Comparative assessment of SF-6D health state preferences among Lebanese population pre- and post-COVID-19 pandemic

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1. Introduction

This paper reports on the findings from a cross-sectional study comparing health state preferences of the general Lebanese population before and after the COVID-19 pandemic using the SF-6D measure. Health state preferences represent individuals' valuations of different health conditions and are essential for health economic evaluations and public health decision-making. The COVID-19 pandemic, combined with Lebanon's economic collapse and the Beirut Port explosion, may have influenced how people perceive and value health. However, no studies in Lebanon or the wider Arab region have compared population preferences across these two time periods using the SF-6D. This study aims to compare health state preferences pre- and post-COVID and to identify key predictors of these preferences.

2. Highlights

- The impact of the COVID-19 pandemic on health state preferences is unknown, and research on this topic in the Middle East and North Africa (MENA) region, and particularly in Lebanon, remains scarce.
- Our findings reveal a significant post-pandemic increase in population health state valuations, as evidenced by higher SF-6D utility index scores.
- The results highlight the influence of family burden and lifestyle factors on population health state valuations.

3. SF-6D data set

The SF-6D

The SF-6D includes six health dimensions: *physical functioning, role limitation, social functioning, bodily pain, mental health* and *vitality,* each with between four and six levels [1]. An SF-6D health state is defined by selecting one statement from each dimension. Health state 111111 denotes perfect health. The worst possible health state is 645655, known as 'the pits'. A total of 18,000 health states can be defined in this way.

Study design

A sample of 577 Lebanese respondents valued 249 health states described through the SF-6D using standard gamble (SG) [2].

Selection of respondents: A stratified cluster random selection design was used. Lebanese governorates were the strata, the clusters in each stratum were chosen at the level of districts where clusters were 100-150 households. Within each cluster, households were chosen using systematic random sampling, based on the probability proportional to size technique using the Lebanese Central Administration of Statistics [3]. Adult aged 18 years old or above drawn from each household.

Selection of health states: The same health states valued in the UK study were used in the Lebanon study. The UK study had 49 states identified using an orthogonal design and an additional 200 states identified using a stratified random sampling method to ensure a balance of mild, moderate and severe states [1].

Interviews: Each respondent was asked to rank and then value six SF-6D health states using SG, where respondents are iterated towards their point of indifference. The SG valuation task asked respondents to value each of five SF-6D health states against perfect health and 'pits'. Respondents were then asked in the sixth SG question to value 'pits'. Based on their valuation of the "pits", each respondent was asked to choose between either:

- the certain prospect of being in the "pits" state and the uncertain prospect of full health or immediate death, or
- the certain prospect of death and the uncertain prospect of full health or the "pits" state.

States valued worse than death were simply assigned the negative of the indifference probability of the best outcome, which has the effect of bounding negative values at minus one. The five earlier health state valuations (SG) were adjusted onto the scale 1 to 0, with 1 being the perfect health state and 0 indicating death.

Time frames

- The pre-COVID period was defined as data collected between July and October 2019, prior to the nationwide protests and the pandemic outbreak.
- The post-COVID period was defined as data collected between February and July 2022, following the easing of lockdown measures and the return to normal activities.
- A total of 577 participants were initially recruited. Of these, 316 participants were recruited during the pre-COVID phase, and 261 participants were recruited during the post-COVID phase.

4. Statistical analysis

Descriptive statistics were displayed as means and standard deviations (SD) for continuous variables or as counts (n) and proportions (%) for categorical ones. Independent samples t-tests and Chi-square tests were employed to examine differences in sociodemographic and health characteristics between the pre- and post-COVID participants. Simple and multiple linear regression analyses were applied to identify significant predictors of the health state preferences (SF-6D utility scores). In all analysis, a p-value below 0.05 was considered statistically significant.

5. Results

The analytic sample included 553 respondents (95% response rate) providing 3,308 observed SG valuations: 1,813 pre-COVID, and 1,495 post-COVID. Sociodemographic and health characteristics:

- Participants' mean age increased from 46.75 ± 16.60 pre-COVID to 51.75 ± 18.08 post-COVID ($p < .001$).
- Higher percentage of unemployed pre-COVID ($p < .001$).
- Educational level was higher post-COVID ($p < .001$).
- The average household size decreased post-COVID (3.6 vs. 4.4; $p < .001$).
- Participants who didn't have medical benefits were mostly from the pre-COVID phase ($p < .001$).
- Smoking rates also declined post-COVID ($p < .001$).

Mean utility scores increased from 0.646 ± 0.284 (pre-COVID) to 0.719 ± 0.258 (post-COVID) ($p < .001$).

Figure 1 displays the distribution of health state preferences pre-COVID, with a mean utility score of 0.646 ± 0.284. The distribution was negatively skewed, indicating a concentration of moderate-to-high scores but also a subset of participants giving very low utility scores to health states. The negative kurtosis (-0.864) reflects a relatively flattened distribution, suggesting more variability at the extremes.

Figure 1. Histogram and descriptive statistics for the adjusted health state valuations pre-COVID

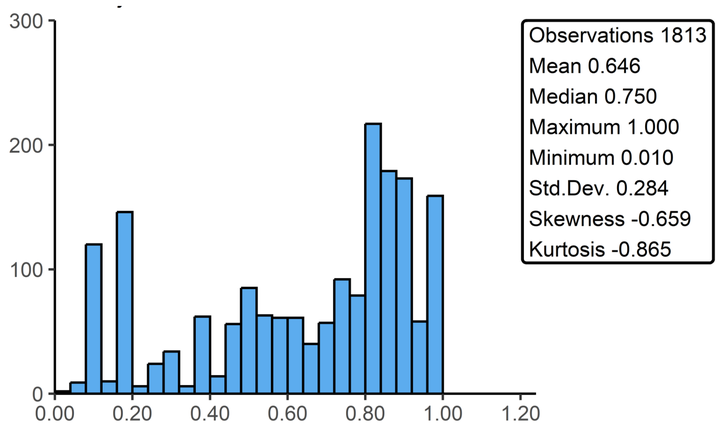
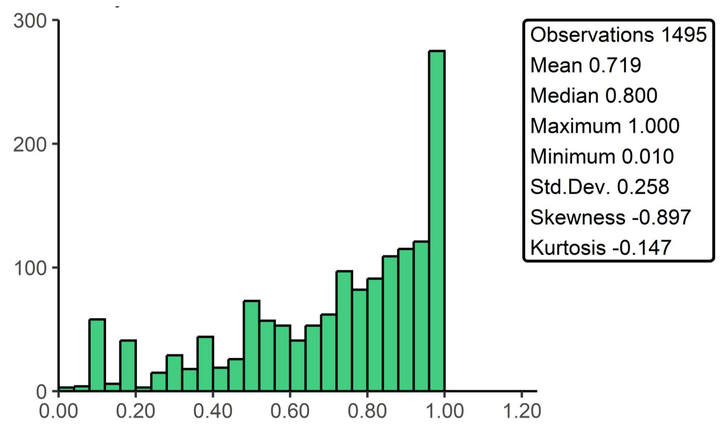


Figure 2 shows post-COVID utility scores, which were significantly higher (mean = 0.719 ± 0.258), suggesting higher health state preferences. The distribution was more negatively skewed, with a greater concentration of high utility scores, and the kurtosis (-0.144) indicated a closer to normal distribution with less extreme variability.

Figure 2. Histogram and descriptive statistics for the adjusted health state valuations post-COVID



Multiple regression analysis, adjusting for sociodemographic and health state dimensions, identified significant predictors of SF-6D utility scores:

- Time (pre/post-COVID) (B=0.070; p<.001)
- Number of children ≤14 (B=-0.017; p<.001)
- Educational level (B=0.006; p=.039)
- Smoking (B=-0.006; p<.001)
- Health condition: asthma (B=0.028; p=.024)
- Health condition: liver problems (B=0.055; p=.006)

Regarding the SF-6D health state dimensions, all coefficients displayed the expected negative sign, indicating that poorer health within each dimension corresponded to lower utility valuations.

6. Discussion

- This study conducted a comparative analysis of health state preferences among the Lebanese population before and after COVID-19 pandemic, identifying important predictors.
- The results revealed a significant increase in population-level health state valuations during the post-pandemic phase, as demonstrated by an increase in the mean utility across all health state valuations elicited pre- and post-COVID from 0.646 to 0.719.
- Time (pre/post-COVID), number of children below 14 years of age, smoking, educational level, health conditions, and health state dimensions emerged as significant predictors of these preferences.
- These results contribute to the growing body of research on the long-term impacts of COVID-19, especially in the MENA region where data remain limited.
- Future research should perform longitudinal analyses to evaluate long-term changes in HRQoL in Lebanon and across the broader MENA region.

7. References and data sharing

References

1. Brazier JE, Roberts J, Deverill M: The estimation of a preference-based measure of health from the SF-36. *Journal of Health Economics* 2002; 21: 271-292.
2. Kharroubi SA, Mukuria C, Dawoud D, Rowen D. Estimating the SF-6Dv1 value set for a population-based sample in Lebanon. *Value in Health Regional Issues* 2024;42:100977.
3. Lebanese Republic Ministry of Social Affairs/ Central Administration for Statistics/ UNDP, pages 106-107.published 2006.

Data sharing statement

- The study was ethically approved by the Institutional Review Board at the American University of Beirut.
- A de-identified dataset related to this study could be made available from the author at sk157@aub.edu.lb or s.kharroubi@sheffield.ac.uk, with the approval of the IRB committee if necessary.