

Accepted Manuscript

British Journal of General Practice

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DOI: <https://doi.org/10.3399/BJGP.2020.0616>

To access the most recent version of this article, please click the DOI URL in the line above.

Received 28 June 2020

Revised 22 September 2020

Accepted 01 November 2020

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Trends in health-related quality of life inequalities: repeated cross-sections study

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KEYWORDS

Quality of Life; Public health; Population health; Mental health; Socioeconomic factors

ABSTRACT

Background

After decades of steady progress, life expectancy at birth has stalled in England. Inequalities are also rising and life expectancy has fallen for females living in the most deprived areas. However, less attention has been given to trends in other measures of population health, particularly health-related quality of life (HRQoL).

Aim

To examine trends and inequalities in HRQoL in England between 2012 and 2017.

Design and Setting

We use nationally representative survey data on 3.9 million adults to examine HRQoL (measured by EQ-5D-5L - overall score, plus each of the five health domains: mobility, self-care, usual activity, pain/discomfort, and anxiety/depression).

Methods

We explore trends across time and inequalities by gender, age and deprivation.

Results

Although HRQoL seemed steady overall between 2012 and 2017, there is evidence of increasing inequality across population subgroups. There was a rise in gender disparity over time, the female-male gap in EQ-5D-5L increased from -0.009 in 2012 to -0.016 in 2017. The youngest females and those living in the most deprived areas had a particularly concerning trend. Females in the most deprived regions suffered a 1.3% decrease in HRQoL between 2012 and 2017, compared with a 0.5% decrease in males. The key contribution to the decline in HRQoL, particularly in females, was a 1.5% increase in reported levels of anxiety/depression between 2012 and 2017.

Conclusion

Developing interventions to address these worrying trends should be a policy priority. A particular focus should be on mental health in younger populations, especially females and in deprived areas.

HOW THIS FITS IN

Although life expectancy at birth has stalled in some high-income countries and inequalities have widened, there has been less focus on other population health indicators, such as health-related quality of life (HRQoL). We examine trends and inequalities in HRQoL in England using data from 3.9 million adults from large national surveys, from 2012 to when the series ended in 2017. There has been no change in average HRQoL, but increasing inequalities for females, particularly the youngest and those living in the most deprived areas. These deteriorations are driven by increases in anxiety and depression, which should be a future policy priority.

INTRODUCTION

After decades of steady progress, life expectancy at birth in England has stalled (1). This trend is also apparent in other high-income countries, such as the United States (2). Health inequalities have also increased with falling life expectancy among females living in deprived areas (3). While there is close monitoring of life expectancy, little attention is paid to other measures of population health.

There are reasons for this predominant focus on life expectancy at birth. It is a routinely available indicator of population health and can be used to make comparisons over time and across health systems (4). However, it fails to reflect variations in the quality of life while people are alive (5). It is sometimes adapted to 'healthy life expectancy', which adds an adjustment based on the proportion of people reporting "very good" or "good" general health (6). This is crude, prone to reporting bias, and does not reveal which specific aspect(s) of health are contributing to compromised quality of life (7, 8).

Health-related quality of life (HRQoL) is an alternative, multi-dimensional measure of health that incorporates physical, mental and social domains of health into a single figure. Arguably, it therefore better reflects the WHO's definition of health, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (9). HRQoL and life expectancy can move in similar or opposite directions. If HRQoL is falling while life expectancy is constant, this would indicate an overall decrease in population health. However, if HRQoL is still rising, overall population health might still be improving.

We use nationally representative survey data from England to examine how HRQoL changed between 2012 and 2017. We use the EQ-5D, the measure of HRQoL preferred by the National Institute for Health and Care Excellence (NICE) in the UK, and similar institutions in other regions, to inform policymaking and purchasing decisions (10-13). We explore trends across each of the five dimensions of health, and inequalities by population subgroups – gender, age and deprivation – comparable to the related life expectancy literature (14).

METHODS

Data

We used the General Practice Patient Survey (GPPS) (15); an independent, national patient survey conducted by Ipsos MORI. The GPPS is sent by post to two million randomly selected patients from all GP practices in England, providing they are aged 18+, have an NHS number, and have been registered with a GP practice for six months. All respondents are anonymous and cannot be followed over time. The GPPS was conducted bi-annually between 2012 and 2015, and annually from 2016 onwards. Biannual data was collected in January to March, and July to September of each year; annual data was collected in January to March of each year. Survey weights that account for the sampling design and the impact of non-response bias ensure results are representative of the population of adult patients registered with a GP (15).

We obtained GPPS data from nine survey waves (collected between July to September 2012 and January to March 2017), at the individual-patient level through NHS England, and extracted information on patients' EQ-5D-5L responses. The most recent, five-level (5L) version, introduced in 2011, lets respondents choose between five levels across each dimension: "no problems, slight problems, some problems, severe problems, or extreme problems" (16). The level selected for each dimension is combined with a 'value set' to produce a single index value (17). EQ-5D scores are measured on a scale between -0.59 to 1, where 1 indicates perfect health, 0 indicates death, and negative values indicate a state worse than death.

We additionally extracted gender, age, area deprivation and region. Area deprivation was measured by the Index of Multiple Deprivation (18).

For mapping, we obtained administrative data from the Office of National Statistics, including look-up files for geographical boundaries (19); and the latest digital vector boundaries for Clinical Commissioning Groups (as at April 2018) from the Open Geography Portal (20).

From an initial set of 4,378,022 respondents, we deleted 1,230 (0.003%) observations with no information on respondents' local authority district, and 438,476 (10%) observations with incomplete data on EQ-5D, age, gender or deprivation, leaving 3,938,316 observations.

Analyses

We first plotted the average of the EQ-5D score for the full sample population between 2012 and 2017. We then examined health inequalities. First, we examined gender differences in trends of EQ-5D, for males and females separately, and additionally for gender-specific age categories. Second, we examined socio-economic inequalities by dividing respondents into quintiles of area deprivation, and tracking the course of EQ-5D for males and females. Third, to examine changes at a geographical level, we used digital vector boundaries and mapping software to create choropleth maps that visualise the spatial distribution of the change in EQ-5D across Clinical Commissioning Groups between 2012 and 2017. Finally, we examined the trajectory of each of the five domains in the EQ-5D separately (scored 1 to 5

representing the five levels) to explore whether particular domains were driving the overall trend. In each line graph, we displayed error bars that represent 95% confidence intervals.

We used Stata/MP 16 and R 3.6.3.

RESULTS

Sample characteristics

The weighted sample characteristics are largely similar over time (Table 1). Just over half the respondents are female and around 20% of the respondents are over 65 years old. The mean EQ5D score is around 0.8, with an average level better than 4 (“slight problems”) in each domain.

[insert Table 1]

Visual graphs

Figure 1 shows that the average EQ-5D score is fairly static between 2012 and 2017 with a slight downward trend. EQ-5D for males was greater than that for females at every time point. The error bars do not overlap confirming the difference is statistically significant, but the absolute difference is small. From 2015 onwards, however, the trends begin to deviate slightly, HRQoL begins to fall at a steeper rate for females leading to increasing gender inequalities. Overall, the mean EQ-5D scores for males was 0.826 (95% confidence interval 0.824 to 0.827) in 2012, and 0.826 (0.825 to 0.827) in 2017; and for females was 0.817 (0.816 to 0.818) in 2012 and 0.810 (0.809 to 0.811) in 2017.

[insert Figure 1]

Figure 2 explores how much of the gender variation in EQ-5D is attributed to respondents' age. As expected, there is a laddered effect by age band, with younger individuals reporting higher average HRQoL. The average EQ5D scores are similar between men and women in the younger age groups. From age 65 onwards, however, there are progressively larger gaps with higher scores for men than women. This likely, at least partially, reflects the higher average length of life for females.

[insert Figure 2]

The trends for almost all age bands are steady for both age and gender groups over time. However, the exception to this is the trend for young females, particularly those aged 18-24 whose average EQ5D score dropped from 0.887 (0.884 to 0.891), which was equivalent to the 25-34 females in 2012, to 0.858 (0.854 to 0.862), which was equivalent to the 35-44 females by 2017.

Figure 3 considers inequalities in HRQoL by area deprivation. For every quintile of deprivation, females reported a lower EQ-5D than males across all time periods. The average scores are statistically equivalent for all deprivation quintiles for males in 2012 and

2017 but have decreased for all deprivation quintiles of females. The sharpest decline occurred in the most deprived females, with the average EQ5D score falling from 0.777 (0.774 to 0.780) in 2012, to 0.767 (0.765 to 0.769) in 2017.

Declines in EQ5D have also occurred mainly in deprived regions (6), such as the North and the Midlands.

[insert Figure 3]

Figure 4 shows the extent to which the trajectory of EQ-5D can be explained by each of its five domains. Consistently, self-care was the highest reported domain and pain/discomfort was the lowest reported domain across the population. Respondents' scores for self-care, usual activities, and mobility were largely similar across genders and time. However, anxiety/depression and pain/discomfort scores were worse for females than males over all time periods. Further, anxiety/depression scores gradually worsened over time, particularly for females, with a decline in the average domain score from 4.509 (4.505 to 4.513) in 2012, to 4.441 (4.369 to 4.444) in 2017, and a more pronounced decline from 2015 onwards.

[insert Figure 4]

DISCUSSION

Summary

Our results show that although EQ-5D seemed to be steady overall between 2012 and 2017, there is evidence of increasing inequality in HRQoL across population subgroups. We identified disparity in EQ-5D across gender. Overall, males reported higher scores than females at each time point in our study, and this gender disparity increased from 2015 onwards. It was the younger female population (aged 18-24) who accounted for this increasing inequality, as they reported the largest decline in HRQoL over time. The most deprived quintile of the population had the lowest HRQoL at every time point, in particular, deprived females reported the lowest EQ-5D score across the population that worsened over time. The most deprived regions suffered decreases in HRQoL over time, while wealthier regions improved. The key driver of the decline in EQ-5D over time was increasing levels of anxiety and depression.

Strengths and limitations

We analysed the well-known and widely used EQ-5D instrument, whose reliability as a tool for measuring and valuing health status has been supported by decades of evidence-based research (21).

We used large-scale, nationally representative data that monitored the trajectory of EQ-5D across 3.9 million respondents in total.

We were unable to include recent GPPS surveys (2018 and 2019) into our analyses as questions on EQ-5D were removed, and prior years of GPPS used alternative sampling methods (<2012) or measures of HRQoL (early 2012). Our study is therefore restricted to survey waves between mid-2012 and 2017.

The 2016 and 2017 GPPS surveys were conducted in the winter period between January and March. Prior surveys from 2012 to 2015 included an additional summer data collection between July and September. Our results, however, display a similar trend during 2016 and 2017 as per the previous years.

Comparison with existing literature

The results support the growing evidence base that health inequalities across certain population subgroups are widening. In particular, our findings echo those reported in the recent follow up to the Marmot Review, that 'social determinants of health' such as gender, region and socioeconomic circumstances play a large role in determining health (3).

The gender gap in life expectancy has been a common feature of mortality trends for many years, both in England and across the world more generally, with females living longer lives than males (22, 23). It is also widely reported that females spend more of these life years in poor health, and so the gender gap in healthy life expectancy is relatively smaller (24, 25). Prior research suggests that this gender differential in health is attributed in part to increased female longevity, but also to structural differences in fundamental characteristics between males and females, and their respective roles in society (26, 27).

Some studies have additionally explored gender inequality in HRQoL, finding that on average, females tend to report lower scores than males. After adjusting for functional disability, differences in self-reported health persist as a result of differences in sociodemographic and socioeconomic characteristics, such as age, race, education and income (28-30). Our results show that, although females overall are more likely than males to experience day-to-day health-related limitations that adversely impact their quality of life, there are particular domains, such as self-care, mobility and usual activities, for which they report equivalent scores. Conversely, their scores for pain/discomfort and anxiety/depression are lower than males. These findings are in line with the evidence that males are more likely to experience life-threatening health shocks that adversely impact their ability to perform daily tasks, while females are more likely to experience chronic but non-life-threatening disorders that test their pain threshold and mental health (31).

The social gradient in health has been a major area of research for many decades (32, 33). It is well understood that health inequalities, as a result of socioeconomic factors, can heavily influence life expectancy and healthy life expectancy (34). Recent evidence suggests that these inequalities are widening further, and disproportionately affecting females living in deprived communities more so than any other subpopulation (3). Our findings show that from 2015 onwards, females living in the most deprived areas experienced a worsening in HRQoL, while the situation over the same time period was steady for males. The most deprived areas in our sample were regions located in the North and the Midlands, which experienced the most negative changes in EQ-5D scores over time, thus reinforcing the already well-established North-South divide in inequalities in health (35-37).

An alarming finding is that the youngest males and, particularly, females were the main sub-populations to experience a fall in HRQoL between 2012 and 2017. The driving factor was an increase in anxiety and depression. Mental health disorders are a large contributor to the overall health of young people, and a key determinant of disability and mortality both in youth and in later life (38-40). In the UK, the reported prevalence of affective disorders in young people is rising considerably, with young females being most impacted (41-43). A growing body of research has evaluated potential determinants of mental health disorders, particularly among young adults, finding that in addition to well recognised social and economic risk factors, the current generation of youths are faced with a novel range of problems relating to social media, educational pressures, financial uncertainty and changing cultural norms (44). Some of these risk factors, for example, the rising psychological distress among students and graduates, may disproportionately affect young females more than males (45, 46). Further, young people in general are less likely to seek medical help during an emotional crisis, which may explain the worsening trend in anxiety and depression over time, if mental health concerns are not addressed (47). Ultimately, poor mental health could be a mechanism for decreasing life expectancy too, if it leads to suicide. There has been a significant increase in the suicide rate in recent years for both young males and females, despite low overall number of deaths the rate has increased by 83% since 2012 for females aged 10 to 24 years (48).

Implications for research and/or practice

Slowing improvements in life expectancy and widening health inequalities have prompted concerns about the progress of society as a whole (3). Our study suggests that while policymakers should continue to understand the main drivers behind the trend in longevity and healthy life expectancy, some additional thought should be given to address similar trends in HRQoL.

Several papers have explored the potential reasons behind the 2015 fall in life expectancy and the slowing of improvements in mortality post-2011. Many have linked these changes to the government austerity policies from 2010 onwards that resulted in reductions of health, social care and other public budgets, likely to affect the social determinants of health (1, 49, 50). Others attribute these changes to increased prevalence of influenza, or even the possibility that life expectancy has reached its physical limits (1). The drivers behind these trends are still unclear, however it is likely that some of these factors that affect mortality also affect quality of life, or as highlighted above, quality of life can be directly linked to mortality.

An additional finding from our study that warrants attention is that of declining HRQoL in young adults, which seems to be linked to rising mental health issues. There are ongoing concerns over the increased prevalence of mental health problems in England, the widening gap in mental health inequalities, and the potential link to welfare policies and austerity measures as the main contributing factors (51, 52). Developing interventions to address these worrying trends should be a policy priority.

Future research could further investigate health inequalities by exploring trends in EQ-5D by ethnicity, for example, given the availability of this data in the GPPS.

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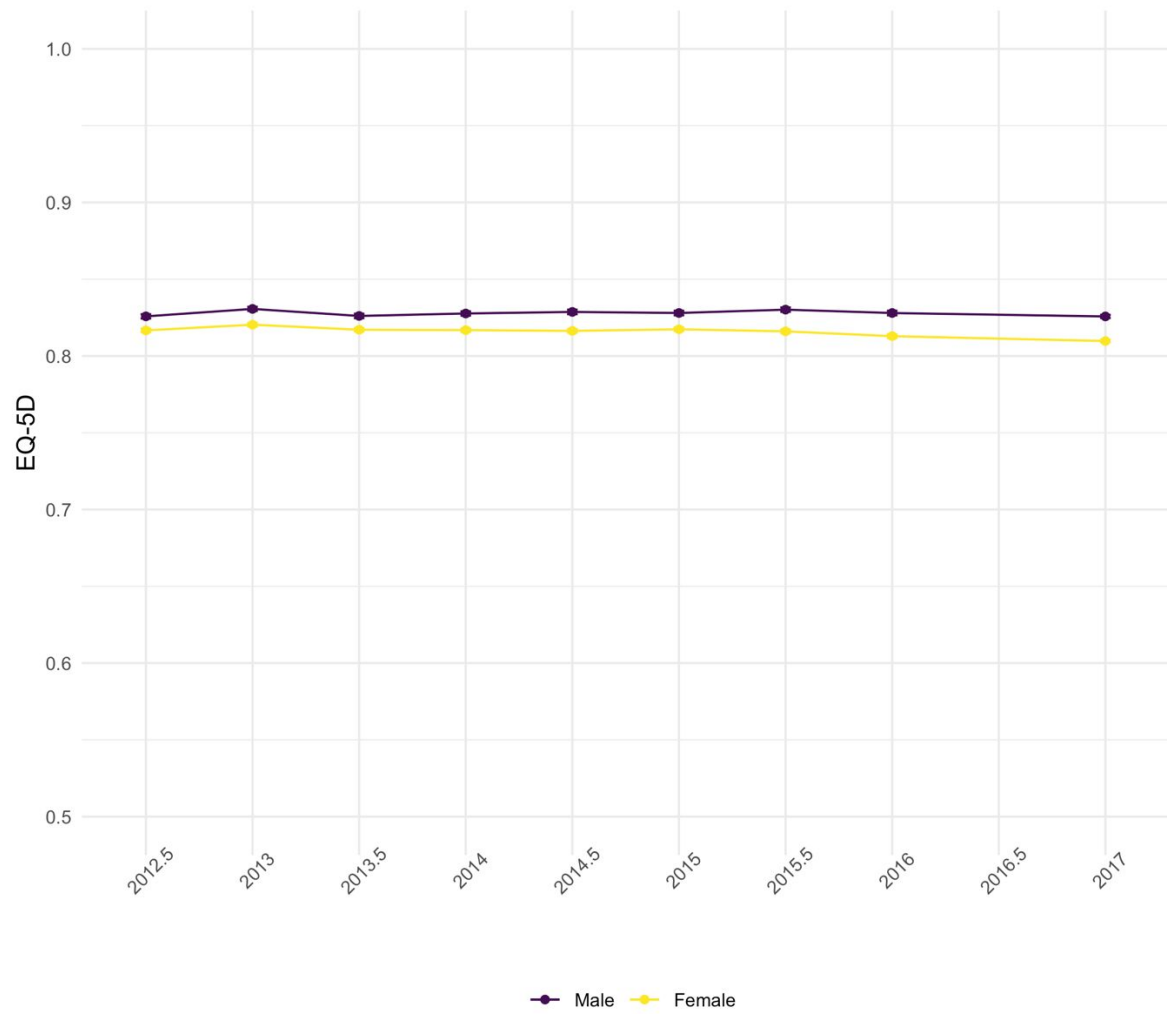
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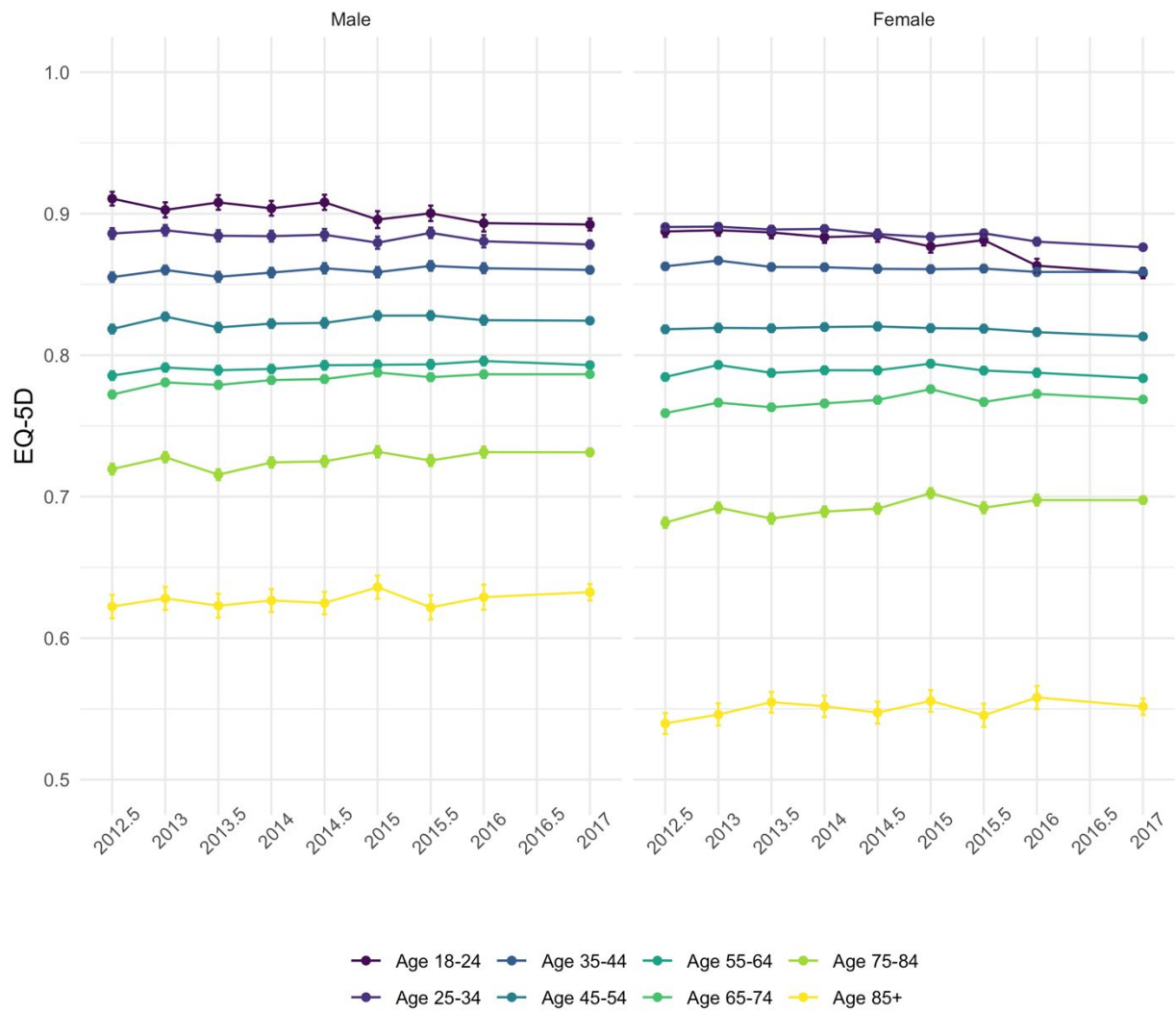
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Figure 1. EQ-5D (with 95% confidence intervals) for males and females, England, 2012 to 2017



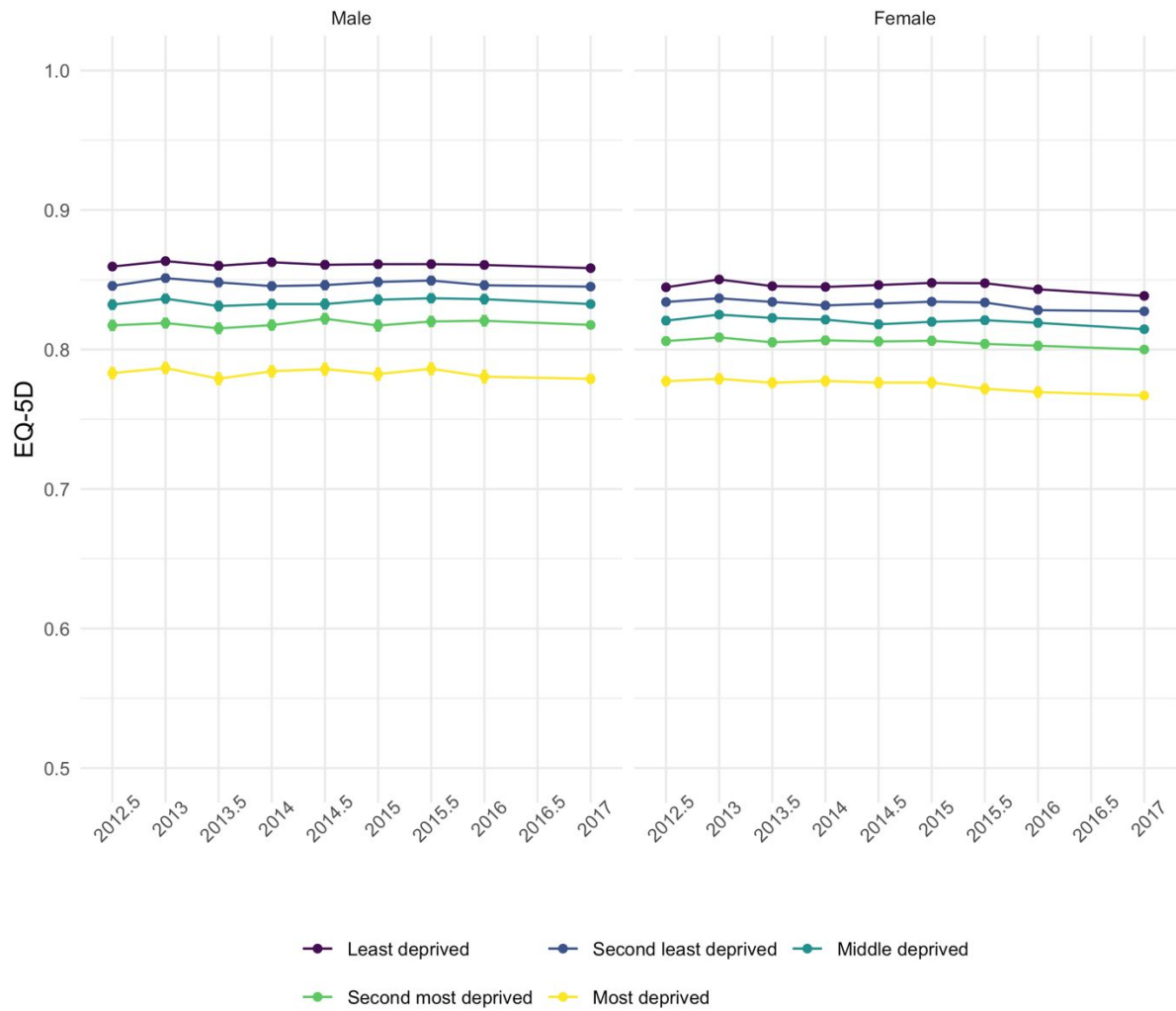
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Figure 2. EQ-5D (with 95% confidence intervals) for males and females, by age categories, England, 2012 to 2017



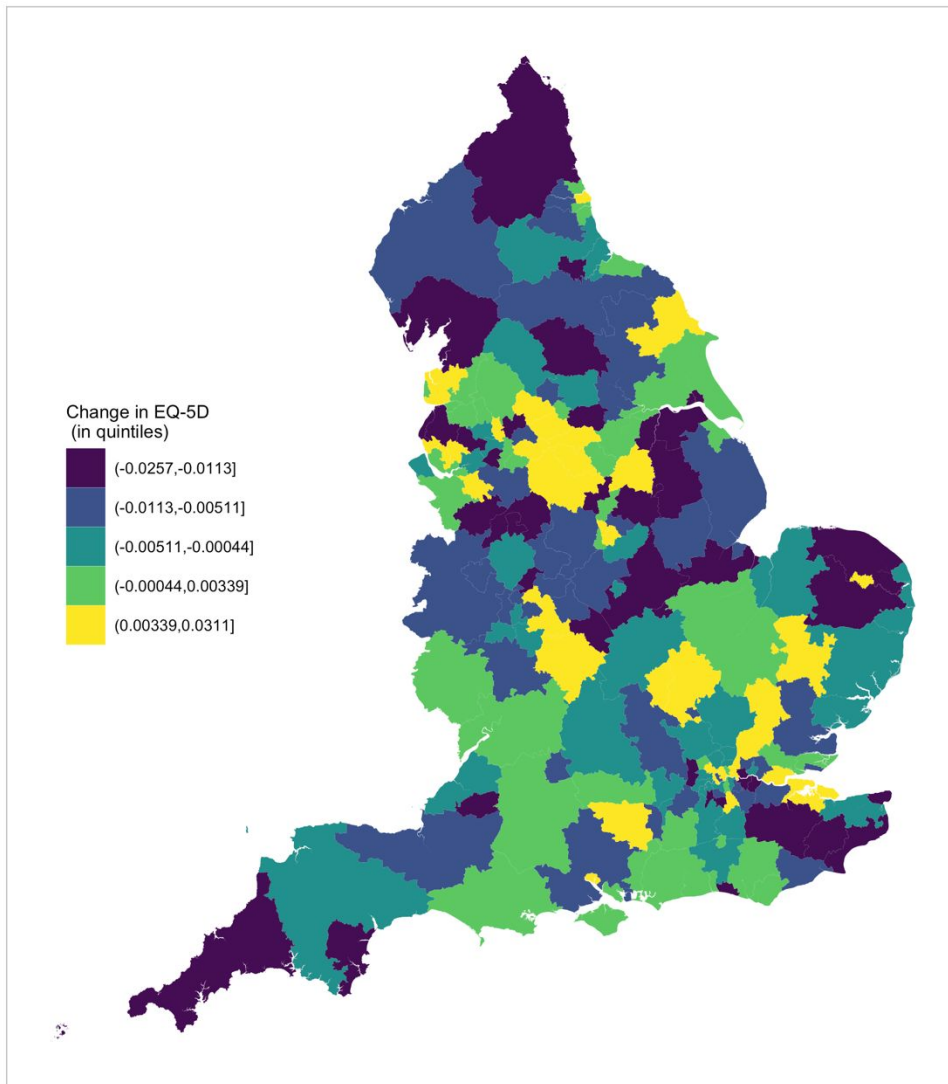
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Figure 3a. EQ-5D (with 95% confidence intervals) for males and females, by quintiles of deprivation, England, 2012 to 2017



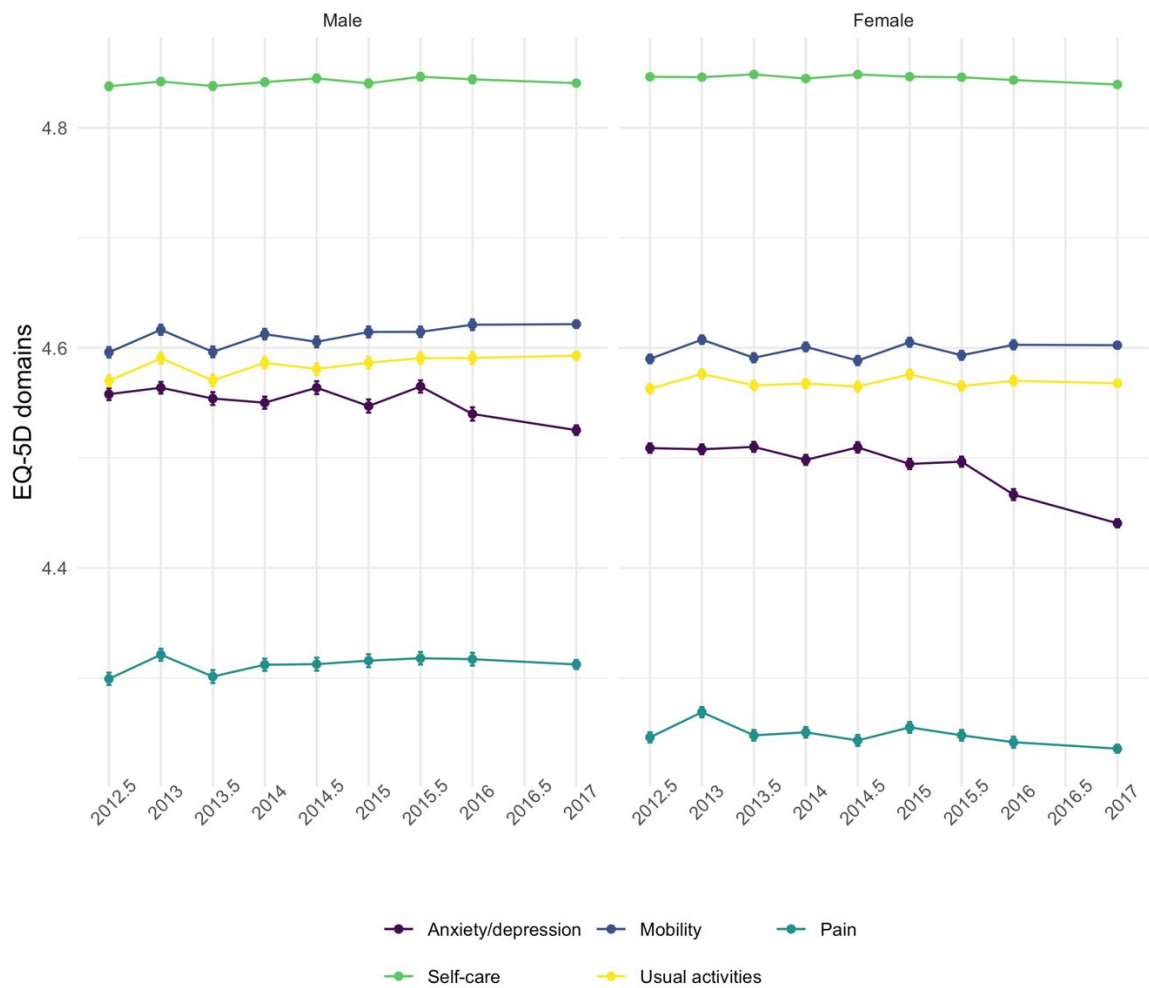
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Figure 3b. Change in EQ-5D across Clinical Commissioning Groups, by quintiles, England, 2012 to 2017



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Figure 4. EQ-5D domain responses (with 95% confidence intervals) for males and females, England, 2012 to 2017



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Table 1. Sample characteristics of GPPS respondents across England for each survey waves

	Jul-Sep 2012	Jan-Mar 2013	Jul-Sep 2013	Jan-Mar 2014	Jul-Sep 2014	Jan-Mar 2015	Jul-Sep 2015	Jan-Mar 2016	Jan-Mar 2017
Mean* (SD)									
<i>Demographic characteristics</i>									
% Female	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.50 (0.50)	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)
% Aged 18-24	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.29)	0.10 (0.30)	0.10 (0.30)	0.09 (0.29)
% Aged 25-34	0.18 (0.38)	0.18 (0.38)	0.18 (0.38)	0.18 (0.38)	0.17 (0.38)	0.17 (0.38)	0.18 (0.38)	0.18 (0.38)	0.17 (0.38)
% Aged 35-44	0.18 (0.39)	0.18 (0.38)	0.18 (0.38)	0.18 (0.38)	0.17 (0.38)	0.18 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
% Aged 45-54	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)	0.19 (0.39)
% Aged 55-64	0.15 (0.36)	0.15 (0.35)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)
% Aged 65-74	0.11 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.33)	0.12 (0.33)	0.12 (0.33)	0.12 (0.33)	0.13 (0.33)
% Aged 75-84	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)
% Aged 85+	0.02 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)
IMD 2015	22.00 (15.65)	21.58 (15.45)	21.62 (15.53)	21.64 (15.52)	21.64 (15.53)	21.64 (15.49)	21.62 (15.50)	21.69 (15.48)	21.70 (15.51)
<i>EuroQol 5D</i>									
Utility score #	0.821 (0.23)	0.825 (0.22)	0.821 (0.23)	0.822 (0.22)	0.822 (0.22)	0.823 (0.23)	0.823 (0.22)	0.820 (0.23)	0.818 (0.23)
Mobility	4.593 (0.85)	4.612 (0.83)	4.594 (0.85)	4.607 (0.84)	4.597 (0.84)	4.610 (0.83)	4.604 (0.84)	4.612 (0.83)	4.612 (0.83)
Self-care	4.842 (0.57)	4.844 (0.57)	4.843 (0.57)	4.843 (0.57)	4.847 (0.56)	4.843 (0.57)	4.846 (0.57)	4.844 (0.57)	4.840 (0.58)
Usual activities	4.566 (0.87)	4.583 (0.86)	4.568 (0.87)	4.577 (0.86)	4.573 (0.86)	4.581 (0.86)	4.578 (0.86)	4.580 (0.86)	4.580 (0.86)
Pain/Discomfort	4.272 (0.93)	4.295 (0.92)	4.274 (0.93)	4.281 (0.92)	4.277 (0.93)	4.285 (0.92)	4.283 (0.93)	4.279 (0.92)	4.274 (0.93)
Anxiety/Depression	4.533 (0.82)	4.535 (0.82)	4.532 (0.83)	4.524 (0.82)	4.536 (0.82)	4.520 (0.83)	4.530 (0.83)	4.503 (0.85)	4.482 (0.86)
N	425,734	442,215	400,629	409,923	381,628	390,748	378,241	376,764	732,434

*Weighted means. # Utility score of 1 indicates perfect health. SD = standard deviation

Accepted Manuscript – BJGP – BJGP.2020.0616