

RESEARCH

Open Access



# Income to self-rated health by multilevel modeling: the moderating role of healthcare access and quality index

Jiansong Zheng<sup>1</sup> , Tao Zhang<sup>1\*</sup> and Xi Wang<sup>1</sup>

## Abstract

Income-health gradients vary in societies with diverse cultures and healthcare access levels, and generalized trust in unknown resources of health services may play a crucial role in these gradients. Multilevel models using a sample of 152,501 respondents from 89 societies are conducted to investigate the moderation of estimating mechanisms linking relative

## Introduction

Self-rated health refers to individuals' assessment of their health status including mental and physical health by themselves [1]. Self-rated health was influenced by factors with multiple dimensions including personal and environmental determinants. Specifically, individual predictors include socioeconomic status (i.e. income, education level, employment status), health lifestyle, access to resources and medical treatment [2–4]. Environmental

factors, particularly physical conditions such as access to healthcare, play a crucial role in individuals' health [5]. From this perspective, income-health gradients may vary in different countries and regions with varying levels of health systems [6].

### Self-rated health and relative income

A large body of literature shows that relative income is viewed as a positive predictor of self-rated health [7–9]. Individuals with lower income may face greater difficulties in accessing medical resources compared to wealthier groups [10]. Especially when poor individuals live in areas with underdeveloped healthcare systems, they face higher relative medical costs, and often have limited medical knowledge [11]. In addition, people with

\*Correspondence:

Tao Zhang

taozhang@mpu.edu.mo

<sup>1</sup>Faculty of Humanities and Social Sciences, Macao Polytechnic University, Rua de Luis Gonzaga Gomes, Macau, China

lower relative incomes are more likely to suffer frustration and stress from their upward comparisons [6]. These stresses from social comparison can damage their mental health [12]. In this case, they may use unhealthy defen-

sample to verify the positive associations between relative income and self-rated health across countries and regions. Second, it examines the mediating role of generalized trust in the relationship between relative income and self-rated health across different countries and regions. Lastly, this study explores how the levels of Healthcare Access and Quality across countries and regions moderate the relationship between relative income and self-rated health. The specific research framework is illustrated in Fig. 1.

## Data and variables

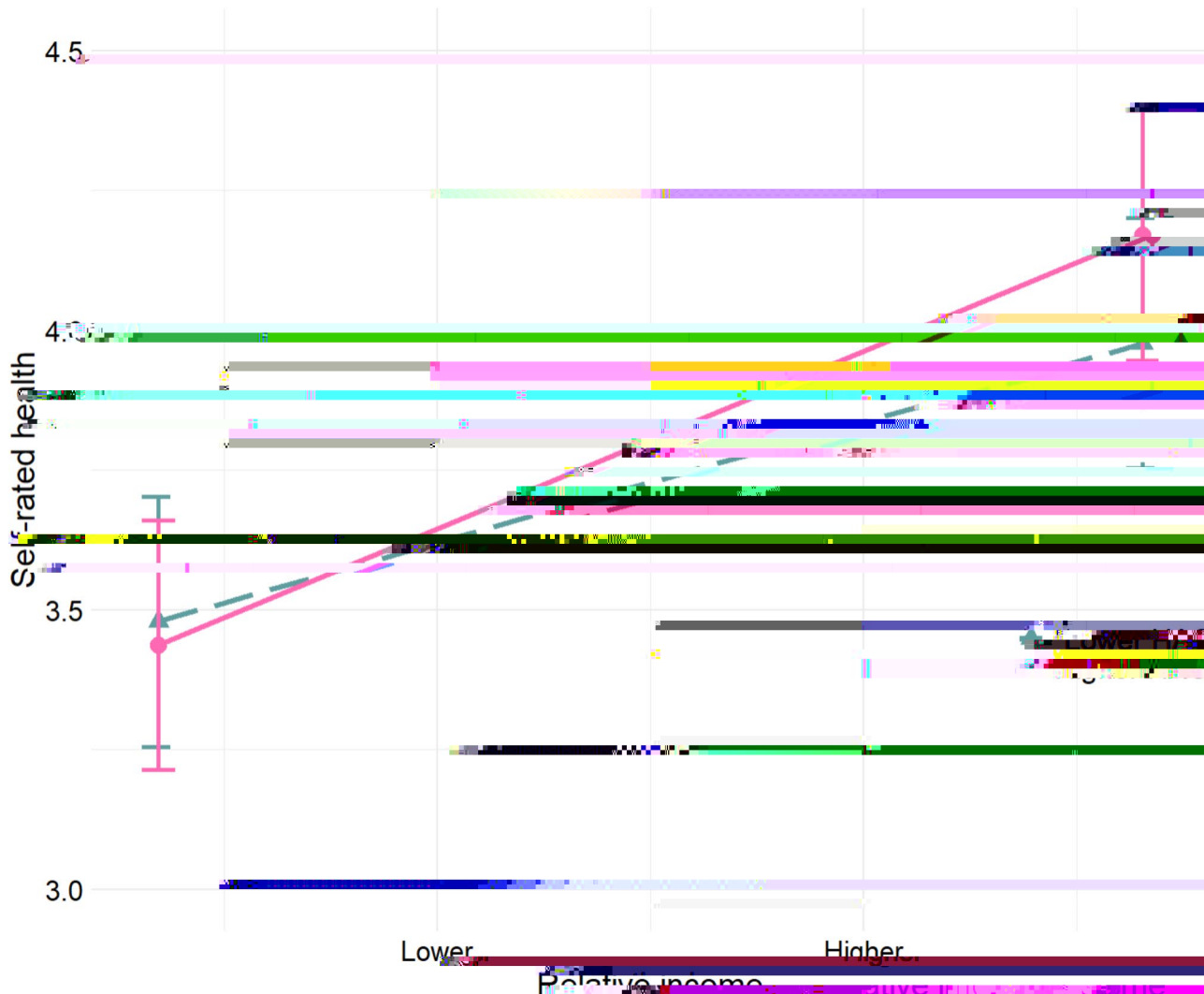
### Data

We used the joint EVS-WVS 2017–2022 dataset (Version 4.0.0) to construct the individual-level data. The joint



national differences in residents' self-rated health and generalized trust [36].

Table 2 presents the results of the main models. Relative income significantly and positively predicted both self-rated health and generalized trust at the 0.1% significance level. Generalized trust demonstrated a significant positive relationship with self-rated health at the 0.1% significance level. After controlling for generalized trust, relative income remained a significant positive predictor



**Fig. 2** Result of the simple slope test. Notes: 1. HAQ is the Healthcare Access and Quality Index. 2. 95% confidence intervals are reported

plus and minus their one standard deviation represent higher and lower levels of this index, respectively. Relative income is taken as the mean plus and minus three standard deviations, and the global sample can be covered. Figure 2 indicates that in countries and regions with higher levels of Healthcare Access and Quality, individuals with higher relative incomes tend to report a healthier status. For instance, the simple slope for the HAQ index scored at one standard deviation below the mean is 0.083 (95% CI = [-0.017, 0.183]). The simple slope for the HAQ index scored at one standard deviation above the mean is 0.123 (95% CI = [0.023, 0.233]).

**Discussion**

**General discussion**

There is evidence of a positive association between relative income and self-rated health across societies. Individuals with higher incomes tend to rate their health

more favorably, while those with lower income levels report worse health outcomes. This relationship is likely influenced by several factors, and for instance, people with higher incomes show greater access to healthcare, healthier lifestyle options, and reduced financial stress [11, 40]. Conversely, individuals with lower income often face barriers such as limited access to healthcare, increased financial strain, and fewer resources for maintaining a healthy lifestyle, all of which contribute to poorer health outcomes [41, 42]. Moreover, higher income often correlates with increased social status, which can positively enhance one’s perception of their own health [43].

We found weak evidence that generalized trust plays a mediating role in the association between relative income and self-rated health across the globe. In particular, people with higher relative income exhibit higher levels of generalized trust, which is linked to their increased









63. Doodoo JE, Al-Samarraie H, Alzahrani AI. Telemedicine use in Sub-Saharan Africa: barriers and policy recommendations for Covid-19 and beyond. *Int J Med Informatics*. 2021;151:104467.
64. Böckerman P, Ilmakunnas P. Unemployment and self-assessed health: evidence from panel data. *Health Econ*. 2009;18(2):161–79.
65. Mouteyica AEN, Ngepah N. Exploring health outcome disparities in African regional economics communities: a multilevel linear mixed-effect analysis. *BMC Public Health*. 2025;25(1):175.
66. Mansyur CL, Amick BC III, Harrist RB, Franzini L, Roberts RE. The cultural production of health inequalities: a cross-sectional, multilevel examination of 52 countries. *Int J Health Serv*. 2009;39(2):301–19.

### **Publisher's note**

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.