# Estimating the HRQoL Shortfall of Long COVID: Meta Analysis of Cohort Studies Relative to Population Norms

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## Background

Long COVID – COVID-19 symptoms or sequelae that persist for longer than three months – is a significant public health problem. It is estimated that 6% of individuals who get COVID-19 will go on to develop long COVID.[1] Vaccination appears to have reduced the risk; however millions still suffer symptoms.

Long COVID is not a single condition, but an umbrella term for a myriad of symptoms including brain fog, fatigue, breathlessness, cardiovascular problems, pain, and mental health problems. More than 200 symptoms have been identified that impact multiple organ systems.

There is reported variability in individuals' experience of long COVID, thus to understand the burden of long COVID is it important to draw on a range of data.

## Objective

To estimate the health-related quality of life (HRQoL) decrement of long COVID, by pooling data from multiple long COVID cohort studies.

## Methods

We utilise three UK long COVID studies: Living With Covid Recovery, PHOSP-COVID and CoverScan, which each collected EQ-5D-5L data on individuals with long COVID symptoms. Each study had different recruitment criteria providing variability across severity of initial infection (hospitalised or not) and therefore variability in the long COVID condition.

Pooling of individual data was not possible given data governance, therefore we undertook a meta analysis of the means and standard deviations of the EQ-5D-5L utilities by age group and sex.

The HRQoL shortfall was estimated relative to EQ-5D-5L age/sex population norms from the Health Survey for England 2017 & 2018.

### Living With Covid Recovery

Living With Covid Recovery (LWCR) is bespoke digital health intervention designed to facilitate remote rehabilitation and to support the recovery of people living with long COVID. It was implemented in 35 long COVID clinics in the UK.[2] LWCR collected patient-reported outcome measures (PROMs) so clinicians could monitor and adjust care. PROMs were collected within the first month of registering with the programme (baseline), and then monthly for six months. EQ-5D-5L was one of the PROMs. EQ-5D-5L health states were valued using the Devlin tariff.[3] A population-based longitudinal cohort study was created to examine functioning, HRQoL and societal costs.

### PHOSP-COVID

Post-hospitalisation COVID-19, PHOSP-COVID, is a prospective, longitudinal cohort study.[4] It recruited adults who had been hospitalised with COVID-19 in the UK. Recovery was assessed using PROMs and other measures at 5 months (our baseline) and 1 year after hospital discharge. PHOSP-COVID collected a range of functioning, symptom and HRQoL measures, including the EQ-5D-5L, in the form of a prospective observational study. EQ-5D-5L was valued using the Devlin tariff.[3]

### CoverScan

CoverScan is an ongoing, prospective, longitudinal COVID-19 recovery study with a specific interest in understanding biochemical and imaging characterisation of organ function. The study involved community-based recruitment of participants to take part in multiparametric MRI assessment in order to better understand the clinical impact of long COVID on organs. Symptoms were assessed using the EQ-5D-5L and other measures at baseline (mean 141 days following COVID-19 infection).[5] EQ-5D-5L profiles were valued using the NICE recommended Hernandez Alava et al crosswalk method.[6]

### Health Survey for England (HSE)

This national health survey collected self-reported EQ-5D-5L responses in the 2017 and 2018 waves. Individual sampling weights were used to adjust the sample for nonresponders and to make it nationally representative in terms of age, sex, and geography. Health states were valued using the crosswalk method.[6] The HSE has been used previously to estimate shortfalls at a population level.[7]



*Figure 1: EQ-5D-5L mean values, females with long COVID*
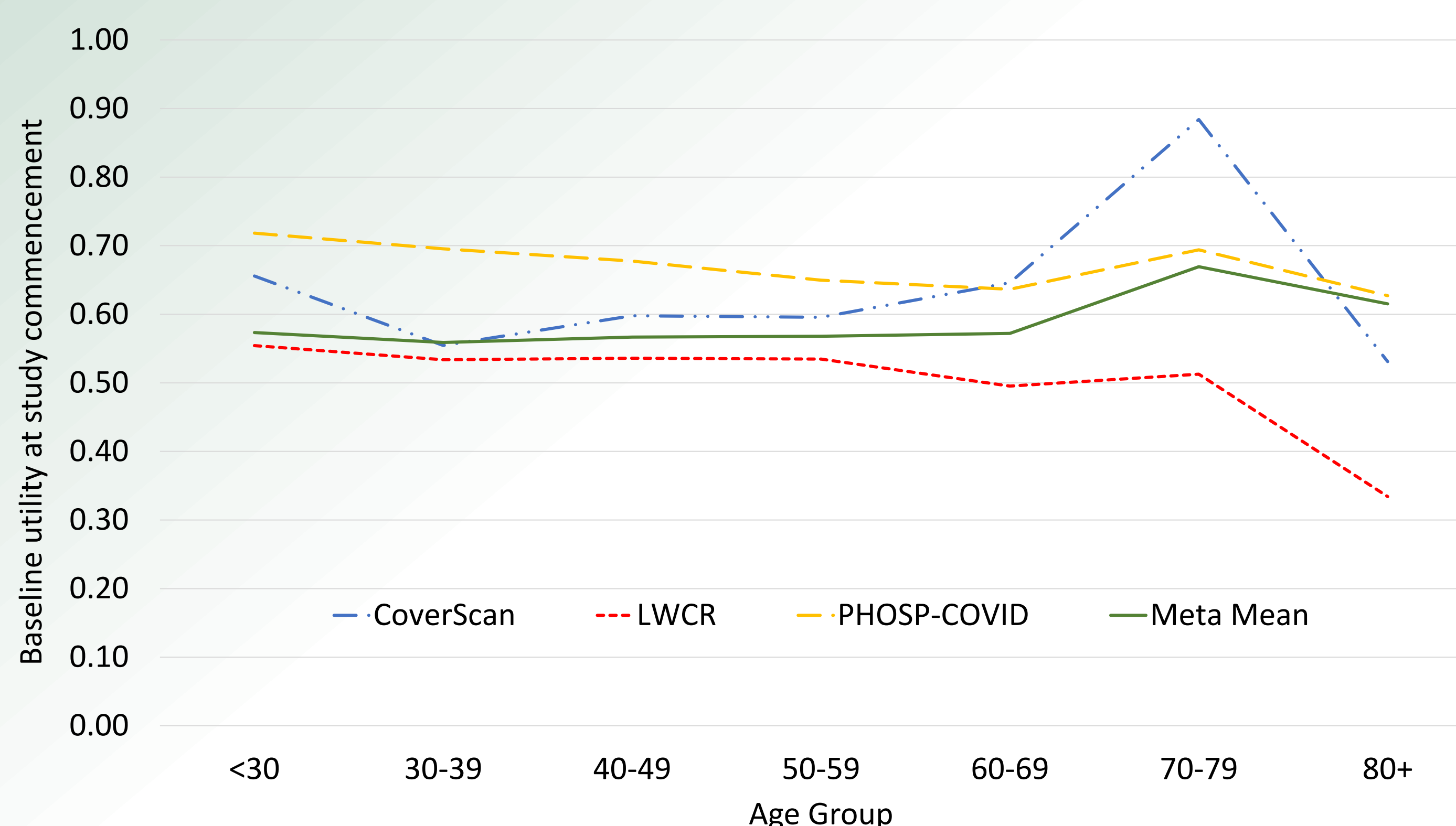
## Analysis

Each study provided estimates of the mean and standard deviations of EQ-5D-5L utility values for age groups <30, 30-39, 40-49, 50-59, 60-69, 70-79 and 80+ for females and males.

The variation in mean utility values across studies is depicted in Figure 1. This is reflective of the different population subgroups and recruitment protocols.
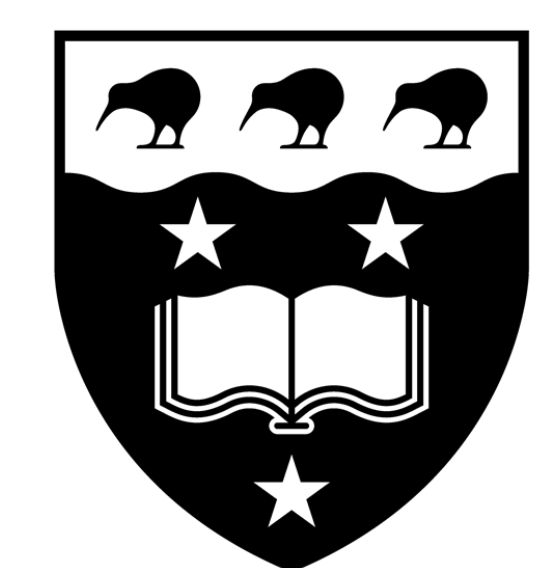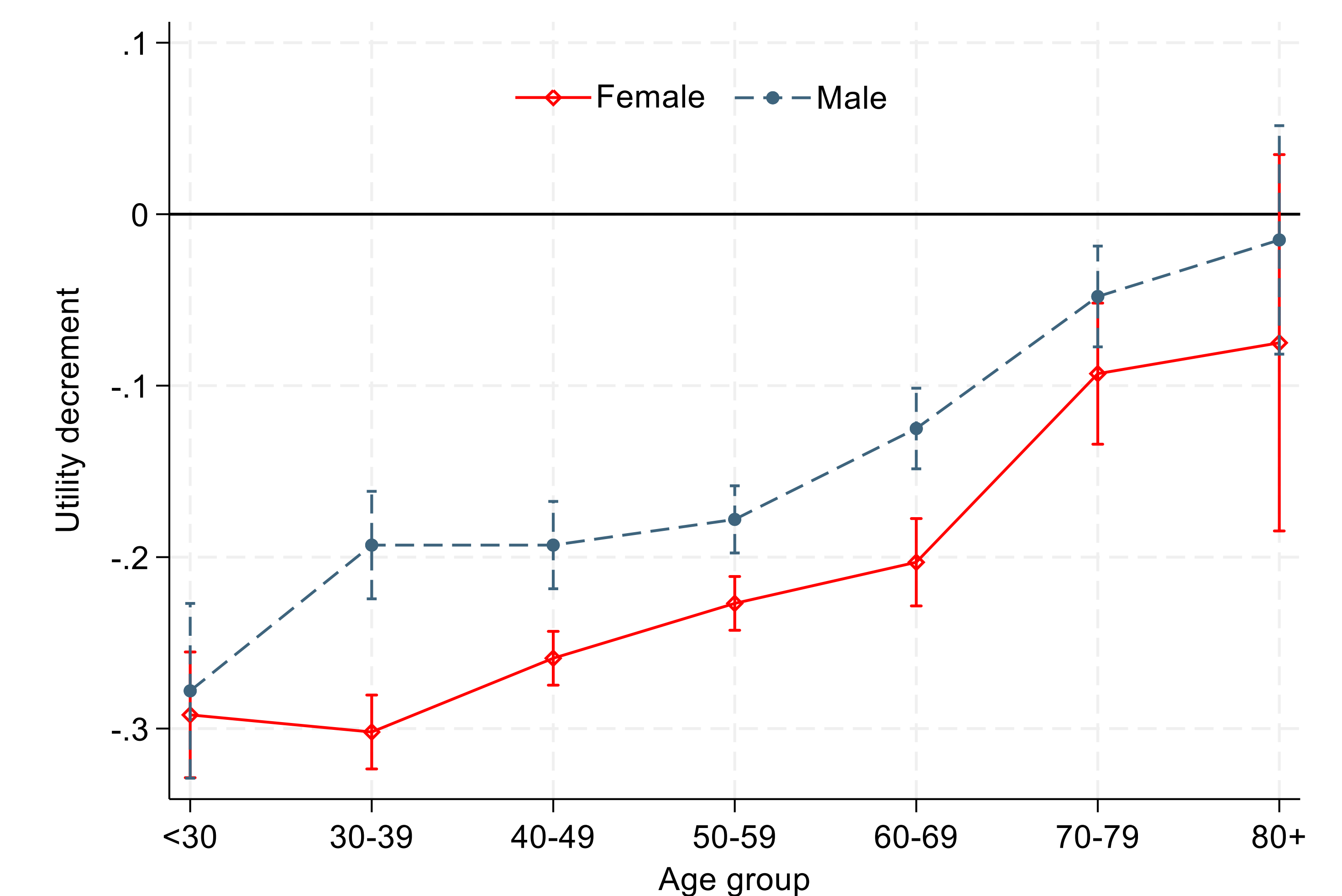
## Results

The estimated long COVID HRQoL shortfall finds that the decrement is larger for females than males and greatest for the younger age groups (see Figure 2). For example, for females aged 30-39 years old the EQ-5D-5L utility decrement is -0.302 (95%CI -0.325, -0.280); for males aged 30-39 years old the EQ-5D-5L utility decrement is -0.193 (95%CI -0.226, -0.161). That is, the burden of long COVID is felt most by females aged <40 years old.

## Conclusions

The estimated burden, that is the HRQoL EQ-5D shortfall, is greatest for younger women, this aligns with the clinical literature. Given the risk of long COVID is greatest for females, and younger age groups are often not prioritised for COVID boosters, this finding has potential policy implications.

*Figure 2: EQ-5D-5L estimated shortfall for long COVID*

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