

# STA108\_TermProjectEdits

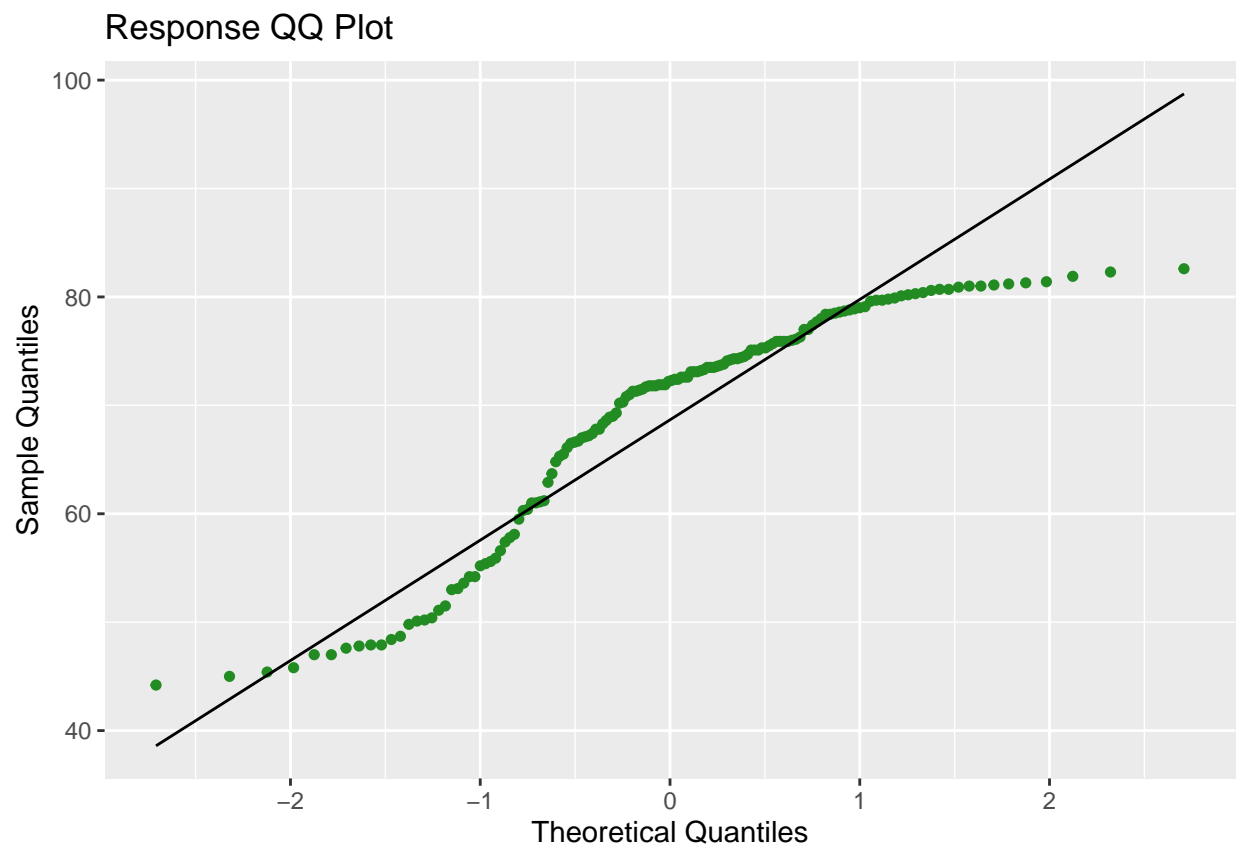
Gabriel Jones

2023-11-23

```
## Warning: package 'leaps' was built under R version 4.3.2
```

## Single Linear Regression Models & Analysis

### Life Expectancy Analysis

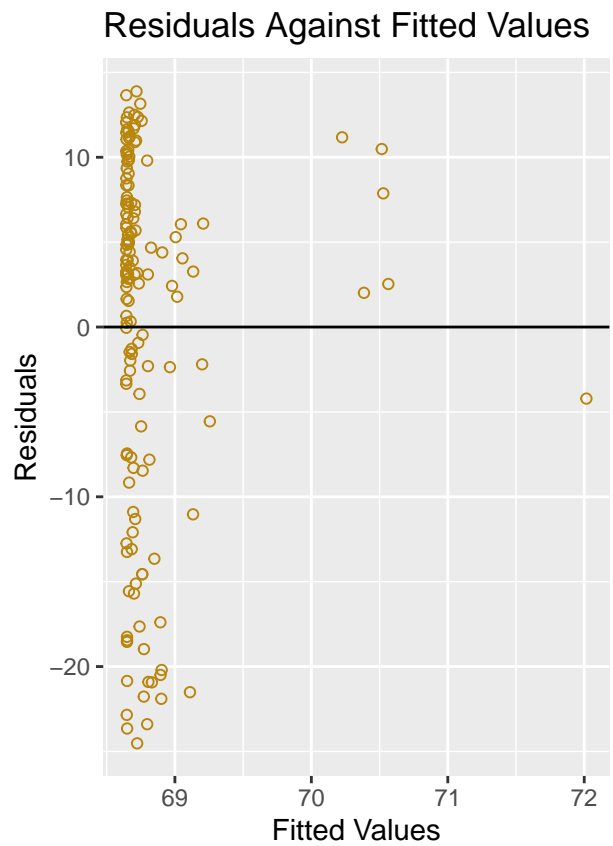
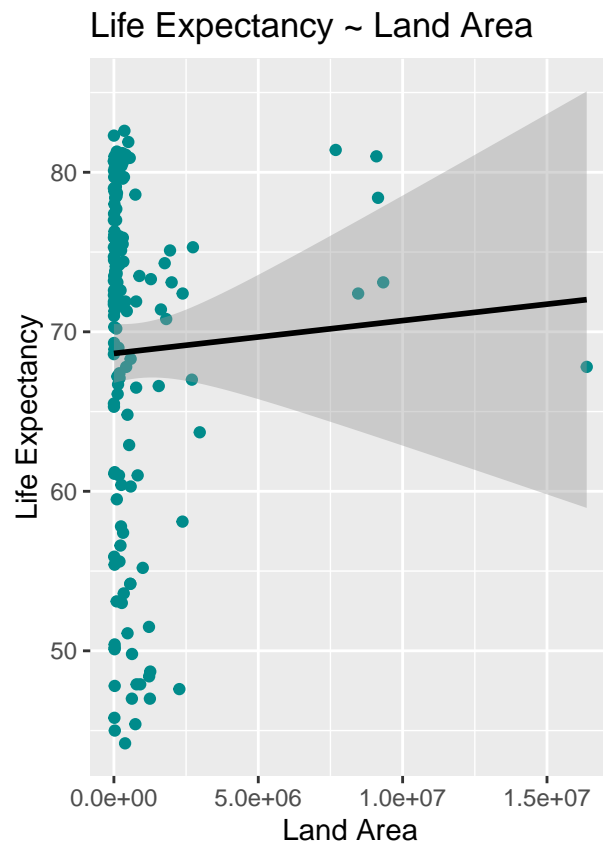


### Life Expectancy ~ Land Area

Table 1: Life Expectancy ~ Land Area

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	68.6437149	0.9344772	73.4568137	0.0000000
Land Area	0.0000002	0.0000004	0.4899179	0.6249274

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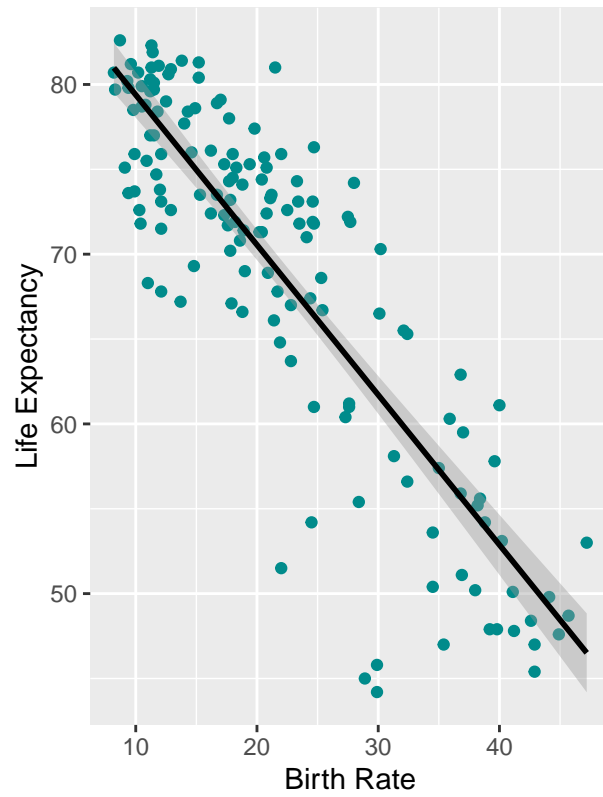
Life Expectancy ~ Birth Rate

Table 2: Life Expectancy ~ Birth Rate

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	88.2252805	1.0469920	84.26548	0
Birth Rate	-0.8837966	0.0431595	-20.47747	0

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Life Expectancy ~ Birth Rate



Residuals Against Fitted Values



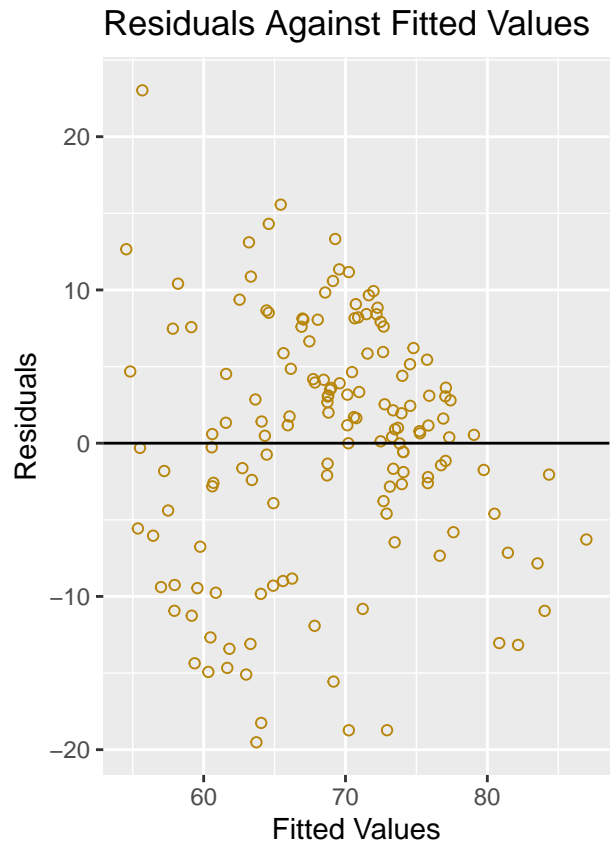
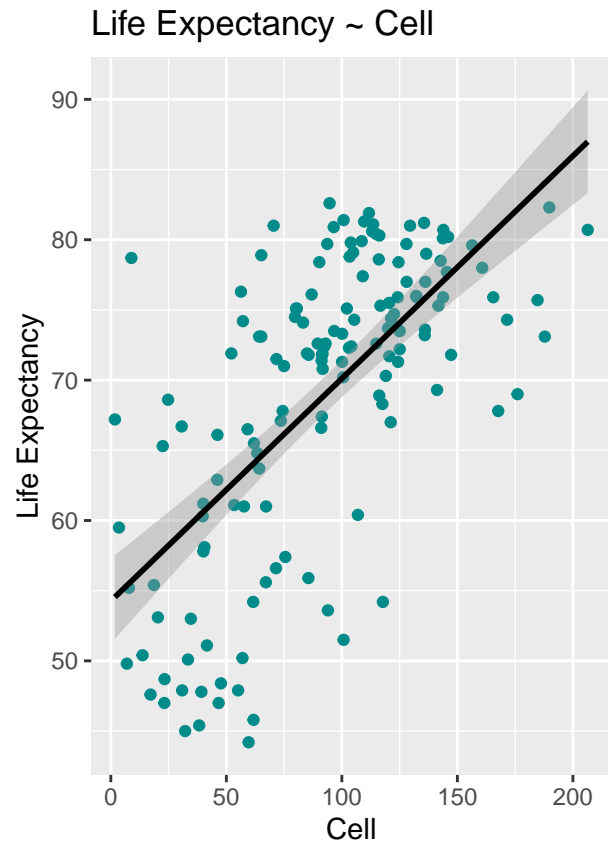


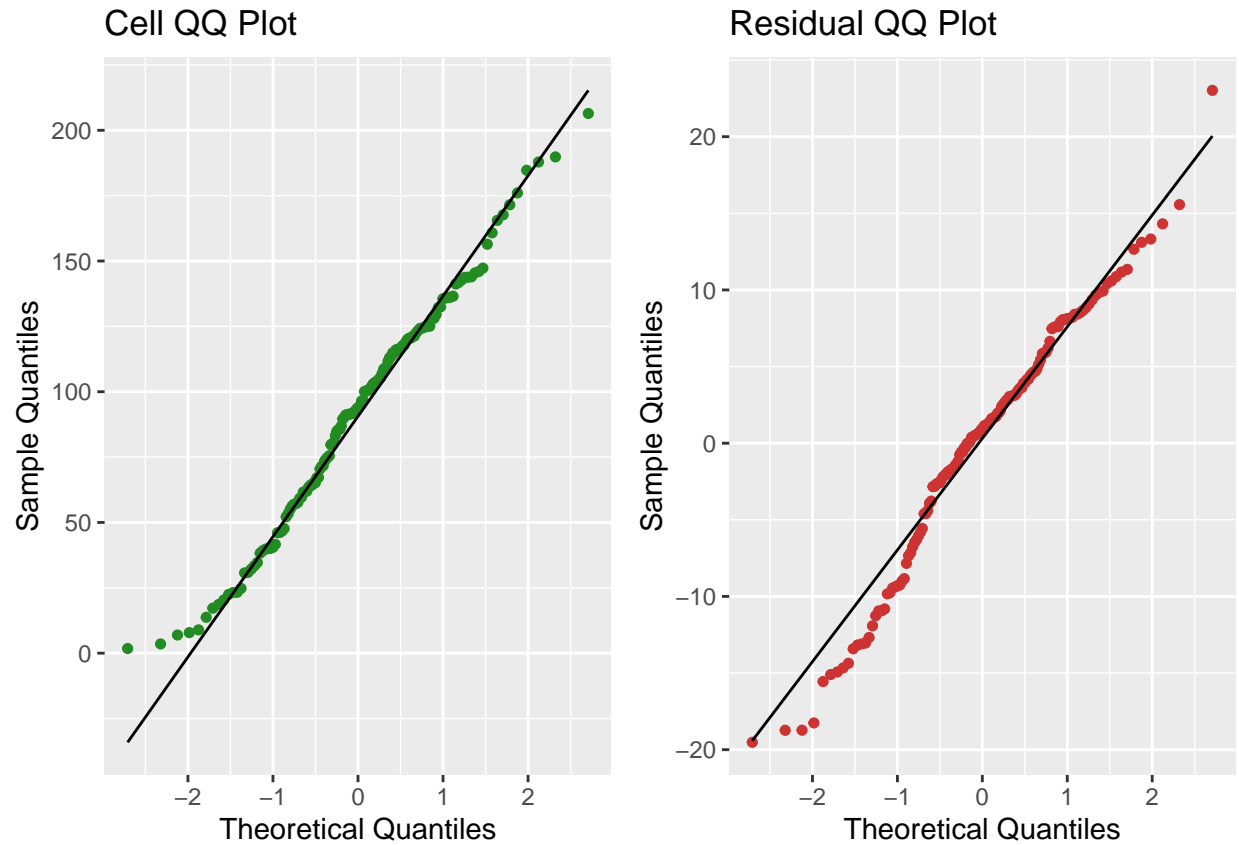
Life Expectancy ~ Cell

Table 3: Life Expectancy ~ Cell

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	54.262300	1.5330388	35.39526	0
Cell	0.158516	0.0150848	10.50833	0

```
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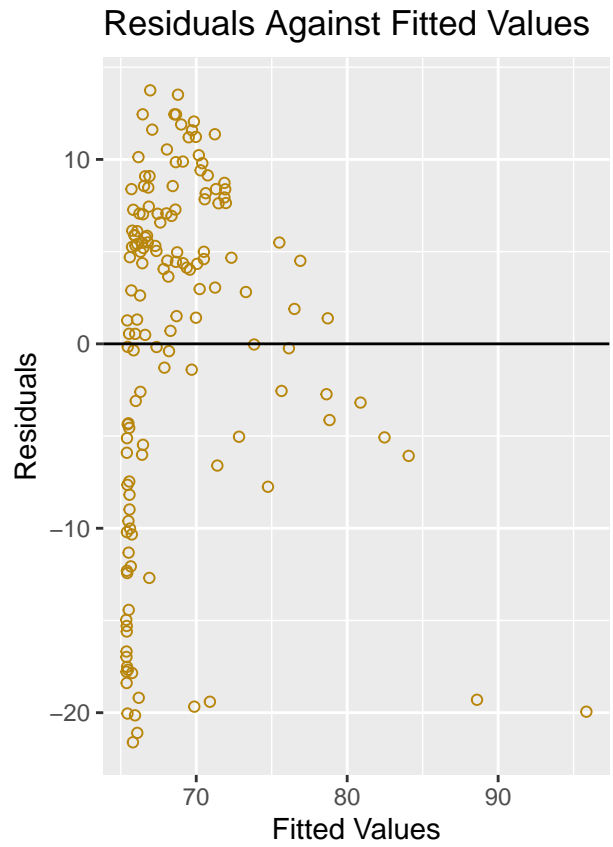
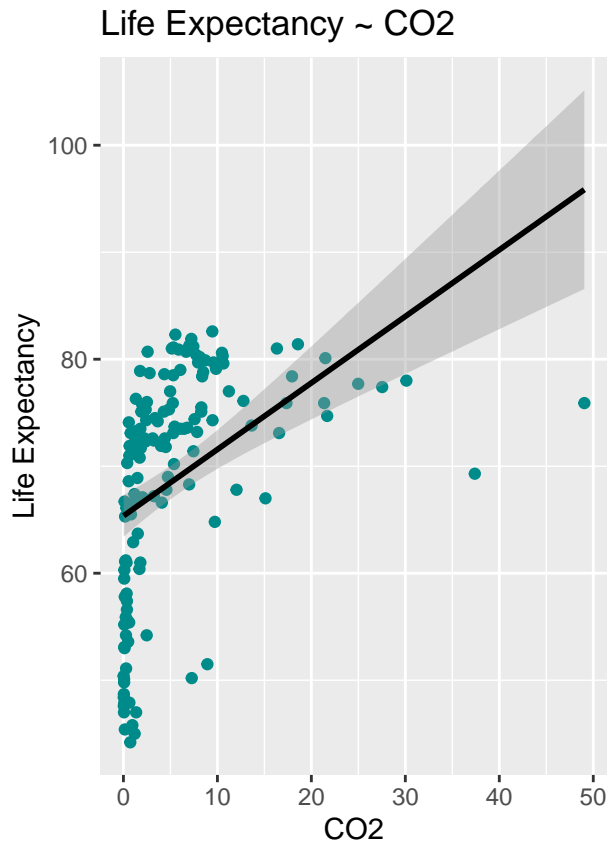


Life Expectancy ~ CO2

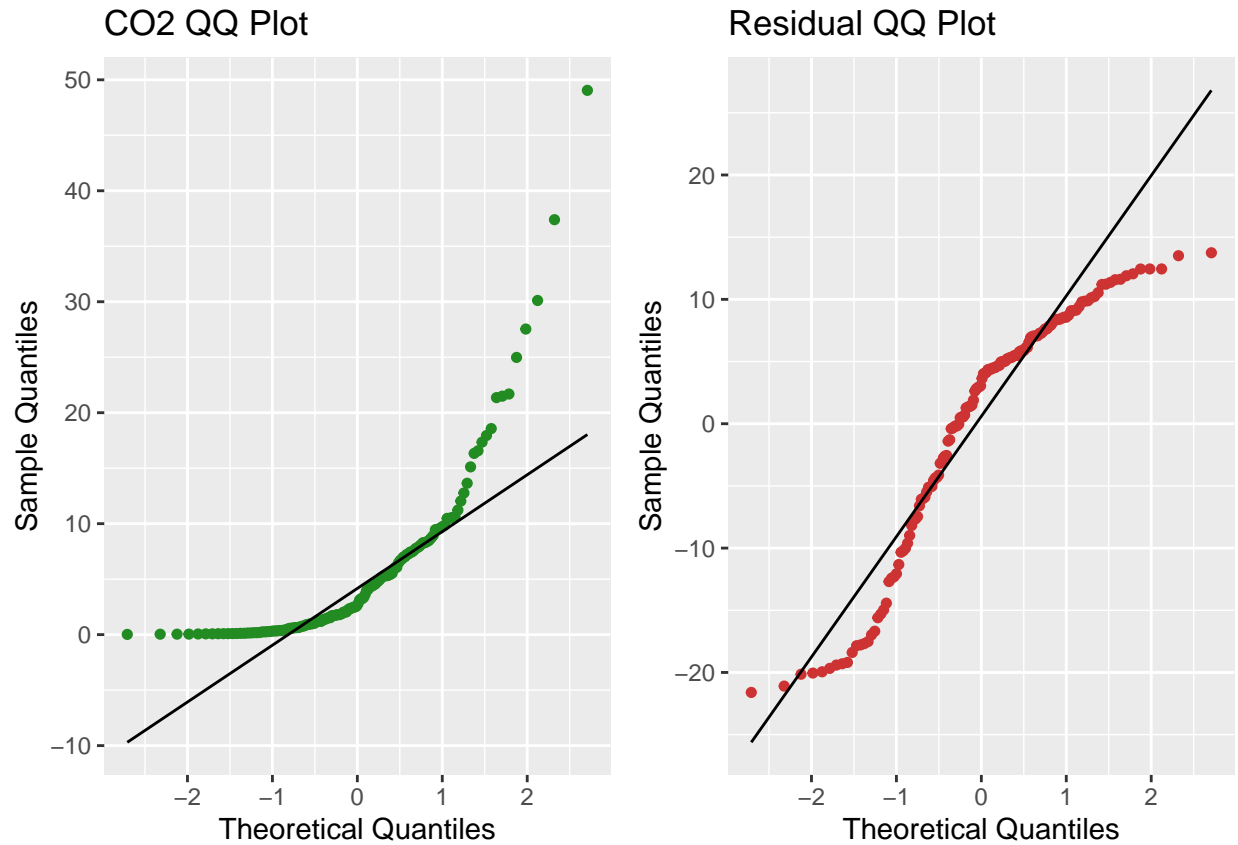
Table 4: Life Expectancy ~ CO2

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	65.3529718	0.9840266	66.413824	0
CO2	0.6216755	0.1064559	5.839747	0

```
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## 'geom_smooth()' using formula = 'y ~ x'
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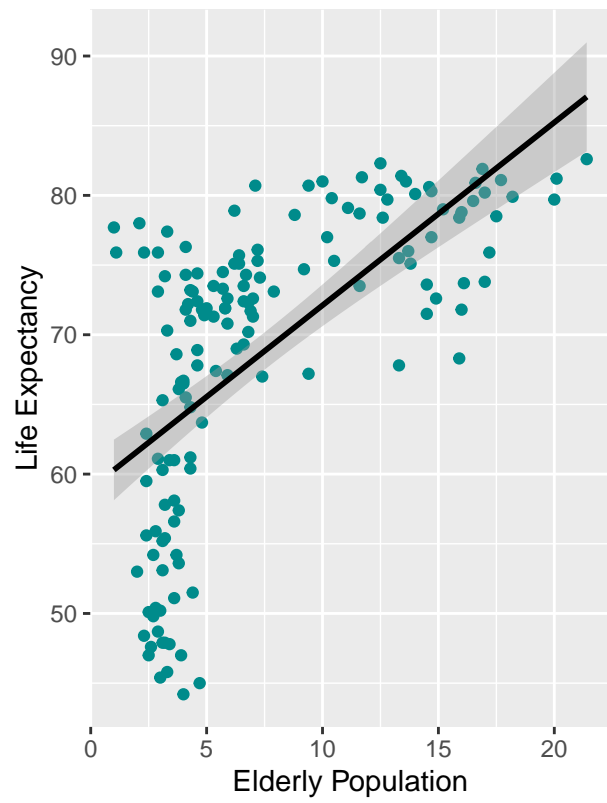
### Life Expectancy ~ Elderly Population

Table 5: Life Expectancy ~ Elderly Population

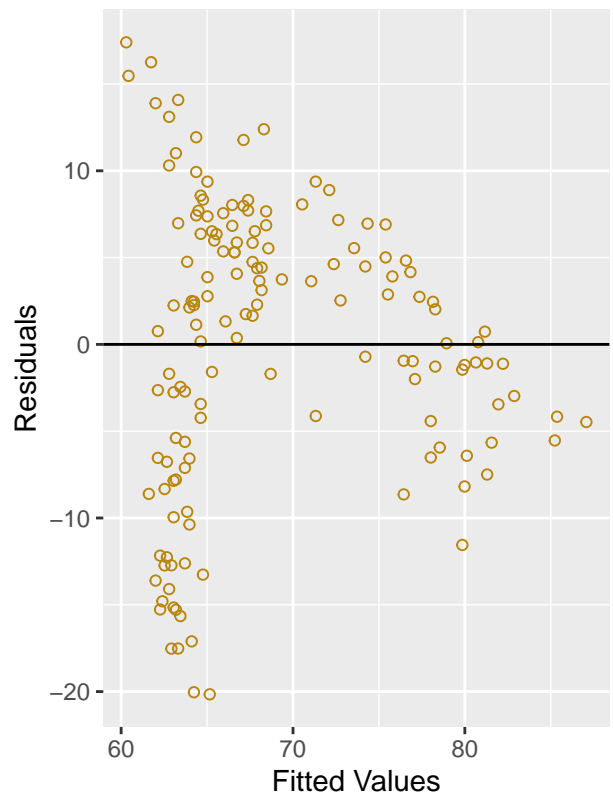
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	58.987283	1.2078486	48.836652	0
Elderly Population	1.312309	0.1336064	9.822199	0

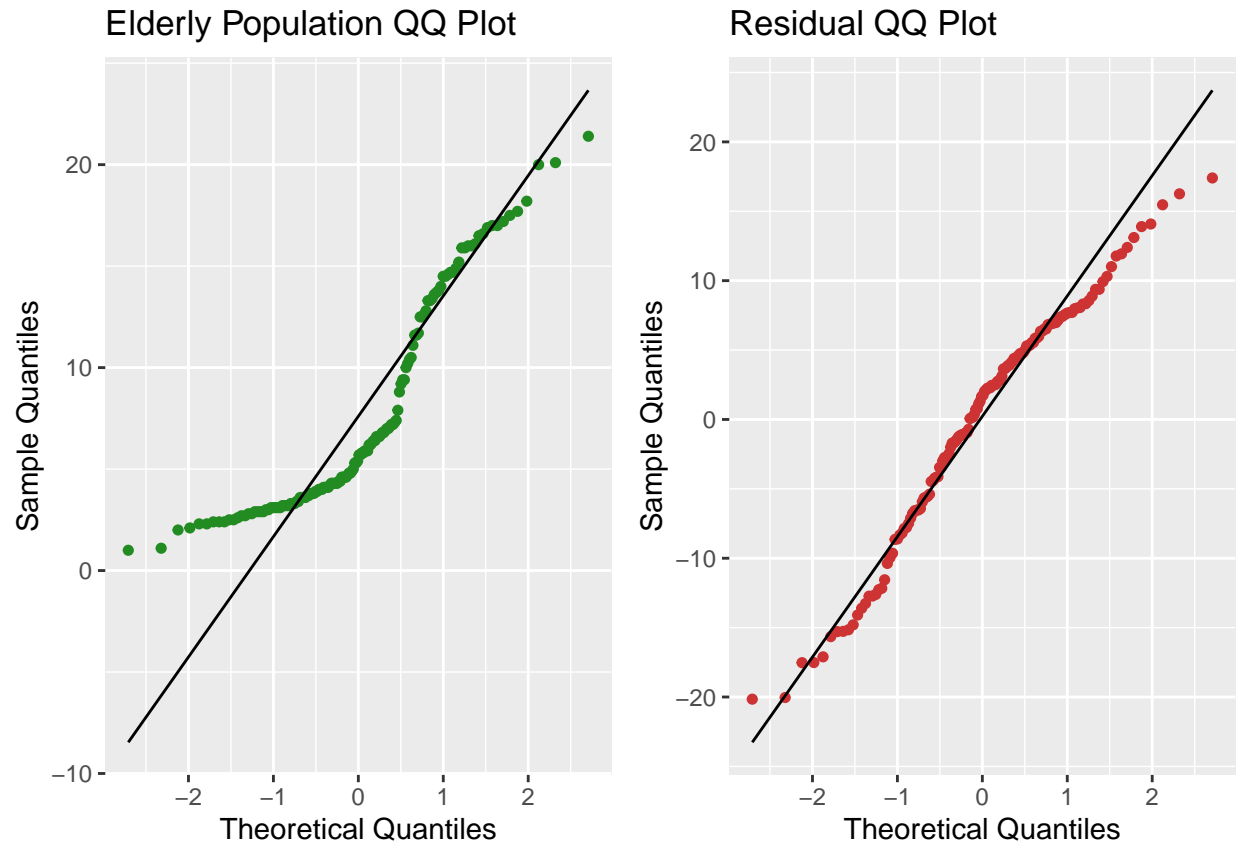
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Life Expectancy ~ Elderly Populatio



Residuals Against Fitted Values





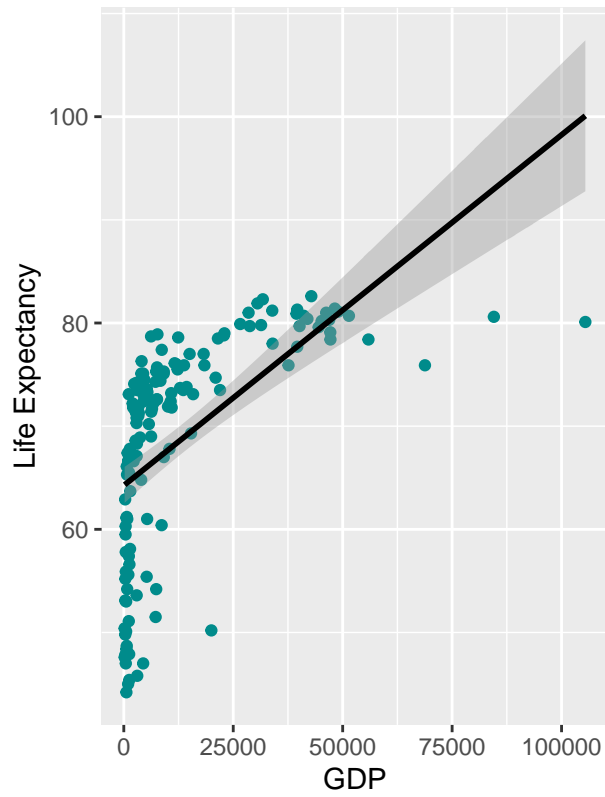
**Life Expectancy ~ GDP**

Table 6: Life Expectancy ~ GDP

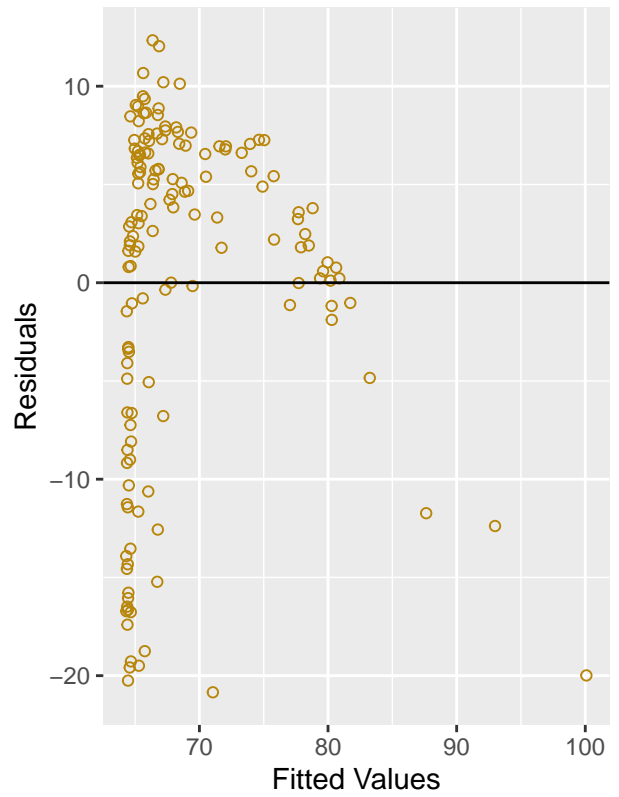
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	64.2487516	0.8867131	72.457200	0
GDP	0.0003399	0.0000395	8.610075	0

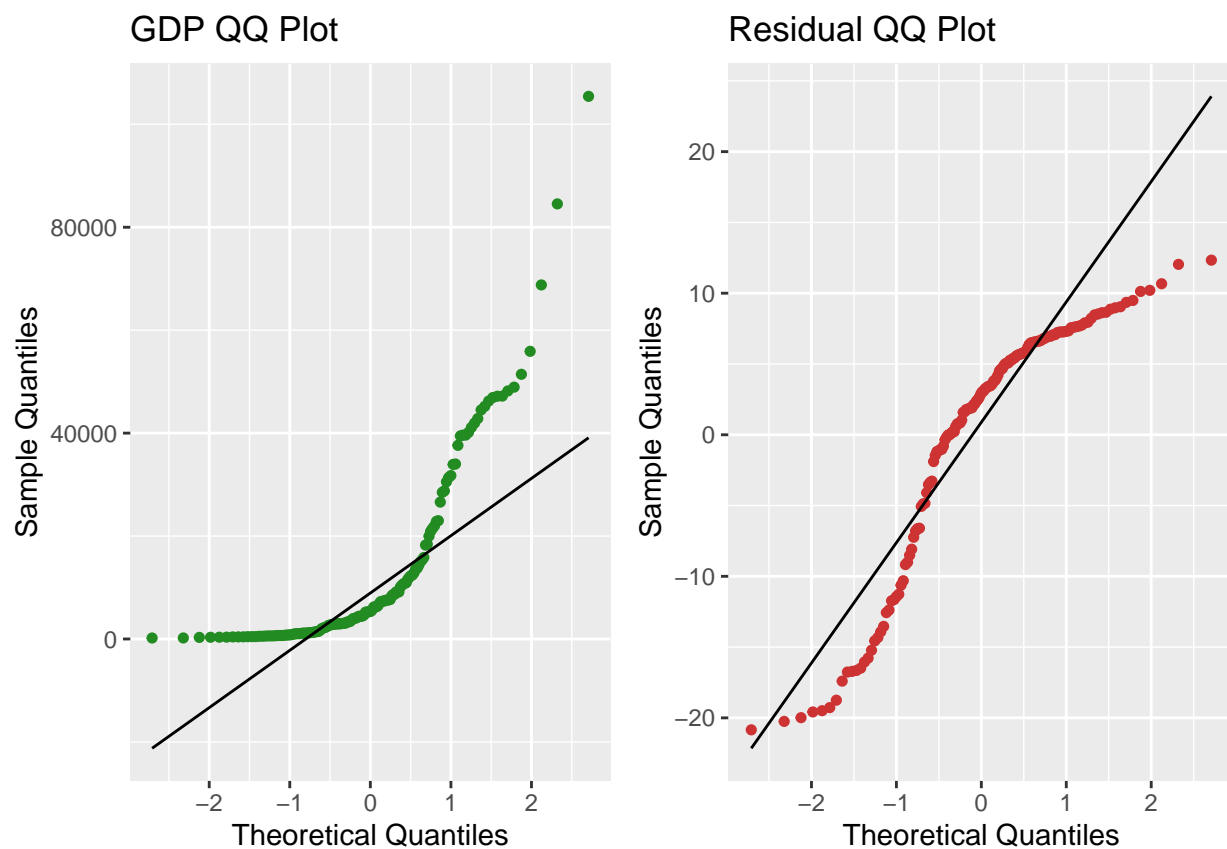
```
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## 'geom_smooth()' using formula = 'y ~ x'
```

Life Expectancy ~ GDP



Residuals Against Fitted Values





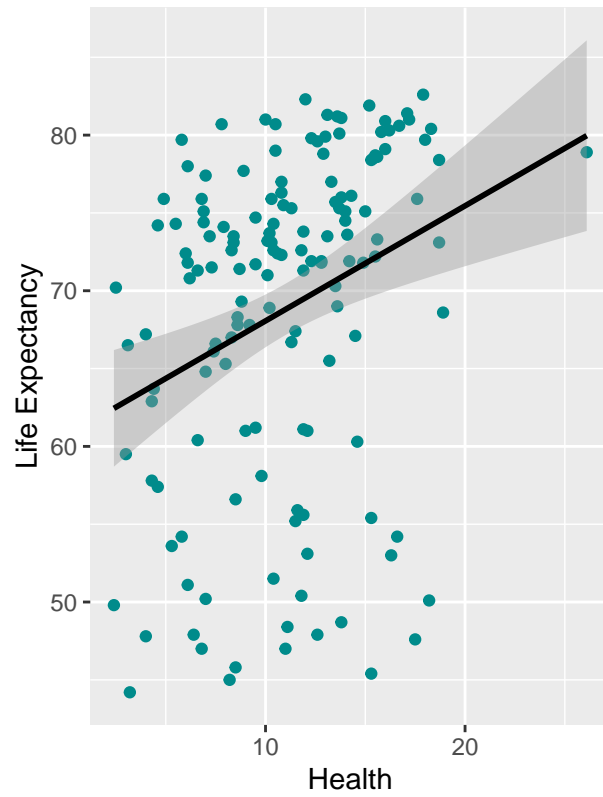
Life Expectancy ~ Health

Table 7: Life Expectancy ~ Health

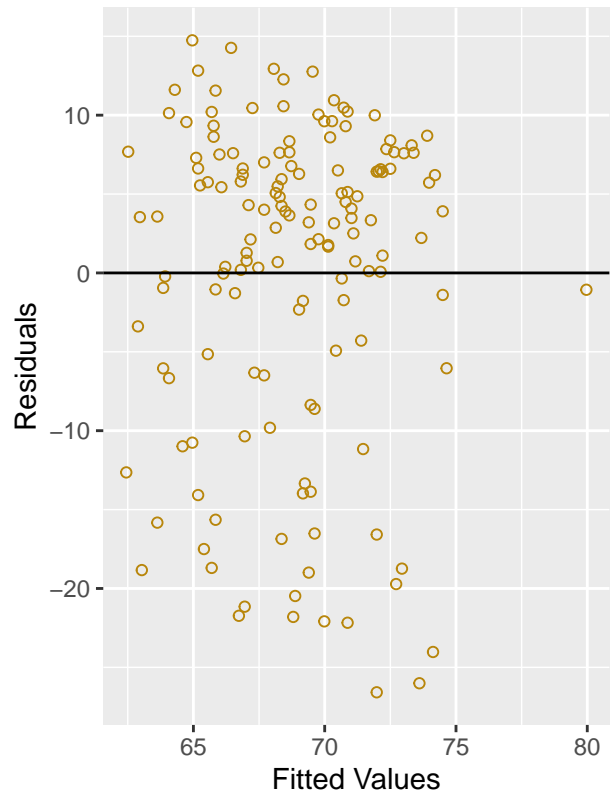
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	60.6696446	2.3307451	26.030150	0.0000000
Health	0.7392994	0.1977105	3.739303	0.0002644

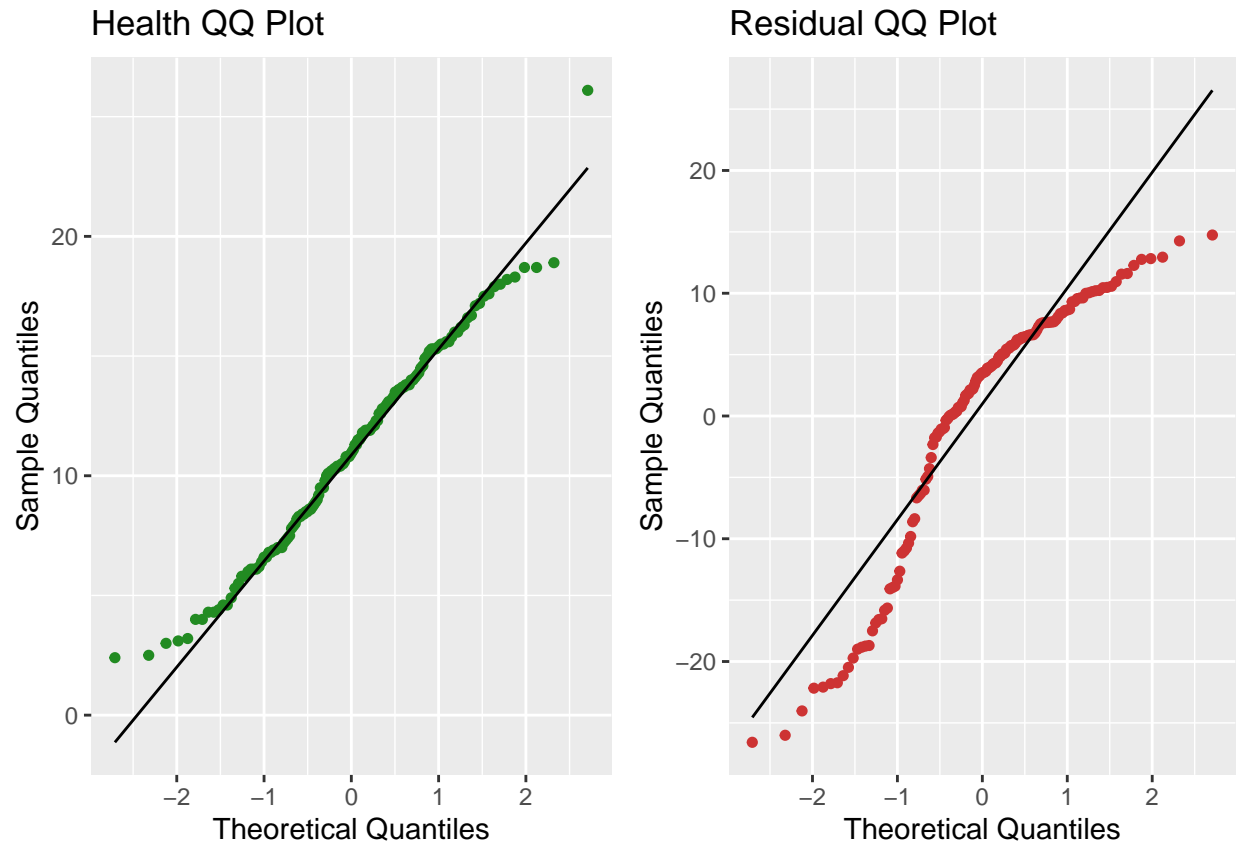
```
## Saving 6.5 x 4.5 in image
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## Saving 6.5 x 4.5 in image
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## Saving 6.5 x 4.5 in image
## 'geom_smooth()' using formula = 'y ~ x'
```

Life Expectancy ~ Health



Residuals Against Fitted Values



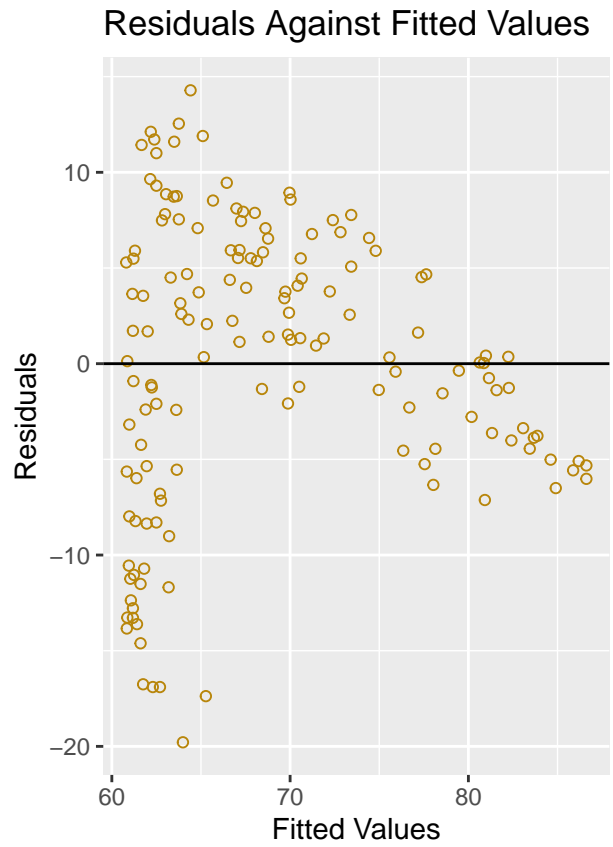
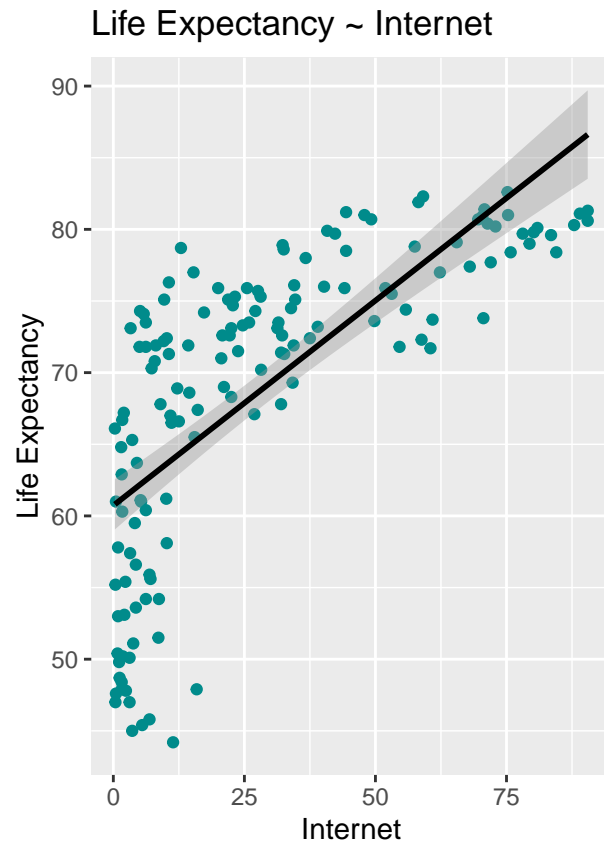


Life Expectancy ~ Internet

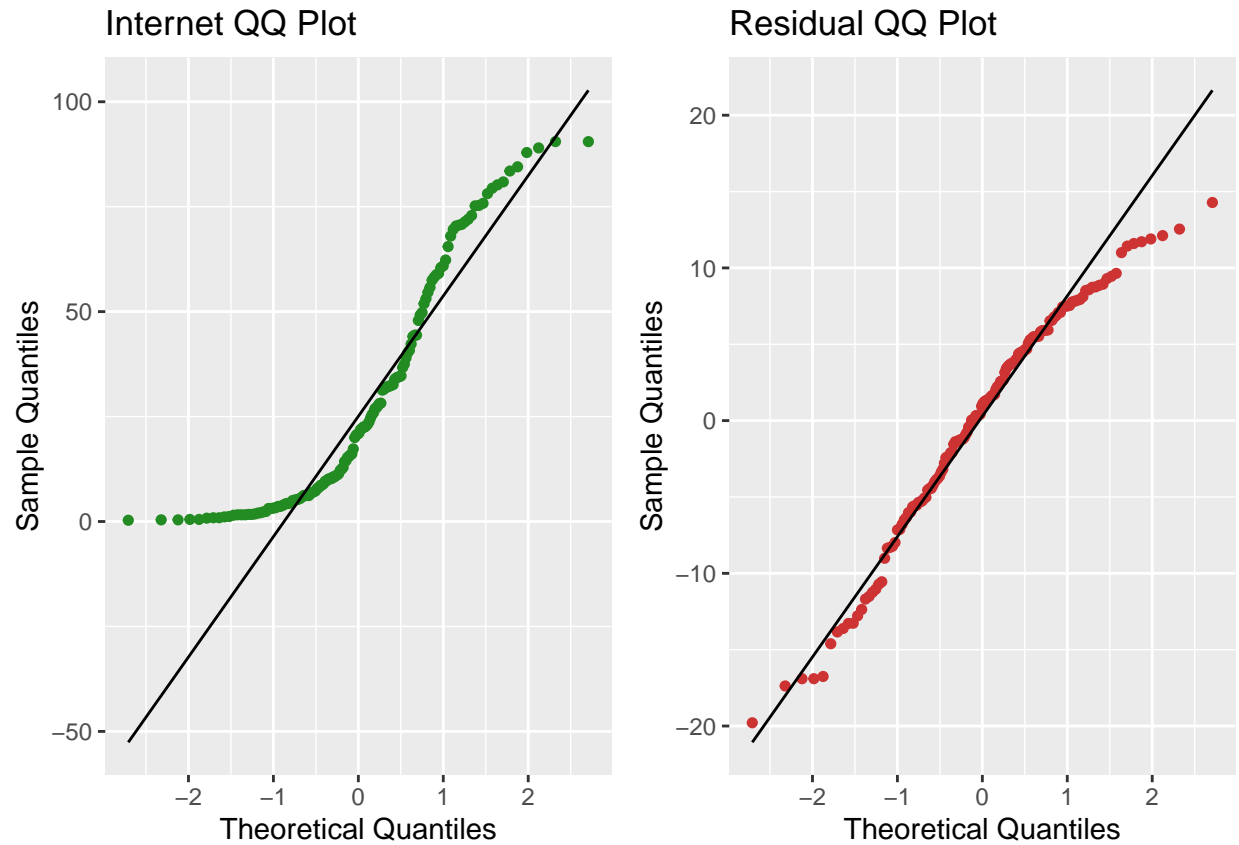
Table 8: Life Expectancy ~ Internet

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	60.725099	0.8927376	68.02122	0
Internet	0.286114	0.0230849	12.39400	0

```
## Saving 6.5 x 4.5 in image
## 'geom_smooth()' using formula = 'y ~ x'
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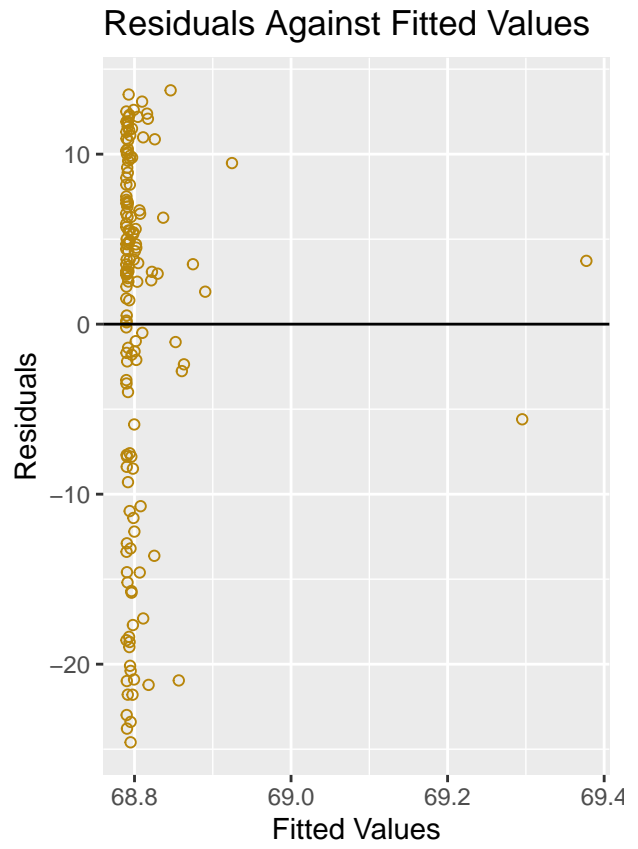
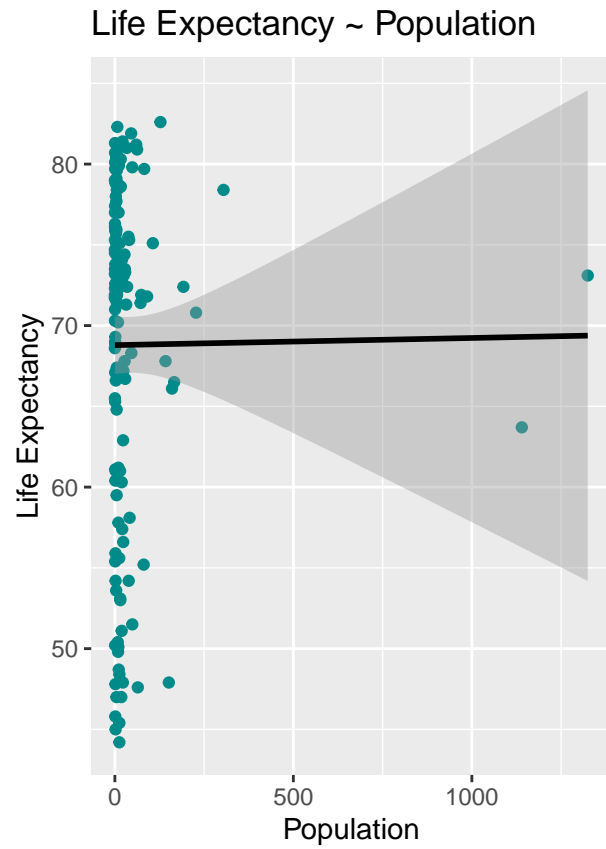


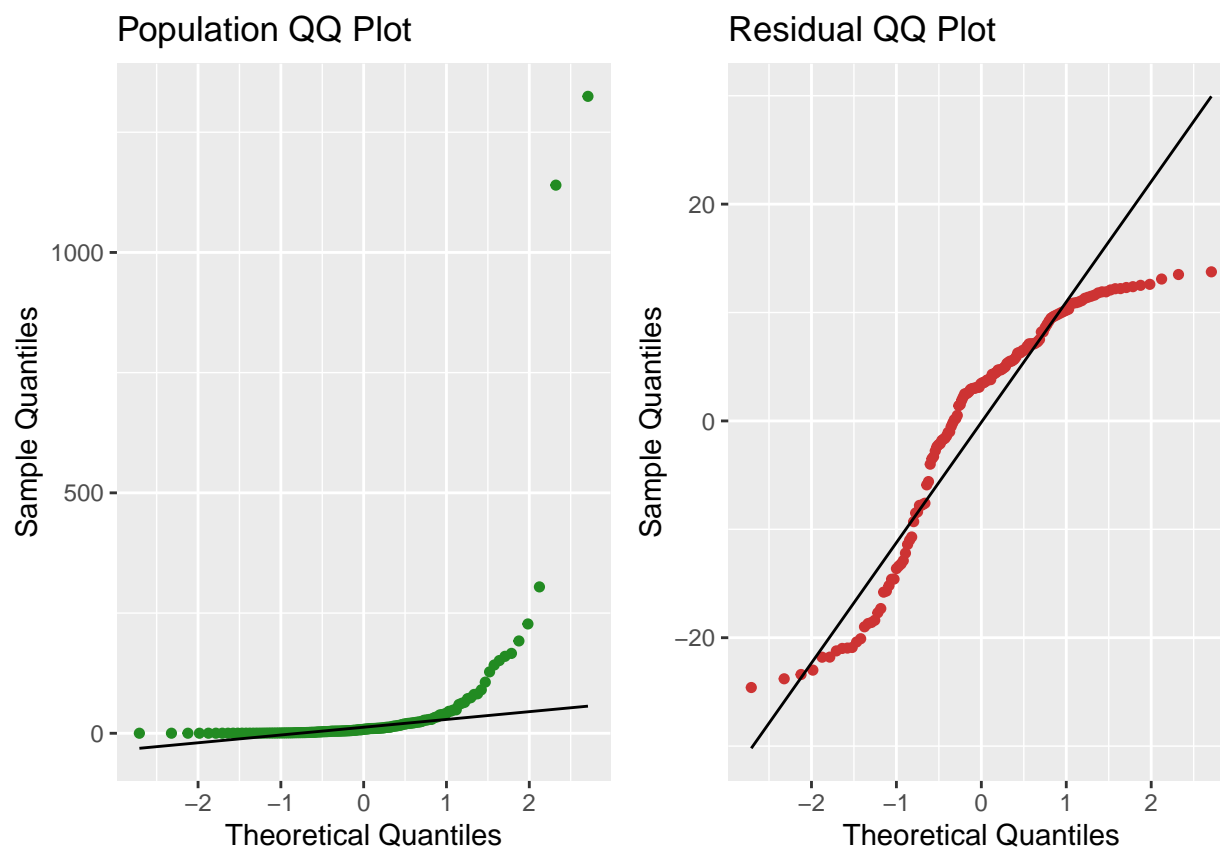
Life Expectancy ~ Population

Table 9: Life Expectancy ~ Population

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	68.7894859	0.9058768	75.9369106	0.0000000
Population	0.0004438	0.0059454	0.0746386	0.9406045

```
## Saving 6.5 x 4.5 in image
## 'geom_smooth()' using formula = 'y ~ x'
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```





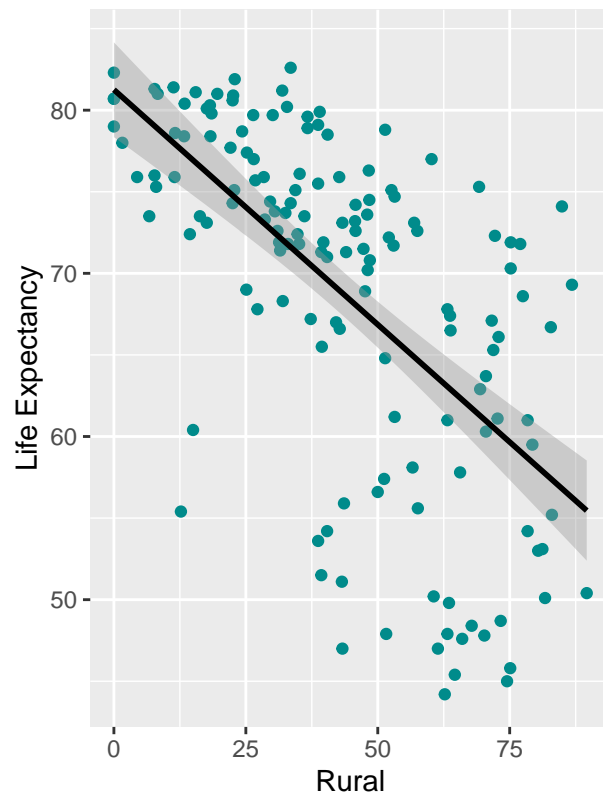
Life Expectancy ~ Rural

Table 10: Life Expectancy ~ Rural

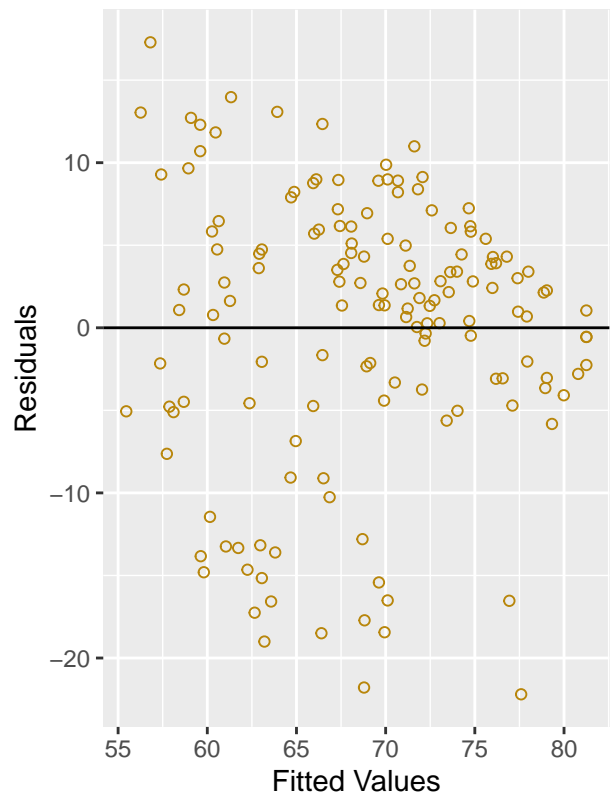
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	81.2538126	1.4694641	55.294859	0
Rural	-0.2878945	0.0300757	-9.572321	0

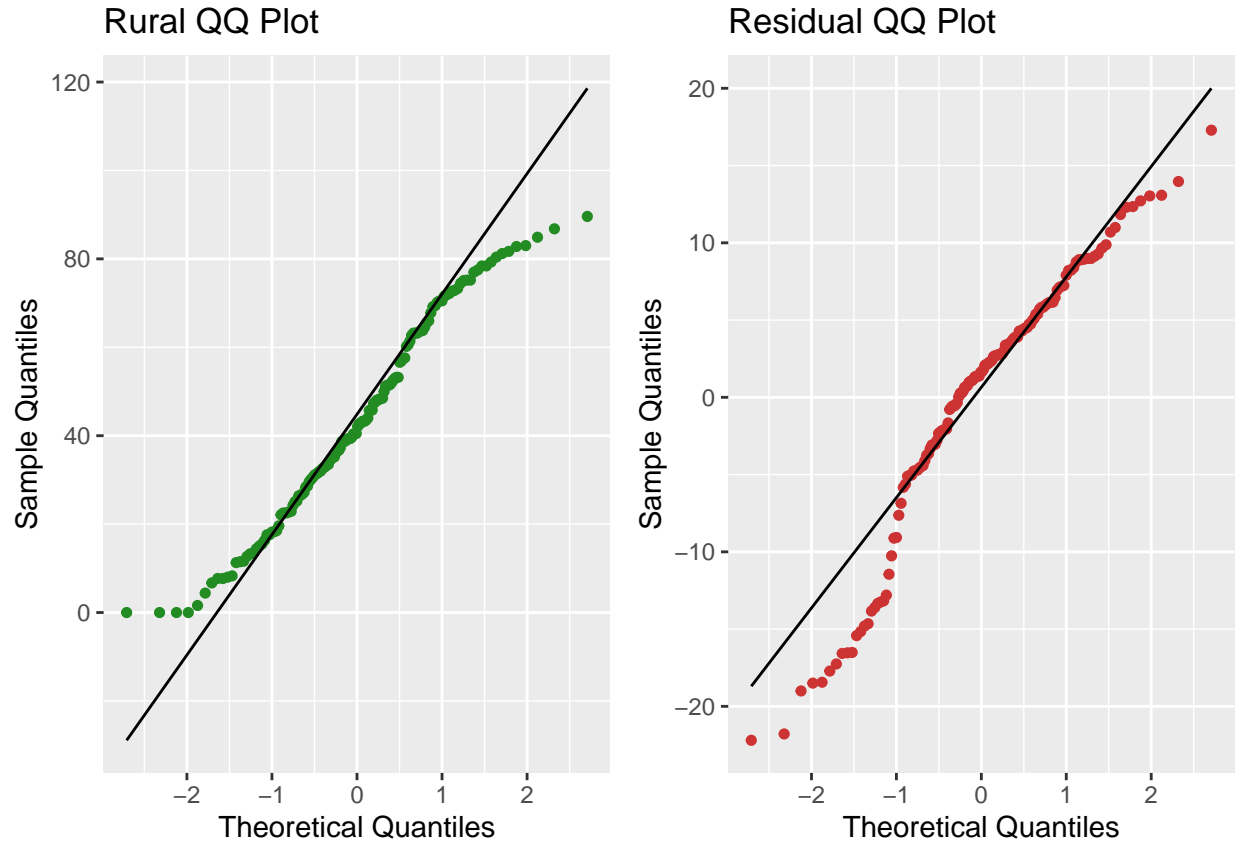
```
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## Saving 6.5 x 4.5 in image
## 'geom_smooth()' using formula = 'y ~ x'
```

Life Expectancy ~ Rural



Residuals Against Fitted Values





## Transformations

## New Models

## State All Rsq

Table 11: R Squared Values

XVar	Rsq	Adj.Rsq	Trans.Rsq
Birth Rate	0.7417423	0.7399734	NA
Cell	0.4306327	0.4267329	NA
CO2	0.1893512	0.1837988	0.5481698
Elderly Population	0.3978775	0.3937534	0.4298627
GDP	0.3367658	0.3322231	0.6091308
Health	0.0873995	0.0811488	NA
Internet	0.5127019	0.5093643	0.6141996
Land Area	0.0016413	-0.0051968	NA
Population	0.0000382	-0.0068109	NA
Rural	0.3855977	0.3813895	NA

## Multifactor Models

Table 12: Forward Selection Predictions

	Include
(Intercept)	TRUE
population	FALSE
rural	TRUE
health	TRUE
internet	TRUE
birth_rate	TRUE
elderly_pop	TRUE
co2	FALSE
gdp	FALSE
cell	FALSE

Table 13: Forward Selection Algorithm | nbest=5

	population	rural	health	internet	birth_rate	elderly_pop	co2	gdp	cell
1 ( 1 )					*				
2 ( 1 )				*	*				
3 ( 1 )		*		*	*				
4 ( 1 )		*	*	*	*				
5 ( 1 )		*	*	*	*	*			
6 ( 1 )		*	*	*	*	*			*
7 ( 1 )		*	*	*	*	*	*		*
8 ( 1 )		*	*	*	*	*	*	*	*

Table 14: Backward Elimination Predictions

	Include
(Intercept)	TRUE
population	FALSE
rural	TRUE
health	TRUE
internet	TRUE
birth_rate	TRUE
elderly_pop	TRUE
co2	FALSE
gdp	FALSE
cell	FALSE

Table 15: Backward Elimination Algorithm | nbest=5

	population	rural	health	internet	birth_rate	elderly_pop	co2	gdp	cell
1 ( 1 )					*				
2 ( 1 )				*	*				
3 ( 1 )		*		*	*				
4 ( 1 )		*	*	*	*				
5 ( 1 )		*	*	*	*	*			

	population	rural	health	internet	birth_rate	elderly_pop	co2	gdp	cell
6 ( 1 )		*	*	*	*	*		*	
7 ( 1 )		*	*	*	*	*	*	*	
8 ( 1 )		*	*	*	*	*	*	*	*

## Assess Multicollinearity

```
## Warning: 'select_()' was deprecated in dplyr 0.7.0.
## i Please use 'select()' instead.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.
```

Table 16: VIF Values

	LandArea	Population	Rural	Health	Internet	BirthRate	ElderlyPop	CO2	GDP	Cell
LandArea	Inf	1.260	1.022	1.002	1.009	1.010	1.016	1.023	1.011	1.002
Population	1.260	Inf	1.006	1.010	1.000	1.004	1.001	1.001	1.002	1.009
Rural	1.022	1.006	Inf	1.023	1.775	1.550	1.231	1.791	2.306	1.675
Health	1.002	1.010	1.023	Inf	1.084	1.062	1.161	1.008	1.093	1.009
Internet	1.009	1.000	1.775	1.084	Inf	2.672	1.750	2.659	3.283	1.999
BirthRate	1.010	1.004	1.550	1.062	2.672	Inf	2.549	2.973	2.799	1.823
ElderlyPop	1.016	1.001	1.231	1.161	1.750	2.549	Inf	1.401	1.627	1.270
CO2	1.023	1.001	1.791	1.008	2.659	2.973	1.401	Inf	4.304	2.087
GDP	1.011	1.002	2.306	1.093	3.283	2.799	1.627	4.304	Inf	2.175
Cell	1.002	1.009	1.675	1.009	1.999	1.823	1.270	2.087	2.175	Inf

## Best Model

Table 17: Best Model Summary

	Estimate	Std. Error	t value	Pr(> t )	RSq
(Intercept)	82.2440751	3.8475946	21.375452	0.0000000	0.7837944
rural	-0.0460924	0.0245643	-1.876394	0.0626535	NA
health	0.2307352	0.1063916	2.168734	0.0317680	NA
internet	1.5883390	0.5275125	3.010998	0.0030829	NA
birth_rate	-0.7054330	0.0816440	-8.640350	0.0000000	NA
elderly_pop	-1.5119081	1.0341320	-1.462007	0.1459489	NA