EPIDPP25/101

PPPKAM

MINISTRY OF HEALTH MALAYSIA

NIH

INSTITUT KESIHATAN NEGARA
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SURVIVAL ANALYSIS OF NEWLY DIAGNOSED DIABETES MELLITUS :

FINDINGS FROM THREE POPULATION-BASED SURVEYS

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INTRODUCTION

- Diabetes is a serious, long-term condition with a major impact on the lives and well-being of individuals, families, and societies worldwide.
- In Malaysia, the number of cases with diabetes is increasing. The National Health and Morbidity Survey (NHMS) in 2019 reports that the prevalence of diabetes among adults in Malaysia was 18.3%[1]
- Diabetes is among the top 10 causes of death in adults, and was estimated to have caused four million deaths globally in 2017[2]

OBJECTIVE

- This study was conducted to determine the mortality and its contributing factors among newly diagnosed DM

METHODOLOGY

- This study used data from three National Health and Morbidity Survey (NHMS) (ie : NHMS 2006, NHMS 2011, NHMS 2015).
- All these NHMS employed a multi-stage stratified sampling design proportionate to the population size throughout all state in Malaysia, covering both urban and rural areas
- The population in this analysis were newly-diagnosed DM in these three NHMS
- Measurement of fasting blood glucose was performed on finger-prick blood samples using the CardioChek portable blood test system, only on respondents who claimed to be not diabetic
- Definition of "undiagnosed diabetes" for the purpose of this study is when the respondent was not diagnosed to have T2DM previously but had a fasting capillary blood glucose (FBG) of ≥ 6.1mmol/L[3]
- Ascertainment of deaths among the NHMS cohort during this period was obtained by record-matching of the identification number with the NRD death record
- Participants were followed up for 7.5 years from the day they were interviewed in respective NHMS
- Statistical analyses were performed using SPSS Version 26
- Kaplan-Meier survival curve was used to analyse time to event data
- Multiple Cox regression was applied to compare risk of mortality among newly diagnosed DM

RESULTS

- There were 5021 newly diagnosed Diabetes Mellitus in this study
- The sociodemographic of the respondents were summarize in Table 1

Table 1 : Sociodemographic Characteristic of Respondents

Characteristics		n	%
Age (years) [mean/sd]		47.7 (14.91)	
Gender	Male	2493	49.7
	Female	2528	50.3
Ethnicity	Malays	3136	62.5
	Chinese	892	17.8
	Indians	467	9.3
	Other Bumiputra	392	7.8
	Others	134	2.7
Locality	Urban	2888	57.5
	Rural	2133	42.5
Year of NHMS	NHMS 2006	1466	29.2
	NHMS 2011	1558	31.0
	NHMS 2015	1997	39.8
Hypertension status	Yes	2603	48.1
	No	2416	51.9

- Total follow-up time was 36,638 person-years with 461 deaths (9.2 %)
- Figure 1 to Figure 5 showed the survival function for newly diagnosed DM according to gender, ethnicity, locality, year of NHMS & hypertension status

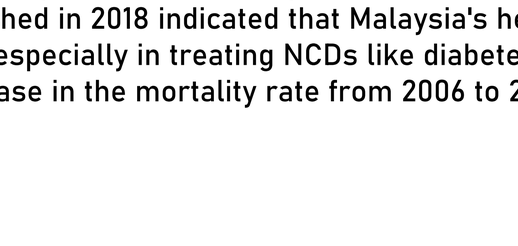

Figure 1 : Survival Function by Gender

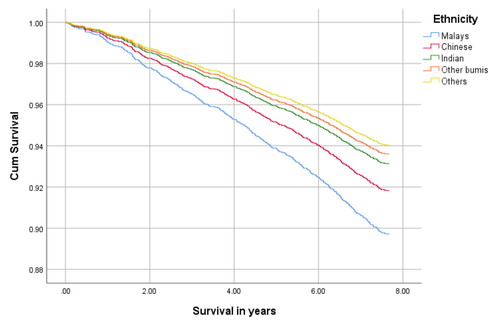

Figure 2 : Survival Function by Ethnicity

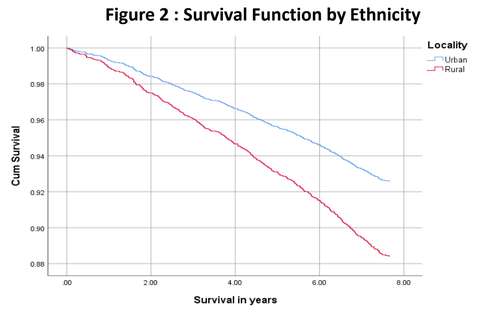

Figure 3 : Survival Function by Locality

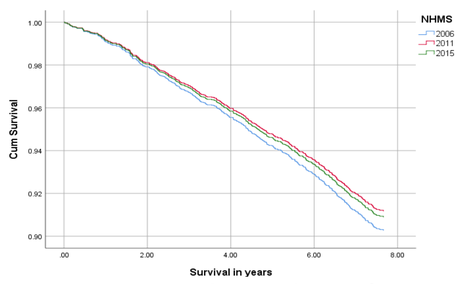

Figure 4 : Survival Function by Year of NHMS

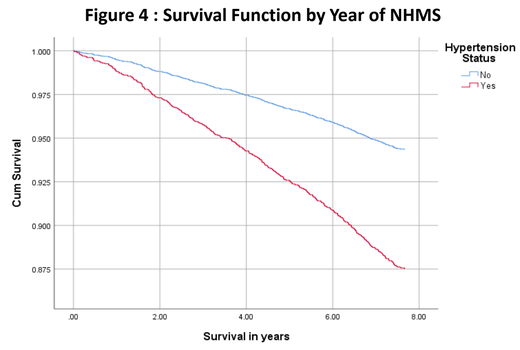

Figure 5 : Survival Function by Hypertension Status

- The risk of dying was higher among male, rural area and with increasing age
- The timing of diagnosis also a significant factor as those diagnosed in 2006 had higher risk compared with those diagnosed in 2015
- No association of mortality with ethnicity and hypertension status (Table 2)

Table 2: Risk factors for mortality among newly diagnosed Diabetes Mellitus

Variable		HR	p-value	Adj. HR	p-value
Age		1.08 (1.07-1.09)	<0.001	**1.08 (1.07-1.09)**	**<0.001**
Gender	Male	1.45 (1.15–1.83)	0.002	**1.62 (1.30-2.02)**	**<0.001**
	Female	Ref		**Ref**	
Ethnicity	Malays	1.96 (0.80-4.60)	0.145	1.11 (0.46-2.65)	0.821
	Chinese	1.45 (0.59-3.89)	0.424	0.60 (0.24-1.49)	0.267
	Indians	1.17 (0.44-3.16)	0.751	0.99 (0.37-2.66)	0.980
	Other Bumi	1.07 (0.40-2.87)	0.892	0.82 (0.31-2.15)	0.688
	Others	Ref		Ref	
Locality	Rural	1.71 (1.35-2.17)	<0.001	**1.35 (1.06-1.72)**	**0.014**
	Urban	Ref		**Ref**	
NHMS	NHMS 2006	1.63 (1.26-2.11)	<0.001	**1.59 (1.22-2.07)**	**0.001**
	NHMS 2011	1.33 (0.98-1.79)	0.063	1.31 (0.98-1.74)	0.071
	NHMS 2015	Ref		**Ref**	
Hypertension	Yes	2.80 (2.16-3.64)	<0.001	1.20 (0.92-1.57)	0.171
	No	Ref		Ref	

CONCLUSION

- The risk for mortality among newly diagnosed DM was higher among male, increasing age and living in rural area
- Therefore, early detection with prompt treatment should be targeted among this groups in order to reduce the number of mortalities among newly diagnosed DM

DISCUSSION

- Men may have a higher risk of mortality from diabetes due to differences in disease management and health behaviour. Men are often less likely to seek regular medical care and may have poorer adherence to medication and dietary guidelines[4]
- Age is a well-known risk factor for many diseases, including diabetes. As people age, they are more likely to develop comorbidities, which can complicate the management of diabetes and increase the risk of mortality[5]
- People living in rural areas often have less access to healthcare services, including regular check-ups, screening, and management of diabetes. This can lead to poorer health outcomes and higher mortality rates[6]
- The Malaysian healthcare system has seen substantial improvements over the years. A study published in 2018 indicated that Malaysia's healthcare access and quality have improved over time, especially in treating NCDs like diabetes[7]. This improvement can contribute to a decrease in the mortality rate from 2006 to 2015

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The authors would like to thank the Director General of Health, Malaysia, for permission to present this poster