**	-0.008	-0.011
	(-0.78)	(-5.91)	(-7.48)	(-2.96)	(-1.49)	(-1.27)
female	0.252***	0.164*	0.151*	0.185**	0.237*	-0.189
	(-4.12)	(-2.47)	(-2.03)	(-3.12)	(-2.37)	(-1.22)
2.quintile_c	0.166	-0.017	0.011	0.009	-0.051	-0.298
	(-1.85)	(-0.18)	(-0.11)	(-0.1)	(-0.40)	(-1.46)
3.quintile_c	0.112	-0.172	-0.205	-0.044	-0.264	-0.496*
	(-1.18)	(-1.70)	(-1.80)	(-0.48)	(-1.81)	(-1.99)
4.quintile_c	0.105	-0.231*	-0.19	-0.095	-0.328*	-0.581*
	(-1.15)	(-2.35)	(-1.73)	(-1.07)	(-2.30)	(-2.37)
5.quintile_c	0.033	-0.312**	-0.241*	-0.144	-0.439**	-0.550*
	(-0.35)	(-3.04)	(-2.11)	(-1.58)	(-2.85)	(-2.24)
_cons	-0.856***	-2.138***	-3.027***	-0.943***	-1.027**	-1.012
	(-3.56)	(-8.30)	(-10.51)	(-4.04)	(-2.73)	(-1.62)
N	1973	1973	1973	1973	1973	1973

Table A.12 – Education regression for Mexico

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	0.005	0.019***	0.027***	0.010**	-0.008	-0.01
	(-1.42)	(-4.89)	(-6.15)	(-2.78)	(-1.40)	(-0.93)
female	0.251***	0.189*	0.164	0.187**	0.300**	-0.2
	(-3.74)	(-2.55)	(-1.96)	(-2.86)	(-2.72)	(-1.12)
higheduc	-0.068	-0.198*	-0.287**	-0.104	-0.352*	-0.602
	(-0.85)	(-2.15)	(-2.62)	(-1.31)	(-2.43)	(-1.73)
_cons	-0.888***	-2.180***	-2.988***	-1.004***	-1.161**	-1.424*
	(-3.48)	(-7.84)	(-9.56)	(-4.01)	(-2.91)	(-2.02)
N	1581	1581	1581	1581	1581	1581

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.13 – Income regression for Russian Federation

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	0.003	0.024***	0.032***	0.002	0.010*	0
	(-0.9)	(-6.43)	(-6.87)	(-0.91)	(-2.56)	(-0.06)
female	-0.063	0.03	-0.004	-0.096	-0.037	-0.001
	(-1.09)	-0.37	(-0.04)	(-1.69)	(-0.43)	(-0.01)
2.quintile_c	-0.052	-0.138	-0.129	-0.049	-0.194	-0.099
	(-0.59)	(-1.27)	(-1.02)	(-0.57)	(-1.69)	(-0.66)
3.quintile_c	-0.041	-0.111	-0.134	-0.042	-0.288*	-0.067
	(-0.47)	(-1.04)	(-1.06)	(-0.50)	(-2.44)	(-0.46)
4.quintile_c	-0.198*	-0.537***	-0.548**	-0.252**	-0.477***	-0.295
	(-2.16)	(-3.98)	(-3.25)	(-2.80)	(-3.57)	(-1.78)
5.quintile_c	-0.076	-0.350**	-0.396*	-0.125	-0.427***	-0.194
	(-0.86)	(-2.84)	(-2.56)	(-1.43)	(-3.30)	(-1.25)
_cons	-1.138***	-3.073***	-3.832***	-1.040***	-2.131***	-1.894***
	(-5.59)	(-10.94)	(-10.94)	(-5.24)	(-7.27)	(-5.32)
N	3313	3313	3313	3313	3313	3313

Table A.14 – Education regression for Russian Federation

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	0.001	0.023***	0.027***	0.001	0.011**	0.002
	(-0.31)	(-5.77)	(-5.58)	(-0.51)	(-2.7)	(-0.38)
female	-0.055	0.051	0.017	-0.083	0	0.003
	(-0.96)	(-0.62)	(-0.17)	(-1.48)	(-0.00)	(-0.03)
2.edu_cat	-0.249**	-0.319**	-0.487***	-0.239**	-0.191	-0.013
	(-2.74)	(-3.08)	(-4.31)	(-2.68)	(-1.59)	(-0.07)
3.edu_cat	-0.280**	-0.528***	-0.772***	-0.286**	-0.289	-0.027
	(-2.61)	(-3.75)	(-4.36)	(-2.72)	(-1.91)	(-0.14)
_cons	-0.883***	-2.897***	-3.309***	-0.852***	-2.302***	-2.133***
	(-3.72)	(-9.12)	(-8.48)	(-3.68)	(-6.84)	(-5.00)
N	3285	3285	3285	3285	3285	3285

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.15 – Income regression for South Africa

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	-0.002	0.014***	0.018***	0.004	0.002	-0.003
	(-0.89)	(-4.22)	(-4.67)	(-1.57)	(-0.47)	(-0.44)
female	-0.009	0.113	0.036	0.107	0.018	-0.018
	(-0.18)	(-1.61)	(-0.44)	(-1.9)	-0.22	(-0.13)
2.quintile_c	0.045	-0.007	0.114	0.095	-0.192	-0.319
	-0.53	(-0.07)	(-0.93)	(-1.05)	(-1.72)	(-1.40)
3.quintile_c	-0.038	-0.248*	-0.103	-0.068	-0.506***	-0.179
	(-0.45)	(-2.23)	(-0.79)	(-0.73)	(-4.06)	(-0.86)
4.quintile_c	-0.186*	-0.230*	-0.126	-0.052	-0.515***	-0.108
	(-2.20)	(-2.14)	(-1.00)	(-0.58)	(-4.25)	(-0.55)
5.quintile_c	-0.092	-0.293**	-0.283*	0.031	-0.770***	-0.299
	(-1.11)	(-2.68)	(-2.11)	(-0.36)	(-5.62)	(-1.39)
_cons	-0.587**	-2.237***	-2.756***	-1.312***	-1.428***	-1.929***
	(-3.22)	(-9.66)	(-10.24)	(-6.87)	(-5.30)	(-4.01)
N	2993	2989	2989	2989	2989	2989

Table A.16 – Education regression for South Africa

	objchronic	*objADL1*	*objADL2*	*objpoorhealth*	*selfpoorhealth*	*subjective*
age	-0.004	0.009	0.011*	0.001	-0.008	-0.002
	(-1.23)	(-1.84)	(-2.1)	(-0.26)	(-1.37)	(-0.20)
female	-0.016	0.102	0.005	0.1	-0.092	-0.132
	(-0.24)	(-1.12)	(-0.04)	(-1.42)	(-0.92)	(-0.76)
higheduc	0.06	-0.176	-0.225	0.146*	-0.280*	-0.252
	(-0.89)	(-1.80)	(-1.90)	(-2.04)	(-2.49)	(-1.24)
_cons	-0.551*	-2.059***	-2.403***	-1.171***	-1.079**	-2.075***
	(-2.44)	(-6.80)	(-6.77)	(-4.88)	(-3.07)	(-3.39)
N	1974	1974	1974	1974	1974	1974

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*

Table A.17 - Average marginal effects – Income (upper quintile relative to lower quintile)

dy/dx	***objchronic***	***objADL1***	***objADL2***	***objpoorhealth***	***selfpoorhealth***	***subjective***
CHINA	-0.065***	-0.053***	-0.029***	-0.075***	-0.057***	-0.064***
	(0.012)	(0.006)	(0.004)	(0.012)	(0.007)	(0.008)
GHANA	-0.027	-0.107***	-0.057***	-0.065***	-0.058***	-0.085***
	(0.017)	(0.015)	(0.012)	(0.018)	(0.011)	(0.018)
INDIA	-0.003	-0.029***	-0.013**	-0.009	-0.018***	-0.017***
	(0.008)	(0.008)	(0.006)	(0.009)	(0.006)	(0.006)
MEXICO	0.011	-0.090***	-0.053**	-0.036	-0.048***	-0.022**
	(0.032)	(0.029)	(0.025)	(0.034)	(0.016)	(0.010)
RUSSIA	-0.016	-0.037***	-0.027***	-0.021	-0.041***	-0.011
	(0.020)	(0.013)	(0.010)	(0.021)	(0.013)	(0.009)
SOUTH AFRICA	-0.027	-0.042***	-0.025**	-0.036	-0.077***	-0.012*
	(0.024)	(0.016)	(0.012)	(0.025)	(0.014)	(0.007)

Table A.18 – Average marginal effects – Education (highest education category relative to lowest)

dy/dx	***objchronic***	***objADL1***	***objADL2***	***objpoorhealth***	***selfpoorhealth***	***subjective***
CHINA	-0.014	-0.014***	-0.005**	-0.016*	-0.017***	-0.023***
	(0.009)	(0.003)	(0.002)	(0.008)	(0.005)	(0.006)
GHANA	-0.006	-0.026**	-0.008	-0.010	-0.011	0.042***
	(0.016)	(0.011)	(0.008)	(0.017)	(0.009)	(0.016)
INDIA	-0.008	-0.014**	-0.012**	-0.017**	-0.019**	-0.004
	(0.007)	(0.006)	(0.005)	(0.008)	(0.005)	(0.005)
MEXICO	-0.025	-0.053**	-0.054***	-0.047	-0.034***	-0.012***
	(0.029)	(0.023)	(0.018)	(0.029)	(0.012)	(0.004)
RUSSIA	-0.067**	-0.058***	-0.058***	-0.071***	-0.027*	-0.001
	(0.027)	(0.017)	(0.014)	(0.028)	(0.015)	0.010
SOUTH AFRICA	0.016	-0.021*	-0.017**	0.004	-0.024***	-0.007
	(0.019)	(0.011)	(0.008)	(0.020)	(0.009)	(0.004)

*t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001*