

**Title:** Moving beyond GDP for measuring welfare – Estimating the Level and Rate of Growth of Health Adjusted Income

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### **Abstract**

**Background:** Gross domestic product (GDP) is often used as a proxy for quality of life. Yet, material gains is only one of the many aspects of life that enhance the wellbeing of a population. One of the most important aspects of welfare, argued Nobel-winning economists Kenneth Arrow and William Nordhaus, is the value of human lifespan. A “full-income approach” to capture both monetary income and the value of changes in mortality is preferred to GDP or GDP growth. However, existing literature estimating full-income has two shortcomings: first, they confuse the concepts of *levels* of life expectancy with *changes* in life expectancy, assigning monetary values estimated for *changes* to *levels* instead; second, existing approaches only apply to high-income countries and cannot be expanded to lower-income countries.

**Methods:** We present our framework, named “health-adjusted income”, that captures both the GDP and the monetary values of health and longevity of populations. This framework addresses the limitations mentioned above by first distinguishing the differences between levels and changes, and assigning proper values to each. Second, we explore several simple and defensible approaches for assigning values for changes in mortality for all countries. We compare changes in health-adjusted income across time and geographies, and decompose the changes into four parts (e.g., changes in income, life expectancy, willingness to pay due to changes in income or life expectancy).

**Findings:** We provide health-adjusted income estimates for 195 countries between 1970-2015, and highlight several interesting comparisons. For example, the United States have had approximately 20% greater GDP per capita than France for the past thirty years and the gap has widened over time. Yet, the health-adjusted income of the two have been converging due to the latter’s greater improvements in life expectancy. Other comparisons, such as India versus China, and within China over time, are discussed in detail.

**Interpretation:** Compared to GDP, health-adjusted income provides a more comprehensive picture of how countries’ welfare has changed over time and how they fare compared to similar countries. In a time of worldwide political change, a more comprehensive welfare metric that captures population health should be provided to and used by policymakers.