Author’s response to reviews

Title: Heterogeneous global health stock and growth: Quantitative evidence from 140 countries, 1990-2100

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Title: Heterogeneous global health stock and growth: Quantitative evidence from 140 countries, 1990-2100.

We thank two referees for careful reading our manuscript and for giving useful comments. In addition to it, we really happy to hear that reviewer 1 suggest acceptance as this present form. Thus, we focused on revision suggested by reviewer 2.

First, we really appreciate your comments and the time spent with our manuscript. Your constructive comments and suggestions can really improve our paper. We have tried to modify our paper according to your comments. Our response to your comments is given below. Please note that all changes are presented in the text in red fonts.

Reviewer #2 comments

1. Reviewer comment: The author(s) mentioned in their findings that based on the health stocks from 1990 to 2015, low-income countries have much larger and more rapidly growing health stocks. The Background section of this paper should include the linkage of low-income countries' health stocks and their developments.

Our response: We appreciate this comment. We explained why we focused on the linkage in low-income countries in page 5, line 5-12 as below.

(P.5, L.5-12)

We can analyse growth patterns of the health stock in 140 countries in the future of the 21st century, as well as the linkage between sustainable development and improvement in health and
population growth, particularly in low-income countries (LICs) where many people still face severe health conditions. For instance, people in LICs are often prevented to access healthcare (medicine and devices) and require for the improvement of the quality of health [19, 20]. Thus, this research contributes toward building up the criteria for health-related sustainability in LICs and the other countries.

2. Reviewer comment: In the method section, the authors claim that the health capital stock in each country from 1990 to 2015 was estimated using a capital approach. The future health stocks between 2016 and 2100 were forecast using a time-series model. I want to see some relevant literature in the paper.

Our response: This comment is essential to understand our approach. We add relevant literature for the capital approach and forecasting health stock, respectively. See page 5, line 21- page 6, line 1 for capital approach, and page 7, line 5-10 for forecasting health stock.

(P.5, L.21-P.6, L.1)

The capital approach evaluates human wealth as total current values of human, produced, and natural capital. This approach has been applied in national wealth evaluation [12, 21], regional health evaluation [22], and furthermore in project evaluation [23,24].

(P.7, L.5-10)

Next, we estimate the future health stock by using an econometric method. To forecast health stock, we applied ARIMA because it is commonly and widely used in a time series analysis [16, 25, 26, 27]. The ARIMA model also has the ability to use non-stationary time-series data, and many researchers use this model to forecast various health and medical phenomena [28]. For instance, the ARIMA had been used to forecast future monthly incidence of malaria (2018-2019) in the Kumasi Metropolis [29].

3. Reviewer comment: The following two pieces of literature have discussed the importance of human capital and the expenditure on health in the economy. I recommend citing this work in your paper.


Our response: We really appreciate your suggestions and we think the literatures are important to cite in this manuscript. We cite first paper on page 3, line 4-6 and second paper on page 13, line 15-16.

(P.3, L.4-6)

Although human health and education are important factors for us, health status has larger positive effects on the economic growth in Sub-Saharan Africa relative to education status[5].

(P.13, L.15-16)

Furthermore, improvement in life expectancy most likely influences growth in health expenditure, and vice versa [43].