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Original Research Article

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A study on Epidemiology of Mortality rates associated with Diabetes Mellitus and coronary heart disease as risk factors in Australia

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Conflicts of Interest: None

Abstract

This study looks at how diabetes rates, heart attack rate and deaths have changed in Australia from 2022 to 2026. Diabetes is a long-term illness with high blood sugar levels. It is the 7th leading cause of death in Australia. About 1.2 million Australians have diabetes. We used data from the National Health Survey by AIHW and ABS to study how age, gender, income level, where people live, and hospital access affect both Type 1 and Type 2 diabetes.

The results show that men have higher rates of diabetes and more diabetes-related deaths than women for both Type 1 and Type 2. Type 1 diabetes is most common in children and young people and drops with age. Type 2 diabetes is most common in adults over 45 and increases with age. People with low income had much higher rates of diabetes, more hospital visits, and more deaths - 7% compared to 3.3% in higher income groups. People living in remote areas also had higher rates at 5.3–6.0%, compared to 4.2–4.8% in big cities.

The study also found that cases of gestational diabetes went up between 2022–2026. Overall, diabetes affects some groups more than others. Men, older adults, low-income people, and those in remote areas are at highest risk. The study used large national data, which is a strength, but it was hard to capture all social factors. The results show we need better prevention programs and better hospital access to reduce deaths and close the gaps between different groups. Cox regression analysis showed that having coronary heart disease or absence of foot pulses at the time of entrance to the study were the major independent risk factors for overall mortality after adjustment for initial age. Elevated cholesterol and blood pressure were found to be major independent risk factors for death from coronary heart disease.

Keywords: Diabetes Mellitus, Heart Attack, Cholesterol and Blood Pressure

Introduction

Diabetes mellitus is a chronic condition characterized by high blood glucose levels causing metabolic disorders over prolonged time. According to (AIHW, 2020), access to hospitalization, socioeconomic status, age, gender and remote living conditions and indigenous status pose significance impact on mortality rates associated with diabetes.

Diabetes mellitus are classified as type 1 and type 2 diabetes with gestational diabetes as prediabetic condition. Currently, 1.2 million Australians are affected by Diabetes. Diabetes was ranked seventh position on leading cause of death in Australia during 2018. (NHS, 2018). The incidence of diabetes is higher in males than females in Australia and expected to increase 3.6% since 2000. Type 1 diabetes is also known as insulin-dependent diabetes is caused by decreased or lack of synthesis of insulin due to destruction of pancreatic B cells.

The risk factors associated with type 1 is genetic and destruction of pancreas due to viral infections. Type 1 Diabetes is largely observed in young children and adolescent individuals. Type 2 diabetes is metabolic disorder manifested by hyperglycemia and related to the lack of insulin secretion. According to (Dunstan et al, 2002), the prevalence of diabetes progresses with the age in Australia. Moreover, (AusDiab, 2020) reports that 16% incidence of diabetes are due to impaired glucose tolerance.

Cardiovascular disease (CVD) is a major cause of death and disability among people with diabetes. Adults with diabetes historically have a higher prevalence rate of CVD than adults without diabetes, and the risk of CVD increases continuously with rising fasting plasma glucose levels, even before reaching levels sufficient for a diabetes diagnosis

Survey Study

Diabetes is a prolonged disorder observed by extreme levels of glucose in the blood. The major types of diabetes are type1, type2 and gestational diabetes. Type 2 diabetes is the very regular form and is mostly avoidable by conserving a healthy way of life.

A specification of type 2 diabetes is blood sugar cannot use the effective energy in the cells. This cells may happen will not sensitive to insulin and rapidly too high in the blood sugar. In Australian Institute of Health and Welfare (AIHW) are developed the examining information on the occurrence, hospitalization and demises from the diabetes containing type1 and type 2 diabetes and gestational diabetes. In Australia that informed on a systematic foundation on the AIWH website to confirm the record up to the date developments and information are easily reachable and obtainable. Practically 1million of Australian adults 5.3% age and over affected the type 2 diabetes in 2017-18. Conferring to self-reported data from the Australian Bureau of Statistics (ABS) in 2022.-2026.

Comparisons are marginally higher for men than women. Men 6.1%, female 4.6% are affected this diabetes. Specialized rates for men remained superior than women from age 45 affected the type 2 diabetes. Most of the cities affected the diabetes in inner region (4.8%) and outer region (4.2%) and also remote areas (6%) in Australian countries. In lowest social and economic factor areas range (7.0%) equated with highest economic factor (3.3%) causes the disease.

Risk factors of Diabetes

The common risk factors of Diabetes include:

1. Genetic mutations in Chromosome 6, HLA
2. Familial history
3. Race
4. Obesity
5. Sedentary lifestyle
6. Pancreatic infections
7. Poor nutritional habits

Social economic status on mortalities associated with Diabetes

In a study conducted reported that individuals with low socioeconomic status are highly associated with the comorbidities and mortalities associated with the type 1 and 2 diabetes. This social gradient possesses high influence on onset of diabetes among Australians. Diabetes Australia also reported that low socio economic status has been strongly associated with the prevalence of diabetes in Australia.

Access to Hospitalization

According to (AIHW, 2026), hospital care accounts for the largest component of expenses related to diabetes associated mortalities. Diabetes related hospitalization is rapidly increasing in Australia since 2022. It is estimated that one in ten adults would be diabetic by 2040 in Australia, which demands the increase in the hospital care. Poor hospital care is one of the determinants of mortalities associated with the Diabetes among Australian population. Focusing on diabetes hospital rates would provide the big picture about discrepancies that currently exists while treating diabetic patient in Australia.

Remoteness of living

The prevalence of rate of diabetes in major cities is higher than remote regions. However, prevalence of diabetes among aboriginal communities is 29% higher than non-aboriginal Australians. Lifestyle related risk factors are largely associated with the onset of diabetes among people dwelling in major Australian cities.

Age

Individuals 65 years old and higher are more likely incident with Diabetes around Australia. The incident and mortality rates of Diabetes increases with the increase of age. The mortality rate of diabetes is 15% higher among 70-year-old and above than other age groups. The incident of diabetes among 45 age and above is 10.2% in Australia.

Gender

Diabetes related mortality is largely reported among males (55%) than women (45%). The rate of diabetes is steadily increasing over years during 2022 to 2026 due to numerous risk factors among Australian communities.

Methodology

Objective

The main aim of the study is to evaluate the epidemiological trends associated with mortalities of Diabetes mellitus among Australian population.

Analysis

The study adopted quantitative research methods to solve the research problem of interest. The data was gathered from secondary research sources. The study employed the National Health Survey conducted by AIHW during 2022 – 2026 among Australian residents. The data was preprocessed and cleaned prior to the analysis. The data was analyzed using SPSS software version 21.

Findings

Participants

The study participants were individuals living in Australia aged between 1 – 75 years old. The study covered both Australians and aboriginals. The key determinant variables are prevalence of diabetes among age group, gender, remoteness of living, socioeconomic status. The death associated with gender, age, socioeconomic status,

hospitalization. Most of the Australians participated in the research. The study covered the incidence and deaths associated with diabetes during 2022 – 2026.

Results

Prevalence of Type 1 Diabetes in Australia

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Male_T1DM	16	4.20	35.80	12.6938	8.63909
Female_T1DM	16	1.40	31.90	9.6063	9.08453
Year	19	2000	2018	2009.00	5.627
Below_14yr	19	853	1126	1032.68	70.888
Below_24yr	19	405.00	565.00	494.2105	48.35124
Above_25yr	19	811.00	1178.00	990.2632	111.66957
Valid N (listwise)	16				

The above table reveals the summary of prevalence of type 1 diabetes in Australia (number of 100,000 populations). The mean prevalence of diabetes is higher among female than male during 2022 – 2026 The average incidence of type 1 diabetes in male is 12.69 whereas for female, 9.60. The above table also shows that mean incidence of type 1 diabetes is 1032.68±70.88. However, the maximum prevalence of type 1 diabetes mellitus was observed among individuals above 25 years.

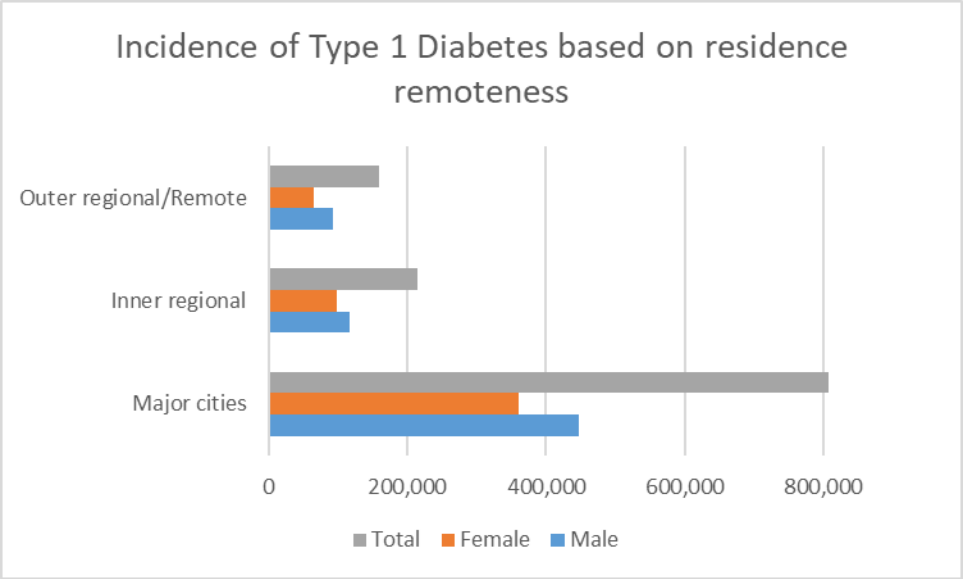
Prevalence of Type 2 Diabetes in Australia

Descriptive Statistics

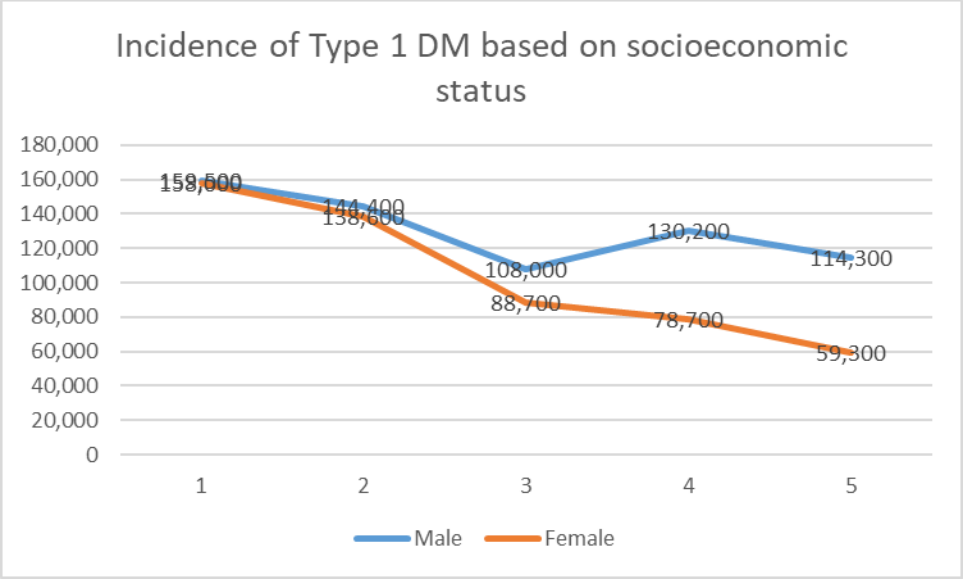
	N	Minimum	Maximum	Mean	Std. Deviation
Male_T2DM	5	30,400	185,300	111,100.00	62,310.794
Female_T2DM	5	36,300	124,000	88,320.00	41,663.377
Valid N (listwise)	5				

The above table shows that the incidence of type 2 diabetes in male (M111100 ±62310) higher than female (M88320±41663SD) at 95% C.I. The minimum count of type 2 diabetes is 36,300 which is higher than incidence rate in male which is 30,400.

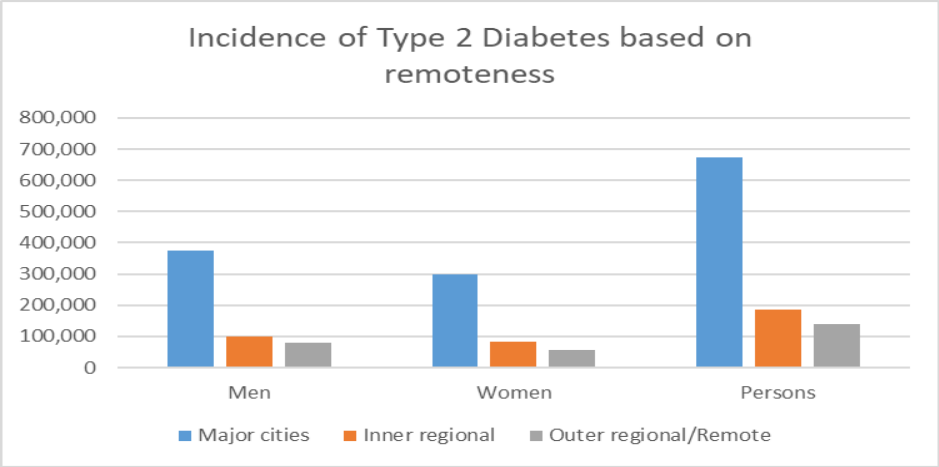
Remoteness of residence



The above graph clearly reveals that incidence of Type 1 diabetes is higher when compared with inner region and outer remote regions of Australia. The total incidence on remote areas of Australia is extremely less. Incidence rate is very high in male than female.

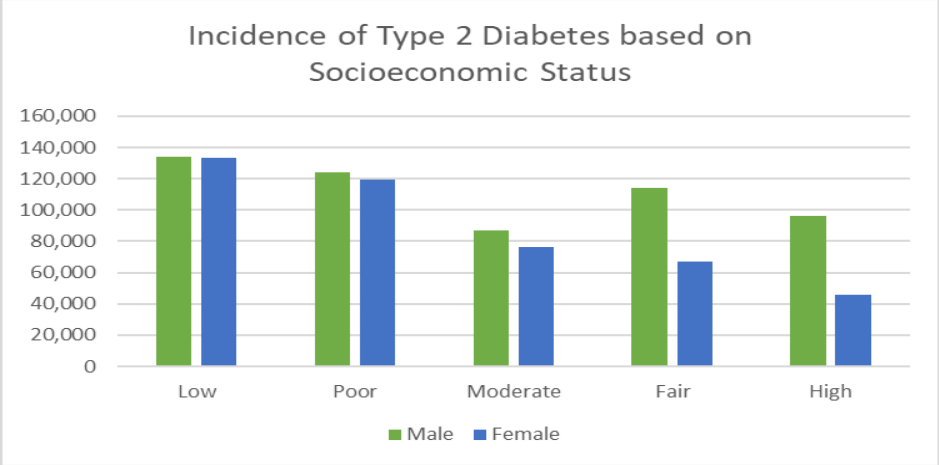


The incidence of type 1 diabetes is recorded high among people with low socio economic status among male and female. The prevalence rate of Type 1 diabetes decreases with the increase of socio economic status of individuals living in Australia.



The incidence of type 2 diabetes is largely observed in major cities and highly seen among males than females.

Socioeconomic status



The incidence of type 2 diabetes is higher in low and poor economic status individuals. However, individuals with moderate socioeconomic status. The prevalence of type 1 diabetes among high and fair socioeconomic cringe level individuals are lesser than individuals from lower economic status in Australia.

Mortality rates of Type 1 Diabetes based on Gender

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Year_T1DM	22	1997.00	2018.00	2007.5000	6.49359
Male_Death_T1DM	22	67.00	78.00	71.5455	2.61365
Females_Death_T1Dm	22	41.00	49.00	44.5455	1.96946
Male_Death_T2DM	22	18.00	22.00	20.1364	1.08213
Female_Death_T2DM	22	12.00	15.00	13.4545	.73855
GD	6	101.00	2204.00	1081.0000	810.04889
Valid N (listwise)	6				

The mean male deaths (M71.54 ± 2.61 S. D) is found to be higher than female (M44.54±1.96 S.D) for Type 1 diabetes during 2015 to 2022. The average male death caused due to type 2 diabetes (M20.13± 1.08 SD) than female (M13.45 ± 0.73 SD). The average incidence of gestational diabetes among female is M1081±810 S.D.

Mortality rates of Type 2 Diabetes based on Gender

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Male_Death_T2DM	22	18.00	22.00	20.1364	1.08213
Female_Death_T2DM	22	12.00	15.00	13.4545	.73855
Valid N (listwise)	22				

Regression analysis

Age differences in prevalence rate of Type 1 Diabetes in Australia

Descriptive Statistics

	Mean	Std. Deviation	N
Age_Gp	8.50	4.761	16
Male_T1DM	12.6937	8.63909	16
Female_T1DM	9.6063	9.08453	16

The mean prevalence rate of Type 1 diabetes is higher in male than female among six different age groups in Australia

Correlations

		Age_Gp	Male_T1DM	Female_T1DM
Pearson Correlation	Age_Gp	1.000	-.796	-.770
	Male_T1DM	-.796	1.000	.951
	Female_T1DM	-.770	.951	1.000
Sig. (1-tailed)	Age_Gp	.	.000	.000
	Male_T1DM	.000	.	.000
	Female_T1DM	.000	.000	.
N	Age_Gp	16	16	16
	Male_T1DM	16	16	16
	Female_T1DM	16	16	16

The Pearson's r value for impact of age group on male prevalence rate is -0.79, female prevalence rate is 0.77 at 95% C.I. The r value is close to 1 and observed to be negative. It emphasis that there exists age differences in the incidence of type 1 diabetes. The incidence rate differences with the age group of individuals.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.797[a]	.635	.578	3.091	.635	11.291	2	13	.001

a. Predictors: (Constant), Female_T1DM, Male_T1DM

The R squared value of this model is 0.79 at 95% C.I. This infers that this model is 79% accurate to predict the impact of age on the incidence. The standard error rate of the model is 30%.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	215.778	2	107.889	11.291	.001[a]
	Residual	124.222	13	9.556		
	Total	340.000	15			

a. Predictors: (Constant), Female_T1DM, Male_T1DM

b. Dependent Variable: Age_Gp

The F (11.29) has alpha value 0.001>0.005 at 95% CI. This shows that there exists a statistical significant difference between age group and female as well as male type 1 diabetes prevalence rates in Australia

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	13.851	1.659		8.348	.000	10.266	17.435
	Male_T1DM	-.369	.300	-.670	-1.229	.241	-1.018	.280
	Female_T1DM	-.069	.286	-.132	-.243	.812	-.686	.547

a. Dependent Variable: Age_Gp

The regression equation of the model

Age group = 13.85 – 0.36 (Male_T1DM) – 0.69 (Female_T1DM)

The incidence rate of type 1 diabetes in male and female decreases with increase in age. The decrease of incidence is lesser in female and male. Hence, it is concluded that age has significant impact on incidence of type1 diabetes which is largely observed in younger population.

Impact of Socioeconomic status on morbidity related to type 2 diabetes (Access to hospitalization

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.976[a]	.953	.905	.48606	.953	20.163	2	2	.047

a. Predictors: (Constant), Female, Male

The R squared value of model is 0.976 at 95% C.I. This model has 97% accurate to predict the relationship between socioeconomic status and morbidity related to Type 2 diabetes

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	10.415	5.467		1.905	.197	-13.107	33.936
	Male	-.002	.004	-1.225	-.467	.687	-.021	.017
	Female	.000	.004	.249	.095	.933	-.018	.019

a. Dependent Variable: Socioeconomic status

The socioeconomic status has negative relationship with hospitalization rate of male type 2 diabetes affected individuals whereas no relationship with female. This infers that access to hospitalization is seriously affected by socioeconomic status of the type 2 diabetes.

Impact of socioeconomic status on mortality associated with Diabetes

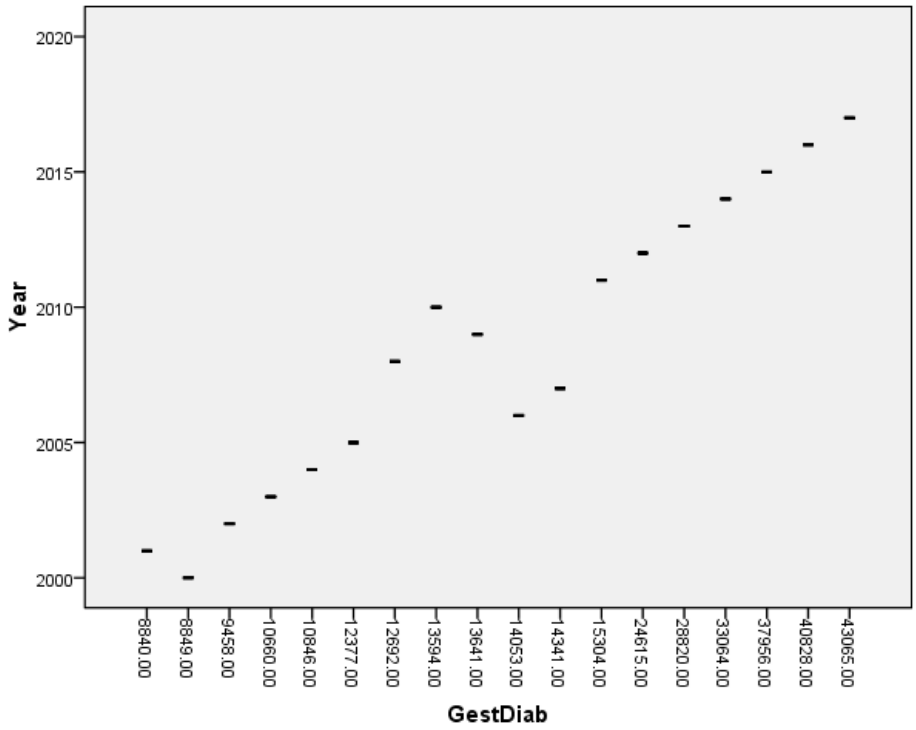
Coefficients[a]

Model		Unstandardized Coefficients		SD Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.009	.278		25.208	.002	5.813	8.205
	Male_death_prop	.088	.029	1.126	2.994	.096	-.038	.214
	Female_death_prop	-.247	.044	-2.112	-5.618	.030	-.435	-.058

a. Dependent Variable: Socio economic status

The above regression model infers that socioeconomic status exhibits positive relationship with male death and negatively associated with female death. Hence, it is concluded that male is largely impacted by mortalities associated with diabetes concerning with socioeconomic status in Australia.

Incidence of Gestational Diabetes in Australia



The above graph clearly shows the increase in the prevalence of gestational diabetes during 2022 – 2026.

Discussion

The study has analyzed the prevalence and morbidities associated with Diabetes in Australia. The study findings once again confirmed that prevalence of Diabetes and its associated mortalities. Male shows increased likelihood for prevalence of diabetes and morbidities than females in Australia. The study shows slight variations in the prevalence of diabetes in 2022–2026 for both males and females by level of remoteness with 4.3% in Major cities, 3.9% in Inner regional areas and 5.3% in Outer regional and remote areas (Evans et al, 2000; Green, 2014; Grace et al, 2012). The prevalence of diabetes increased with the level of socioeconomic disadvantage for both males and females from 3.2% in the least disadvantaged areas up to 6.3% in the most disadvantaged areas. Socioeconomic and hospitalization rate status plays immense role in prevalence and mortalities associated with both Type 1 and Type 2 diabetes. Moreover, the study found strong statistical relationship between elderly age group on onset and mortalities than young individuals. (Williams et al, 2010).

Conclusion

The study focused the evaluation of epidemiological trends of Prevalence and mortality rates of Diabetes in Australia. The study intended on key determinants such as age, gender, socioeconomic status, remoteness of living and indigenous status. The study was performed using National Health Survey dataset conducted by Australian Bureau of Statistics. The study observed the increase of diabetes rate with respect to age, male affected slightly

higher than female and low economic status individuals largely presented with mortalities of Diabetes.

synthesize global prevalence rates of CVD, including stroke, MI, angina, heart failure, atherosclerosis and CAD among people with T2DM. The results show that CVD is a major cause of comorbidity and death among patients with T2DM with CAD having the highest prevalence. There is a paucity of research studies investigating both the prevalence of CVD and risk factors such as obesity among people with T2DM.

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