



WHAT IS CAUSING THE STALL IN LIFE EXPECTANCY?

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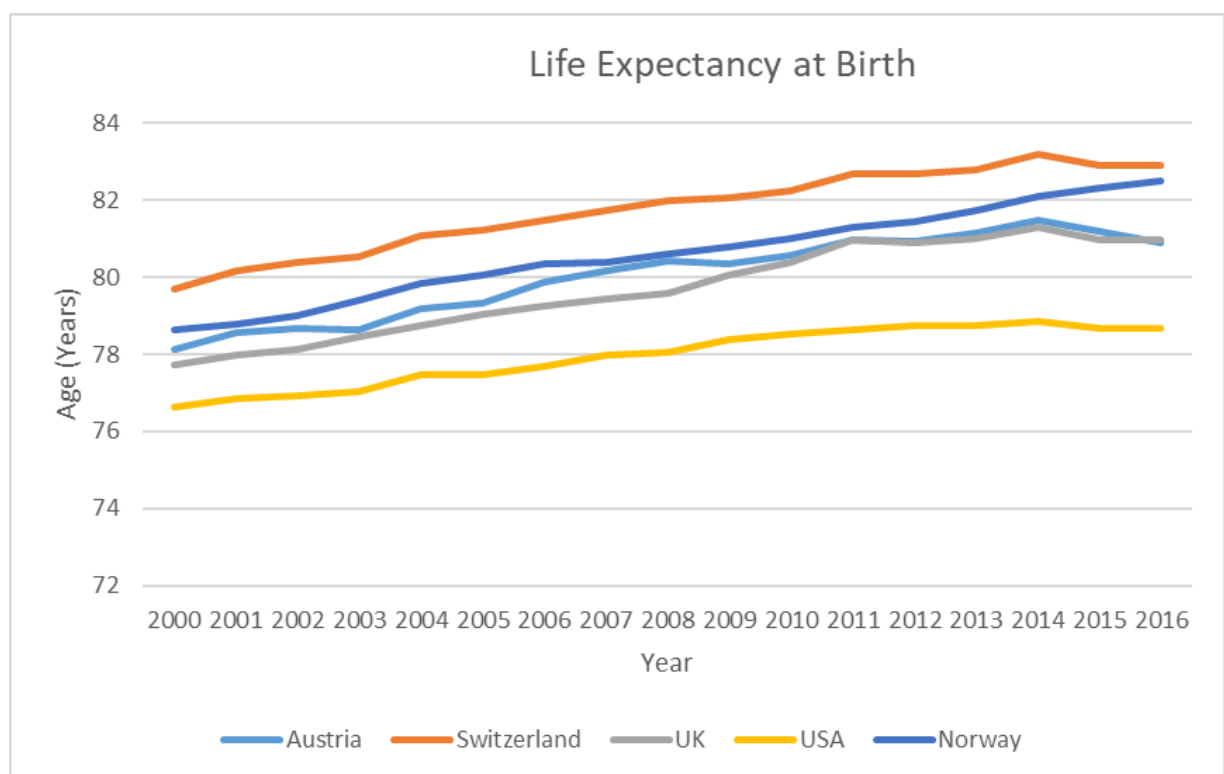
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ABSTRACT

Life expectancy has been steadily rising for the past century. Yet, recently a new trend has emerged; since around 2011, the increase in life expectancies of some countries have stalled or in some cases declined. (Demakakos, 2019). In the United Kingdom there has been an unexpected slowdown of the increase of life expectancy as the annual average increase has more than halved, with an improvement in life expectancy of 17 weeks between 2011-2006 compared to only 4 weeks between 2016-2011. (Marshall, 2019). Although many other countries share this stall in life expectancy it is far from universal; in Japan, Norway, and Italy the opposite trend has been identified, with increases in life expectancy continuing throughout this period. The driver of the stall in life expectancy, only recently accepted by National statistical agencies in the UK, is contested. This research will be investigating which countries experienced the stall in life expectancy and whether they share particular contextual characteristics that might plausibly have a causal role. The question to which this project will contribute towards is “What is the cause of the unexpected stall in life expectancy?”



Graph 1 – The life expectancy at birth from 2000 - 2016

In the graph above, it can be noticed that from 2014 onwards, there is a significant decline in the improvement in life expectancy from 2011 in all of the selected countries apart from Norway. These 5 countries were chosen for this line graph as they visually show that the stall in life expectancies occurred to varying degrees, or not at all, in different national contexts.

INTRODUCTION

What does a stall in life expectancy mean?

This is a concern as this trend has not been noticed before in a group of western countries without an obvious cause - such as the influenza epidemic of 1951 - which created a sudden decline of life expectancy (Dorling, 2017). A stall in life expectancy that has yet to be explained is a concern as it means that there is a larger and unexpected number of deaths each year. It is predicted that one million extra people will die before 2058 than previously thought as this stall has come as a surprise for all demographers (Dorling & Gietel-Basten, 2017). Furthermore, this trend is a concern for today's society as in the last few decades increased longevity and Laseletts of the 'third age' following retirement as a period of life involving fulfilment of ambitions. Such notions rest upon longer lives beyond an increasing retirement age and longer lives in good health which may not be the case particularly for the poorest in society.

What is causing the stall?

Many social scientists have tried to develop theories to explain this new trend although there is still a lot of debate on the main contributing factors. Marshall (2019) provides a review of competing theories). . An early theory trying to explain the stall in life expectancy is linked to influenza outbreaks as during these outbreaks, there tends to be a dramatic rise in the number of deaths. However, this was quickly disproved as there were no influenza outbreaks between 2009 and 2016 and during this time life expectancy in most countries in this study still decreased. Another theory tried to expand on this idea by linking the lowering of life expectancies to colder and harsher winters. This also has been disproven from being the main contributor of the stall in life expectancy as life expectancy has still decreased even during milder winters.

Some think that it is linked to the financial crisis of 2008 as the stalling of life expectancies starts to occur around that time. This could be linked to the fact that many different governments after the crisis had to impose harsher austerity policies to deal with financial difficulties. This meant that departments like social care and pension schemes got less funding than before which may have negatively impacted many vulnerable communities, including people aged over 65. This trend has carried on till today, where many departments are still underfunded and struggle to help those who need it.

In addition to this, many countries have an aging population which means that more people need additional social care and healthcare. This could explain the trend as many countries cannot afford to cover the total care for this since the budget cuts of 2008. Similarly, another reason for the stalling of life expectancy could be influenced by the rate of still births remaining constant after years of improving. (Dorling & Gietel-Basten, 2017) This could be due to cuts also targeting the NHS after the financial crisis and also due to the understaffing problem the NHS faces. Since the NHS have faced many cuts since 2008, this

could contribute to people living shorter lives as the NHS is unable to provide adequate care for the people who need it most with the staff and funding it currently receives.

Furthermore, the final theory is linked to the level of inequality in countries. In the United Kingdom, men who live in the most affluent areas are expected to live 9.1 years more and also expected to live 18.7 years with no illnesses compared to the poorest neighbourhoods. (Bennett, 2018) Such inequalities are pervasive across national contexts and one theory for the stall in life expectancy is linked to rising inequality which has been linked to poor health and other outcomes at societal levels (Wilkinson and Pickett ????, Bennett, 2018)

METHODOLOGY

Where was the data that was used found?

The Office for National Statistics provided the start of the data that began this research, as it already collected the increase of life expectancy in males aged 65 by weeks in the past twelve years split into two categories; 6 most recent years and 6 predeceasing years. In this original report Japan was listed as part of the 20 countries in its findings but was removed from this research as Japan's results are complicated by the tsunami of 2011 that killed nearly 16,000 people. In later stages, countries such as New Zealand, Iceland, Ireland, South Korea and Singapore were considered but there was not enough data available on the increase in life expectancy so this research was not further expanded and remains an avenue for future research.

How was the stall in life expectancy figured out?

As an extension of the ONS research, a variable quantifying stall in life expectancy was created. This value was calculated by dividing the increase in life expectancy in the most recent 6 years by the increase in the predeceasing 6 years. If the value of this new variable was lower than one, it shows us that a country's life expectancy has stalled. However, if the value was greater, it shows an overall increase in life expectancy for that country after 2011 compared to before.

Which variables were used?

Variables on National contextual factors were added to the dataset to compare with the stall and see if there were any underlying correlations. The variables were all sourced from the OECD, my world in data, and Gapminder and they helped to measure each country's following criteria: wealth by using GDP per capita (2018), the general population's health by using BMI (2014), percentage of population smoking (2016), and percentage of overall budget the government spent of healthcare (2010), inequality by using the gini-coefficient (2015), level of education by using percentage of population who completed tertiary education (2010), age by using percentage of population over 65 (2018), life expectancy for both infants (2010) and 65 year olds (2017) as well as infant mortality (2017) to see if any of these had a significant impact on the stall of life expectancy.

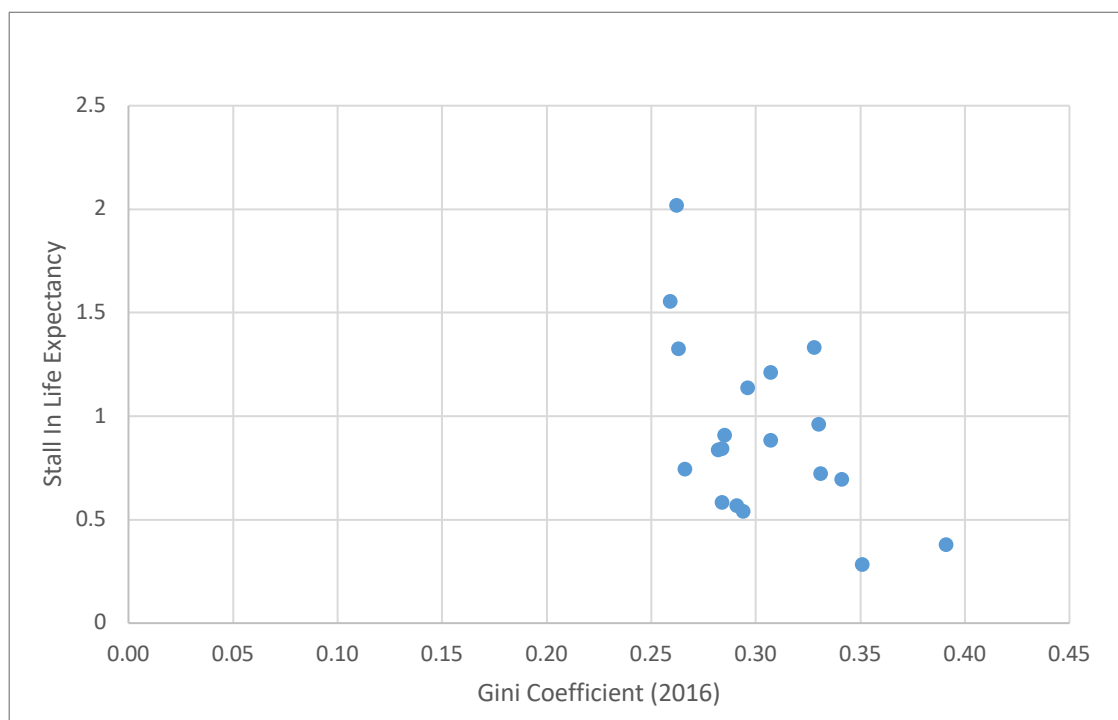
After the dataset was created in excel, it was moved to the software SPSS where it was analysed using a multiple linear regression and a correlation matrix to see if any correlation between life expectancy and these variables existed.

RESULTS AND ANALYSIS

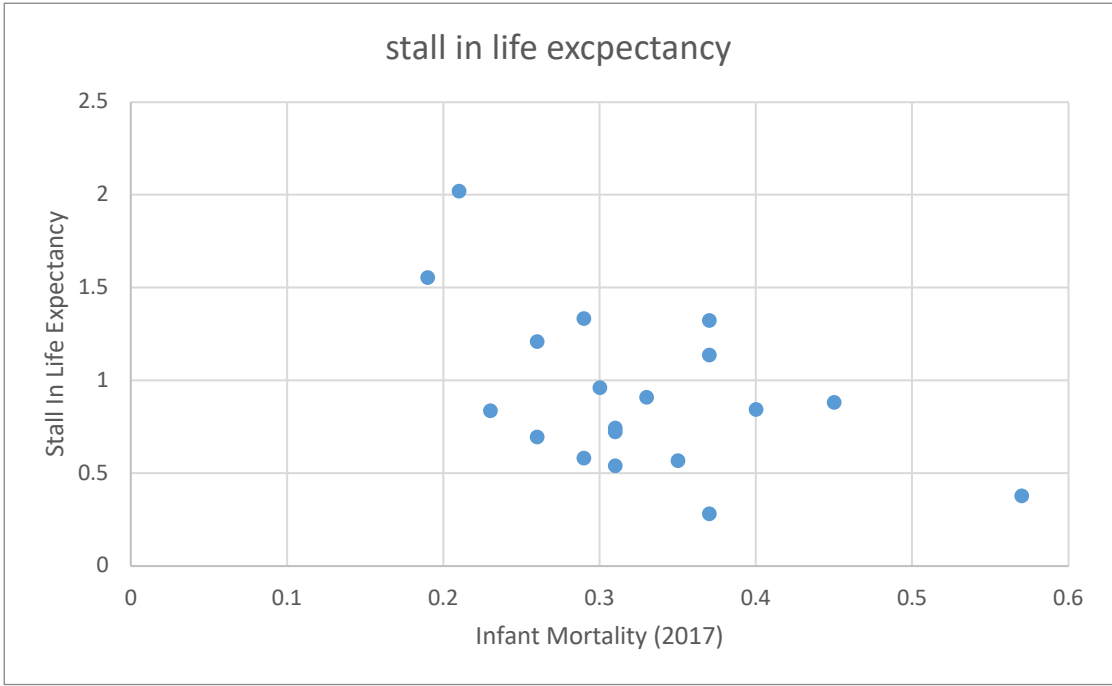
Scatter graphs

To begin the analysis, scatter graphs were produced on SPSS to see if there were any trends that obviously stood out and were visible. The gini-coefficient was the first variable noticed to have a strong correlation with the stall in life expectancy variable (Graph 1). It is measured on a scale from zero to one with zero meaning a country is totally equal and one meaning that the country is purely unequal. There is a visible downwards trend; the more unequal a country is, the bigger the stall in life expectancy.

Infant mortality - which measures how many infants die before the age of one – also stood out from other variables by having a strong correlation. The trend is that as infant mortality in a country increased, life expectancy had a greater stall in that country.

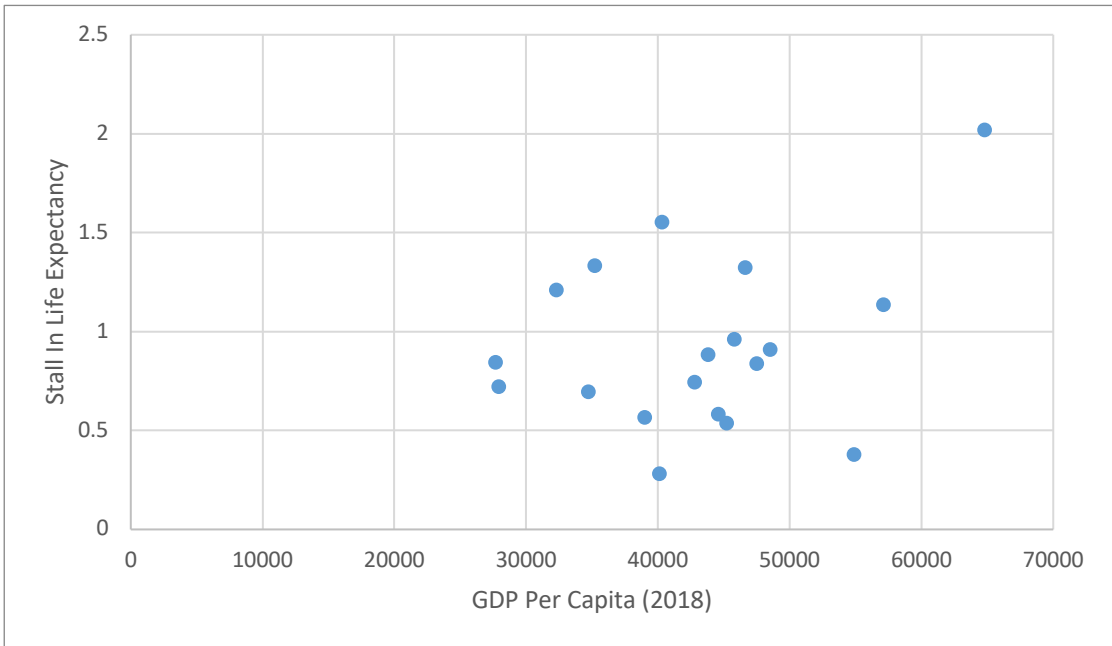


Graph 2 – Gini-coefficient against stall in life expectancy



Graph 3 – Infant Mortality against stall in life expectancy

There is a noticeable difference between the two graphs above and all of the other graphs comparing all of the other variables to life expectancy as everything else had no obvious correlation. An example of a graph without a trend can be seen when comparing GDP per capita to the stall in life expectancy.



Graph 4 – GDP per capita against stall in life expectancy

Multiple linear regression

Next, a multiple linear regression was carried out but surprisingly it did not produce any significant results. This was due to the fact that some of the many variables were connected to each other but more likely that the sample size of countries was not large enough to include all independent variables at once. A correlation matrix was run, however the results were not conclusive and showed that most of the variables were not strongly linked together.

Then, as expected, when a linear regression was carried out on each individual variable separately, the two variables that we expected stood out again by being significant; Infant mortality ($p=0.016$) and the gini-coefficient ($p=0.023$).

These two values also had a large r squared value. This represents the percentage that each variable can explain in the data on the overall stall in life expectancy. As is shown in the table below, these two factors alone explain over a quarter of the variability in the stall in life expectancy across the countries in the sample.

This table clearly displays all of the findings that this analysis has discovered in SPSS.

	GDP 2011	BMI 2014	Gini coeff	% of peopl	% people <	population	infant mort	infant life e	% money	life expect	% of smok
coefficient	1.32E-05	-0.175	-6.658	-0.018	0.018	-0.055	-2.511	0.026	-0.038	0.022	-0.02
p-value	0.222	0.23	0.016	0.328	0.723	0.991	0.023	0.685	0.361	0.826	0.211
r squared	0.086	0.084	0.296	0.056	0.008	0.001	0.269	0.01	0.049	0.003	0.09

Table 1 – Results from linear regressions

What theories can this dismiss?

These results are in many ways surprising; there was very little correlation between the percentage of government spending on healthcare and the stall in life expectancy and similarly the wealth of a country per capita is not associated with any stall in life expectancy. The timing of the stall in life expectancy suggests that recession and austerity may have a role but national variability in wealth and health spending are not in themselves important factors.

An alternative theory is that the stall in life expectancy is due to an aging population that societies cannot support in the context of austerity. Yet this research found no correlation between percentage of population over 65 and the stall in life expectancy undermining this theory suggesting that the stall in life expectancy has nothing to do with the (perceived) problem of ageing populations that most western countries have been recently facing.

Finally, these findings also add to the literature dismissing the theory that the stall was created by a natural limit to life expectancy for humans. The analysis reveals no clear relationship between life expectancy - at birth or at age 65 - and the stall in life expectancy. This shows us that we have not reached a levelling off to how long people can live for which is promising news as it could mean that the stall is reversible and if the causes of it are reversed, life expectancy would continue to steadily increase.

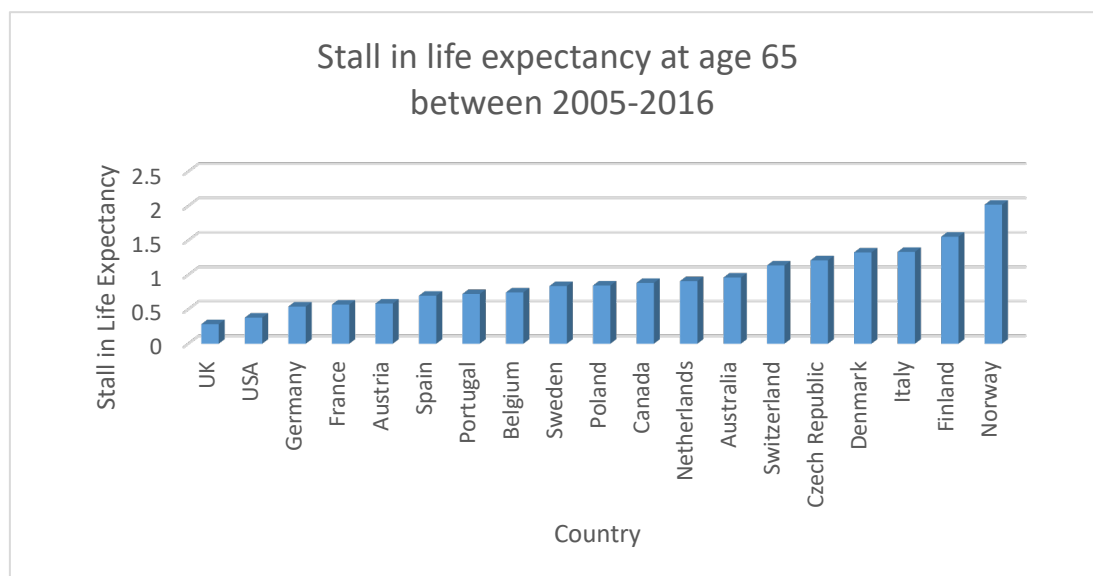
It also shows no link between people looking after their own health – by looking at the BMI and percentage of people smoking – and the stall in life expectancy. This makes it clear that there is no link between how healthy the society is in terms of these indicators of unhealthy lifestyle choice and the stall life expectancy stall.

What can we prove from these results?

On the other hand, the variables that were found to be significant can give an insight into the world today. It can be noted that equality in a country – or lack thereof - has a profound effect on the sudden stall of life expectancy. This is not good news as in most countries the gap between the poor and the richest is widening. This highlights the clear problem in our society as inequality is not a problem that can disappear by itself. It was thought heavily linked to the stall in life expectancies and now it has been found to be the leading cause.

The second variable that was of significance was infant mortality. This showed another worrying trend as infant mortality is on a rise in western countries. This is a shocking revelation as this is not expected or normally associated with western countries such as the United States of America and Canada which had the two highest infant mortality rates; 0.57 and 0.45 per 1000 infants.

In addition, this research has highlighted the countries affected by this recent stall in life expectancy. Western countries that have higher levels of infant mortality and inequality compared to similar countries are affected by this stall in life expectancy. From the 19 countries in this research the only countries not affected were Switzerland, Czech Republic, Denmark, Italy, Finland, and Norway as seen in the graph below.



Graph 5 – Stall in life expectancy across many countries

EVALUATION

If this project was to be continued and expanded, the inclusion of more countries – middle and lower income to be specific – would greatly help as it would further clarify what type of countries this sudden stall is affecting. This could maybe give further insight onto which categories of countries are affected by this stall. It maybe that only the countries with a set range of the gini-coefficient are affected by this and countries at either side – higher or lower - are not affected. It would also increase the sample size of this project, which would make the results more conclusive. Also adding more variables would let us look at any other possible explanations. A new idea could look into people’s lifestyles becoming more sedentary which could impact health in a way that was not included in this study.

In addition to this, it would be of great benefit to figure out what is causing infant mortality and a rise in inequality in the countries affected in order to better understand the stall in life expectancy and how to prevent it from happening in other countries or even reverse in the countries previously affected. This would allow governments from all across the world to prepare for this sudden change in our life expectancy.

APPENDIX

It should be also noted that for the countries of Denmark and Switzerland the gini coefficient for 2015 was used as the coefficient for 2016 was not available on the OCED website. Although this information is slightly older than the rest, it does not impact the results as the trends of those countries still reflect what we expected to see. All of the information used was the most recent statistics available on the internet.

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Dorling (2017, <https://chpi.org.uk/blog/why-didso-many-more-older-people-die-in-england-and-wales-in-2015/> - last accessed 01/08/19)

Dorling & Gietel-Basten (2017, www.theconversation.com/life-expectancy-in-britain-has-fallen-so-much-that-a-million-years-of-life-could-disappear-by-2058-why-88063 - last accessed 01/08/19)

Marshall (2019, Radstats_2019 “Longer Healthier Lives: Are we at the end of an era?”.pwp – last accessed 01/08/19)

Data used

<https://data.oecd.org/inequality/income-inequality.htm> - Gini-coefficient

<https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS> - % population over 65

<https://ourworldindata.org/search?q=bmi> - BMI

<https://ourworldindata.org/tertiary-education> - % of population completed tertiary education

<https://ourworldindata.org/search?q=population+growth> - population growth

<https://data.oecd.org/healthstat/life-expectancy-at-65.htm> - life expectancy at 65

<https://ourworldindata.org/grapher/infant-mortality?tab=chart&country=CAN+AUS+AUT+BEL+CZE+DNK+FIN+FRA+DEU+ITA+POL+PRT+ESP+CHE+SWE+USA+GBR+NLD+NOR> - infant mortality

<https://ourworldindata.org/grapher/differences-in-life-expectancy-are-more-regional-than-national> infant life expectancy

<https://www.gapminder.org/data/documentation/gd001/> - GDP

[https://www.gapminder.org/tools/#\\$state\\$time\\$value=2010&delay:188.1419354838712;&entities\\$filter\\$;&dim=geo;&marker\\$axis_x\\$domainMin:null&domainMax:null&zoomedMin=194&zoomedMax=96846;&axis_y\\$which=total health spending percent of gdp&domainMin:null&domainMax:null&zoomedMin:null&zoomedMax:null;&color\\$which=world_6region;;&ui\\$chart\\$trails:false;;&chart-type=bubbles](https://www.gapminder.org/tools/#$state$time$value=2010&delay:188.1419354838712;&entities$filter$;&dim=geo;&marker$axis_x$domainMin:null&domainMax:null&zoomedMin=194&zoomedMax=96846;&axis_y$which=total health spending percent of gdp&domainMin:null&domainMax:null&zoomedMin:null&zoomedMax:null;&color$which=world_6region;;&ui$chart$trails:false;;&chart-type=bubbles) - % of government budget spent on healthcare

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/articles/changingtrends inmortalityaninternationalcomparison/2000to2016#next-steps> - tall in life expectancy

<https://ourworldindata.org/smoking> - % of population that smoke

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