



The Effect of Diabetes Mellitus and
Hypertension amongst Indonesian Hajj
Pilgrims on Health Hajj Services

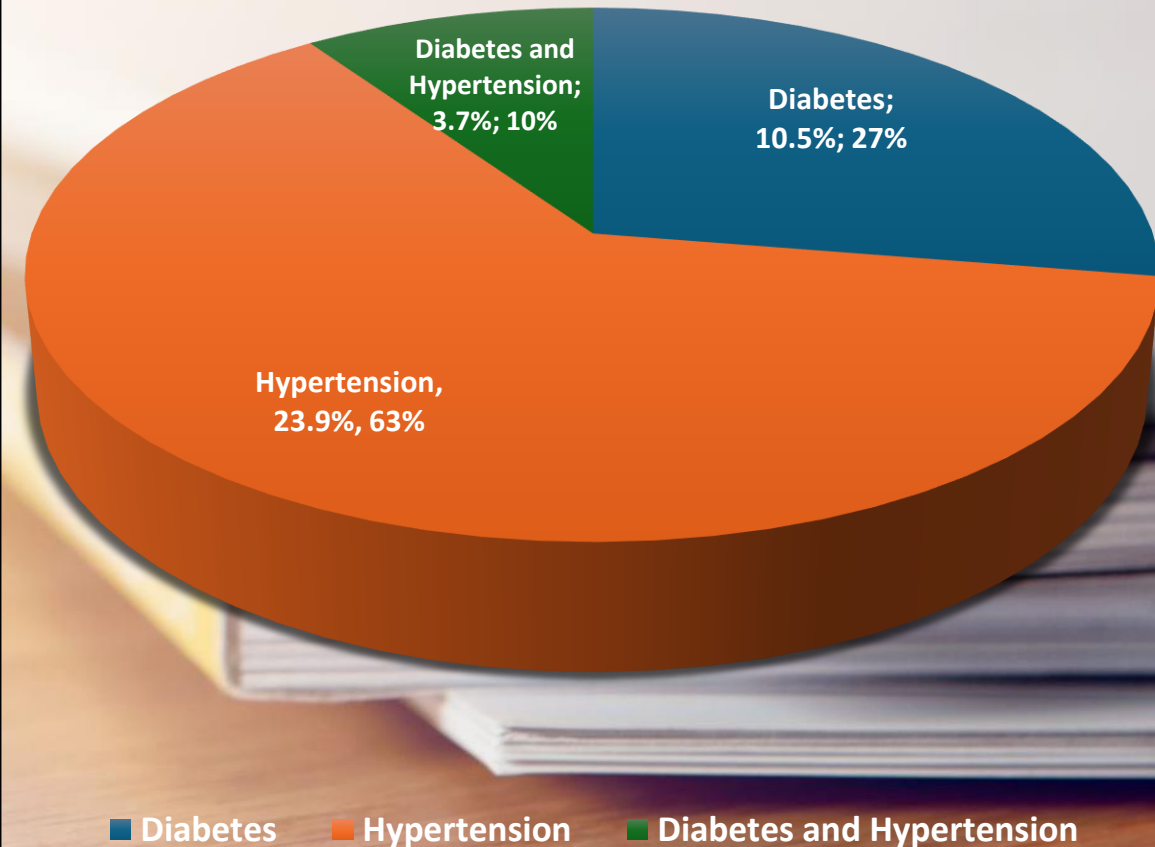
Masdalina Pane



Acknowledgement

Introduction

- Indonesia has the most Hajj pilgrims worldwide (11%).
- Hypertension (HT) and Diabetes (DM) are the most diseases burden for Indonesian hajj in the last 8 years
- Prevalence for DM (10.5%), HT (23.9%) dan both (3.7%) and increase in 2023 become DM (10.6%), HT (26.7%) dan both (4.1%)
- Hospitalization (inpatient) amongst Indonesian Hajj pilgrims : 0.8-1.2%
- Mortality rate 200 – 450 per 100,000 haj except in 2022 (112 per 100,000 haj)





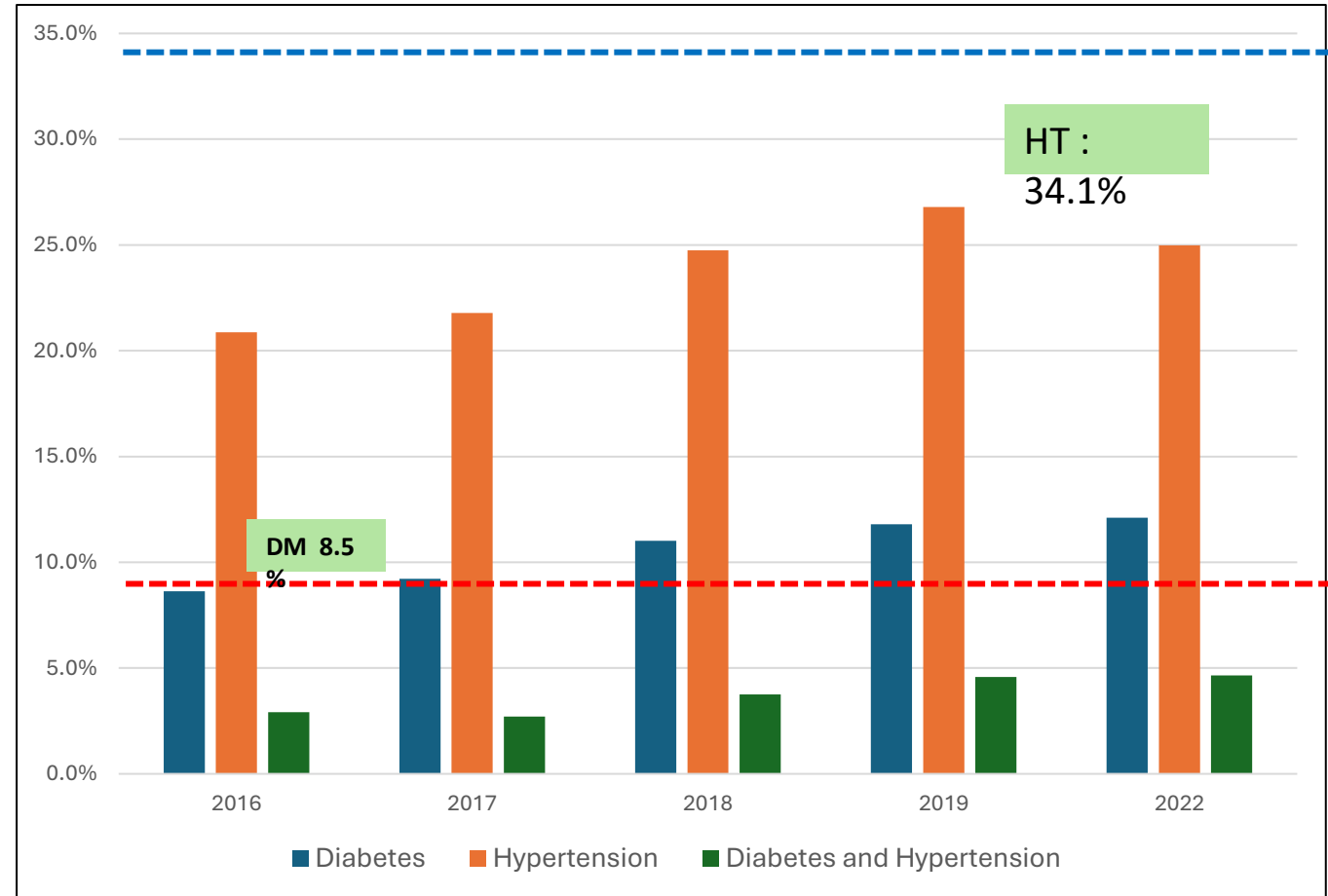
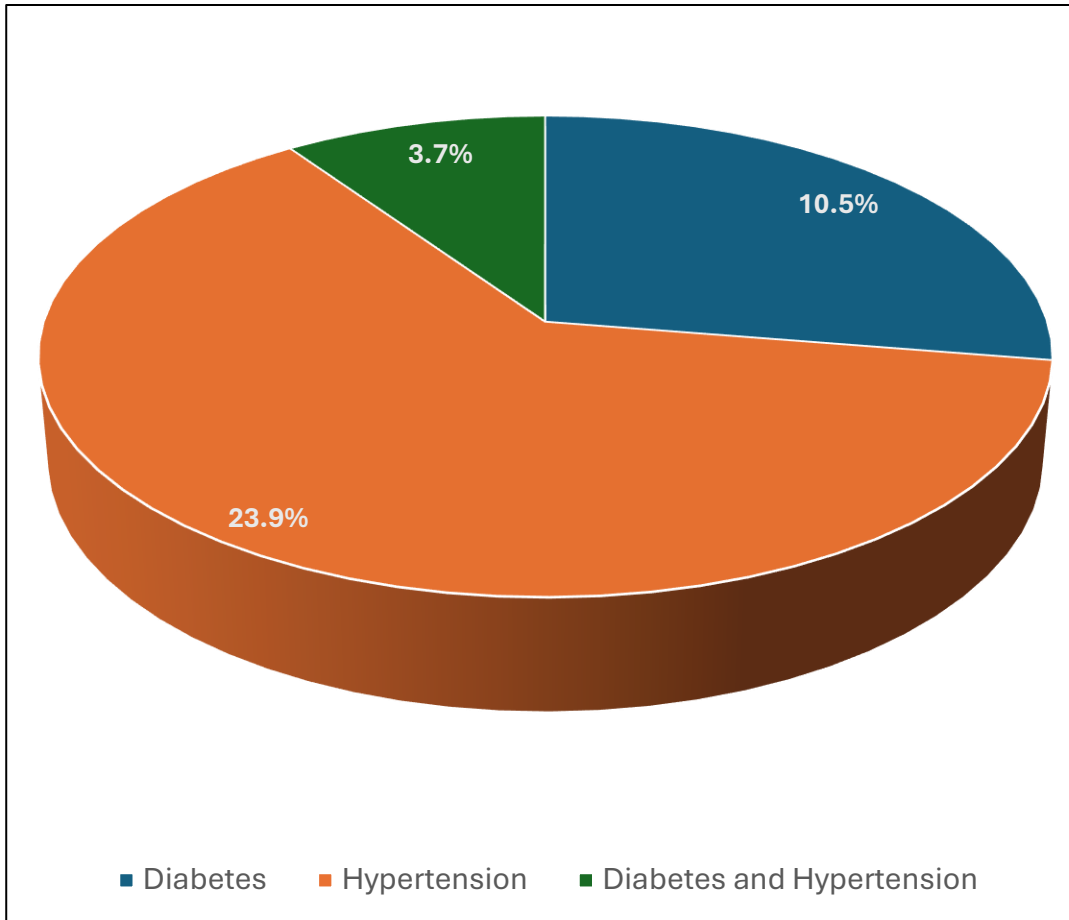
Objectives

- **To determine effect of Diabetes and Hypertension amongst Indonesian hajj Pilgrims**
- **To develop hajj health prevention models for high risk**

Methods

- The Quantitative Research with cohort prospective design using secondary data from Indonesian Hajj pilgrims 2016 – 2022
- The unit analysis is 1,089,224 hajj, spatial analysis carried out on Hajj pilgrims in 2023
- The Qualitative approach was conduct through in-depth interviews and focus group discussions with heads of Health Services, Hajj program managers, and field implementers at Community Health Centres.
- Analysis used binary logistic (multiple logistic regression)
- The Prediction Model is using the Adams-Bashforth-Moulton and Runge-Kutta methods through the use of MAPE (Mean Absolute Percentage Error)

Diabetes Mellitus and Hypertension



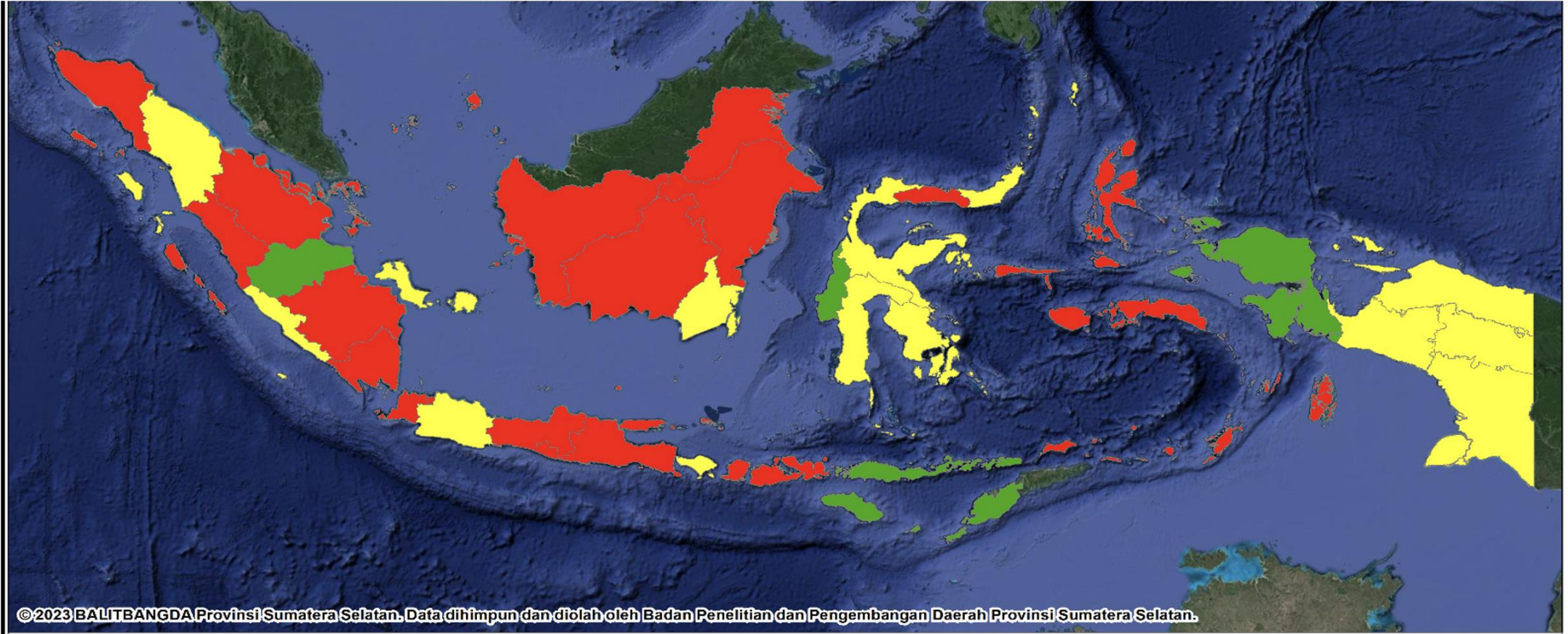
Trends in Prevalence of Diagnosed Diabetes, Hypertensions, and Both DM+HT among Indonesian Hajj, 2016–2023

	Prevalence						Overall
	2016	2017	2018	2019	2022	2023	
Total	156356	205485	205874	215377	93608	212524	1.089.224
Diabetes	13487 (8.5%)	18934 (9.2%)	22688 (11.0%)	25399 (11.8%)	11338 (12.1%)	26638 (12.5%)	115367 (10,6%)
Hypertension	32643 (20.9%)	44752 (21.8%)	50961 (24.8%)	57703 (26.8%)	23386 (25.0%)	68637 (32,3%)	290444 (26,7%)
DM+HT	4563 (2.9%)	5579 (2.7%)	7724 (3.8%)	9868 (4.6%)	4351 (4.6%)	12481 (5,87%)	44999 (4,1%)

Characteristics	Number (%)	Diabetes (%)	Hypertension (%)	DM and HT (%)
Total	876700	91846 (10,5%)	209445 (23,9%)	32085 (3,7%)
Age				
< 65 years old	754349 (86.0%)	52582 (7.0%)	139291 (18.5%)	26737 (3.5%)
≥ 65 years old	122351 (14.0%)	7179 (5.9%)	38069 (31.1%)	5348 (4.4%)
Sex				
Male	391970 (44.7%)	28445 (7.3%)	75461 (19.3%)	13519 (3.4%)
Female	484730 (55.3%)	31316 (6.5%)	101899 (21%)	18566 (3.8%)
Education				
Higher Education	362030 (41.4%)	25528 (7.1%)	69728 (19.3%)	13501 (3.7%)
Secondary Education	294232 (33.7%)	20720 (7%)	55936 (19%)	10813 (3.7%)
Primary and Illiterate	217354 (24.9%)	13315 (6.1%)	50902 (23.4%)	7655 (3.5%)
Occupation				
Farmer	108883 (12.4%)	5169 (4.7%)	25802 (23.7%)	2762 (2.5%)
Civil Servant	192568 (22.0%)	14749 (7.7%)	35090 (18.2%)	7436 (3.9%)
Police/Military	8534 (1.0%)	730 (8.6%)	1528 (17.9%)	330 (3.9%)
Housewife	241600 (27.6%)	15698 (6.5%)	55099 (22.8%)	9972 4.1%)
Student	12690 (1.4%0	258 (2%)	580 (4.6%)	90 (0.7%)
Business Employee	278331 (31.7%)	20549 (7.4%)	49781 (17.9%)	9637 (3.5%)
Retired	34080 (3.9%)	2608 (7.7%)	9477 (27.8%)	1858 (5.5%)

Characteristics	Number (%)	Diabetes (%)	Hypertension (%)	DM and HT (%)
Total	876700	91846 (10,5%)	209445 (23,9%)	32085 (3,7%)
High Risk	466679 (55.6%)	53617 (11.5%)	159853 (34.3%)	29686 (6.4%)
Non-High Risk	372958 (44.4%)	5780 (1.5%)	16163 (4.3%)	2249 (0.6%)
Hajj Status				
Hajj Pilgrims	860201 (98.1%)	59289 (6.9%)	176737 (20.5%)	31941 (3.7%)
Hajj Officer	16499 (1.9%)	472 (2.9%)	623 (3.8%)	144 (0.9%)
Smoking Status	97953 (13.6%)	6942 (7.1%)	19135 (19.5%)	3164 (3.2%)
Non-Smoking	621793 (86.4%)	44739 (7.2%)	133165 (21.4%)	24938 (4%)
Route				
Route I	380508 (43.4%)	26537 (7%)	81789 (21.5%)	15608 (4.1%)
Route II	496192 (56.6%)	33224 (6.7%)	95571 (19.3%)	16477 (3.3%)
BMI				
Normal (18.5-22.9)	231153 (26.4%)	14769 (6.4%)	42815 (18.5%)	7113 (3.1%)
Low IMT (<18.5)	32875 (3.7%)	1903 (5.8%)	6307 (19.2%)	755 (2.3%)
Over Weight (23-24.99)	175794 (20.1%)	12359 (7.0%)	33389 (19%)	6269 (3.6%)
Obesity (25 – 29.99)	320116 (36.5%)	22566 (7%)	66922 (20.9%)	12728 (4%)
Very Obese (>30)	116762 (13.3%)	8164 (7%)	27927 (23.9%)	5220 (4.5%)
Outpatient	653622 (74.6%)	47523 (7.3%)	140335 (21.5%)	26484 (4.1%)
Hospitalize	8978 (1.0%)	1082 (12.1%)	2327 (25.9%)	750 (8.4%)
Mortality	1942	200 (22.8 per 100 000)	500 (57 per 100 000)	132 (15.1 per

Distribution of Diabetes Mellitus for the Indonesian Hajj



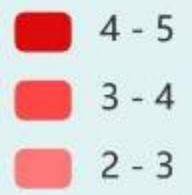
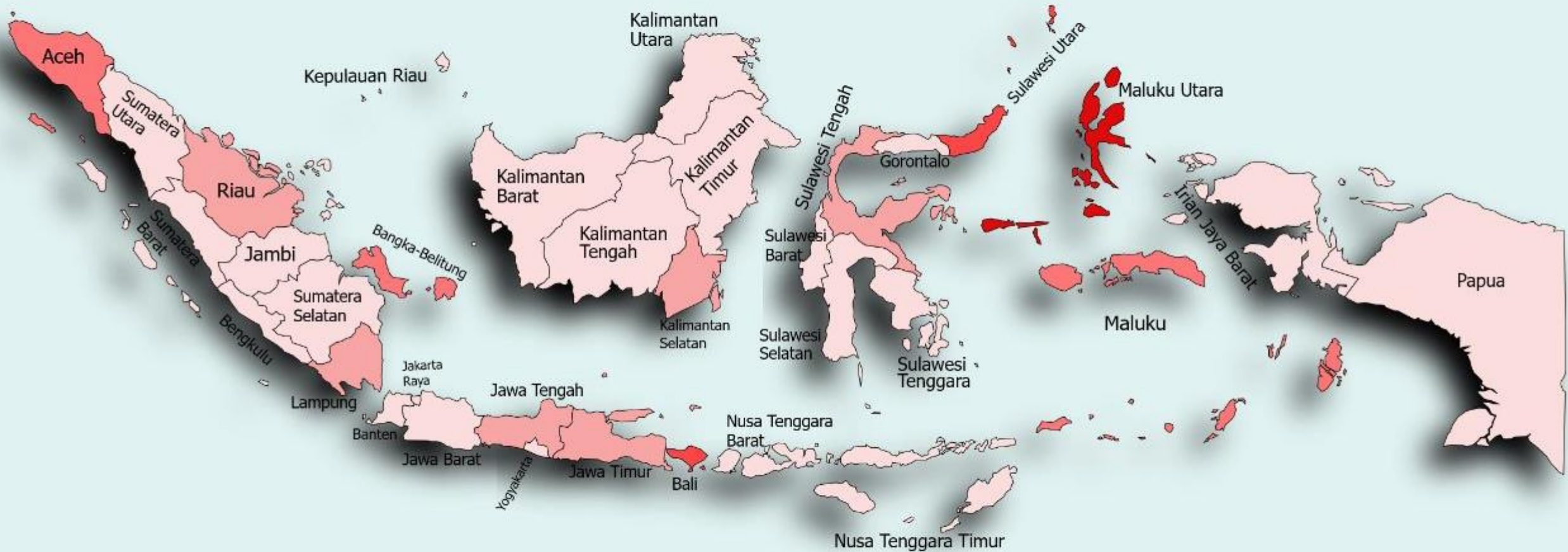
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KETERANGAN
Penderita Diabetes Mellitus Berdasarkan Provinsi

<p>Batas Cut Off Point ($i \leq 8,5$)</p> <p>Nusa Tenggara Timur Papua Barat Jambi Sulawesi Barat</p>	<p>Batas Cut Off Point ($8,6 \leq i \leq 10,9$)</p> <p>Sulawesi Tenggara Kalimantan Selatan Sulawesi Selatan Sumatera Utara Sulawesi Tengah Sulawesi Utara Bengkulu Papua Kep. Bangka Belitung Bali Jawa Barat</p>	<p>Batas Cut Off Point ($i > 10,9$)</p> <p>Kalimantan Utara Riau Sumatera Selatan Jawa Timur Kalimantan Tengah DKI Jakarta Maluku Utara Banten Nusa Tenggara Barat Gorontalo DI Yogyakarta Jawa Tengah Kepulauan Riau Maluku Kalimantan Barat Lampung Kalimantan Timur Aceh Sumatera Barat</p>
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Mortality Rate per 1,000 Indonesian Hajj Pilgrims



Characteristics	Hospitalization					
	B	SE	pValue	OR	95% CI for OR	
					Lower	Upper
Age > 65 years old*	1.175	0.028	.000	3.239	3.068	3.418
Male (Female*)	.466	0.032	.000	1.593	1.498	1.695
Secondary Education (Higher Education*)	.008		.790	1.008	.951	1.068
Primary and Illiterate	.251	0.030	.000	1.285	1.212	1.363
Occupation (Others*)		0.030				
Housewife	.214	0.037	.000	1.239	1.151	1.333
Farmer	.237	0.035	.000	1.267	1.184	1.356
Retired	.240	0.046	.000	1.272	1.162	1.391
High Risk	.580	0.030	.000	1.787	1.684	1.896
Smoking Status	.166	0.036	.000	.180	1.101	1.266
BMI (Normoweight (18.5-22.99)*)						
Underweight (<18.5)	.147	0.040	.000	1.158	1.070	1.253
Overweight (23-24.99)	.723	0.052	.000	2.060	1.859	2.282
Obesity Grade I (25-29.99)	-.033	0.044	.450	.967	.888	1.054
Obesity Grade II (>=30)	-.077	0.040	.052	.926	.856	1.001
Diabetes	.706	0.706	.000	2.026	1.853	2.215
Hypertension	.184	0.184	.000	1.202	1.087	1.330
DM+HT	.126	0.126	.034	1.135	1.010	1.275
Outpatient (Flight Group Health Services)	1.193	0.043	.000	3.297	3.028	3.589
Constant	-7.106	0.092	0.000			

Characteristics	Mortality				
	B	pValue	OR	95% CI for OR	
				Lower	Upper
Age > 65 years old	1.075	.000	2.93	2.63	3.27
Male	.275	.000	1.32	1.19	1.46
Education (Higher Education*)					
Secondary Education	.099	.139	1.10	0.97	1.26
Primary and Illiterate	.355	.000	1.43	1.26	1.62
Gelombang 2 (Glb 1*)	0.961	.000	2.61	2.33	2.93
High Risk	.540	.000	1.72	1.51	1.95
BMI (Normoweight (18.5-22.99)*)					
Underweight (<18.5)	.548	.000	1.73	1.47	2.04
Overweight (23-24.99)	-.094	.217	.910	.78	1.06
Obesity Grade I (25-29.99)	-.140	.038	.870	.76	0.99
Obesity Grade II (>=30)	.105	.209	1.111	.94	1.31
Diabetes	.183	.035	1.20	1.01	1.42
Hypertension	-.070	.274	.93	.82	1.06
DM and Hypertension	0.238	0.021	1.27	1.04	1.55
Rawat Jalan	-238	.001	.788	.69	0.89
Inpatient (KKHI dan KSA's Hospital)	4.546	.000	94.25	84.7	104.87
Constant	-8.325	.000	0.000		

Conclusion

- Diabetes and hypertension are significant disease burdens amongst Indonesian Hajj Pilgrims and contribute to hospitalization and Mortality.
- Contribution of dominant factors to hospitalization and Mortality such as age > 65 years with pre-existing diseases especially diabetes and hypertension, male, departure in first route, overweight and obesity, should be manage for the safety and healthy pilgrimage.
- Prioritize of the health hajj management are preventive measures, health education, and better medical care for the pilgrims
- Collaboration among health authorities, community organizations, and religious leaders will be critical to ensuring that Indonesian Hajj pilgrims can make this precious journey safely and healthily.

Thank You!!

Number of Hajj and Mortality Rate 1950 - 2022

