

# Health-Related Quality of Life in the United Kingdom: an Analysis of Income-Related Inequality using the EQ-DAPHNIE pilot data

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## Objectives

- EuroQol instruments have been increasingly used for monitoring population health. Studies have shown that quality of life outcomes are not distributed equally across socioeconomic groups, with evidence suggesting that income-related disparities significantly influence health outcomes.
- The EQ-DAPHNIE project aims to collect approximately 67,500 respondents across 15 countries, providing a rich dataset for analyzing health status, well-being, and quality of life in diverse populations.
- This study analyzes pilot data from the EQ-DAPHNIE project in the United Kingdom (UK) to examine whether income-related disparities exist in quality-of-life outcome among UK population.
- Both EQ-5D-5L and experimental version of EQ-HWB-S were used in the EQ-DAPHNIE project and were used in this study.
- Concentration Index (CI) was used to quantify the impact of income levels on quality-of-life outcome.

## Methods

- Data for this cross-sectional survey study was obtained from the EQ-DAPHNIE project. The EQ-5D-5L UI was calculated using the UK crosswalk value set, and the EQ-HWB UI was calculated using the Mukuria et al.
- The CI was calculated to measure income-related inequality in HRQoL across different income groups. The statistical significance of differences in the CI between the EQ-5D-5L UI and the EQ-HWB UI is assessed by conducting a t-test based on the standard errors of the two CIs, with the p-value being reported to compare their means across immigrant and non-immigrant groups.
- The concentration index (CI) of HRQoL is decomposed to explore the contributions of various factors. HRQoL ( $y$ ) is determined by multiple factors ( $x_j$ ). The decomposition formula is:
$$C = \sum_j \left( \frac{\beta_j^m \bar{x}_j}{\bar{y}} \right) C_j + \frac{GC_u}{\bar{y}_i}$$
- The first part shows the contributions of the following factors: general health, self-care behaviours, health insurance, COVID infection, and demographics. The second part represents the impact of unobserved factors.

## Results

- Following data cleaning, the sample size decreased from 12,247 to 1,925 participants due to the exclusion of cases with missing or incomplete data across various demographic and health-related variables.
- For the EQ-5D-5L UI, the CI for the UK-born group is 0.02833 (SE = 0.0172), while for the non-UK-born group, it is -0.0003 (SE = 0.0195). The p-value for the CI difference is 0.0059, indicating a statistically significant difference. For the EQ-HWB UI, the CI values for the UK-born and non-UK-born groups are 0.0246 (SE = 0.0180) and 0.0005 (SE = 0.0190), respectively. The difference was not significant.

| Table 1. CI for EQ-5D-5L utility index and EQ-HWB utility index |                  |                 |                |                 |
|-----------------------------------------------------------------|------------------|-----------------|----------------|-----------------|
| Categories                                                      | EQ-5D-5L utility |                 | EQ-HWB utility |                 |
|                                                                 | CI Value         | SE <sup>a</sup> | CI Value       | SE <sup>a</sup> |
| Total (N = 1925)                                                | 0.0274           | 0.0174          | 0.0235         | 0.0180          |
| P value                                                         |                  |                 |                |                 |
| 0.3686                                                          |                  |                 |                |                 |
| UK-born                                                         | No (n=253)       | -0.0003         | 0.0195         | 0.0005          |
|                                                                 | Yes (n=1672)     | 0.02833         | 0.0172         | 0.0246          |
| P value                                                         |                  |                 |                |                 |
| 0.0059                                                          |                  |                 |                |                 |
| 0.4124                                                          |                  |                 |                |                 |

<sup>a</sup> Standard error.

- The CI decomposition results show that income and education are key factors influencing HRQoL inequality. In the non-immigrant group, there was a shift from pro-poor inequality to pro-rich inequality when comparing those with a Bachelor's degree or higher to those with lower educational levels. In the immigrant group, this shift occurred at the Master's degree level.
- As income increases, both groups showed increasingly significant pro-rich inequality, particularly in the immigrant group, where the health advantage among the highest income group (CI=1) further exacerbated the overall health divide. Foreign-born groups also show pro-rich trends in long-term hospital use (CI=1).
- Self-care behaviors and health insurance further influence these inequalities (Fig 1).
- The analysis in Table 2 reveals that general health and self-care behaviours exacerbate health inequality in the non-immigrant group but alleviate it in the immigrant group. In the Foreign-born group, general health significantly exacerbates HRQoL inequality in EQ-HWB UI (1095%), while having a negative impact on EQ-5D-5L UI (-177%). Self-care behaviours slightly alleviate inequality in EQ-5D-5L UI (96%) but increase it in EQ-HWB UI (-152%). Health insurance substantially reduces HRQoL inequality in EQ-HWB UI (-613%) but exacerbates it in EQ-5D-5L UI (177%). Demographics and Residual have smaller effects, with Residual slightly reducing inequality in both groups.

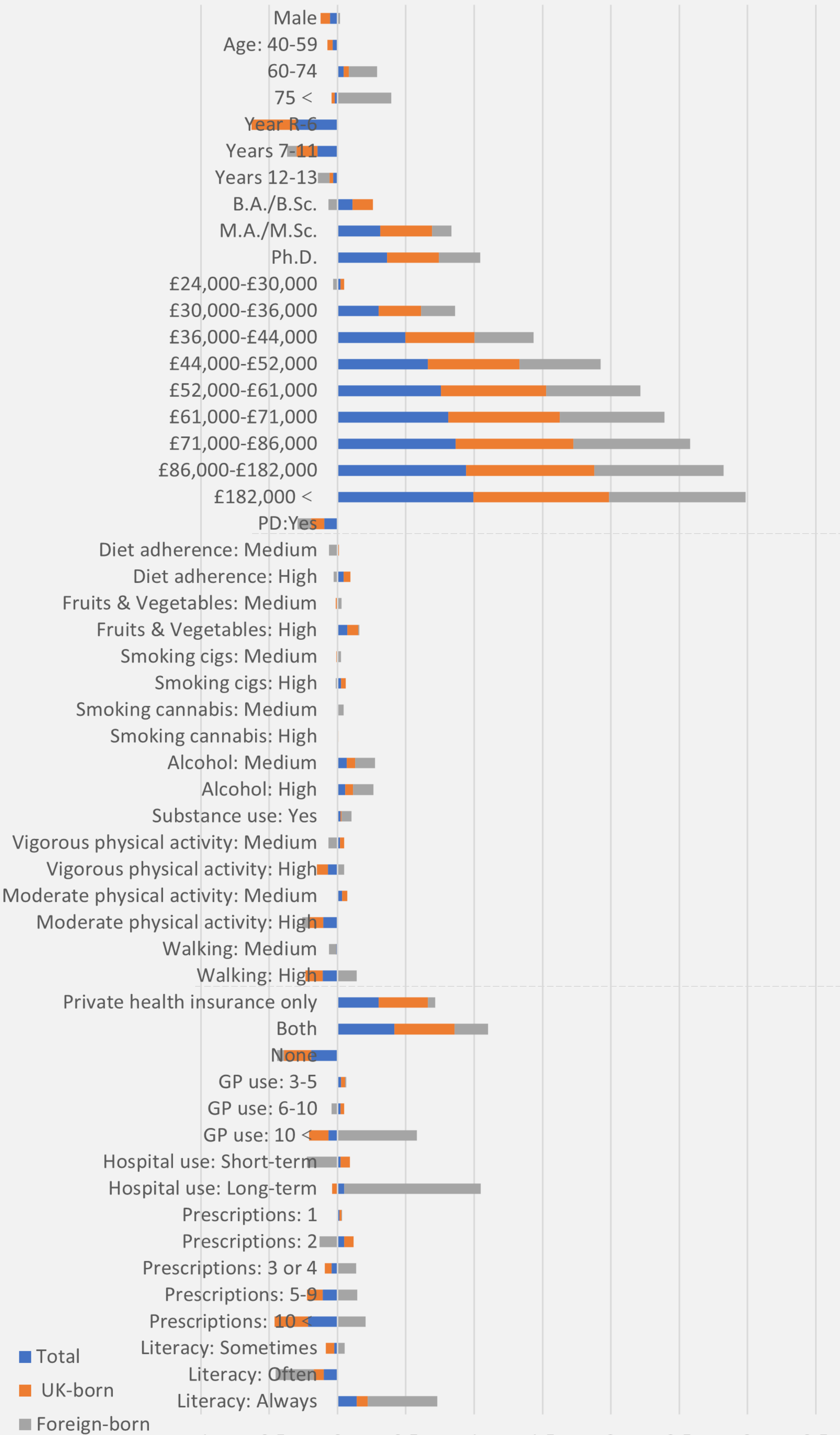


Fig 1. Decomposing Concentration Index (CI) of EQ-5D-5L Utility Index and EQ-HWB Utility Index by Place of Birth (top 3 factors)

Table 2. Contribution of Decomposed CI for EQ-5D-5L and EQ-HWB Utility Indices by Place of Birth

|                      | Total sample         |                    | UK-born              |                    | Foreign-born         |                    |
|----------------------|----------------------|--------------------|----------------------|--------------------|----------------------|--------------------|
|                      | EQ-5D-5L Utility (%) | EQ-HWB Utility (%) | EQ-5D-5L Utility (%) | EQ-HWB Utility (%) | EQ-5D-5L Utility (%) | EQ-HWB Utility (%) |
| General Health       | 56.52                | 59.36              | 56.13                | 58.86              | -177                 | 1095               |
| Self-Care Behaviours | 13.98                | 14.15              | 14.71                | 14.45              | 96                   | -152               |
| Health Insurance     | 15.42                | 19.62              | 17.45                | 18.86              | 177                  | -613               |
| COVID Infection      | 0.68                 | 0.69               | 0.6                  | 0.68               | -2                   | 23                 |
| Demographics         | 13.39                | 6.17               | 16.12                | 13.3               | 16                   | -71                |
| Residual             | -5.53                | -8.21              | -5.02                | -6.16              | -10                  | -181               |

## Discussion

- The EQ-5D-5L and EQ-HWB-S utilities produced similar results, indicating pro-rich inequality among the UK population. However, a notable difference was observed: the EQ-5D-5L utility revealed pro-poor inequality among immigrants, which was statistically significant compared to the non-immigrant group. This pattern was not observed when using the EQ-HWB-S utility.
- The CI decomposition results highlight the top three contributing factors: general health, self-care behaviours, health insurance. Income and education are key factors affecting HRQoL inequality. Immigrant individuals show significant pro-rich inequality, particularly with higher income and education, while foreign-born individuals experience greater pro-poor inequality, especially in income and health insurance.
- In the UK-born group, all the variables included in the five factors exacerbated HRQoL inequality, whether captured by the EQ-HWB utility index or the EQ-5D-5L utility index. In the Foreign-born group, the variables included in General Health significantly exacerbated HRQoL inequality as captured by the EQ-HWB utility index, but alleviated HRQoL inequality as captured by the EQ-5D-5L utility index. On the other hand, the variables included in self-care behaviours health insurance had the opposite effect. The Residual term showed a negative contribution in both groups, indicating that there are unexplained factors that play a role in alleviating health inequality and subjective health inequality.