**Life Expectancy Trend over Time**

(top of page)

Life Expectancy is a statistical measure of the average amount of time a person will live given the year of birth. Vaccination prevents illness and death and thus should also affect the length of life. Improved vaccination should improve life expectancy.

**Infant Mortality Trend over Time**

(top of page)

The infant mortality rate is number of deaths of children under the age of one per 1000 live births. It is considered to be an important measure of the health and wellbeing. Several diseases preventable by vaccination are included in the top 10 causes of infant death. Improved vaccination should improve the infant mortality rate.

**Life Expectancy Regression Analysis**

(top of page)

Improved vaccination coverage of a country should improve (increase) its life expectancy of a country.

*Regression Fit*

(Above reg fit chart)

This regression analysis seeks to define the relationship between the vaccination coverage life expectancy. To conduct this analysis on the country and vaccine level, the assumption was made that the relationship between the percent of vaccination coverage with life expectancy is static over time. That means that the ability of a vaccine to keep a person alive does not change based on what year it was given. While there are many other factors that affect an individual’s health and wellbeing, a given vaccine will always consistently protect that individual from the same ailment. Unless the formulation of a vaccine changes, its ability to protect against that ailment does not change over time.

(below reg fit chart)

Certain assumptions are made to conduct this linear regression analysis. 1. Linearity, 2. Independence, 3. Normality, 4. Equal Variance (Homoscedasticity). Linearity can be visually seen in the regression fit plot. R squared is a measure of the strength of the correlation between the response and predictor variable. Normality can be visually confirmed by a normal QQ plot. Homoscedasticity can be visually checked by a residual plot.

*Normal QQ Plot*

(below QQ plot)

The normal assumption is confirmed by plotting theoretical normal quantiles to observed quantiles compared to the fit of a normal distribution. While tails at the extremities is common, the majority of the data should align closely with the fit of the normal distribution.

*Residual Plot*

(Below resid plot)

The assumption of equal variance is check by plotting residuals (observed value – predicted value) versus the values predicted by the regression. In the case of homoscedasticity (equal variance), the residuals should be randomly distributed in the chart. In the case of heteroscedasticity (unequal variance), a shape might be present in the residual plot.

**Infant Mortality Regression Analysis**

(top of page)

Improved vaccination coverage of a country should improve (decrease) its infant mortality rate.

*Regression Fit*

(Above reg fit chart)

This regression analysis seeks to define the relationship between the vaccination coverage and infant mortality. To conduct this analysis on the country and vaccine level, the assumption was made that the relationship between the percent of vaccination coverage with the infant mortality rate is static over time. That means that the ability of a vaccine ability to prevent infant death does not change based on what year it was given. While there are many other factors that affect an infant’s health and wellbeing, a given vaccine will always consistently protect that infant from the same ailment. Unless the formulation of a vaccine changes, its ability to protect against that ailment does not change over time.

(below reg fit chart)

Certain assumptions are made to conduct this linear regression analysis. 1. Linearity, 2. Independence, 3. Normality, 4. Equal Variance (Homoscedasticity). Linearity can be visually seen in the regression fit plot. R squared is a measure of the strength of the correlation between the response and predictor variable. Normality can be visually confirmed by a normal QQ plot. Homoscedasticity can be visually checked by a residual plot.

*Normal QQ Plot*

(below QQ plot)

The normal assumption is confirmed by plotting theoretical normal quantiles to observed quantiles compared to the fit of a normal distribution. While tails at the extremities is common, the majority of the data should align closely with the fit of the normal distribution.

*Residual Plot*

(Below resid plot)

The assumption of equal variance is check by plotting residuals (observed value – predicted value) versus the values predicted by the regression. In the case of homoscedasticity (equal variance), the residuals should be randomly distributed in the chart. In the case of heteroscedasticity (unequal variance), a shape