SECI2143

PROBABILITY & STATISTICAL DATA ANALYSIS

SECTION 08

PROJECT 2 - GROUP PROJECT REPORT

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Contents

Introduction

The statistics around causes of death are imperative as well as vital in determining and monitoring the health status of populations as well as for identifying critical priorities for various health systems. Most industrialized countries have effective systems in place to determine the main causes of death. In contrast to this, developing countries are not as advanced in placing such systems which proves detrimental in trying to improve the overall health of the nation. Indeed, there are vast differences in the top causes of death within developed countries versus the developing countries. Mortality rates are the basic form of measurement needed to assess health status. By counting the number of deaths in a year and comparing it to preceding years, the health status of various populations can be determined (Ogden, 2007). In this report, we will be analyzing the annual number of deaths due to 3 main causes of death which are Alzheimer's disease, Parkinson and Malaria.

The most crucial symptom of Alzheimer's is memory loss, and the person faces difficulties in remembering. It also leads to occasional memory lapses. An Alzheimer's patient often gets lost in familiar places and also does not find the right word to identify objects and often tends to forget close relatives and family members.Alzheimer's disease significantly impairs reasoning and cognitive skills, making it difficult for the patient to reach conclusions or render accurate judgments. As the illness worsens, the patient frequently overlooks routine duties or even the most basic ones like clothing or taking a shower. Many behavioral and personality abnormalities, including sadness, hallucination, and mood swings, are common in Alzheimer's patients. A lack of self-awareness and self-care, prolonged confinement to a bed, feeding failure, inability to receive proper nutrition and dehydration are all factors in the development of other life-threatening health conditions in dementia patients.

Parkinson's disease(PD) is not the primary cause of death for most people. Individuals with PD die from the same diseases that kill the majority of people. These include cancer, heart disease, and stroke. As we get older, we realize that our bodies are susceptible to a variety of

harmful conditions. Two areas in which Parkinson's Disease may bring death are the risk of falling badly that can lead to death and. Other than that, people with Parkinson's Disease are at risk for aspiration pneumonias. Because Parkinson's Disease patients often have swallowing problems, there is an increased tendency for this to happen, and because Parkinson's Disease patients don't cough as strongly as they used to, they cannot always cough up the material they aspirated. When this happens, some liquid or food particles remain behind in the lung, where they may set up an infection.

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable. In 2020, there were an estimated 241 million cases of malaria worldwide. The estimated number of malaria deaths stood at 627 000 in 2020. In 2020, nearly half of the world's population was at risk of malaria. Some population groups are at considerably higher risk of contracting malaria and developing severe disease: infants, children under 5 years of age, pregnant women and patients with HIV/AIDS, as well as people with low immunity moving to areas with intense malaria transmission such as migrant workers, mobile populations and travelers.

Therefore, in this report, we will use the data about Alzheimer's disease to do a sample test to test the mean year of the people getting Alzheimer's. Aside from that, we will also do correlation Analysis to investigate the relationship between years in 2005 and the number of death cases of Alzheimer. We will also be doing Regression Analysis to investigate the relationship between Year and Number of death cases of Malaria and lastly, we will include Chi Square test of independence to determine whether there is a significant relationship between Parkinson or Drowning result.

Hypothesis Testing

Test 1 : : 1 sample test to test the mean year of the people getting Alzheimer.

This 1 sample testing is to test whether the statement is true based on the mean year of getting Alzheimer in 2005. Assume the confidence level to be 95%, significant level, $\alpha = 0.05$. Let the population mean, $\bar{x}$ of the people's age getting Alzheimer μ.

H_0: $\mu = 2005$

H_1: $\mu > 2005$

$\alpha = 0.05$

Based on R studio,

Coding segment

```
x<- annual_number_of_deaths_by_cause$Year
n = length(x)
print(n)

# get sample size value
xbar <- mean(x)
print(xbar)
standard_deviation = sd(x)
print(standard_deviation)

# get the sample mean value
mu = 2005
alpha = 0.05

#calculate z test
z=(xbar-mu)/(standard_deviation/sqrt(n))

print(z)
```

Sample size , n = 7273

Sample mean , $\bar{x}$ = 2004.425

Sample Standard deviation, s = 8.623572

$$Z = \frac{x - \mu}{\sigma}$$

Test statistic, using the following formula,
z = -5.685075

Critical value , c.v = z_{005} = 1.644854

Decision (using critical region) :

Since the test statistic value,z = -5.685075 is greater than the critical value, c.v = 1.644854 which falls within the critical region. Hence, we reject the null hypothesis.

Test 1 Conclusion :

There is sufficient evidence to prove that the mean year of getting Alzheimer's is greater than in 2005.

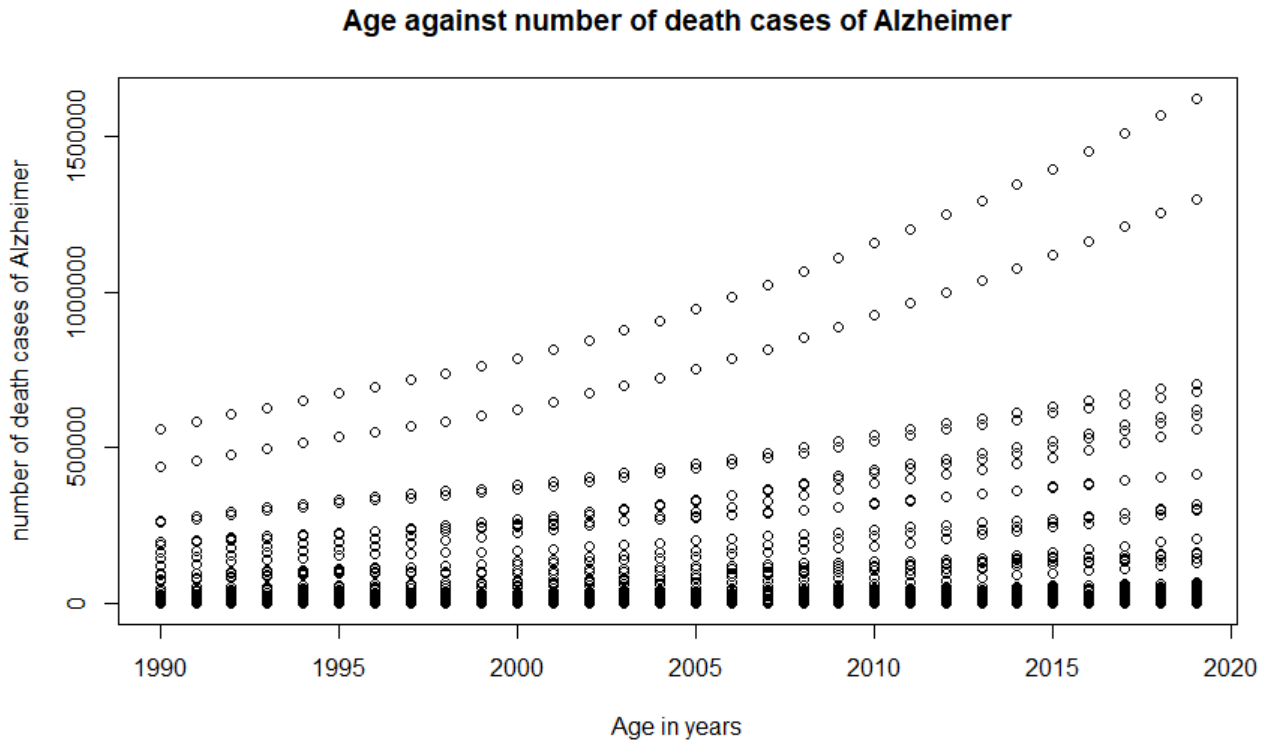
Test 2 : Correlation Analysis to investigate the relationship between years in 2005 and number of death cases of Alzheimer.

This test is to measure the strength of the relationship between years in 2005 and number of death cases of Alzheimer.

Assume the confidence level to be 95%, significant level , $\alpha = 0.05$.

H0: $\rho = 0$ (no linear correlation between years in 2005 and number of death cases of Alzheimer.)

H1: $\rho \neq 0$ (linear correlation exists between age in years and number of death cases of Alzheimer.)



The independent variable is years in 2005 while the dependent variable is the number of death cases of Alzheimer. Since both the variables are ratio scale data , hence we can use Person's product-moment correlation using cor.test() function in R to obtain the correlation efficiently (r).

$\alpha = 0.05$

Using RStudio,

Correlation coefficient, r =0.07648068

Sample size = 7273

Degree of freedom, df = 6838

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\left(\sum X^2 - \frac{\left(\sum X\right)^2}{N}\right)}\sqrt{\left(\sum Y^2 - \frac{\left(\sum Y\right)^2}{N}\right)}}$$

Test statistic = 6.3429

Critical value,

-t0.05,6838 = 0.05287731

t0.05,6838 = 0.09999865

Decision :

Since the test statistic , t = 6.3429 is larger than -t0.05, 6838 = 0.05287731 and t0.05, 6838 = 0.09999865. It falls within the rejection region. Hence, we reject the null hypothesis.

Test 2 Conclusion :

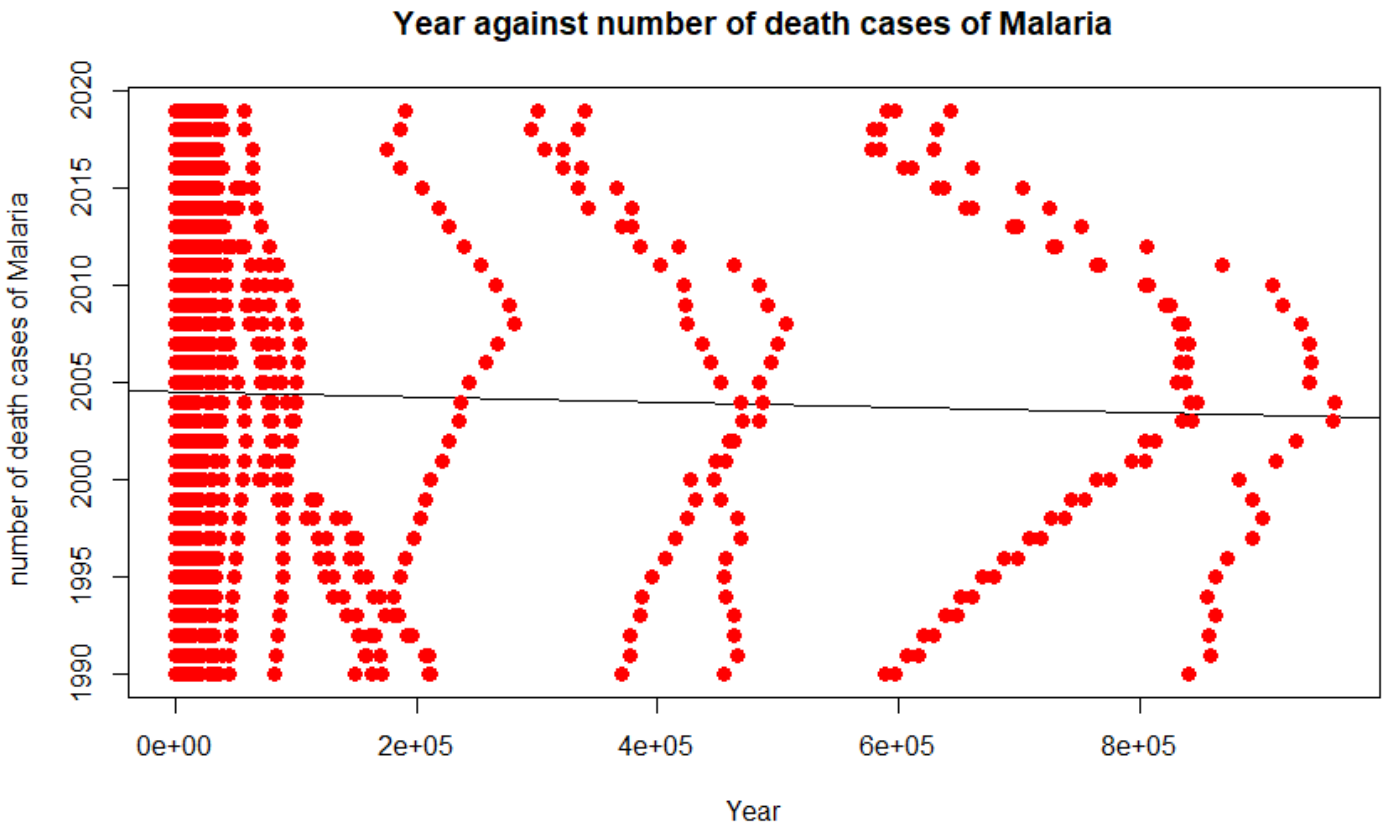
There is sufficient evidence that linear regression exists between years in 2005 and the number of death cases of Alzheimer. There is enough evidence that year affects the number of death cases of Alzheimer.

Test 3 : Regression Analysis to investigate the relationship between Year and Number of death cases of Malaria.

Assume the confidence level to be 95%, significant level , α = 0.05.

H0: $\beta 1 = 0$ (no linear regression between year and number of death cases of Malaria.)

H1: $\beta 1 \neq 0$ (linear regression exists between year and number of death cases of Malaria.)



The independent variable (variable that used to explain the dependent variable) is year while the dependent variable (variable that I wish to explain) is number of death cases of Malaria.

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 364352.9 272580.8 1.337 0.181

x -172.3 136.0 -1.267 0.205

Residual standard error: 97340 on 6838 degrees of freedom

(435 observations deleted due to missingness)

Multiple R-squared: 0.0002348, Adjusted R-squared: 8.862e-05

F-statistic: 1.606 on 1 and 6838 DF, p-value: 0.205

$\alpha = 0.05$

Sample size, n = 7273

401 Degree of freedom, df = 6838

The regression line,

$\hat{y} = 364352.9 + (-172.3)x$

R2 = 0.2051

t = 1.606

Critical value,

$-t_{0.05,6838} = 0.0002348$

$t_{.0.05,6838} = 8.862e-05$

Decision :

Since the test statistic, t = 1.606 is bigger than $-t_{0.05,6838} = 0.0002348$

and $t_{0.025,399} = 8.862e\text{-}05$.

It falls within the rejection region. Hence, we reject the null hypothesis. **Test 3**

Conclusion :

Since R2 = 0.205, it should be considered a weak linear relationship as its value is far from 1. Nevertheless, there is enough evidence that linear regression exists between the year and number of death cases of Malaria.

Test 4 : Chi Square test of independence to determine whether there is a significant relationship between Parkinson or Drowning result.

Assume the confidence level to be 95%, significant level , $\alpha = 0.05$.

H0 : The Parkinson or Drowning results are independent.

H1: The Parkinson or Drowning results are dependent.

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454574 460665

Contingency table that used for test statistic:

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Chi-squared test for given probabilities :

Data : tbl3

X-squared =111936, df = 2448, p-value < 2.2e-16

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Test statistic ,

χ 2= 111936

The degree of freedom is 2448

α = 0.05

Critical value = 1.644854

The p-value is 2.2e-16

Decision :

Since the test statistic ,χ 2= 111936 is greater than the critical value which is 1.644854 . It falls within the critical region . Besides that the p-value obtained is 2.2e-16 is smaller than 0.05 . Hence, we reject the null hypothesis.

Test 4 Conclusion :

There is enough evidence that Parkinson or Drowning results are dependent.

Conclusion

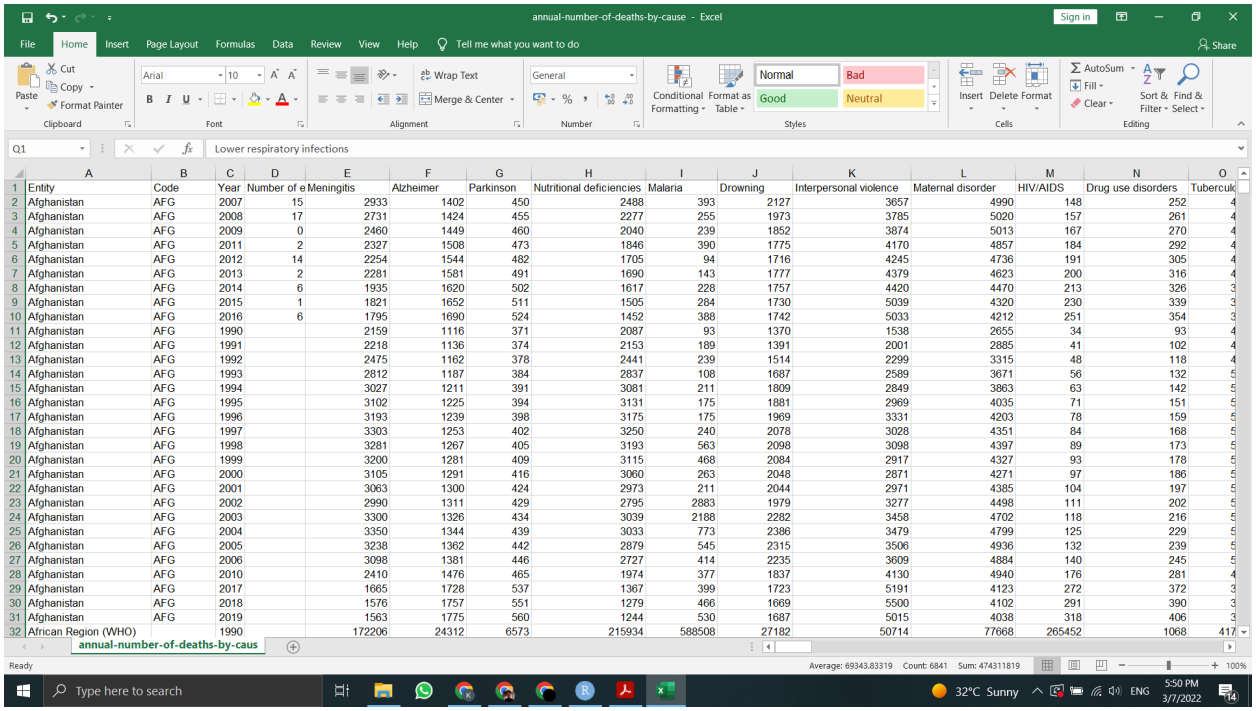
In this research, we use a data collection of annual numbers of deaths. The information includes their gender, age, numbers of death, and other details. Using the data, we do a hypothesis test related to the cause of death.

Based on the test 1 of hypothesis testing, We may conclude that there is sufficient evidence to prove that the mean year of getting Alzheimer's is greater than in 2005.. This test demonstrates to be the truth because it has already been validated by one sample test. Aside from that, in test 2, correlation analysis is used to investigate the relationship between years in 2005 and number of death cases of Alzheimer. There is sufficient evidence that linear regression exists between years in 2005 and the number of death cases of Alzheimer. There is enough evidence that year affects the number of death cases of Alzheimer.

Moving on to the next one, by using regression analysis in test 3, it demonstrates that There is enough evidence that linear regression exists between the year and number of death cases of Malaria. As a result, Malaria can be influenced by the amount of year. Last but not least, in test 4, the Chi Square test of independence is employed to determine whether there is a significant relationship between Parkinson and Drowning. There is enough evidence that Parkinson or Drowning results are dependent.

In conclusion, the annual death rate must, therefore, be carefully monitored throughout the year with appropriate medication and a healthy lifestyle. The appropriate prescription, regular checkups, and a healthy lifestyle can all contribute to a long and healthy life. We discover a lot about one another and how to work together to produce a quality report through this group assignment. Additionally, we have the chance to make some of the concepts we reviewed in class more beneficial for the final test. Lastly, we would like to express our gratitude to Dr. Shahrin Shazlin Binti Huspi, our lecturer, for her assistance during the entire session.

Appendix


annual-number-of-deaths-by-cause - Excel

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Q1 Lower respiratory infections

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Entity	Code	Year	Number of e	Meningitis	Alzheimer	Parkinson	Nutritional deficiencies	Malaria	Drowning	Interpersonal violence	Maternal disorder	HIV/AIDS	Drug use disorders	Tubercul
2	Afghanistan	AFG	2007	15	2933	1402	450	2488	393	2127	3657	4990	148	252	4
3	Afghanistan	AFG	2008	17	2731	1424	455	2277	255	1973	3785	5020	157	261	4
4	Afghanistan	AFG	2009	0	2460	1449	460	2040	239	1852	3874	5013	167	270	4
5	Afghanistan	AFG	2011	2	2327	1508	473	1846	390	1775	4170	4857	184	292	4
6	Afghanistan	AFG	2012	14	2254	1544	482	1705	94	1716	4245	4736	191	305	4
7	Afghanistan	AFG	2013	2	2281	1581	491	1690	143	1777	4379	4623	200	316	4
8	Afghanistan	AFG	2014	6	1935	1620	502	1617	228	1757	4420	4470	213	326	3
9	Afghanistan	AFG	2015	1	1821	1652	511	1505	284	1730	5039	4320	230	339	3
10	Afghanistan	AFG	2016	6	1795	1690	524	1452	388	1742	5033	4212	251	354	3
11	Afghanistan	AFG	1990		2159	1116	371	2087	93	1370	1538	2655	34	93	4
12	Afghanistan	AFG	1991		2218	1136	374	2153	189	1391	2001	2885	41	102	4
13	Afghanistan	AFG	1992		2475	1162	378	2441	239	1514	2299	3315	48	118	4
14	Afghanistan	AFG	1993		2812	1187	384	2837	108	1687	2589	3671	56	132	5
15	Afghanistan	AFG	1994		3027	1211	391	3081	211	1809	2849	3863	63	142	5
16	Afghanistan	AFG	1995		3102	1225	394	3131	175	1881	2969	4035	71	151	5
17	Afghanistan	AFG	1996		3193	1239	398	3175	175	1969	3331	4203	78	159	5
18	Afghanistan	AFG	1997		3303	1253	402	3250	240	2078	3028	4351	84	168	5
19	Afghanistan	AFG	1998		3281	1267	405	3193	563	2098	3098	4397	89	173	5
20	Afghanistan	AFG	1999		3200	1281	409	3115	468	2084	2917	4327	93	178	5
21	Afghanistan	AFG	2000		3105	1291	416	3060	263	2048	2871	4271	97	186	5
22	Afghanistan	AFG	2001		3063	1300	424	2973	211	2044	2971	4385	104	197	5
23	Afghanistan	AFG	2002		2990	1311	429	2795	2883	1979	3277	4498	111	202	5
24	Afghanistan	AFG	2003		3300	1326	434	3039	2188	2282	3458	4702	118	216	5
25	Afghanistan	AFG	2004		3350	1344	439	3033	773	2386	3479	4799	125	229	5
26	Afghanistan	AFG	2005		3238	1362	442	2879	545	2315	3506	4936	132	239	5
27	Afghanistan	AFG	2006		3098	1381	446	2727	414	2235	3609	4884	140	245	5
28	Afghanistan	AFG	2010		2410	1476	465	1974	377	1837	4130	4940	176	281	4
29	Afghanistan	AFG	2017		1665	1728	537	1367	399	1723	5191	4123	272	372	3
30	Afghanistan	AFG	2018		1576	1757	551	1279	466	1669	5500	4102	291	390	3
31	Afghanistan	AFG	2019		1563	1775	560	1244	530	1687	5015	4038	318	406	3
32	African Region (WHO)		1990		172206	24312	6573	215934	588508	27182	50714	77668	265452	1068	417

annual-number-of-deaths-by-caus

Ready Average: 69343.83319 Count: 6841 Sum: 474311819 100%

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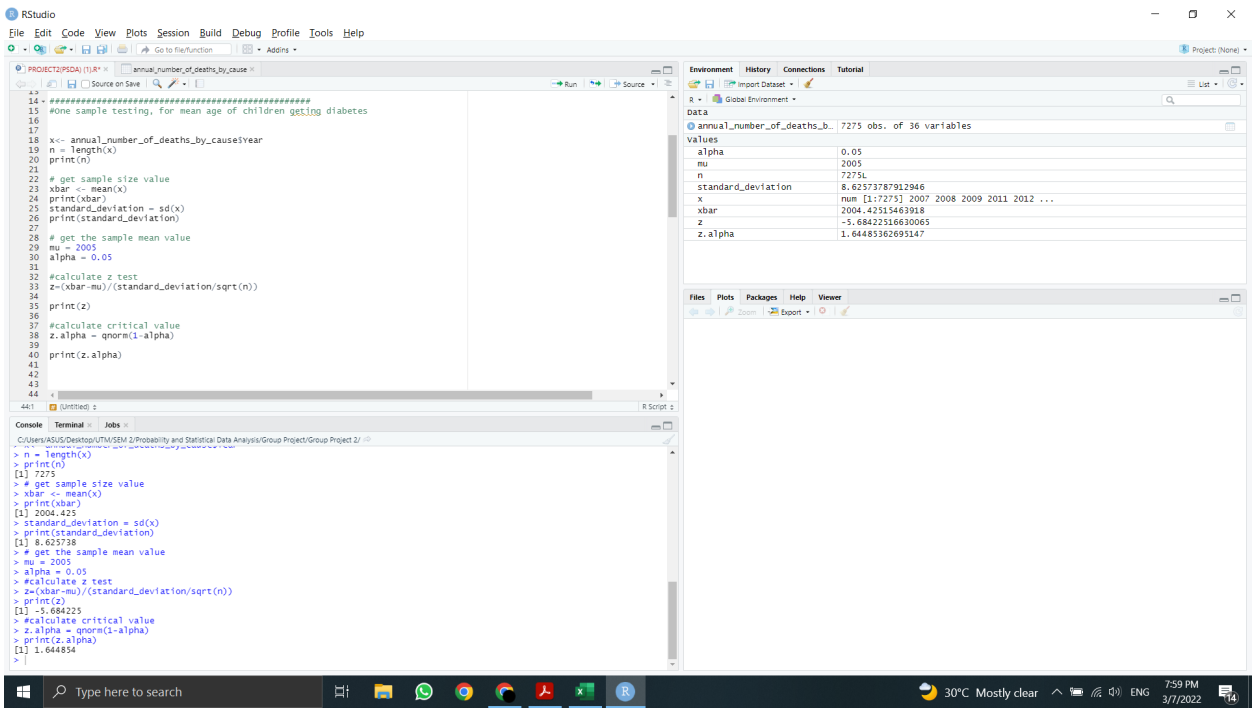
RStudio

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```
##################################################
#One sample testing, for mean age of children getting diabetes

x<- annual_number_of_deaths_by_cause$Year
n = length(x)
print(n)

# get sample size value
xbar <- mean(x)
print(xbar)
standard_deviation = sd(x)
print(standard_deviation)

# get the sample mean value
mu = 2005
alpha = 0.05

#calculate z test
z=(xbar-mu)/(standard_deviation/sqrt(n))

print(z)

#calculate critical value
z.alpha = qnorm(1-alpha)

print(z.alpha)
```

```
> n = length(x)
> print(n)
[1] 7275
> # get sample size value
> xbar <- mean(x)
> print(xbar)
[1] 2004.425
> standard_deviation = sd(x)
> print(standard_deviation)
[1] 8.625738
> # get the sample mean value
> mu = 2005
> alpha = 0.05
> #calculate z test
> z=(xbar-mu)/(standard_deviation/sqrt(n))
> print(z)
[1] -5.684225
> #calculate critical value
> z.alpha = qnorm(1-alpha)
> print(z.alpha)
[1] 1.644854
>
```

Environment	
Data	
annual_number_of_deaths_b..	7275 obs. of 36 variables
Values	
alpha	0.05
mu	2005
n	7275L
standard_deviation	8.6257378712946
x	num [1:7275] 2007 2008 2009 2011 2012 ...
xbar	2004.42515463918
z	-5.68422516630065
z.alpha	1.64485362695147

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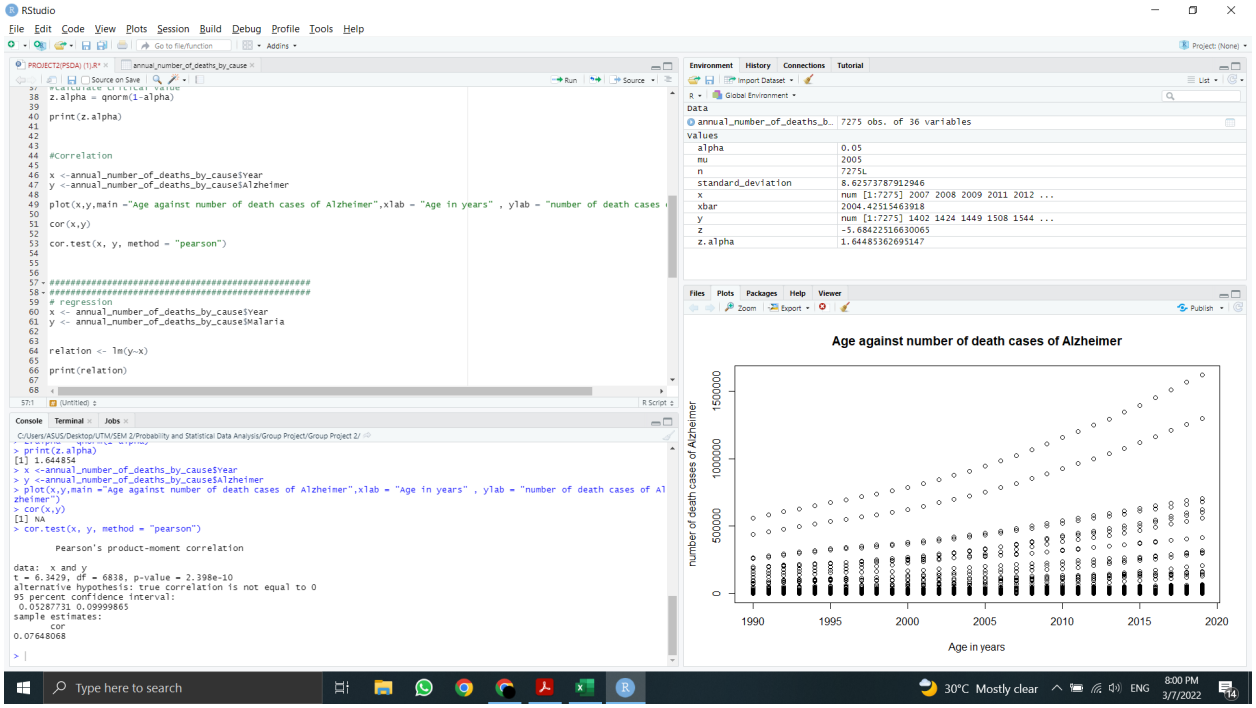
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
z.alpha = qnorm(1-alpha)
print(z.alpha)
#Correlation
x <-annual_number_of_deaths_by_cause$Year
y <-annual_number_of_deaths_by_cause$Alzheimer
plot(x,y,main ="Age against number of death cases of Alzheimer",xlab = "Age in years" , ylab = "number of death cases
cor(x,y)
cor.test(x, y, method = "pearson")
# regression
x <- annual_number_of_deaths_by_cause$Year
y <- annual_number_of_deaths_by_cause$Malaria
relation <- lm(y~x)
print(relation)
> print(z.alpha)
[1] 1.644854
> x <-annual_number_of_deaths_by_cause$Year
> y <-annual_number_of_deaths_by_cause$Alzheimer
> cor(x,y)
[1] NA
> cor.test(x, y, method = "pearson")
Pearson's product-moment correlation
data: x and y
t = 6.3429, df = 6838, p-value = 2.398e-10
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
0.05287731 0.09999865
sample estimates:
cor
0.07648068
Environment History Connections Tutorial
annual_number_of_deaths_b... 7275 obs. of 36 variables
alpha 0.05
mu 2005
n 7275L
standard_deviation 8.62573787912946
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xbar 2004.42515463918
y num [1:7275] 1402 1424 1449 1508 1544 ...
z -5.68422516630065
z.alpha 1.64485362695147
Age against number of death cases of Alzheimer
number of death cases of Alzheimer
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Age in years
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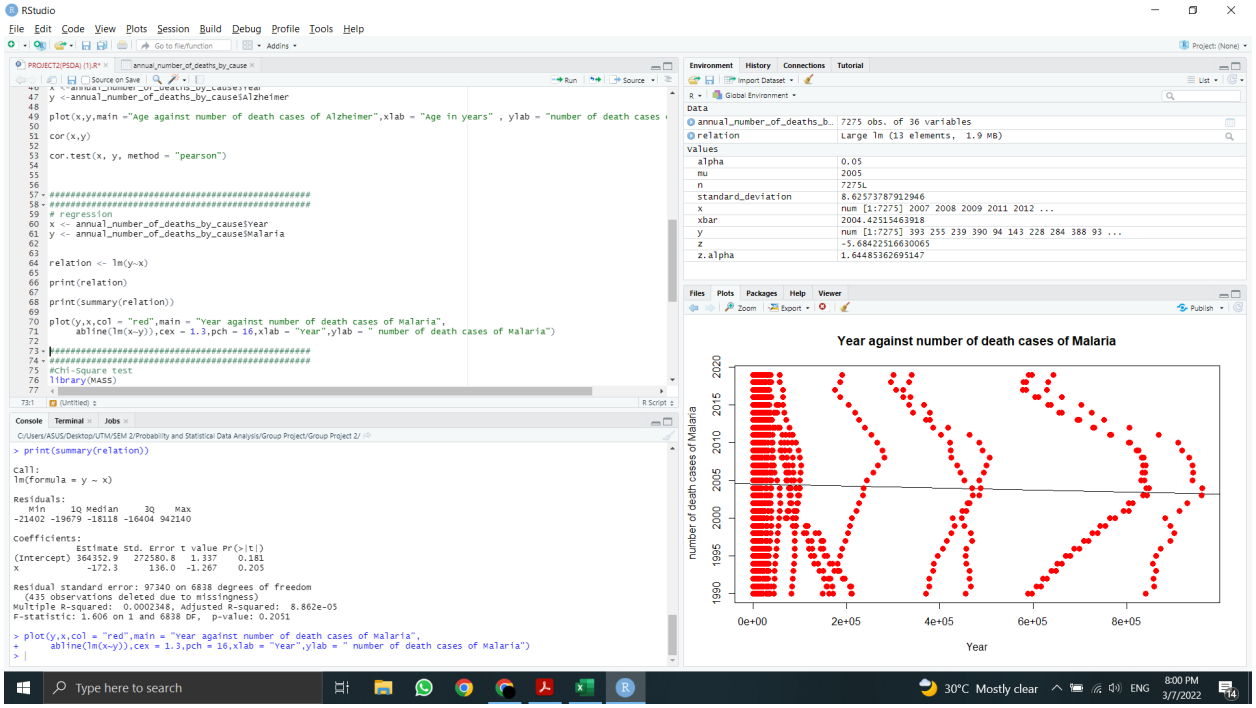
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
y <-annual_number_of_deaths_by_cause$Alzheimer
plot(x,y,main ="Age against number of death cases of Alzheimer",xlab = "Age in years" , ylab = "number of death cases
cor(x,y)
cor.test(x, y, method = "pearson")
# regression
x <- annual_number_of_deaths_by_cause$Year
y <- annual_number_of_deaths_by_cause$Malaria
relation <- lm(y~x)
print(relation)
print(summary(relation))
plot(y,x,col = "red",main = "Year against number of death cases of Malaria",
abline(lm(x~y)),cex = 1.3,pch = 16,xlab = "Year",ylab = " number of death cases of Malaria")
#Chi-Square test
library(MASS)
> print(summary(relation))
Call:
lm(formula = y ~ x)
Residuals:
Min 1Q Median 3Q Max
-21402 -19679 -18118 -16404 942140
Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept) 364352.9 272580.8 1.337 0.181
x -172.3 136.0 -1.267 0.205
Residual standard error: 97340 on 6838 degrees of freedom
(435 observations deleted due to missingness)
Multiple R-squared: 0.0002348, Adjusted R-squared: 8.862e-05
F-statistic: 1.606 on 1 and 6838 DF, p-value: 0.2051
> plot(y,x,col = "red",main = "Year against number of death cases of Malaria",
+ abline(lm(x~y)),cex = 1.3,pch = 16,xlab = "Year",ylab = " number of death cases of Malaria")
Environment History Connections Tutorial
annual_number_of_deaths_b... 7275 obs. of 36 variables
relation Large lm (13 elements, 1.9 MB)
alpha 0.05
mu 2005
n 7275L
standard_deviation 8.62573787912946
x num [1:7275] 2007 2008 2009 2011 2012 ...
xbar 2004.42515463918
y num [1:7275] 393 255 239 390 94 143 228 284 388 93 ...
z -5.68422516630065
z.alpha 1.64485362695147
Year against number of death cases of Malaria
number of death cases of Malaria
1990 1995 2000 2005 2010 2015 2020
0e+00 2e+05 4e+05 6e+05 8e+05
Year
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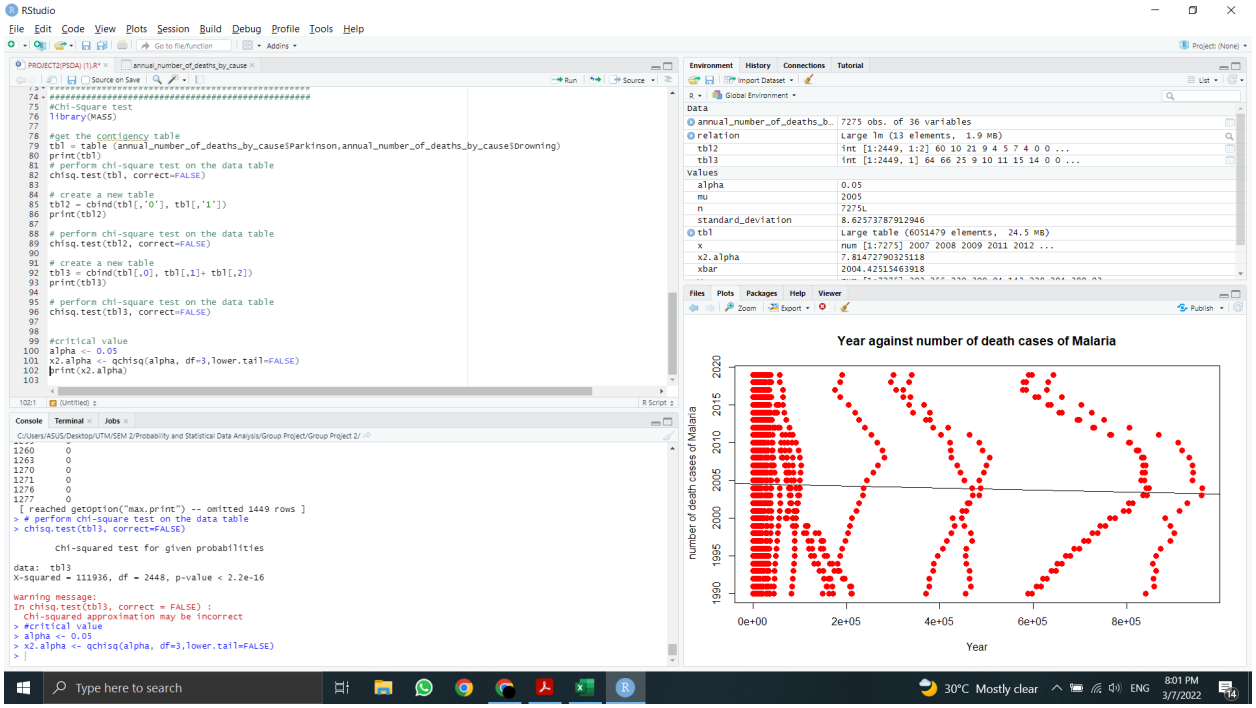
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
#Chi-Square test
library(MASS)
#get the contigency table
tbl = table (annual_number_of_deaths_by_cause$Parkinson,annual_number_of_deaths_by_cause$Drowning)
print(tbl)
# perform chi-square test on the data table
chisq.test(tbl, correct=FALSE)
# create a new table
tbl2 = cbind(tbl[,'0'], tbl[,'1'])
print(tbl2)
# perform chi-square test on the data table
chisq.test(tbl2, correct=FALSE)
# create a new table
tbl3 = cbind(tbl[,0], tbl[,1]+ tbl[,2])
print(tbl3)
# perform chi-square test on the data table
chisq.test(tbl3, correct=FALSE)
#critical value
alpha <- 0.05
x2.alpha <- qchisq(alpha, df=3,lower.tail=FALSE)
print(x2.alpha)
Console Terminal Jobs
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1260 0
1263 0
1270 0
1271 0
1276 0
1277 0
[reached getOption("max.print") -- omitted 1449 rows]
> # perform chi-square test on the data table
> chisq.test(tbl3, correct=FALSE)
Chi-squared test for given probabilities
data: tbl3
X-squared = 111936, df = 2448, p-value < 2.2e-16
Warning message:
In chisq.test(tbl3, correct = FALSE) :
Chi-squared approximation may be incorrect
> #critical value
> alpha <- 0.05
> x2.alpha <- qchisq(alpha, df=3,lower.tail=FALSE)
Environment History Connections Tutorial
Import Dataset
Global Environment
Data
annual_number_of_deaths_b... 7275 obs. of 36 variables
relation Large lm (13 elements, 1.9 MB)
tbl2 int [1:2449, 1:2] 60 10 21 9 4 5 7 4 0 0 ...
tbl3 int [1:2449, 1] 64 66 25 9 10 11 15 14 0 0 ...
Values
alpha 0.05
mu 2005
n 7275L
standard_deviation 8.6257378791294 6
tbl Large table (6051479 elements, 24.5 MB)
x num [1:7275] 2007 2008 2009 2011 2012 ...
x2.alpha 7.8147279032511 8
xbar 2004.4251546391 8
Files Plots Packages Help Viewer
Zoom Export Publish
Year against number of death cases of Malaria
number of death cases of Malaria
1990 1995 2000 2005 2010 2015 2020
0e+00 2e+05 4e+05 6e+05 8e+05
Year
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References

Correlation Analyses in R - Easy Guides - Wiki - STHDA. (2022, June 8). Sthda. Retrieved June 19, http://www.sthda.com/english/wiki/correlation-analyses-in-r

DataCamp. (2022, June 26). R Linear Regression Tutorial: lm Function in R with Code Examples. Regression. Retrieved June 19, https://www.datacamp.com/tutorial/linear-regression-R

Hypothesis Testing. (2022, June 25). Statistics How To. Retrieved June 18, https://www.statisticshowto.com/probability-and-statistics/hypothesis-testing/ Teboul, A. (2021, August 25). Chi-Square Test in R | Explore the Examples and Essential concepts! DataFlair. Retrieved June 20, https://data-flair.training/blogs/chi-square-test-in-r/

Malaria. (n.d.). World Health Organization. Retrieved July 3, 2022, from https://w ww.who.int/news-room/fact-sheets/detail/malaria

Death in Parkinson's Disease. (n.d.). AMERICAN PARKINSON DISEASE ASSOCIATION. Retrieved July 3, 2022, from https://www.apdaparkinson.org/article/death-parkinsons-disease/