 FSHe3 Life expectancy

Outcomes

MG2H-1 uses mathematics and statistics to evaluate and construct arguments in a range of familiar and unfamiliar contexts

MG2H-2 analyses representations of data in order to make inferences, predictions and conclusions

MG2H-3 makes predictions about situations based on mathematical models, including those involving cubic, hyperbolic or exponential functions

MG2H-5 interprets the results of measurements and calculations and makes judgements about reasonableness, including the degree of accuracy of measurements and calculations and the conversion to appropriate units MG2H-7 answers questions requiring statistical processes, including the use of the normal distribution, and the correlation of bivariate data

MG2H-9 chooses and uses appropriate technology to locate and organise information from a range of contexts

MG2H-10 uses mathematical argument and reasoning to evaluate conclusions drawn from other sources, communicating a position clearly to others, and justifies a response

New South Wales Board of Studies (2012), Mathematics General Stage 6 Syllabus, pp13-14.

| Content | Teaching strategies and activities | Resources |
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| Interpret life expectancy data in various forms, including in tables and graphs | Students should begin this topic by developing an understanding of what is meant by life expectancy. They should be encouraged to make predictions about the variables that they think may affect life expectancy, both on a global and on a personal level. Teachers may wish to brainstorm a list for investigation during work on the Focus Study.  Life expectancy is calculated using population census data. The historical basis of life expectancy records should be discussed. In 1662, John Graunt published *Natural and Political Observations Made upon the Bills of Mortality.* The work was based on the publication of the number of people dying each week in big cities, with the data categorised in terms of the cause of death. Discussion should include the validation of Graunt’s data-gathering method and Graunt’s method in comparison to current data‑collection methods.  Life expectancy data can be displayed in various forms, e.g. colour-coded maps of the world indicating life expectancy for individual countries, scatterplots of life expectancy against year of birth or country of birth, and line graphs of life expectancy against infant birth rate for various countries.  Historical events may include medical advancements (e.g. the development of vaccines), periods of conflict, and technological advancements. Graphs of Australian male life expectancy since 1891 reflect an increase in deaths from road accidents in the 1950s and 1960s.  It should be noted that not all relationships regarding life expectancy will be linear, e.g. graphs of gross domestic product (GDP) against life expectancy are non-linear. | Scroll down to “World maps of median age” to get a great interactive map that spans 60 years. Great visual on improving life expectancy across the globe. Also has many other forms of data displayed in graphical form.  <http://ourworldindata.org/data/population-growth-vital-statistics/life-expectancy/> |
| Plot life expectancy data for a range of variables (e.g. country of birth and country’s population, gross domestic product (GDP), birth rate, infant mortality rate, spending on health care, percentage of urbanisation, etc.), using the most appropriate form of display |  |  |
| Investigate trends, or points of significance, for specific countries over time, including any specific historical events such as medical advancements | The first graph on this link will allow for a lot of discussion around various countries and their trends both up and down in life expectancy. There is a large list to choose from.  Students use online life expectancy calculators to identify variables associated with life expectancy. | <http://ourworldindata.org/data/population-growth-vital-statistics/life-expectancy/> |
| Interpolate from plotted data to make predictions where appropriate | Students use spreadsheets to create graphs displaying life expectancy data. |  |
| Interpret published graphs and statistics, including critically evaluating data collection methods, e.g. bias in data that may be included or omitted | Investigate if you can locate the source of data in the given links.  If the source exists discuss whether the data can be trusted.  Discuss: if the source is not given, can the data be trusted at all? | <http://ourworldindata.org/data/population-growth-vital-statistics/life-expectancy/>  <http://data.worldbank.org/indicator/SP.DYN.LE00.IN/countries/RW?display=graph>  <http://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends/en/> |
| Construct scatterplots of life expectancy for a range of variables, e.g. year of birth, gender, health status, etc.  Create scatterplots for sets of variables to identify strong predictors of life expectancy, and calculate correlation coefficients | Students explore providing a mathematical justification for the insurance premiums of women being lower than those of men because, in general, they live longer than men. |  |
| Plot life expectancy for different variables using online life expectancy calculators to make assessments about how variables are weighted, e.g. What effect does smoking have on a person’s life expectancy? | Analysts have made predictions that life expectancy in some Western countries may decline over the next few decades with increases in the incidence of weight-related diseases. Students could model the effect that such increases may have on future life expectancies. | Quick online quiz to get a rapid snapshot. Requires students with access to their email also.  <http://gosset.wharton.upenn.edu/mortality/perl/CalcForm.html>  In-depth calculator. Requires an extended period of time to complete (most of the lesson, with a lot of medical information they may not know)  <https://www.livingto100.com/> |

Australian Institute of Health and Welfare data can be accessed on the internet.