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# Health equities: social determinants of migrant health

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BOSTON UNIVERSITY  
SCHOOL OF MEDICINE

Thesis

**HEALTH EQUITIES: SOCIAL DETERMINANTS OF MIGRANT HEALTH**

by

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B.A., Syracuse University, 2014

Submitted in partial fulfillment of the  
requirements for the degree of  
Master of Science

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# **HEALTH EQUITIES: SOCIAL DETERMINANTS OF MIGRANT HEALTH**

**DAVINA SODAM KANG**

## **ABSTRACT**

The World Health Organization (WHO) Constitution defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, and further states “the highest standards of health should be within reach of all, without distinction of race, religion, political belief, economic or social condition” (WHO, 2006). “This definition applies equally to migrants as health is a basic human right and an essential component of sustainable development. Health is a fundamental precondition for migrants to contribute to the social and economic development of their communities of origin and destination” (Migration Data Portal, 2021). However, migrants often experience legal, social, cultural, economic, behavioral and communication dissimilarities from their own country. These differences and conditions often lead to health inequity between migrants and locals. Nevertheless, there is little research on the determinants of health inequity between migrants and locals.

This paper intends to reveal, through empirical analysis, factors determining health inequity between migrants and locals. Based on the International Organization of Migration’s (IOM) applied Dahlgren-Whitehead (2007) model, health equity determinants were examined based on three areas: (1) the effect of social and community influences on health equity, (2) the effect of living and working conditions on health

equity, and (3) the effects of general socioeconomic, cultural, and environmental conditions on health equity.

From the analysis: countries that have less discrimination against minorities (the higher GAI), fewer language spoken (the lower LDI), higher acceptance of migrants (the higher MAI), better assessment of 'basic human needs' and 'welfare-based' opportunities (the higher SPI), more specialized quality body and enforcement mechanisms for discrimination (the higher MDISC), more equitable laws addressing individual and property right (the higher RLI), and fairer distribution of income and benefits (the higher IHDI) indicated fewer health inequities between migrants and locals.

# TABLE OF CONTENTS

|                                                                                                |             |
|------------------------------------------------------------------------------------------------|-------------|
| <b>ABSTRACT .....</b>                                                                          | <b>iv</b>   |
| <b>TABLE OF CONTENTS .....</b>                                                                 | <b>vi</b>   |
| <b>LIST OF TABLES .....</b>                                                                    | <b>vii</b>  |
| <b>LIST OF FIGURES .....</b>                                                                   | <b>viii</b> |
| <b>LIST OF ABBREVIATIONS.....</b>                                                              | <b>ix</b>   |
| <b>CHAPTER ONE .....</b>                                                                       | <b>1</b>    |
| <i>Section 1.1: Introduction .....</i>                                                         | <i>1</i>    |
| <i>Section 1.2: Organization of Dissertation .....</i>                                         | <i>4</i>    |
| <b>CHAPTER TWO: Theoretical &amp; Empirical Review.....</b>                                    | <b>5</b>    |
| <i>Section 2.1: Introduction .....</i>                                                         | <i>5</i>    |
| <i>Section 2.2: Lalonde Model.....</i>                                                         | <i>5</i>    |
| <i>Section 2.3: Dahlgren-Whitehead's (2006) Model.....</i>                                     | <i>7</i>    |
| <i>Section 2.4: Healthy People 2020 Model.....</i>                                             | <i>8</i>    |
| <i>Section 2.5: IOM's Adopted Migration Model for SDH .....</i>                                | <i>11</i>   |
| <b>CHAPTER THREE: Modeling &amp; Empirical Estimation .....</b>                                | <b>14</b>   |
| <i>Section 3.1: Introduction .....</i>                                                         | <i>14</i>   |
| <i>Section 3.2: Empirical Modeling.....</i>                                                    | <i>17</i>   |
| <i>Section 3.3. Estimation Results I: Social and community influences .....</i>                | <i>20</i>   |
| Subsection 3.3.1. Data Descriptions and Theoretical Hypotheses .....                           | 20          |
| Subsection 3.3.2: Estimation Results .....                                                     | 28          |
| <i>Section 3.4: Estimation Results II: Living and Working Conditions on Health Equity.....</i> | <i>34</i>   |
| Subsection 3.4.1: Data Descriptions and Theoretical Hypotheses.....                            | 34          |
| Subsection 3.4.2: Estimation Results .....                                                     | 38          |
| <i>Subsection 3.5: Estimation Results III: General Social Conditions on Health Equity.....</i> | <i>41</i>   |
| Subsection 3.5.1: Data Descriptions and Theoretical Hypotheses.....                            | 41          |
| <i>Subsection 3.6: Summing-up.....</i>                                                         | <i>50</i>   |
| <b>CHAPTER FOUR: Conclusion.....</b>                                                           | <b>53</b>   |
| <b>BIBLIOGRAPHY.....</b>                                                                       | <b>58</b>   |
| <b>CURRICULUM VITAE.....</b>                                                                   | <b>66</b>   |

## LIST OF TABLES

|                                                                                       |    |
|---------------------------------------------------------------------------------------|----|
| Table 1. Four Critical Factors for Health Promotion in Lalonde Model.....             | 6  |
| Table 2. Descriptive Statistics of Health MIPEX Score .....                           | 17 |
| Table 3. Migrant Acceptance Items.....                                                | 24 |
| Table 4. Descriptions of Variables: Social and Community Influence.....               | 26 |
| Table 5. Statistics of Variables: Social and Community Influences .....               | 26 |
| Table 6. Correlation Matrix: Social and Community Influence.....                      | 27 |
| Table 7. Regression Results I: Social and Community Influence on Health Equity.....   | 30 |
| Table 8. Regression Results II: Social and Community Influence on Health Equity.....  | 32 |
| Table 9. Regression Results III: Social and Community Influence on Health Equity..... | 33 |
| Table 10. Descriptions of Variables: Living and Working Conditions .....              | 36 |
| Table 11. Statistics of Variables: Living and Working Conditions.....                 | 36 |
| Table 12. Correlation Matrix: Living and Working Conditions .....                     | 37 |
| Table 13. Regression Results IV: Living and Working on Health Equity .....            | 39 |
| Table 14. Regression Results V: Living and Working on Health Equity .....             | 40 |
| Table 15. Descriptions of Variables: General Social Conditions .....                  | 44 |
| Table 16. Statistics of Variables: General Social Conditions.....                     | 44 |
| Table 17. Correlation Matrix: General Social Conditions .....                         | 45 |
| Table 18. Regression Results VI: General Social Conditions on Health Equity .....     | 48 |
| Table 19. Regression Results VII: General Social Conditions on Health Equity .....    | 49 |
| Table 20. Hypotheses of SDH and Estimated Results .....                               | 55 |



## LIST OF FIGURES

|                                                                                |    |
|--------------------------------------------------------------------------------|----|
| Figure 1. Dahlgren-Whitehead Model of Social Determinants of Health .....      | 7  |
| Figure 2. Place Based Model for Social Determinants of Health .....            | 9  |
| Figure 3. IOM's Adopted Migration Model for SDH .....                          | 12 |
| Figure 4. Schematic Analysis Procedure for Social determinants of Health ..... | 15 |
| Figure 5. Histogram of Health MIPEX Score.....                                 | 17 |
| Figure 6. Correlation Matrix: Social and Community Influences .....            | 27 |
| Figure 7. Correlation Matrix: Living and Working Conditions .....              | 37 |
| Figure 8. Correlation Matrix: General Social Conditions.....                   | 46 |

## **LIST OF ABBREVIATIONS**

|        |                                                                                                                                                           |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDC    | Centers for Disease Control and Prevention                                                                                                                |
| GAI    | Global Acceptance Index for LGBT                                                                                                                          |
| GCM    | Global Compact for Migration: the first intergovernmental negotiated UN agreement on international migration                                              |
| GDP    | Gross Domestic Product: the standard measure of the value added created through the production of goods and services in a country during a certain period |
| GENRST | level of generosity from the Happiness index                                                                                                              |
| GSC    | General Social Conditions such as socioeconomic, cultural, and environmental conditions                                                                   |
| GWP    | Gallup World Poll                                                                                                                                         |
| HEXPN  | The ratio of government health expenditure to general government expenditure (%)                                                                          |
| HP2020 | Healthy People 2020                                                                                                                                       |
| HDI    | Human Development Index                                                                                                                                   |
| IHDI   | Inequity-adjusted Human Development Index                                                                                                                 |
| IOM    | International Organization of Migration                                                                                                                   |
| LDI    | Linguistic Diversity Index                                                                                                                                |
| LGBT   | Lesbian, Gay, Bisexual and Transgender                                                                                                                    |
| lnGDP  | A transformed log form of GDP                                                                                                                             |
| LWC    | Living and Working Conditions                                                                                                                             |
| MAI    | Migration Acceptance Index                                                                                                                                |
| MDG    | Millennium Development Goals                                                                                                                              |

|         |                                                |
|---------|------------------------------------------------|
| MDISC   | Anti-discrimination strand/score of MIPEX      |
| MHEALTH | Health strand/score of MIPEX                   |
| MIPEX   | Migrant Integration Policy Index               |
| MLABOR  | Labor market integration strand/score of MIPEX |
| MRATE   | Rate of migrants to total population           |
| OLS     | Ordinary Least Squares                         |
| RLI     | Rule of Law Index                              |
| SCI     | Social and Community Influences                |
| SDGs    | Sustainable Development Goals                  |
| SDH     | Social Determinants of Health                  |
| SPI     | Social Progress Index                          |
| UNDP    | United Nations Development Programme           |
| WHO     | World Health Organization                      |
| YRDUM   | Dummy variable to capture the effect of years  |

## **CHAPTER ONE**

### **Section 1.1: Introduction**

Health is influenced by various factors and conditions that are commonly referred to as the social determinants of health (SDH) which "range from general socioeconomic, political, cultural, environmental, and physical environments to individual factors such as lifestyle, age, hereditary, and behavioral factors that impact health" (Migration Data Portal, 2021). Health inequity can often be illustrated in terms of SDH and refer to "inequalities in health that are deemed to be unfair or stemming from a form of socially produced and systematic injustices" (Kawachi et al., 2002). They are influenced by interactions with colleagues and social communities, living and working conditions, education levels, health services and accessibility, employment status, housing, etc., and the macro-environment and policy of economic, cultural, political, and social society (Dahlgren & Whitehead, 2007).

Migration is a global phenomenon and is defined as "the movement of persons away from their place of usual residence, either across an international border or within a State" and a migrant as "a person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons" (IOM, 2019). "Throughout the migration process, migrants are exposed to a unique set of sociocultural, economic, and environmental factors that may increase their risk of exposure to negative health outcomes, including communicable and non-communicable diseases" (IOM, 2020). Migrants and mobile populations are often faced with innumerable difficulties in

accessing essential health care services due to diverse aspects including irregular migration status, language barriers, discrimination, lack of migrant-inclusive health policies, and shortage of affordable health services, leaving many migrants behind and unaccounted for in health systems (IOM, 2021). Currently, there are an estimated 270 million international migrants, which account for 3.5% of the world's population as of 2019 (IOM, 2020). With the increasing number of migrants worldwide, migrant health and equity to healthcare have become essential (Jong, 2015) and even adapted into the Millennium Development Goals (GCM, 2018) in addition to the UN 2030 Agenda for Sustainable Development.

“Individual lifestyle factors, social and community influences, living and working conditions, general socio-economic, cultural and environmental conditions determine the health of individuals. These social determinants of health are mostly responsible for health equities and inequities within and between countries” (IOM, 2021). Therefore, there is a crucial need to “incorporate the health needs of immigrants in national and local health care policies and plans, such as strengthening capacities for service provision, facilitating affordable and non-discriminatory access, reducing communication barriers, and training health care providers on culturally-sensitive service delivery, in order to promote the physical and mental health of migrants and their communities, in addition to the recommendations from the WHO Framework of Priorities and Guiding Principles to Promote the Health of Refugees and Migrants” (GCM, 2018)

Empirical studies on health effects by social factors, apart from healthcare, have been collected for decades, and have consistently demonstrated the impact of

socioeconomic environment not only on health care but also health. However, the relationship between social aspects and health has not been well-defined, and controversy still exists over evidence supporting the causal relationship (Braveman and Gottlieb, 2014). Numerous empirical studies have been conducted based on health inequity between migrants and locals within a country, which is often consistent with the theory of SDH. However, many of these studies are focused on analyzing the health inequity between migrants and locals within a country, not among countries. In addition, even though the level of health inequity between migrants and locals differs among countries, there is little analysis on why health inequity level varies from country to country and factors affecting the health inequity level of each country. For instance, the Migrant Integration Policy Index (MIPEX) Health Strand, show a noteworthy difference with higher countries scoring 85 out of 100 and the lowest countries scoring 2, among 51 countries in the 2019 data (MIPEX 2020). Despite the vast difference, there have been an insufficient number of studies inspecting which factors affect the health inequity level of each country.

Therefore, this study intends to analyze factors determining health inequity between migrants and locals across countries. The analysis is divided into three areas based on the IOM model that is an application of the Dahlgren-Whitehead model: how (1) social and community influences, (2) living and working conditions, and (3) general socioeconomic, cultural, and environmental conditions affect health inequity level (Dahlgren-Whitehead Model, 2006).

## **Section 1.2: Organization of Dissertation**

The paper is organized into three chapter, in addition to the introduction (Chapter One) and conclusion (Chapter Four). Chapter 2 provides the theoretical basis for this paper. The objectives of Chapter 2 are to review the multiple theories and empirics regarding SDH. Chapter 3 describes the method to test the theoretical model empirically based on a basic SDH model refined to reflect the health equity in the SDH. In addition, this chapter introduces all data sources and statistic values of dependent and independent variables. Empirical estimates and their results based on the theoretical model are also reported.

## **CHAPTER TWO: Theoretical & Empirical Review**

### **Section 2.1: Introduction**

The public health community's interest has been increasingly drawn to factors aside from medical care and biology (Braveman and Gottlieb, 2014). The World Health Organization's Commission has defined the SDH as “the conditions in which people are born, grow, live, work and age” (WHO, 2021). There are various factors that determine health, and are largely classified into biological, behavioral, social, and environmental factors. Biological factors comprise genetics, individual biological, physiological, and demographic characteristics. Behavioral factors include personal and lifestyle choices such as exercise, smoking, and drinking. Environmental factors include climate, air pollution, and exposure to harmful substances (e.g., Allen, 2007). Social factors include socio-economic characteristics such as education, occupation, income, and social policies (e.g., Bambra et al., 2008; Benzveva et al., 2001, Braveman et al., 2011; Braveman et al., 2010; DeNavas-Walt et al., 2010). Studies from the Lalonde model (1974), Dahlgren-Whitehead model (2006), and the "place-based" model in Healthy People 2020 (CXC, 2019), have proven these socioeconomic factors as a contributing and significant factor on health.

### **Section 2.2: Lalonde Model**

The Lalonde Report, published by Marc Lalonde, refers to “human biology, environment, lifestyle, and health care organization as critical factors for health promotion” (Lalonde, 1974). The Lalonde Model is significant in that it broadens the



overall understanding of health promotion by emphasizing human biology, environment, and lifestyle as important factors for health promotion. These factors have a substantial impact on defining determinants of health promotion and explaining conceptual frameworks for a holistic understanding of health.

Table 1. Four Critical Factors for Health Promotion in Lalonde Model

| Factors                 | Elements                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Human Biology           | This element includes the genetic inheritance of the individual, the processes of maturation and aging, and the many complex internal systems in the body, such as skeletal, nervous, muscular, cardio-vascular, endocrine, digestive, and so on.                                                                                                                                                                                       |
| Environment             | Individuals cannot, by themselves, ensure that foods, drugs, cosmetics, devices, water supply, etc. are safe and uncontaminated; that the health hazards of air, water and noise pollution are controlled; that the spread of communicable diseases is prevented; that effective garbage and sewage disposal is carried out; and that the social environment, including the rapid changes in it, do not have harmful effects on health. |
| Lifestyle Category      | Personal decisions and habits that are bad, from a health point of view, create self-imposed risks. When those risks result in illness or death, the victim's lifestyle can be said to have contributed to, or caused, his own illness or death.                                                                                                                                                                                        |
| HealthCare Organization | Healthcare Organization includes medical practice, nursing, hospitals, nursing homes, medical drugs, public and community health care services, ambulances, dental treatment and other health services such as optometry, chiropractic and podiatry. This fourth element is what is generally defined as the health care system.                                                                                                        |

Source: Lalonde (1974)

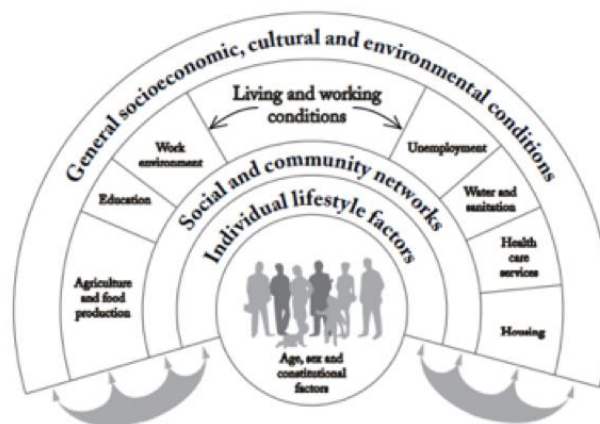
The four critical factors for health promotion for the Lalonde Model are summarized in “Table 1: ‘human biology’ comprises aspects of health, both physical and mental, and developed within the human body as a consequence of the basic biology and the organic make-up of the individual; ‘environment’ includes all those matters related to health which are external to the human body and over which the individual has little or no control; ‘lifestyle category’ consists of the aggregation of decisions which affect health

and an individuals has more or less control; and ' health care organization' entails the quantity, quality, arrangement, nature and relationships of people and resources in the provision of health care” (Lalonde, 1974).

### Section 2.3: Dahlgren-Whitehead's (2006) Model

The Dahlgren-Whitehead 's Rainbow Model (DWRM) was introduced to strategize health policy goals and to target factors threatening health, promoting health, and protecting health at the four health policy levels (Dahlgren-Whitehead, 2007).

Figure 1. Dahlgren-Whitehead Model Social Determinants of Health



Source: Main Determinants of Health (Dahlgren and Whitehead, 1993; Dahlgren and Whitehead, 2006)

The Dahlgren-Whitehead models describes health determinants by emphasizing interactions, where “individual lifestyles are embedded in social norms and networks, and in living and working conditions, which in turn are related to the wider socioeconomic and cultural environments” (Dahlgren-Whitehead, 2006 & 2007).

The DWRM places the individual at the center surrounded by four distinctive layers of influences:

At the center are characteristics that affect personal health, such as age, gender, and constitutional characteristics that are largely fixed. The first layer refers to personal health behaviors that can be improved by an individual's efforts to maintain health and participate in healthy behaviors such as physical activity. The second layer entails health affected by social and community networks, that can provide support and a "sense of community" to build strong social relationships and supportive networks known to improve health. The third layer refers to structural factors such as living and working conditions, basic goods and services, education level, employment status, and housing.

#### **Section 2.4: Healthy People 2020 Model**

The Healthy People 2020 (2019) defines SDH as "the conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks." SDH provide a means to "identify ways to create social and physical environments that promote good health for all" and a conceptual framework based on five key domains, as seen in Figure 2.

Figure 2. Place Based Model for Social Determinants of Health (CDC, 2019)



Source: Healthy People 2020 Social Determinants of Health (CDC,2019)

The “Economic Stability” domain indicates the relationship between an individual’s financial stability and its impact on health. Economic stability provides and represents an individual’s ability to acquire various resources such as nutritious food, adequate living conditions, and appropriate medical care (Ettner, 1996).

The “Education” domain incorporates early education and development, enrollment in higher education and graduation, and literacy. Countless studies have shown “high educational attainment not only improves health directly but also improves health indirectly through work and economic conditions, social-psychological resources, and lifestyle choices” (Ross & Wo, 1995; Kawachi et al., 2010; Ross et al, 1995).

The “Health & Health Care” domain is comprised of accessibility to health care and health literacy. A key issue within this domain is the accessibility to health care and services, which is described as the “timely use of personal health services to achieve the best possible health outcomes” (Institute of Medicine, 1993). “Regular and reliable access to health services can prevent disease and allow for early detection and treatment, increase quality of life, reduce the likelihood of premature (early) death, and increase life expectancy” (Healthy People 2020).

The “Neighborhood and Built Environment” domain incorporate accessibility to food and nutrition, access to community activities and services aiming to lower crime and violence and increase quality of housing and environmental conditions. Empirics suggest that healthy eating habits can help lower the risk of chronic disease (US Department of Health and Human Services and US Department of Agriculture, 2015;-Steinmetz, 1996; Joshipura, 2001; Zhao et al., 2011;), while malnutrition and an unhealthy diet are associated with high blood pressure (Zhao et al., 2011), diabetes (Joshipura, 2001; Marshall et al., 1994; Feskens, 1995), and cancer (Penney et al., 2015; WHO, 2003). In addition, lack of access to healthy and balanced food (Babey et al., 2008; Ahern et al., 2011), housing inequities, and high levels of crime and violence expose individuals to negative health effects and promote ill-health (CDC, 2019).

The “Social and Community” domain specifies the aspects of an individual’s social environment and an individual’s health with others and within a community, as mentioned in the Dahlgren-Whitehead’s model (2006). Numerous studies have demonstrated that social and community participation such as voting (e.g., Kim et

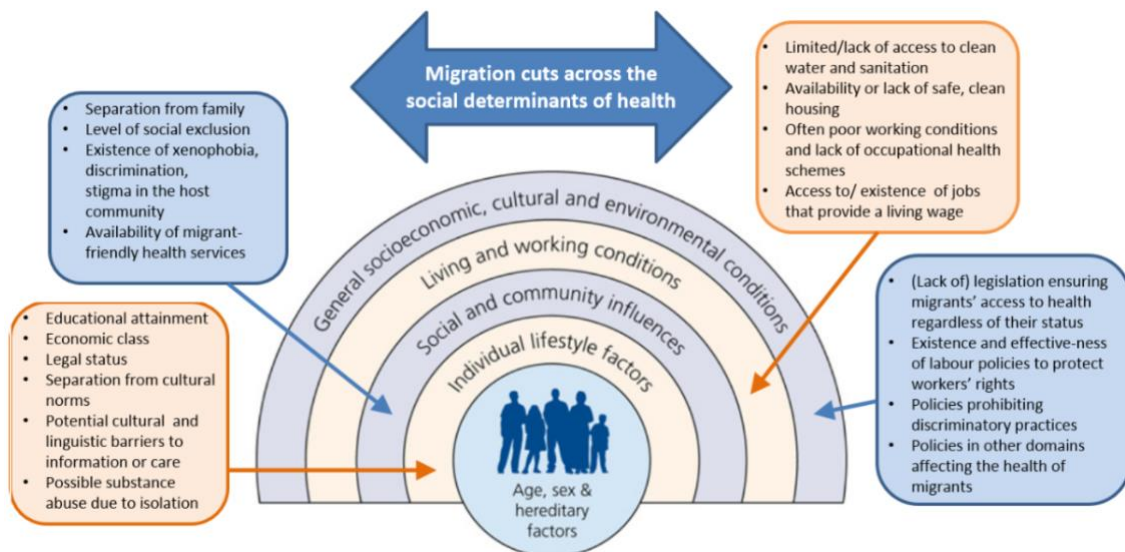
al.,2015), volunteering (e.g., Jenkinson et al., 2013; Burr et al., 2016; Musick and Wilson, 2003), and involvement in group activities (e.g., Putnam 2001; Son et al., 2010; Marquez et al., 2016)) have a positive impact on individual health.

### **Section 2.5: IOM's Adopted Migration Model for SDH**

A migrant is defined as “an individual who moves away from their usual place of residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons” (IOM, 2019). With the increasing numbers of migrants globally, the agenda for health and equity to healthcare for migrants has become more critical.

The Moullan and Jusot (2014) study examined “the heterogeneity of the health gap between migrants and natives across four European countries” and found “after controlling for socio-economic status, immigrants report a poorer health status than natives in France, Belgium and Spain. Nicola et al., (2019) reviewed “127 articles published from 2009 to 2019 on the major databases” (Pub Med, Cochrane Library Scopus) and discovered “migrant workers show an increase in the incidence of serious, psychotic, anxiety, and post-traumatic disorders” due to a series of socio-environmental variables and frequently cause poor life and health conditions.

Figure 3. IOM's Adopted Migration Model for SDH



Source: Social Determinants of Migrant Health | International Organization for Migration (iom.int)

“Structural mechanisms such as social class, ethnicity, occupation, income, education, and gender lead to unequal distribution of power and health-relevant cultural resources in society” (Floor Christie-de Jong, 2018). Perceiving migration as a central social determinant of migrant health, the IOM has adopted the rainbow model of Dahlgren-Whitehead (2007) to reflect the exclusive characteristics of migrant health and is composed of four layers.

The first layer displays major individual lifestyle factors related to migrants including educational attainment, economic class, legal status (e.g., regular or irregular migrants), separation from cultural norms, barriers of language and information accessibility, substances abuse, etc. (see Jackson et al., 2018). The second layer demonstrates social and community influences such as “separation from family, level of social exclusion, existence of xenophobia, discrimination, stigma in the host country,

availability of migrant-friendly health services, etc.” (Detollenaere et al., 2017; Doolittle et al., 2015; Fuller-Thomson, 2009). The third layer describes living and working conditions such as accessibility to clean water and sanitation, safety, housing and working conditions, occupational health schemes, and wage levels. The last layer mainly refers to migration-related policies and legislation ensuring migrant’s access to health, worker’s right, and prohibiting policies and practices against discrimination of migrants.



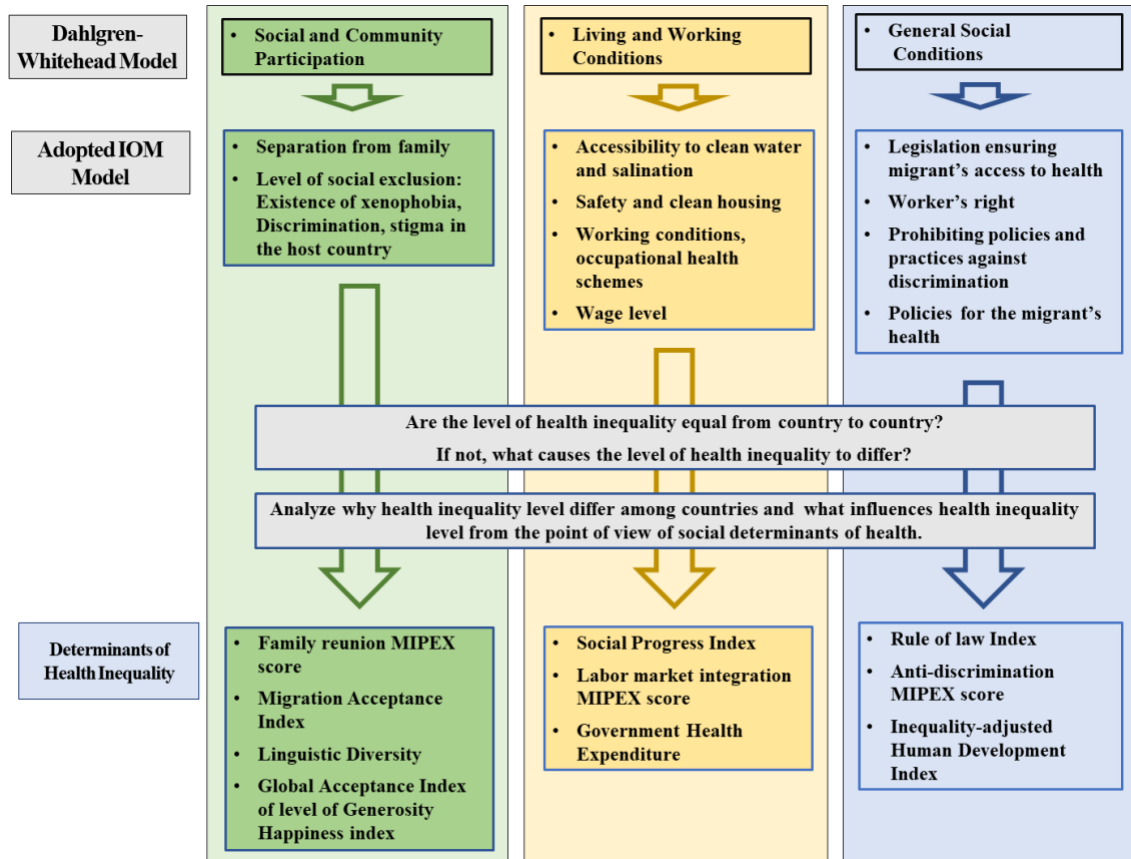
## **CHAPTER THREE: Modeling & Empirical Estimation**

### **Section 3.1: Introduction**

Migration “must be recognized as a social determinant of health; mobility not only impacts an individual’s physical vulnerability, but also on mental and social well-being” (IOM, 2021). Migrants and mobile populations confront numerous obstacles in accessing essential health care services and these disparities impact the well-being of migrants and host countries” (IOM, 2021).

This paper analyzes the determinants of health inequity between migrants and locals based on the IOM model adopted from the rainbow model proposed by Dahlgren-Whitehead (2006). However, each layer of determinants in the IOM model is not independent but interrelated: In other words, general socioeconomics, cultural, social and community aspects, living and working conditions, and environmental conditions are not independent, but highly correlated. In consideration of this correlation, the social determinants of health inequity are analyzed separately according to each layer. <Figure 4> is a schematic representation. The analysis is divided into three sections: (1) the effects of social and community influences (SCI) on health inequity between migrants and locals, (2) effects of living and working environments (LWC) on the health inequity between migrants and locals (3) effects of general socioeconomic, cultural, and environmental settings (GSC) on health inequity between migrants and locals.

Figure 4. Schematic Analysis Procedure for Social determinants of Health Inequity



SCI was measured from the Family reunion MIPEX score, Migration Acceptance Index, Linguistic Diversity Index, Global Acceptance Index of LGBT, and the level of 'generosity' from the Happiness index. LWC was evaluated from the Social Progress Index, Labor market integration MIPEX score, and government health expenditure. GSC was estimated from the Rule of law, Anti-discrimination MIPEX score, and the Inequality-adjusted Human Development Index.

The Health MIPEX score is the proxy variable for health equity and the independent variable MIPEX data comes from 51 countries that are major migrant-

receiving countries. As mentioned, there is no internationally accepted standard for estimating the health level of migrants, so there are few comparative studies by country. For this reason, most health level estimates and determinants are made by comparing the number of citizens versus migrant patients with a specific disease in a country or using self-reported interval estimation values from survey subjects. In this regard, Health MIPEX score is representative of health equities as it is measured under international standards.

The following is a brief description of the Health MIPEX Score from MIPEX2020 as an independent variable. “The Migrant Integration Policy Index (MIPEX) Health Strand is a survey instrument designed to investigate the degree to which policies affect migrant health and promote equity: the index captures four dimensions considered critical for ensuring health equity: (a) entitlements to health-care cover age based on domestic legal and policy frameworks; (b) accessibility to health services; such as responsiveness to issues of language and cultural sensitivity; and (d) measures to achieve change, such as data collection and research to better inform services (MIPEX 2020).” Therefore, the MIPEX health score used in this study does not indicate the health level of migrants, but the level of migrant health equity for each country. The health score can be used as a dependent variable to measure the health level of migrants, where a higher score suggests a higher health level for migrants.

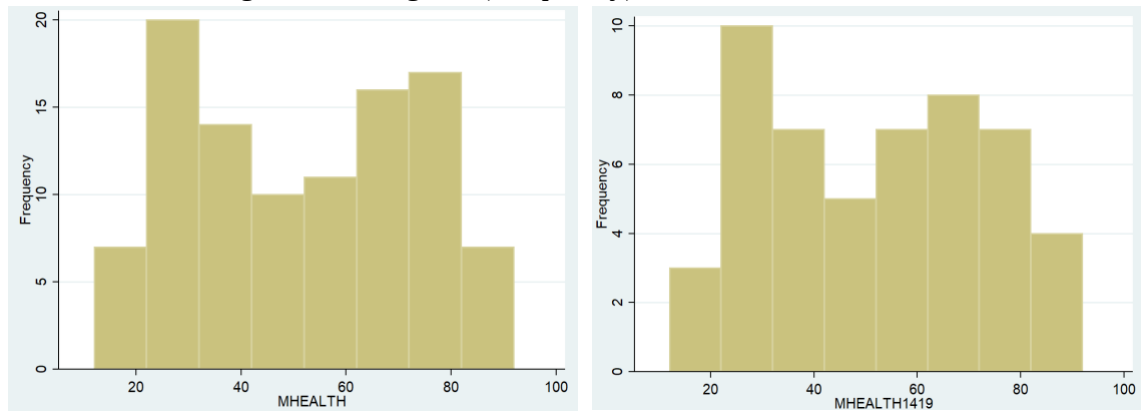
The Migrant Integration Policy Index (MIPEX) estimates eight parts annually, however the MIPEX health score was surveyed only in 2014 and in 2019. Therefore, the

data can be estimated in two ways: 1) using the data pooled 2014 and 2019, and 2) using the average value data of 2014 and 2019. See Table 4 and Figure 5.

Table 2. Descriptive Statistics of Health MIPEX Score

| Variable    | N (Countries) | Mean   | Std. Dev. | Min | Max |
|-------------|---------------|--------|-----------|-----|-----|
| MHEALTH     | 102           | 50.922 | 21.574    | 2   | 85  |
| MHEALTH1419 | 51            | 50.922 | 21.33     | 12  | 84  |

Figure 5. Histogram (Frequency) of Health MIPEX Score



note: MHEALTH: pooled data of 2014 and 2019, MFHEALTH1419: average data of 2014 and 2019

### Section 3.2: Empirical Modeling

As mentioned above, analysis was conducted on (1) the effects of social and community influences on the health equity, (2) effects of living and working conditions on the health equity, and (3) effects of general socioeconomic, cultural, and environmental conditions on the health equity between migrants and locals. The relationship between MHEALTH and deterministic variables is denoted by

$$MHEALTH=f(SCIs, \text{control variables, dummy variable})$$

This equation with  $n$  observations ( $i$ ) on MHEALTH and deterministic variables can be written as

$$MHEALTH_i = \beta_0 + \beta_k * SCIs_{ki} + \beta_{k+1} * MRATE_i + \beta_{k+2} * \ln GDP_i + \delta * YRDUM_i + \mu_i$$

$$(i=1, 2, \dots, n \text{ and } k=1, 2, \dots, k)$$

where MHEALTH stands for health equity, SCIs represents independent variables for social and community influences.

The ‘Family reunion MIPEX score,’ Migration Acceptance Index (hereafter MAI), Linguistic Diversity Index (hereafter LDI), Global Acceptance Index ((hereafter GAI) of lesbian, gay, bisexual and transgender (hereafter LGBT), and level of generosity level (hereafter GENRST) from the Happiness index are adopted as independent variables for SCIs. MRATE and lnGDP are employed as ‘control variables’: MRATE is measured by the rate of migrants to total population and lnGDP for transformed log form of GDP. YRDUM is a dummy variable to capture the effect of years between 2014 and 2019: YRDUM would be equal to 1 for 2014 and 0 for 2019. The relationship between MHEALTH and deterministic variables is denoted by

$$MHEALTH=f(LWCs, \text{control variables, dummy variable})$$

This equation with  $n$  observations ( $i$ ) on MHEALTH and deterministic variables can be written as

$$MHEALTH_i = \beta_0 + \beta_k * LWCs_{ki} + \beta_{k+1} * MRATE_i + \beta_{k+2} * \ln GDP_i + \delta * YRDUM_i + \mu_i$$

$$(i=1, 2, \dots, n \text{ and } k=1, 2, \dots, k)$$

where MHEALTH stands for health equity, LWCs represent independent variables for living and working conditions to capture the attributes of accessibility to clean water and sanitation, safety and security, housing, working conditions and occupational health schemes, and wage level. The Social Progress Index (hereafter SPI), Labor market integration MIPEX score ((hereafter labor MIPEX score), the ratio (%) of government health expenditure to general government expenditure (hereafter migration rate or MRATE), %) were employed as proxy variables for LWCs. The MRATE and  $\ln GDP$  are control variables and the YRDUM is the dummy variable, respectively. The relationship between MHEALTH and deterministic variables is denoted by

$$MHEALTH = f(\text{GSCs, control variables, dummy variable})$$

This equation with  $n$  observations ( $i$ ) on MHEALTH and deterministic variables can be written as

$$MHEALTH_i = \beta_0 + \beta_k * GSCs_{ki} + \beta_{k+1} * MRATE_i + \beta_{k+2} * \ln GDP_i + \delta * YRDUM_i + \mu_i$$

$$(i=1, 2, \dots, n \text{ and } k=1, 2, \dots, k)$$

, where MHEALTH stands for health equity, and GSCs represents independent variables for general social conditions such as socio-economic, cultural, and environmental factors. The Rule of law Index (hereafter RLI), Anti-discrimination MIPEX score, Inequity-adjusted Human Development Index (hereafter IHDI) are employed as proxy variables for GSCs. MRATE and lnGDP and YRDUM are also used for control variables and a dummy variable, respectively.

A higher correlation between independent variables in each model, can adversely affect variables in regression results. Therefore, a variance inflation factor (VIF) was used to detect multi-collinearity in regression analysis.<sup>1</sup> Section 3.3: Estimated Results I: Social & Community Influences on Health Equity.

### **Section 3.3. Estimation Results I: Social and Community Influences**

#### *Subsection 3.3.1. Data Descriptions and Theoretical Hypotheses*

Social and community influences (hereafter SCI) are related to migrant health and include separation from family, level of social exclusion, existence of xenophobia, discrimination, stigma in the host country, etc. The Family reunification MIPEX score,

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<sup>1</sup> “Values of VIF is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. Values of VIF that exceed 10 are often regarded as indicating multicollinearity. The most practical and frequently used remedy would be to drop variables” (MIPEX, 2020)

MAI, LDI, and the ‘generosity level’ from the Happiness index are used as independent variables for SCI.

The Family reunification MIPEX score ranges from 0 to 100 to examine ‘how easily migrants can reunite with their families’ (MIPEX, 2020). The various aspects of a countries’ family reunification policies can influence the well-being of families who have been separated by international borders. The impact of these policies has been studied by international researchers linking MIPEX to these families’ integration outcomes, nonetheless more targeted research is needed. Under inclusive family reunification policies, migrant families are more likely to reunite with their family and “settle down” in their destination country, obtain employment, and live and age with dignity. The ease of meeting with family members is expected to have a positive impact on migrants' health as it can impact emotional stability and mental wellbeing. However, it is difficult to judge if there is a direct relationship between Family Reunification scores and health inequity; it is anticipated that countries with higher scores and permit ‘family reunification’ will have a positive but indirect impact on health equity. The pooled (MFAMILY) and the average data of 2014 and 2019 (MFAMILY1419) are used for regression analysis.

The GAI, MAI, and LDI, indicating “levels of social exclusion, existence of xenophobia, discrimination, and stigma in the host country”, are used as representative variables reflecting discrimination against migrants. In addition, the level of ‘generosity,’ which is the donation amount to GDP per capita, is used as an independent variable for discrimination.



GAI represents the level of acceptance of LGBT persons and issues in each country during a specific period regarding public beliefs of LGBT persons and policies to develop a single country-level score for acceptance (Global-Acceptance-Index-LGBT, 2019). Acceptance, is a country's average societal attitude toward LGBT people expressed in public attitudes and beliefs on LGBT people and rights (Flores, 2019). Estimates of the Global LGBT Acceptance Index score range from 0 to 10: "1" indicates that an individual would be "very uncomfortable" and "10" would signify "totally comfortable" with people who identify as lesbian, gay, bisexual and/or transgender (Global-Acceptance-Index-LGBT, 2019). "Low levels of acceptance are tied to bullying and violence, physical and mental health problems, discrimination in employment, and under representation in positions of civic leadership" (Flores, 2019). Considering that migrants are also a minority, a society that is fair to various minorities has a lower level of discrimination and expected to have a positive effect on health equity. The data of 2014 to 2017 (LGBT1417) is used for the regression analysis as the specific period data of 2014 to 2017 is only available.

Linguistic diversity index (LDI) signifies the level of diversity of languages spoken in a country. However, it is difficult to predict the impact of language diversity as diversity can produce either higher understanding of other ethnic groups and lower discrimination against non-locals, or vice versa. Therefore, the interpretation may vary depending on the estimation result. LDI is based on the population of each language as a proportion of the total population and indicates the probability that two people selected from the population at random will have different mother tongues. LDI ranges from

0 (individuals have the same mother tongue) to 1 (no two individuals have the same mother tongue)” (Ethnologue, 2017). The 2009 and 2017 pooled (LDI) and the average data of 2009 and 2017 (LDI0917) are used for the regression analysis due to unavailability of data in 2014 and 2019.

The Happiness Index is measured by the six hypothesized underlying determinants and released by the Gallup World Poll (GWP) from 2005 to 2020. “The level of generosity is the residual of regressing national average of response to the GWP question “Have you donated money to a charity in the past month?” on GDP per capita” (Helliwell, et. al., 2019). For our analysis, we assume “more generous” countries would be less unequitable in health treatments between migrants and locals, and therefore “generosity” would expect to affect health equity positively.

The MAI is composed of three questions and survey from 147,695 individuals who are 15 or older in 140 countries in 2016 and 2017. The MAI questions are presented in Table 3. The index indicates the sum across the three questions, with a maximum score of 9.0 and a minimum possible score of 0: The higher the score, the higher the acceptance of migrants. The Index scores were then produced by weighting the raw score by the mean value, that is,  $MAI = (\text{raw MAI} / \text{mean of raw MAI}) * 100$ . The 2017 (MAI17) data is used for the regression analysis as it is the only data set available. Countries with a higher acceptance index for migrants are expected to have lower social exclusion, hate, discrimination, and stigma against migrants. Therefore, it is expected that countries with higher receptivity to migrants will have a positive effect on health equity. The 2007 acceptance index for migrants was used as it is the only index available.

Table 3. Migrant Acceptance Items

| Question                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response Options*                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <p>I would like to ask you some questions about foreign immigrants –people who have come to live and work in this country from another country.</p> <p>Please tell me whether you, personally, think each of the following is a good thing or a bad thing?</p> <p>How about: Immigrants living in [country name]?</p> <p>An immigrant becoming your neighbor.</p> <p>An immigrant marrying one of your close relatives?</p> <p>Do you, personally, know any immigrants living in [country name]?</p> | <p>1 A good thing</p> <p>2 A bad thing</p> <p>3 (It depends)</p> <p>4 (Don't know)</p> <p>5 (Refused): 1 for Yes, 2 for No</p> |

Source: View of DATA-SURVEY: Migrant Acceptance Index: A Global Examination of the Relationship Between Interpersonal Contact and Attitudes toward Migrants (tplondon.com)

Control variables are defined as following:

LnGDP: log form of gross national income,  $\ln(\text{GDP})$ ,

MRATE: ratio of migrants to population, (number of migrants/total population)

\*100

YRDUM: dummy variable, 1 for 2014, 0 otherwise (2019=0)

GDP and the migrant ratio are represented as country-specific attributes. GDP converted to logarithmic form ( $\ln\text{GDP}$ ) and the migrant ratio indicates the ratio of migrants to the country's population. The Year dummy variable (YRDUM) (indicator variable) is used to correct for year factors in data between the data in 2014 and 2019, 1 for 2014, 0 otherwise (2019=0).

Summarizing the above discussion, the following is expected:

**Hypothesis 1:** The higher the acceptance level of family reunion (higher MFAMILY), the higher the value of health equity between migrants and locals, and the more positively health equity will be affected.

**Hypothesis 2:** The more languages spoken (higher LDI), the lower the value of health equity between migrants and locals, and the more positively health equity will be affected.

**Hypothesis 3:** The higher the ratio of social giving to per capita (the higher GENRS), the higher the value of health equity between migrants and locals and the more positively health equity will be affected.

**Hypothesis 4:** The more receptive countries (higher MAI) to migrants, the higher the value of health equity between migrants and locals, and the more positively health equity will be affected.

**Hypothesis 5:** The more equitable a country is for minorities (the higher GAI), the higher the value of health equity between migrants and locals, and the more positively health equity will be affected.

The definition and summary of the dependent variables are summarized in Table 4 and the descriptive statistics for independent variables are summarized in Table 5, respectively.

Table 4. Descriptions of Variables: Social and Community Influences

| Variables   | Descriptions                                              |
|-------------|-----------------------------------------------------------|
| MHEALTH     | Health MIPEX score of 2014 and 2019                       |
| MHEALTH1419 | Average health MIPEX score of 2014 and 2019               |
| MFAMILY     | Family reunion MIPEX score of 2014 and 2019               |
| MFAMILY1419 | Average family reunion MIPEX score of 2014 and 2019       |
| MAI         | Migration acceptance index of 2017                        |
| LDI         | Linguistic Diversity Index (LDI) of 2009 and 2017         |
| LDI0917     | Average Linguistic Diversity Index (LDI) of 2014 and 2017 |
| GAI1417     | Average Global Acceptance Index between 2014 and 2017     |
| GENRST      | Level of generosity of 2014 and 2018                      |
| GENRST1418  | Average level of generosity of 2014 and 2018              |
| lnGDP       | Gross national income of 2014 and 2019                    |
| lnGDP1419   | Average gross national income of 2014 and 2019            |
| MRATE       | Ratio of migrants to population of 2014 and 2019          |
| MRATE1519   | Average ratio of migrants to population of 2015 and 2019  |
| YRDUM       | Year Dummy; 2014=1, 2019=0                                |

Table 5. Statistics of Variables: Social and Community Influences

| Variables   | N   | Mean   | Std    | Min    | Max   | Sources                                                                                     |
|-------------|-----|--------|--------|--------|-------|---------------------------------------------------------------------------------------------|
| MHEALTH     | 102 | 50.922 | 21.574 | 12     | 85    | <a href="http://www.mipex.eu">www.mipex.eu</a>                                              |
| MHEALTH1419 | 51  | 50.922 | 21.33  | 12     | 84    |                                                                                             |
| MFAMILY     | 102 | 56.461 | 14.939 | 25     | 94    |                                                                                             |
| MFAMILY1419 | 51  | 56.461 | 14.778 | 25.5   | 94    |                                                                                             |
| GENRST      | 102 | 0.012  | 0.167  | -0.285 | 0.403 | Home   The World Happiness Report                                                           |
| GENRST1418  | 51  | 0.012  | 0.165  | -0.285 | 0.347 |                                                                                             |
| LDI         | 101 | 0.303  | 0.224  | 0      | 0.93  | Ethnologue: Languages of the World                                                          |
| LDI0917     | 51  | 0.302  | 0.209  | 0.002  | 0.922 |                                                                                             |
| MAI         | 51  | 98.665 | 18.685 | 67.3   | 124.2 | <a href="http://tplondon.com/bordercrossing">http://tplondon.com/bordercrossing</a>         |
| GAI1417     | 51  | 6.004  | 1.687  | 2.7    | 8.9   | <a href="https://williamsinstitute.law.ucla.edu">https://williamsinstitute.law.ucla.edu</a> |

Note: MAI Score is based on a 0 to 9 scale, which is indexed by average (100 = average)

Figure 6. Correlation Matrix: Social and Community Influences

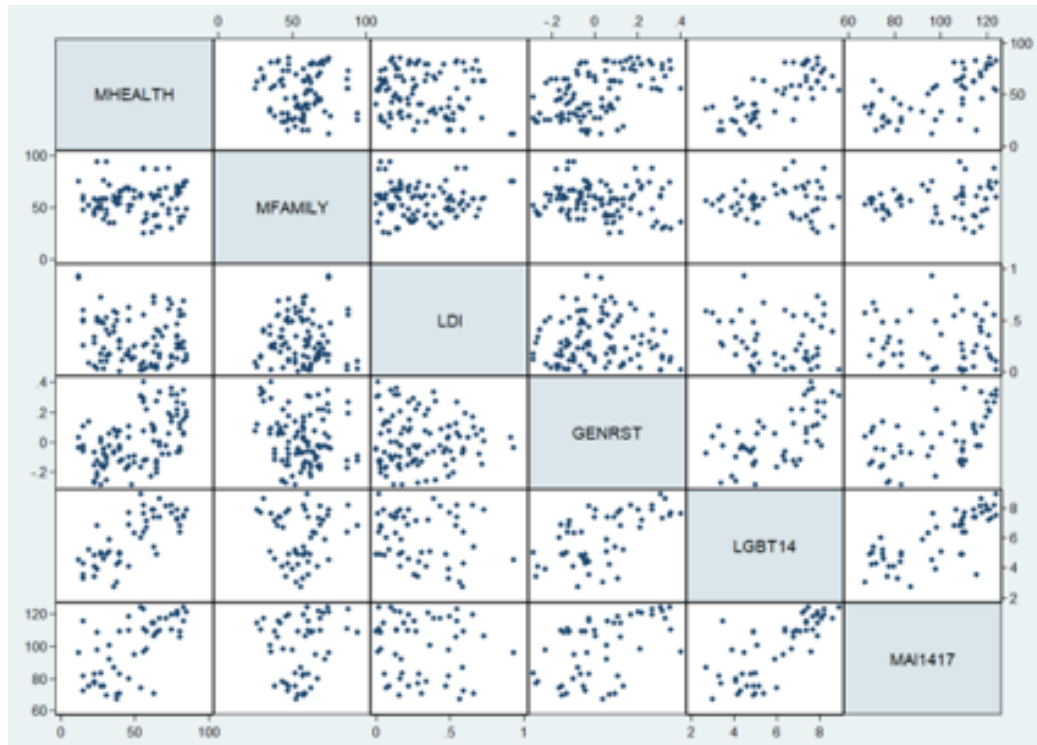


Table 6. Correlation Matrix: Social and Community Influences

| Variables       | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    | (7)    | (8)    | (9)    |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| (1) MHEALTH     | 1      |        |        |        |        |        |        |        |        |
| (2) MHEALTH1419 | 0.987  | 1      |        |        |        |        |        |        |        |
| (3) MFAMILY     | -0.003 | 0.019  | 1      |        |        |        |        |        |        |
| (4) MFAMILY1419 | -0.042 | -0.027 | 0.986  | 1      |        |        |        |        |        |
| (5) MAI         | 0.653  | 0.631  | 0.158  | 0.13   | 1      |        |        |        |        |
| (6) GENRST      | 0.552  | 0.544  | -0.127 | -0.165 | 0.531  | 1      |        |        |        |
| (7) GENRST1418  | 0.548  | 0.532  | -0.141 | -0.170 | 0.542  | 0.991  | 1      |        |        |
| (8) LDI         | -0.061 | -0.053 | -0.026 | -0.015 | -0.102 | -0.065 | -0.02  | 1      |        |
| (9) LDI0917     | -0.141 | -0.134 | -0.026 | -0.013 | -0.112 | -0.042 | -0.003 | 0.936  | 1      |
| (10) GAI1417    | 0.753  | 0.751  | 0.024  | -0.006 | 0.758  | 0.620  | 0.616  | -0.160 | -0.199 |

Table 6 and Figure 6 show the Correlation Matrix among dependent and independent variables. Coefficients of correlations between MHEALTH and MAI, MHEALTH and GENRST, and MHEALTH and GAI are relatively high and positive and a coefficients correlation between MHEALTH and LDI are negative as expected. Unexpectedly, the coefficient of MHEALTH and MFAMILY is low and negative.

### *Subsection 3.3.2: Estimation Results*

Multiple regression analysis is estimated by two data sources: the pooled data from 2014 and 2019 and the average data of 2014 and 2019. Each of the estimated models with the hypotheses using  $n$  observations ( $i$ ) on MHEALTH and deterministic variables can be written as

$$MHEALTH_i = \beta_0 + \beta_1 * MFAMILY_i + \beta_2 * GENRST_i + \beta_3 * LDI_i + \beta_4 * MRATE_i + \beta_5 * \ln GDP_i + \delta * YRDUM_i + \mu_i \quad (i=1, 2, \dots, n)$$

, where MHEALTH stands for MIPEX score of health, MFAMILY for MIPEX score of family reunion, GENRST for the ‘generosity score’ from the Happiness index, LDI for the Language diversity index,  $\ln GDP$  for  $\ln(GDP)$ , MRATE for the ratio of migrants to local population, and YRDUM for year dummy variable, and 1 for 2014 (2009 in case of LDI), 0 otherwise.

$$\text{Model 2: } MHEALTH1419_i = \beta_0 + \beta_1 * MFAMILY1419_i + \beta_2 * GENRST1418_i + \beta_3 * LDI0917_i + \beta_4 * MAI17_i + \beta_5 * GAI1417_i + \beta_6 * MRATE1519_i + \beta_7 * \ln GDP1419_i + \mu_i \quad (i=1, 2, \dots, n)$$

,where MHEALTH1419 stands for the average MIPEX score of health of 2014 and 2019, MFAMILY1419 for the average MIPEX score of family reunion of 2014 and 2019, GENRST1418 for the average Generosity score from Happiness index of 2014 and 2018, MAI1417 for the average of Migration acceptance index from 2014 to 2017, LDI0917 for the average Language diversity index of 2009 and 2017, GAI for the Global level of acceptance of LGBT of 2014 only, lnGDP1419 for the average of ln(GDP) of 2014 and 2019, and MRATE1519 for the average ratio of migrants to local population of 2015 and 2019.



Table 7. Regression Results I: Social and Community Influence on Health Equity

| Variables | (1)                         | (2)                         | (3)                         | (4)                         |
|-----------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| MFAMILY   | -0.089<br>(0.118)           |                             |                             | -0.031<br>(0.107)           |
| LDI       |                             | -26.615***<br>(7.754)       |                             | -20.891***<br>(7.469)       |
| GENRST    |                             |                             | 49.451***<br>(11.459)       | 42.435***<br>(11.559)       |
| MRATE     | 104.833***<br>(18.270)      | 122.895***<br>(18.095)      | 59.236***<br>(19.893)       | 79.291***<br>(20.694)       |
| lnGDP     | 4.619***<br>(0.961)         | 4.546***<br>(0.912)         | 4.66***<br>(0.876)          | 4.675***<br>(0.866)         |
| YRDUM     | -2.578<br>(3.472)           | -2.539<br>(3.318)           | -4.478<br>(3.221)           | -4.193***<br>(3.156)        |
| Constant  | -77.118***<br>(25.789)      | -74.221***<br>(24.468)      | -77.67***<br>(23.464)       | -72.306<br>(23.273)         |
| R-squared | 0.367                       | 0.431                       | 0.466                       | 0.506                       |
| F-test    | 14.055<br>prob.>F=0.00<br>0 | 18.174<br>prob.>F=0.00<br>0 | 21.142<br>prob.>F=0.00<br>0 | 16.025<br>prob.>F=0.00<br>0 |

Note: (1) () shows 'standard error', \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Data sets LDI, GAI, MAI, and MRATE are not balanced in terms of year, which can raise suspicion for over or underestimation. However, it is assumed that the estimation result would not differ significantly as the values do not change considerably year to year and can be used to compile results.

Table 7 reports the estimated results of SCI on health equity (MHEALTH) based on Model 1. Equation (1) shows that the coefficient of MFAMILY is negative but statistically insignificant, indicating that there is no evidence that, at a permissible level, family reunion affects health equity level. Equation (2) states the coefficient of LDI as negative and statistically significant at a 1% level, as predicted, indicating that LDI

negatively affects health equity level and a 1%-point increase of probability in LDI would decrease 0.27 points, on average, in the score of MHEALTH. Equation (3) presents the coefficients of GENRST is positive and statistically significant at a 1 percent level, as predicted, implying that ‘generous’ societies could reduce the gap in health inequity between migrants and locals. On the other hand, Equation (4) using all variables, MFAMILY, GENRST, and LDI, shows almost the same estimation results as that of Equation (1) to (3): the coefficient of MFAMILY is negative but statistically insignificant, the coefficients of LDI and GENRST are positive and statistically significant at 1 percent level, as predicted.<sup>2</sup> In short, less language diversity (the higher LDI), and higher public contribution (the higher GENRS), the higher the value of health equity between migrants and locals, consistent to Hypothesis (1), (2), and (3).

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<sup>2</sup> A variance inflation factor (VIF) is used to detect any multicollinearity problems among independent variables in Equation (4). The test shows that there is very low probability of multicollinearity problem: all values of VIF are lower than 1.60 (lnGDP=1.02, GENRST=1.52, MRATE=1.60, MFAMILY=1.04, LDI=1.14, YRDUM=1.02).

Table 8. Regression Results II: Social and Community Influence on Health Equity

| Variables         | (5)                    | (6)                    | (7)                   | (8)                   |
|-------------------|------------------------|------------------------|-----------------------|-----------------------|
| MFAMILY1419       | -0.084<br>(0.168)      |                        |                       | -0.015<br>(0.150)     |
| LDI0917           |                        | -30.88***<br>(11.484)  |                       | -24.369**<br>(11.132) |
| GENRST1418        |                        |                        | 51.923***<br>(16.251) | 44.04**<br>(16.415)   |
| MRATE1519         | 105.973***<br>(25.681) | 126.855***<br>(25.114) | 57.502**<br>(27.912)  | 80.89***<br>(29.186)  |
| lnGDP1419         | 4.634***<br>(1.349)    | 4.598***<br>(1.249)    | 4.683***<br>(1.217)   | 4.716***<br>(1.191)   |
| Constant          | -79.288**<br>(36.088)  | -76.107**<br>(33.415)  | -80.389**<br>(32.471) | -75.642**<br>(31.937) |
| R-squared         | 0.376                  | 0.457                  | 0.485                 | 0.534                 |
| F-test<br>prob.>F | 9.45<br>0.000          | 13.162<br>0.000        | 14.745<br>0.000       | 10.331<br>0.000       |

Note: (1) () shows 'standard error,' \*\*\* p<.01, \*\* p<.05, \* p<.1

(2) The result shows that there is very low probability of multicollinearity problem in Equation (8): all values of VIF are lower than 1.66 (lnGDP1419=1.02, GENRST1419=1.55, MRATE=1.60, MFAMILY1419=1.05, LDI0917=1.15)

Table 8 reports the estimated results based on Model 2. Estimation results on Equation (5) (6), (7), and (8) are very similar to estimation results of Equation (1), (2), (3) and (4), respectively: the coefficient of MFAMILY1419 is negative but statistically insignificant, the coefficients of LDI0917 and GENRST1418 are positive and statistically significant at a 1% level in Equation (6) and (7) and at a 5% level in Equation (8), respectively. Thus, the estimation results can be interpreted the same as above: the less languages diversity (the higher LDI0917) in a country and the higher the ratio of social giving to per capita GDP (the higher GENRS1418), the higher the value of health equity between migrants and locals as expected, consistent to Hypothesis (1), (2), and (3).

Table 9. Regression Results III: Social and Community Influence on Health Equity

| Variables         | (9)                   | (10)                 |
|-------------------|-----------------------|----------------------|
| GAI               | 7.737***<br>(1.458)   |                      |
| MAI1417           |                       | 0.478***<br>(0.147)  |
| MRATE1519         | 33.726<br>(24.537)    | 66.902**<br>(26.279) |
| lnGDP1419         | 2.350**<br>(1.319)    | 2.519*<br>(1.365)    |
| Constant          | -61.666**<br>(25.581) | -70.634<br>(32.570)  |
| R-squared         | 0.608                 | 0.487                |
| F-test<br>prob.>F | 24.286<br>0.000       | 14.978<br>0.000      |

Note: () shows 'standard error,' \*\*\* p<.01, \*\* p<.05, \* p<.1

Table 9 shows the estimated results with GAI and MAI1417. As mentioned, considering the index values vary little from year to year, it is believed that there will be no significant difference in the estimated results. Equation (9) in <Table III-10> shows the coefficient of GAI as positive and statistically significant at 1% level, meaning a 1-point increase in GAI would increase 7.737 points, on average, in the score of MHEALTH; and Equation (10) shows that the coefficients of MAI1417 is also positive and statistically significant at a 1% level, implying a 1-point increase in MAI 1417 would increase 0.478-point, on average, in the score of MHEALTH. Therefore, the more equitable a county is for minorities (the higher GAI) and the more receptive a country is towards migrants (the higher MAI), the higher the value of health equity level is expected, identical to Hypothesis (4) and (5).

## **Section 3.4: Estimation Results II: Living and Working Conditions on Health Equity**

### *Subsection 3.4.1: Data Descriptions and Theoretical Hypotheses*

Living and working conditions (hereafter LWC) indicate accessibility to clean water and sanitation, safety, housing and working conditions, occupational health schemes, fair wages, etc. The Social Progress Index (hereafter SPI), government health expenditure, and labor MIPeX score' are selected LWC determinants variables.

Accessibility to clean water and sanitation, safety and housing ratio, % of government health expenditure to overall government expenditure (hereafter 'health expenditures' or HEXPN) signify the level of housing, working conditions and occupational health schemes, and the Labor market integration score of MIPeX (hereafter 'labor MIPeX score' or MLABOR) implicates the level of wage and labor market.

SPI is an index consisting of 'Basic Human Needs,' 'Foundations of Wellbeing', and 'Opportunity.'" It can be used as a representative variable of living and working conditions as it includes fifty social and environmental indicators to create a clear image of everyday life. SPI describes the capacity of a society to meet basic human needs to enhance and sustain the quality of their lives, and for all individuals to reach their full potential measure. "The index does not measure people's happiness or life satisfaction, focusing instead on actual life outcomes in areas from shelter and nutrition to rights and education. The index is scored on a 0 – 100 scale and it is expected that the higher the SPI, the more positively it affects health equities" (Helliwell, 2019).

General government health expenditures (World Bank, 2021) are adopted ‘health-related expenses’ from housing, working conditions and occupational health schemes. The World Bank currently has only published data only from 2000 to 2018. Consequently, the data of 2014 and 2018 (instead of 2019 data) are used in this paper and are measured by the ratio of government health expenditure to general government expenditure. Policies promoting government spending on health are expected to have a positive impact on health equity if the purpose is to promote welfare and health benefits for underserved populations.

The Labor MIPLEX value ranges from 0 to 100. The values indicate labor market integration and whether migrants have equal rights and opportunities to access jobs, in addition to the opportunities to develop work skills. Thus, a more equitable society with higher equal rights and opportunities for migrants to access work and improve their works skills is likely to have lower levels of discrimination, and therefore a positive impact on health equity.

Summarizing the above, it can be assumed that:

**Hypothesis 6:** The higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity' (the higher SPI), the higher the level of health equity between migrants and locals, and the more positively health equity will be affected.

**Hypothesis 7:** The more funding the government provides for health support, the higher the level of health equity between migrants and locals, and the more positively health equity will be affected.

**Hypothesis 8:** The higher the equal rights and opportunities for migrants to access jobs and improve their skills, the higher the level of health equity between migrants and locals and the more positively health equity will be affected.

The descriptions of independent variables are summarized in Table10 and the descriptive statistics for independent variables are summarized in Table 11, respectively.

Table10. Description of Variables: Living and Working Conditions

| Variables  | Descriptions                                                                                          |
|------------|-------------------------------------------------------------------------------------------------------|
| SPI        | Social Progress Index of 2014 and 2019                                                                |
| SPI1419    | Average Social Progress Index of 2014 and 2019                                                        |
| MLABOR     | Labor market integration MIPEX score of 2014 and 2019                                                 |
| MLABOR1419 | Average Labor market integration MIPEX score of 2014 and 2019                                         |
| HEXPN      | The ratio of government health expenditure to general government expenditure (%) of 2014 and 2018     |
| HEXPN1418  | Average ratio of government health expenditure to general government expenditure (%) of 2014 and 2018 |

Table 11. Statistics of Variables: Living and Working Conditions

| Variable   | N   | Mean   | Std    | Min   | Max   | Source                                                                                  |
|------------|-----|--------|--------|-------|-------|-----------------------------------------------------------------------------------------|
| SPI        | 102 | 79.219 | 8.726  | 50.24 | 90.95 | <a href="https://www.socialprogress.org">https://www.socialprogress.org</a>             |
| SPI1419    | 51  | 79.389 | 8.4    | 54.67 | 89.04 |                                                                                         |
| MLABOR     | 102 | 50.608 | 19.63  | 11    | 94    | <a href="http://www.mipex.eu">www.mipex.eu</a>                                          |
| MLABOR1419 | 51  | 50.608 | 19.582 | 14    | 94    |                                                                                         |
| HEXPN      | 102 | 8.229  | 2.344  | 3.54  | 16.89 | <a href="https://data.worldbank.org/indicator">https://data.worldbank.org/indicator</a> |
| HEXPN1418  | 51  | 8.229  | 2.332  | 3.58  | 16.65 |                                                                                         |

Table 12. Correlation Matrix: Living and Working Conditions

| Variables       | (1)   | (2)   | (3)   | (4)   | (5)   | (6)   | (7)   |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| (1) MHEALTH     | 1     |       |       |       |       |       |       |
| (2) MHEALTH1419 | 0.987 | 1     |       |       |       |       |       |
| (3) SPI         | 0.720 | 0.723 | 1     |       |       |       |       |
| (4) SPI1419     | 0.712 | 0.714 | 0.989 | 1     |       |       |       |
| (5) MLABOR      | 0.518 | 0.497 | 0.467 | 0.475 | 1     |       |       |
| (6) MLABOR1419  | 0.489 | 0.472 | 0.461 | 0.466 | 0.994 | 1     |       |
| (7) HEXPN       | 0.721 | 0.713 | 0.675 | 0.652 | 0.564 | 0.556 | 1     |
| (8) HEXPN1418   | 0.707 | 0.702 | 0.679 | 0.653 | 0.599 | 0.590 | 0.990 |

Figure 7. Correlation Matrix: Living and Working Conditions



Table 12 and Figure 7 show the correlation matrix among dependent and independent variables. Coefficients of correlations between MHEALTH and SPI, MHEALTH and MLABOR, and MHEALTH and HEXPN are relatively high and



positive. Also, coefficients of correlations between MHEALTH1419 and SPI1419, MHEALTH1419 and MLABOR1419, and MHEALTH1419 and HEXPN1418 are relatively high and positive

#### *Subsection 3.4.2: Estimation Results*

As noted above, regression is estimated in two ways: One is estimated using pooled data of 2014 and 2019 (Model 3) and the other is estimated using the average value of 2014 and 2019 data (Model 4) with the same control variables, MRATE, lnGDP, YRDUM. Each of the estimated models can be written as

$$\text{Model 3: } MHEALTH_i = \beta_0 + \beta_1 * SPI_i + \beta_2 * MLABOR_i + \beta_3 * HEXPN_i + \beta_4 * MRATE_i + \beta_5 * \ln GDP_i + \delta * YRDUM_i + \mu_i \quad (i=1, 2, \dots, n)$$

, where MHEALTH stands for MIPEX score of health, SPI for Social progress index, and MLABOR for MIPEX score of labor market integration, HEXPN for the ratio of domestic government health expenditure to domestic government health expenditure (%), lnGDP for ln(GDP), MRATE for the ratio of migrants to local population, and YRDUM, the dummy variable, would be equal to 1 for 2014 and 0 for 2019.

$$\text{Model 4: } MHEALTH_{1419_i} = \beta_0 + \beta_1 * SPI_{1419_i} + \beta_2 * MLABOR_{1419_i} + \beta_3 * HEXPN_{1419_i} + \beta_4 * MRATE_{1519_i} + \beta_5 * \ln GDP_{1419_i} + \mu_i \quad (i=1, 2, \dots, n)$$

where MHEALTH1419 stands for the average MIPEX score of health of 2014 and 2019, SPI1419 for the average Social progress index of 2014 and 2019, and MLABOR1419 for the average MIPEX score of labor market integration of 2014 and 2019, HEXPN1419 for the average ratio of domestic government health expenditure to domestic government health expenditure (%) of 2014 and 2019, lnGDP1419 for the average ln(GDP) of 2014 and 2019, and MRATE1419 for the average ratio of migrants to local population of 2014 and 2019.

Table 13. Regression Results IV: Living and Working on Health Equity

| Variables        | (11)                    | (12)                   | (13)                  |
|------------------|-------------------------|------------------------|-----------------------|
| SPI              | 1.543***<br>(0.192)     |                        |                       |
| MLABOR           |                         | 0.331***<br>(0.089)    |                       |
| HEXPN            |                         |                        | 4.813***<br>(0.705)   |
| MRATE            | 31.218*<br>(16.902)     | 91.904***<br>(17.518)  | 66.276***<br>(16.099) |
| lnGDP            | 3.918***<br>(0.744)     | 3.45***<br>(0.941)     | 2.22**<br>(0.855)     |
| YRDUM            | 3.644<br>(2.801)        | -2.157<br>(3.260)      | -2.825<br>(2.861)     |
| Constant         | -180.461***<br>(23.432) | -66.677***<br>(24.232) | -53.675***<br>(2.861) |
| R-squared        | 0.618                   | 0.442                  | 0.570                 |
| F-test<br>prob>F | 39.307<br>0.000         | 19.224<br>0.000        | 32.143<br>0.000       |

Note: () shows 'standard error,' \*\*\* p<.01, \*\* p<.05, \* p<.1

Table 13 reports the results of regressions by Model 3: the coefficients of SPI in Equation (11), MLABOR in Equation (12), and HEXPN in Equation (13) are collectively

positive and statistically insignificant at a 1% level as predicted. A 1-point increase in SPI and MLABOR would increase 1.543 and 0.331 points in the score of MHEALTH on average, respectively, while a 1%-point increase in government health expenditure to total government expenditure would increase 4.813 points in MHEALTH score on average.

In conclusion, ‘living and working conditions’ affect health equity positively: the higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity'(the higher SPI), the more funding the government provides for health support, and the higher the equal rights and opportunities for migrants to access jobs and improve their skills, the higher the level of health equity between migrants and locals are expected, consistent to Hypothesis (6), (7), and(8).

Table 14. Regression Results V: Living and Working on Health Equity

| Variables         | (14)                    | (15)                  | (16)                  |
|-------------------|-------------------------|-----------------------|-----------------------|
| SPI1419           | 1.603***<br>(0.271)     |                       |                       |
| MLABOR1419        |                         | 0.328**<br>(0.126)    |                       |
| HEXP1418          |                         |                       | 4.884***<br>(0.992)   |
| MRATE1519         | 26.134<br>(23.751)      | 93.066***<br>(24.599) | 66.456***<br>(22.421) |
| lnGDP1419         | 4.129***<br>(1.018)     | 3.481**<br>(1.320)    | 2.194*<br>(1.190)     |
| Constant          | -188.736***<br>(32.593) | -68.597**<br>(33.871) | -55.023*<br>(29.596)  |
| R-squared         | 0.641                   | 0.452                 | 0.586                 |
| F-test<br>prob.>F | 27.917<br>0.000         | 12.921<br>0.000       | 22.213<br>0.000       |

Note: () shows ‘standard error,’ \*\*\* p<.01, \*\* p<.05, \* p<.1

Table 14 shows similar results with Model 4: the coefficients of SPI1419 in Equation (14), and HEXPN1419 in Equation (16) are both positive and statistically significant at a 1% level and the coefficient of MLABOR1419 in Equation (15) is positive and statistically significant at a 5% level. Indicating, a 1-point increase in SPI1419 and MLABOR1419 would increase 1.603 and 0.328 points, on average, in the score of MHEALTH1419 and a 1%-point increase in government health expenditure to total government expenditure would increase 4.884 points in the MHEALTH1419 score.

In conclusion, similar to previous results, ‘living and working conditions’ affect health equity positively: the higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity'(the higher SPI1419), the more funding the government spends on health support, and the higher the equal rights and opportunities for migrants to access jobs and improve their skills, the higher the level of health equity between migrants and locals, consistent to Hypothesis (6), (7), and (8).

### **Subsection 3.5: Estimation Results III: General Social Conditions on Health Equity**

#### *Subsection 3.5.1: Data Descriptions and Theoretical Hypotheses*

General social conditions such as socioeconomic, cultural, and environmental conditions (hereafter GSC) refer to migration-related policies which may affect migrant health. The most representative data in this regard are the Rule of Law Index, the anti-discrimination score of MIPEX, and the inequity-adjusted human development index.

The Rule of Law Index (hereafter RLI) is estimated based on clarity of law, publicness, stability, fairness, and basic rights (safety of individuals and contracts, property rights, and human rights), and can be used as a representative variable of general socioeconomic, cultural, and environmental conditions. The scores range from 1 (strong adherence to rule of law) and 0 (weak adherence to rule of law). A higher index value is expected to positively affect health equity. “The framework of the RDI is comprised of eight factors further disaggregated into 44 sub-factors. The government as well as private actors are accountable under the law. The RDI 2019 presents a portrait of the rule of law in 126 countries by providing scores and rankings based on eight factors: constraints on government powers, absence of corruption, open government, fundamental rights, order and security, regulatory enforcement, civil justice, and criminal justice” (Rule of Law Index, 2019).

Anti-discrimination strand/score of MIPEX shows the level of discrimination based on nationality, race, ethnicity and religion in all areas of life. Analogous to the MIPEX's Labor market integration and Family reunification score, this value ranges from 0 to 100, with a higher index value expected to positively affect the resulting health equity. Regardless of nationality, race, ethnicity, and religion, the more faithful the contents of the specialized equity body and enforcement mechanisms for discrimination, employment, education, and social protection, the more equitable a society.

The inequity-adjusted human development index (hereafter IHDI) of each country is used as an index that can represent General Socioeconomic, Cultural and Environmental conditions. The data by countries is calculated as the geometric mean of

the values in the inequity-adjusted life expectancy index, inequity-adjusted education index and inequity-adjusted income index and published by the UNDP. “The IHDI is distribution-sensitive average level of human development. Under perfect equity, the IHDI is equal to the HDI but falls below the HDI when inequity rises. The difference between the IHDI and HDI is the human development cost of inequity, also termed – the overall loss to human development due to inequity. The IHDI allows a direct link to equities in dimensions, it can inform policies towards inequity reduction, and lead to better understanding of equities across population and their contribution to the overall human development cost. A recent measure of inequity in the HDI, the Coefficient of human inequity, is calculated as an unweighted average of inequity across three dimensions. Under perfect equity, the HDI and IHDI are equal; the greater the difference between the two, the greater the inequity. The IHDI, estimated for 152 countries, captures the losses in human development due to inequity in health, education, and income” (IDHI, 2020).

Summarizing the above, it is assumed as follows:

**Hypothesis 9:** The higher the standards of clarity of law, publicity, stability, fairness, and basic rights (including safety of individuals and contracts, property rights, and human rights), the higher the health equity between locals and migrants and will positively affect health equity.

**Hypothesis 10:** The lower the discrimination in employment, education, and social protection, regardless of nationality, race, ethnicity, or religion, and the more fulfilling the contents of specialized equity body and enforcement mechanisms for this

purpose, the higher the health equity between citizens and foreigners, the higher the health and will positively affect equity.

**Hypothesis 11:** The more equitable distribution of income and health and education benefits to the people, the higher the health equity between citizens and foreigners, and health equity will have a positive effect.

Table 15. Description of Variables: General Social Conditions

| Variable  | Description                                                        |
|-----------|--------------------------------------------------------------------|
| RDI       | Rule of law Index (WJPI) of 2014 and 2019                          |
| RDI1419   | Average Rule of law Index (WJPI) of 2014 and 2019                  |
| MDISC     | Anti-discrimination score of MIPEX of 2014 and 2019                |
| MDISC1419 | Average Anti-discrimination score of MIPEX of 2014 and 2019        |
| IHDI      | Inequity-adjusted human development index of 2014 and 2019         |
| IHDI1419  | Average Inequity-adjusted human development index of 2014 and 2019 |

Table 16. Statistics of Variables: General Social Conditions

| Variable    | N   | Mean  | Std.  | Min  | Max  | Data Source                                        |
|-------------|-----|-------|-------|------|------|----------------------------------------------------|
| MHEALTH     | 102 | 50.92 | 21.57 | 12   | 85   | <a href="http://www.mipex.eu">www.mipex.eu</a>     |
| MHEALTH1419 | 51  | 50.92 | 21.33 | 12   | 84   |                                                    |
| IHDI        | 102 | 0.78  | 0.093 | 0.44 | 0.90 | Human Development Reports (undp.org)               |
| IHDI1419    | 51  | 1.53  | 0.23  | 0.82 | 1.79 |                                                    |
| MDISC       | 102 | 70.29 | 25.06 | 6    | 100  | <a href="http://www.mipex.eu">www.mipex.eu</a>     |
| MDISC1419   | 51  | 70.29 | 24.67 | 9    | 100  |                                                    |
| RLI         | 82  | .68   | .15   | .35  | .94  | WJP Rule of Law Index 2019   World Justice Project |
| RLI1419     | 41  | .68   | .15   | .415 | .92  |                                                    |

Table 17. Correlation Matrix: General Social Conditions

| Variables       | (1)   | (2)   | (3)   | (4)   | (5)   | (6)   | (7)   |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| (1) MHEALTH     | 1     |       |       |       |       |       |       |
| (2) MHEALTH1419 | 0.987 | 1     |       |       |       |       |       |
| (3) RLI         | 0.692 | 0.716 | 1     |       |       |       |       |
| (4) RLI1419     | 0.729 | 0.72  | 0.985 | 1     |       |       |       |
| (5) MDISC       | 0.242 | 0.224 | 0.205 | 0.230 | 1     |       |       |
| (6) MDISC1419   | 0.230 | 0.241 | 0.196 | 0.212 | 0.983 | 1     |       |
| (7) IHDI        | 0.608 | 0.626 | 0.766 | 0.785 | 0.202 | 0.234 | 1     |
| (8) IHDI1419    | 0.421 | 0.431 | 0.560 | 0.606 | 0.146 | 0.177 | 0.823 |

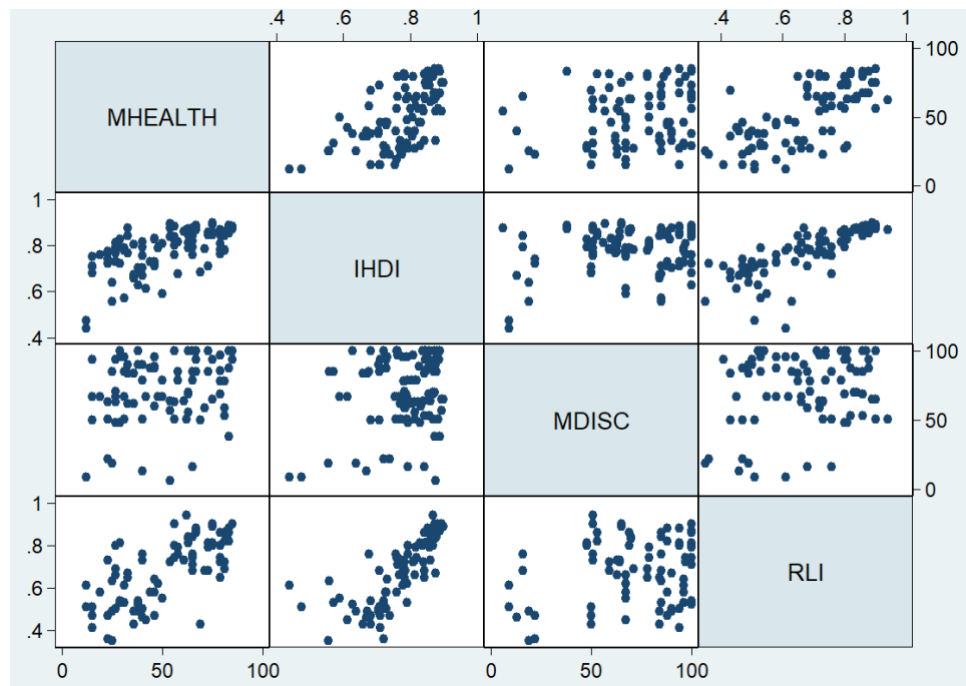
Descriptions of dependent and independent variables are summarized in Table 15 with the exception of MHEALTH, lnGDP, MRATE, and YRDUM while the descriptive Statistics for independent and dependent variables are summarized in Table16.

Table 17 and Figure 8 show the correlation matrix among dependent and independent variables. Coefficients of correlations between MHEALTH and RLI, MHEALTH and MDISC, and MHEALTH and HIDI are positive: the coefficients of correlations between MHEALTH and RLI and MHEALTH and HIDI are relatively high but the coefficient of correlations between MHEALTH and MDISC is relatively low. The coefficients of correlations between MHEALTH1419 and RLI1419 and MHEALTH1419



and IHDI1419 are relatively high and positive and the coefficient between MHEALTH1419 and MDISC1419 are positive but slightly low.

Figure 8. Correlation Matrix: General Social Conditions



### Subsection 3.5.2: Estimation Results

As above, regression is estimated either using pooled data from 2014 and 2019 (Model 5), or using the average value of data from 2014 and 2019 (Model 6). Each of the estimated models with the hypotheses using  $n$  observations ( $i$ ) can be written as

$$\text{Model 5: } MHEALTH_i = \beta_0 + \beta_1 * IHDI_i + \beta_2 * MDISC_i + \beta_3 * RLI_i + \beta_4 * MRATE_i + \beta_5 * \ln GDP_i + \delta * YRDUM_i + \mu_i \quad (i=1, 2, \dots, n)$$

, where MHEALTH stands for MIPEX score of health, IHDI for Inequity-adjusted human development index, MDISC for MIPEX score of anti-discrimination, RLI for Rule of law index, MRATE for the ratio of migrants to local population,  $\ln GDP$  for  $\ln(GDP)$ , and YRDUM for year 1 for 2014, 0 otherwise.

$$\text{Model 6: } MHEALTH_{1419_i} = \beta_0 + \beta_1 * IHDI_{1419_i} + \beta_2 * MDISC_{1419_i} + \beta_3 * RLI_{1419_i} + \beta_4 * MRATE_{1519_i} + \beta_5 * \ln GDP_{1419_i} + \mu_i \quad (i=1, 2, \dots, n)$$

, where MHEALTH<sub>1419</sub> stands for the average MIPEX score of health of 2014 and 2019, IHDI<sub>1419</sub> for the average inequity-adjusted human development index of 2014 and 2019, MDISC<sub>1419</sub> for the average MIPEX score of anti-discrimination of 2014 and 2019, RLI<sub>1419</sub> for the average Rule of law index of 2014 and 2019,  $\ln GDP_{1419}$  for the average  $\ln(GDP)$  of 2014 and 2019, and MRATE<sub>1419</sub> for the average ratio of migrants to local population of 2014 and 2019.

Table 18. Regression Results VI: General Social Conditions on Health Equity

| Variables         | (17)                   | (18)                   | (19)                   |
|-------------------|------------------------|------------------------|------------------------|
| IHDI              | 121.143***<br>(18.804) |                        |                        |
| MDISC             |                        | 0.209***<br>(0.069)    |                        |
| RLI               |                        |                        | 73.656***<br>(12.932)  |
| MRATE             | 41.406**<br>(18.261)   | 96.662***<br>(17.731)  | 65.247***<br>(23.634)  |
| lnGDP             | 4.728***<br>(0.801)    | 5.012***<br>(0.927)    | 3.054***<br>(0.927)    |
| YRDUM             | -0.494<br>(2.930)      | -2.027<br>(3.331)      | -3.319<br>(3.219)      |
| Constant          | -173.13***<br>(25.867) | -106.584***<br>(26.01) | -85.722***<br>(24.596) |
| R-squared         | 0.554                  | 0.419                  | 0.583                  |
| F-test<br>prob.>F | 30.124<br>0.000        | 17.453<br>0.000        | 26.929<br>0.000        |

Note: () shows 'standard error,' \*\*\* p<.01, \*\* p<.05, \* p<.1

Table 18 reports results with Model 5: all coefficients of IHDI in Equation (17), MDISC in Equation (18), and RLI in Equation (19) are positive and statistically significant at a 1% level. A 1-point increase in IHDI and RLI would increase 1.211 and 0.737 points, on average, in the MHEALTH score, respectively and a 1-point MDISC would increase 0.209 points, on average, in the MHEALTH score. Therefore, the higher the standards of fairness, and basic rights (including safety of individuals and contracts, property rights, and human rights), the higher RLI; the lower the discrimination in employment, education, and social protection regardless of nationality, race, ethnicity, or religion, and the more specialized quality body and enforcement mechanisms for discrimination (the higher MIPLEX score: MDISC) are; and the fairer the distribution of

income and benefits of education and health for the people (the higher IHDI) are, the higher the value of health equity between migrants and locals, and the more positively the health equity will be affected, consistent with Hypothesis (9), (10), and (11).

Table 19. Regression Results VII: General Social Conditions on Health Equity

| Variables         | (20)                    | (21)                    | (22)                   |
|-------------------|-------------------------|-------------------------|------------------------|
| IHDI1419          | 30.646***<br>(11.140)   |                         |                        |
| MDISC1419         |                         | 0.213**<br>(0.098)      |                        |
| RLI1419           |                         |                         | 77.958***<br>(18.352)  |
| MRATE1519         | 77.456***<br>(26.108)   | 97.857***<br>(24.841)   | 61.299*<br>(32.921)    |
| lnGDP1419         | 4.819***<br>(1.249)     | 5.047***<br>(1.299)     | 3.021**<br>(1.275)     |
| Constant          | -132.628***<br>(38.029) | -108.996***<br>(36.355) | -89.022***<br>(33.740) |
| R-squared         | 0.46                    | 0.43                    | 0.61                   |
| F-test<br>prob.>F | 13.342<br>0.000         | 11.835<br>0.000         | 19.256<br>0.000        |

Note: () shows 'standard error,' \*\*\* p<.01, \*\* p<.05, \* p<.1

Table 19 reports results with Model 6: all coefficients of IHDI1419 in Equation (20), MDISC1419 in Equation (21), and RLI 1419 in Equation (22) are positive and statistically insignificant at a 1% level. A 1-point increase in IHDI1419 and RLI1419 would increase 0.306 and 0.780, on average, points in the MHEALTH score, respectively and a 1-point MDISC would increase 0.213 points in the MHEALTH score. Similar to Hypothesis (9), (10), and(11), I conclude the higher the standards of fairness, and basic rights including safety of individuals and contracts, property rights, and human rights (the

higher RLI), the lower the discrimination in employment, education, and social protection regardless of nationality, race, ethnicity, or relaxation, and the more specialized quality body and enforcement mechanisms for discrimination (the higher MDISC) are; and the fairer the distribution of income and benefits of education and health for the people (the higher IHDI) are, the higher the value of health equity between migrants and locals, and the more positively health equity will be affected.

### **Subsection 3.6: Summing-up**

Based on the IOM's migrant health factor model applied by Dahlgren-Whitehead (2006), this paper examines health equity determinants based on SDH with three areas: (1) the effect of social and community influences on health equity, (2) the effect of living and working conditions on health equity, and (3) the effects of general socioeconomic, cultural, and environmental conditions on health equity.

The health MIPEX score was used as an independent variable, representing health equity levels in various countries. The Family MIPEX score, MAI, LDI, GAI, and the level of generosity from the Happiness Index were adopted for the determinants social and community; SPI, Labor MIPEX score, and government health expenditure for the determinants of living and working conditions; and RLI, Anti-discrimination MIPEX score, and IHDI for the determinants of general social conditions. The pooled and the average data of 2014 and 2019 are used for the regression analysis because the health MIPEX score were surveyed only twice in 2014 and 2019.

From the estimated results, the following conclusions could be drawn:

In the case of social and community influences, the coefficients of MFAMILY and MFAMILY1419 are positive but statistically insignificant; the coefficients of LDI and LDI0917 are negative and statistically significant at a 1% level, as predicted; the coefficients of GENRST and GENRST1419 are positive and statistically significant at a 1 and a 5% level, respectively; the coefficients of GAI14 and MAI1417 are both positive and statistically significant at a 1% level. From these results, the less languages diversity (the higher LDI) in a country, the higher the ratio of social giving to per capita GDP (GENRS), the fairer countries for minorities (the higher GAI) and the more receptive countries (the higher MAI) to migrants, the higher value of health equity level between migrants and locals.

In case of living and working conditions, the coefficients of SPI, SPI1419, HEXPN and HEXPN1419 are all positive as predicted and statistically significant at a 1% level; the coefficient of MLABOR and MLABOR1419 are both positive and statistically significant at a 1 and a 5% level, respectively. From these results, the higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity'(the higher SPI), the more funding the government provides for health support (the higher HEXPN) and the higher the equal rights and opportunities for migrants to access jobs and improve their skills (the higher MLABOR), the higher the level of health equity between migrants and locals.

In case of social conditions, all coefficients of IHDI, IHDI1419, MDISC, MDISC1419, RLI, and RLI1419 are positive and statistically insignificant at a 1% level. Thus, the higher the standards of clarity of law, publicity, stability, fairness, and basic

rights including safety of individuals and contracts, property rights, and human rights (the higher RLI); the lower the discrimination in employment, education, and social protection regardless of nationality, race, ethnicity, or relaxation, and the more specialized quality body and enforcement mechanisms for discrimination (the higher MDISC) are and the fairer the distribution of income and benefits of education and health for the people (the higher IHDI) are, the higher the value of health equity between migrants and locals.

## **CHAPTER FOUR: Conclusion**

Social gradient is the compilation of factors in which individuals are born and live. “The qualities of these conditions are often made worse by discrimination, stereotyping, and prejudice. The unequal distribution of health-damaging experience is not in any sense a ‘natural’ phenomenon but is the result of toxic combination of poor social policies and programs, unfair economic arrangements, and bad politics” (WHO, 2021). Most migrants experience or face legal, social, cultural, economic, behavioral and communication differences. “Conditions surrounding migration often fuel health inequities and repeatedly expose migrants to increased health risks and negative health outcomes: restrictive migration policies cause an increasing number of migrants to travel in a clandestine and risky manner using irregular means of transportation; economic downturns and anti-migrant sentiments present limited access to health care, education, as well as safe and dignified working and living conditions. In this context, migration has become a key social determinant of the health of migrants” (IOM, 2021). Nevertheless, there is little research on the determinants of the health equity between migrants and locals. Accordingly, this paper intended to reveal through empirical analysis which factors determine the health inequity between migrants and locals.

The basic framework of the study is an adapted IOM model that Dahlgren-Whitehead (2006) presented. The Dahlgren-Whitehead model divides the determinants affecting health into four categories: individual lifestyle, social community factors, living and working conditions, and general social conditions. This was developed to suggest the



strategies for health policies in terms of factors threatening health, promoting health, and protecting health policies. (Dahlgren-Whitehead, 2007).

The adapted IOM model presents each social factor in relation to migration according to Dahlgren-Whitehead's model. Based on these adapted IOM models, this paper developed variables for each social determinant and attempted an empirical analysis of how these variables affect the health equity between migrants and locals.

This paper uses the health MIPEX score as independent variables for health equity. The MIPEX score can identify positive and negative aspects of national policies in health equity as well as show the level of migrant health equity at which migrants can enjoy a healthy and fulfilled life in their host countries. In addition, the MIPEX Health score is a robust measurement tool that has already yielded several significant results and has proven as a valuable resource for researchers and policymakers (Ingleby, 2018). The Migrant Integration Policy Index (MIPEX) estimates eight parts. However, health-related surveys were conducted twice in 2014 and 2019. Hence, the pooled (MHEALTH) and average data of 2014 and 2019 (MHEALTH1419) are used for the regression analysis. The empirical estimations were conducted in three parts as the determinants in each part are not independent of each other, but rather highly correlated.

The Family reunion MIPEX score, Migration Acceptance Index, Linguistic Diversity Index, Global Acceptance Index of LGBT, the level of generosity from Happiness index were adopted as the independent variables for social community factors; Social Progress Index, Labor market integration MIPEX score. Government health expenditure were employed as independent variables for social and community. The Rule

of law, Anti-discrimination MIPEX score, and Inequality-adjusted Human Development Index were used as independent variables for general social conditions.

Each of the three SDH was assumed as shown in <Table IV-1>: All but the ‘level of family reunion’ was found to be related to health equity.

Table 20. Estimated Results

| SDH                                               | Estimated                                                                                                                                                                                                                                     |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Health Equity and Social and Community Influences | (1) The acceptance level of family reunion (MFAMILY) is not related to the value of health equity between immigrants and locals and does not impact health equity.                                                                            |
|                                                   | (2) The more languages spoken (higher LDI), the lower the value of health equity between immigrants and locals, and the more positively the health equity will be affected.                                                                   |
|                                                   | (3) The higher the ratio of social giving to per capita (the higher GENRS), the higher the value of health equity between immigrants and locals and the more positively the health equity will be affected. .                                 |
|                                                   | (4) The more receptive countries (higher MAI) to immigrants, the higher the value of health equity between immigrants and locals, and the more positively the health equity will be affected. .                                               |
|                                                   | (5) The more equitable a country is for minorities (the higher GAI), the higher the value of health equity between immigrants and locals, and the more positively the health equity will be affected.                                         |
| Health Equity and Living and Working Conditions   | (6) The higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity' (the higher SPI), the higher the level of health equity between immigrants and locals, and the more positively the health equity will be affected. |
|                                                   | (7) The more funding the government provides for health support, these higher the level of health equity between                                                                                                                              |

|                                                                                |                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                | immigrants and locals, and the more positively the health equity will be affected.                                                                                                                                                                                                                                                                                              |
|                                                                                | (8) The higher the equal rights and opportunities for immigrants to access jobs and improve their skills, the higher the level of health equity between immigrants and locals and the more positively the health equity will be affected.                                                                                                                                       |
| Health Equity and General Socioeconomic, Cultural and Environmental Conditions | (9) The higher the standards of clarity of law, publicity, stability, fairness, and basic rights (including safety of individuals and contracts, property rights, and human rights), the higher the health equity between locals and immigrants and will positively affect health equity.                                                                                       |
|                                                                                | (10) The lower the discrimination in employment, education, and social protection, regardless of nationality, race, ethnicity, or religion, and the more fulfilling the contents of specialized equity body and enforcement mechanisms for this purpose, the higher the health equity between citizens and foreigners, the higher the health and will positively affect equity. |
|                                                                                | (11) The more equitable distribution of income and health and education benefits to the people, the higher the health equity between citizens and foreigners, and health equity will have a positive effect.                                                                                                                                                                    |

From the estimated results, I conclude the following: The fairer countries are toward minorities (the higher GAI); the less languages diversity (the higher LDI); the more receptive countries (the higher MAI) to migrants; the higher the public contribution (the higher GENRS); the higher score in 'Basic Human Needs', 'Foundations of Wellbeing', and 'Opportunity' (the higher SPI); the more government expenditures on health support; the higher the equal rights and opportunities for migrants to access jobs and improve their skills; the higher the standards of fairness, and basic rights including safety of individuals and contracts, property rights, and human rights (the higher RLI); the lower the discrimination in employment, education, and social protection regardless

of nationality, race, ethnicity, or relaxation, and the more specialized quality body and enforcement mechanisms for discrimination (the higher MDISC) are; and the fairer the distribution of income and benefits of education and health for the people (the higher IHDI) are, the higher the value of health equity between migrants and locals. As seen from our analysis, the health of individuals, including migrants, are influenced by social and community influences, living and working conditions, and general socioeconomic and cultural environments, which are the foremost cause for health equities within and between countries.

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