

# REMEMBER. FOR. ME.

ELATION BEING THE PREDICTOR VARIABLE. OVER THE PAST FIVE YEARS OVER TIME, THIS REGRESSION MODEL ACCOUNTS FOR 97.5346% OF ALL VARIABILITY IN THE DATA SET. CONFIDENCE LEVEL: 95% ERROR MARGIN: 5% H<sub>0</sub>:  $\Pi \leq 0.5$ , H<sub>1</sub>:  $\Pi > 0.5$ , TEST: Z = (PS -  $\Pi$ ) /  $\sqrt{(\Pi(1-\Pi))/N}$  N(0,1), REJECT H<sub>0</sub> WHEN P(Z>Z) < A = 0.05, UNDER H<sub>0</sub>:  $\Pi = 0.5$ , TEST: Z =  $(0.5(1-0.5)/5679)^{1/2} = 54.10093578$ . WE REJECT H<sub>0</sub>. WE HAVE SUFFICIENT EVIDENCE AT 5% SIGNIFICANT LEVEL THAT THE MAJORITY OF RESPONDENTS ARE SINGAPORE CITIZENS. THOSE WITH DEMENTIA MAKES UP LESS THAN 1% OF OUR SAMPLE, ONLY 0.5635%. PRIMARY CAREGIVERS MAKES UP 6.3391% OF OUR SAMPLE, SECONDARY CAREGIVERS MAKES UP 14.0166% OF OUR SAMPLE. THOSE CONNECTED TO ANY OF THE THREE CATEGORIES MAKES UP 79.0808% OF OUR SAMPLE. WHEN  $|Z| > 5.991$  UNDER H<sub>0</sub>, VARIABLES ARE INDEPENDENT. TEST = 54.10093578 > 5.991, THEREFORE, WE REJECT H<sub>0</sub>. MARASCUILLO PROCEDURE. THERE IS NO SIGNIFICANT DIFFERENCE BETWEEN THE PROPORTION OF RESPONDENTS WHO DID THEM, BETWEEN THE PRIMARY CAREGIVER PROFILE AND THE GENERAL PROFILE. GENERALLY, MOST OF THE RESPONDENTS DO NOT FEEL THAT OTHERS LOOK AT THEM NEGATIVELY. HOWEVER, ABOUT 40.0778% OF THE RESPONDENTS IN THIS PROFILE HAD ENCOUNTERED EMBARRASSING SITUATIONS BECAUSE THEY HAVE TO TAKE CARE FOR HAS ALZHEIMER'S DISEASE OR DEMENTIA. SIMILARLY, THOSE IN THIS PROFILE DO NOT FEEL THAT OTHERS TREAT OR LOOK AT THEM NEGATIVELY. HOWEVER, ABOUT 14.8629% OF THE RESPONDENTS HAD ENCOUNTERED EMBARRASSING SITUATIONS DUE TO A FAMILY MEMBER SUFFERING FROM ALZHEIMER'S DISEASE OR DEMENTIA WHO DOES NOT LIVE WITH THEM. CHI-SQUARE TEST:  $\chi^2 = 250.5$ , H<sub>1</sub>:  $\Pi_1 \neq \Pi_2 \dots \neq \Pi_N$ , A=0.05, N = 2923, PS = 1670/2923. FROM THE TUKEY-KRUEGER COMPARISONS, THOSE WITH ALZHEIMER'S DISEASE AND THE GENERAL PROFILE HAVE A SIGNIFICANT DIFFERENCE. THOSE WITH ALZHEIMER'S CONNECTION GENERALLY HAVE DIFFERENT VIEWPOINTS ON WHETHER ALZHEIMER'S DISEASE SHOULD LIVE. DEMENTIA IS THE 4TH LEADING CAUSE OF DEATH IN SINGAPORE AT THE START OF 2017, ACCOUNTING FOR 11.72% OF ALL DEATHS. SINCE THE COEFFICIENT IS POSITIVE AND VERY CLOSE TO 1, THERE IS A STRONG LINEAR CORRELATION. THE PERCENTAGE OF DEATHS DUE TO DEMENTIA AND THE PROGRESSIVE DISEASE. THIS REGRESSION MODEL ACCOUNT FOR 97.5346% OF ALL VARIABILITY. CONFIDENCE LEVEL: 95% ERROR MARGIN: 5% H<sub>0</sub>:  $\Pi \leq 0.5$ , H<sub>1</sub>:  $\Pi > 0.5$ , TEST: Z = (PS -  $\Pi$ ) /  $\sqrt{(\Pi(1-\Pi))/N}$  N(0,1), REJECT H<sub>0</sub> WHEN P(Z>Z) < A = 0.05, UNDER H<sub>0</sub>:  $\Pi = 0.5$ , TEST: Z =  $(0.5(1-0.5)/5679)^{1/2} = 54.10093578$ . WE REJECT H<sub>0</sub>. WE HAVE SUFFICIENT EVIDENCE AT 5% SIGNIFICANT LEVEL THAT THE MAJORITY OF RESPONDENTS ARE SINGAPORE CITIZENS. THOSE WITH DEMENTIA MAKES UP LESS THAN 1% OF OUR SAMPLE, ONLY 0.5635%. PRIMARY CAREGIVERS MAKES UP 6.3391% OF OUR SAMPLE, SECONDARY CAREGIVERS MAKES UP 14.0166% OF OUR SAMPLE. THOSE CONNECTED TO ANY OF THE THREE CATEGORIES MAKES UP 79.0808% OF OUR SAMPLE. WHEN  $|Z| > 5.991$  UNDER H<sub>0</sub>, VARIABLES ARE INDEPENDENT. TEST = 54.10093578 > 5.991, THEREFORE, WE REJECT H<sub>0</sub>. MARASCUILLO PROCEDURE. THERE IS NO SIGNIFICANT DIFFERENCE BETWEEN THE PROPORTION OF RESPONDENTS WHO DID THEM, BETWEEN THE PRIMARY CAREGIVER PROFILE AND THE GENERAL PROFILE. GENERALLY, MOST OF THE RESPONDENTS DO NOT FEEL THAT OTHERS LOOK AT THEM NEGATIVELY. HOWEVER, ABOUT 40.0778% OF THE RESPONDENTS IN THIS PROFILE HAD ENCOUNTERED EMBARRASSING SITUATIONS BECAUSE THEY HAVE TO TAKE CARE FOR HAS ALZHEIMER'S DISEASE OR DEMENTIA. SIMILARLY, THOSE IN THIS PROFILE DO NOT FEEL THAT OTHERS TREAT OR LOOK AT THEM NEGATIVELY. HOWEVER, ABOUT 14.8629% OF THE RESPONDENTS HAD ENCOUNTERED EMBARRASSING SITUATIONS DUE TO A FAMILY MEMBER SUFFERING FROM ALZHEIMER'S DISEASE OR DEMENTIA WHO DOES NOT LIVE WITH THEM.



## What is Dementia?

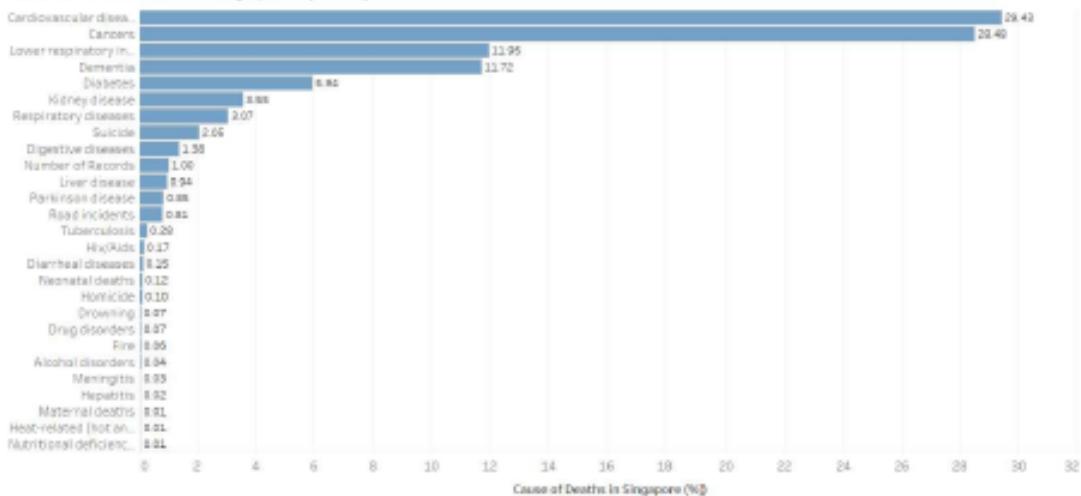
Overall term that describes a group of symptoms related to loss of memory resulting in a reduction of a person's ability to perform day to day activities.

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## Section A

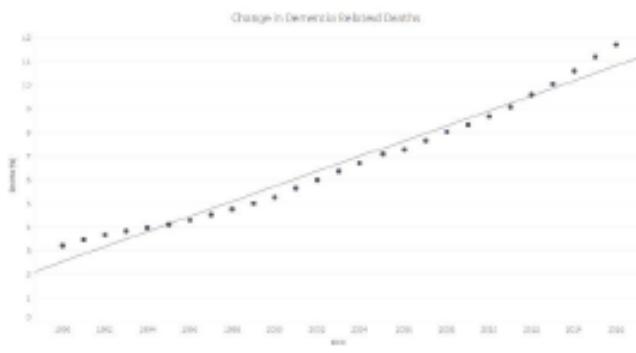
A2. Across the globe by the start of 2017, dementia ranked fourth from the top, as shown at right. Generate a similar chart which ranks the shares of deaths by cause in Singapore. What position does dementia take?

Causes of Deaths in Singapore (2016)



Dementia is the 4<sup>th</sup> leading cause of death in Singapore at the start of 2017, accounting for 11.72% of all deaths.

A3. Run a regression model of Singapore's trend in its share of deaths caused by dementia across the years from 1990 to 2016. Predict the figure to come by 2030. Is this cause for alarm?



Let x be the Year

Let y be the percentage of deaths caused by dementia

$\sum xy$	361674.3546
$\sum x$	54081
$\sum y$	180.3058667
$(\sum x)^2$	2924754561
$(\sum y)^2$	32510.20555
$\sum(x^2)$	108325881
$\sum(y^2)$	1374.462165
N	27

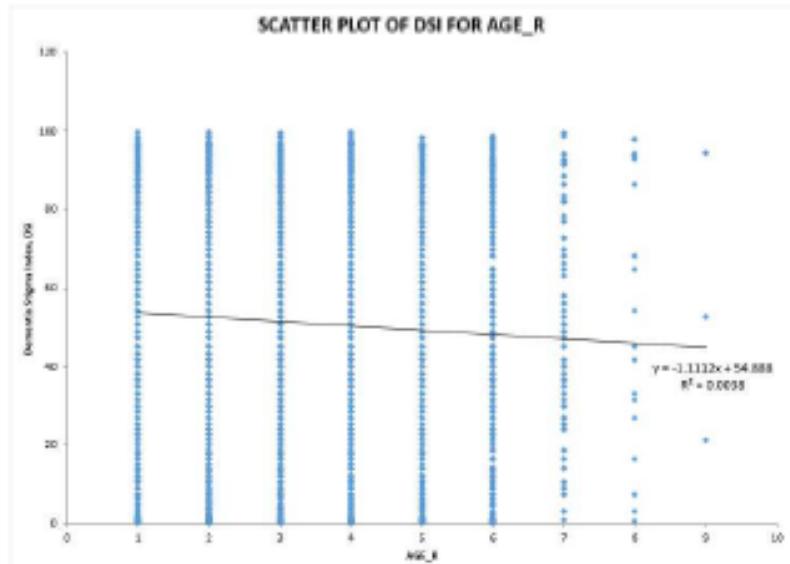
$$r = \frac{361674.3546 - \frac{(54081)(180.3058667)}{27}}{\sqrt{(\sum x^2) - \frac{(\sum x)^2}{27}} \cdot \sqrt{(\sum y^2) - \frac{(\sum y)^2}{27}}} \\ = 0.987545271985751 \\ = 0.9875 \text{ (rounded off to 4 s.f.)}$$

$$r^2 = 0.975245664 \\ = 97.5246\% \text{ (rounded off to 4 s.f.)}$$

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DSI A2. Show if evidence exists of a relationship between DSI and AGE\_R (original), providing full statistics.

AGE_R	
1	<21
2	21 ≤ x < 30
3	30 ≤ x < 40
4	40 ≤ x < 50
5	50 ≤ x < 60
6	60 ≤ x < 70
7	70 ≤ x < 80
8	80 ≤ x < 90
9	>90



Regression Statistics	
Multiple R	0.0614
R Square	0.0038
Adjusted R Square	0.0036
Standard Error	28.3274
Observations	5679

ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	17228.4463	17228.4463	21.4701	0.0000	
Residual	5677	4555448.1886	802.4393			
Total	5678	4572676.6349				

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	54.8879	0.8144	67.3955	0.0000	53.2914	56.4845	53.2914	56.48450
AGE_R	-1.1112	0.2398	-4.6336	0.0000	-1.5813	-0.6411	-1.5813	-0.64107

The scatterplot shows an almost negligible linear relationship between DSI and AGE\_R.

Since  $r = 0.0614$  is much closer to 0 than 1, there is very weak linear correlation between relationship between DSI and age. Since  $r^2 = 0.0038$ , which means that only 0.38% of the variation in the DSI is explained by the variability of age while 99.62% of the variability in the DSI is due to others factors not present in the regression model.

Let  $\rho$  be the true linear correlation coefficient between DSI and age.

$$H_0: \rho = 0$$

$$H_1: \rho \neq 0$$

From the regression ANOVA,  $p\text{-value} = 0.0000$ . Since  $p\text{-value}$  is small, we have strong evidence that there is a significant relationship between DSI and age.