



National Diabetes Registry Report 2023



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Edition 2023

Suggested Citation:

Ministry of Health Malaysia. 2023. National Diabetes Registry Report 2023

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Published By:

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Level 2, Block E3, Complex E 62590 Putrajaya
Tel: 03-88924413
Website: www.moh.gov.my



Cataloguing-in-Publication Data

Perpustakaan Negara Malaysia

A catalogue record for this book is available
from the National Library of Malaysia

eISBN 978-967-2469-73-5

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Executive Summary

This report presents the clinical outcome, treatment, and complications among audited Type 2 Diabetes Mellitus (T2DM) patient records for the year 2023 that was derived from the National Diabetes Registry (NDR) in comparison with 2022.

According to the registry dataset, there was a total of 1,956,151 patients enrolled in the registry and there were 870,771 active diabetes patients in the NDR at the end of the reporting year for 2023, of which 99.48% were diagnosed with T2DM.

The majority of T2DM patients were between 65-69 years old (16.10%) and the mean age at diagnosis was 65 years old. The majority of patients were female (57.08%) and Malay ethnicity (60.13%).

From the findings of the clinical audit, the mean glycosylated haemoglobin (HbA1c) has decreased from 7.8% in 2022 to 7.7% in 2023. For the QA target, in 2023, 34.38% of patients achieved the target of HbA1c \leq 6.5%, a slight decrease from 35.94% in 2022. A variation could be observed between states for the target achievements.

In 2023, 81.10% had hypertension and 78.39% had dyslipidaemia. As for total complications, 12.70% of patients had diagnosed nephropathy, 11.12% had the presence of retinopathy, and 5.11% were reported to have ischaemic heart disease (IHD).

Metformin (85.57%) was the most common oral anti-diabetic drug (OAD) used among T2DM patients, followed by sulphonylureas (42.40%). Meanwhile, 27.12% of patients were treated with insulin in 2023 compared to 28.80% in 2022. Calcium channel blockers (60.70%) and angiotensin-converting enzyme inhibitors (ACE-i) (51.90%) were the most commonly used anti-hypertensive in 2023. Acetylsalicylic acid (14.70%) and statins (86.41%) were the most commonly used anti-platelet and anti-lipid drugs.

There are several limitations to the NDR data. The NDR relies on the quality of documentation at the primary health clinics. To limit the burden of data collection, NDR audit is conducted through a random sampling method via a web-based data entry system.

Abbreviations

2HPP	2-hour post-prandial blood glucose
ACE-i	Angiotensin-converting enzyme inhibitors
BMI	Body Mass Index
BP	Blood pressure
CVD	Cardiovascular disease
CI	Confidence interval
CPG	Clinical Practice Guideline
ECG	Electrocardiogram
FBS	Fasting blood glucose
HbA _{1c}	Glycosylated haemoglobin
HDL	High-density lipoprotein
IHD	Ischaemic heart disease
IQR	Inter-quartile range
KK	Health Clinic (<i>Klinik Kesihatan</i>)
LDL	Low-density lipoprotein
MOH	Ministry of Health
NCD	Non-communicable disease
NDR	National Diabetes Registry
NHMS	National Health and Morbidity Survey
OAD	Oral anti-diabetic drug
QA	Quality Assurance
RBS	Random blood sugar
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
TG	Triglycerides

Definition

Active T2DM patients	Patients with Type 2 Diabetes Mellitus with at least one visit to the health clinic within one year of the date of clinical audit
Registry patients	Patients diagnosed with diabetes and registered at any of the participating health clinics
Audited patients	Active T2DM patients who were sampled in the clinical audit year



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Acknowledgement

Special gratitude to the workforce of all the healthcare facilities who continue to provide productive and sustained care for all Non-communicable Disease (NCD) patients in Malaysia. The National Diabetes Registry database and this report would not have been possible without their astounding contribution. It is wished that the clinic teams will find the data useful, enabling them to visualise improvements along with monitoring performance at the facility level.

We would as well to extend our acknowledgement to all State NCD Public Health Officers who have contributed their time and thoughts to making the annual clinical audit a successful one for many years.

A special mention to En. Mohd Nazri bin Abdullah, Pn. Massaliza bt Su and Cik. Nur Nadhirah Johari from Disease Control Division for collating the data required to produce this report.

About This Report

This is the fifth NDR report since the establishment of the registry. By publication of this report, we intend to share the data collected within the NDR annually for clinicians, public health specialists, researchers and all those who are interested in the clinical management of diabetes.

About National Diabetes Registry

The objectives of the NDR are:

- i. To enable tracking of glycaemic control and clinical outcomes of patients with diabetes managed at MOH health clinics
- ii. To enable comparisons over time and across geographical locations
- iii. Enable research to improve the quality of care provided to patients

The NDR has been a collaborative effort among MOH health clinics and hospitals that leverages existing data collection requirements and processes. The registry is a useful tool to better understand patterns of disease and clinical management of patients managed within the MOH to prevent complications and improve patient management and future outcomes.

National Diabetes Registry Components

The NDR contains information on patients with diabetes managed at participating MOH health clinics (*klinik kesihatan* or KKS) and consists of two related components: (i) patient registry and (ii) clinical audit datasets.

As baseline information, the NDR collects basic socio-demographic information, clinical and outcome data of all patients with DM managed in MOH health clinics and selected hospitals in the patient registry. At the end of December 2023, the patient registry contained nearly 1.9 million unique patient records

The audit dataset is a subset of the patient registry. The Diabetes Clinical Audit is conducted on randomly sampled active T2DM patients on follow-up at MOH health clinics. Universal data entry for clinical variables is not currently feasible as the medical records in the majority of MOH health clinics are still paper-based. The NDR has allowed greater efficiency to conduct the annual Diabetes Clinical Audit. The clinical audit dataset has more complete information as it captures clinical variables, drug use and outcomes of care data for audited patients.

Methodology

Site Selection Criteria

All MOH Ks managing patients with diabetes in 2023 were eligible for inclusion in this report. At the end of 2023, 966 Ks throughout Malaysia have provided data to the NDR.

Patient selection criteria

The NDR includes all forms of diabetes, except gestational diabetes. However, for clinical data analysis, only T2DM patients are reported.

Data collection

The NDR is a web-based application. The database contains information about patients with diabetes receiving care at participating Ks.

The following data is collected for all diabetes patients:

- i. Sociodemographic information
- ii. Type of Diabetes
- iii. Date Diagnosed
- iv. Diabetes-Related Complications
- v. Comorbidities

Clinical Audit for Diabetes Patients

Annually, randomly sampled T2DM patients meeting the selection criteria are selected for clinical audit whereby more detailed clinical data is collected. The sampled population comes from active patients with T2DM enrolled in the registry dataset.

The workflow for data collection for clinical audit is described in the first NDR Report.

Sample size estimation

The sample of patients with T2DM required for the clinical audit from each district was based on the number of active patients registered in each district and the sample size calculation is described in the first NDR Report.

Statistical methods

Results below present descriptive statistical analysis as generated by the NDR web-based application, and are presented as categorical variables (n,%) or continuous variables (mean, 95% CI and/or median, IQR).

Results below were generated using data from the NDR for 2022-2023 that was extracted on 31st December 2023.

Clinical Setting

A total of 966 MOH Kks from all states in Malaysia submitted data to the NDR in the reporting period ending 2023. The distribution of Kks providing data to the NDR by state is shown in Table 1.

Table 1 - Distribution of Kks enrolled in the NDR registry by state, 2023

State	Number of Kks
Johor	98
Kedah	59
Kelantan	88
Melaka	32
Negeri Sembilan	50
Pahang	82
Perak	77
Perlis	13
P. Pinang	31
Sabah	95
Sarawak	194
Selangor	75
Terengganu	51
WP Kuala Lumpur	16
WP Labuan	1
WP Putrajaya	4
Malaysia	966

General Findings

Patients Population

There was a total of 1,956,151 patients enrolled in the registry and there were 870,771 active diabetes patients in the NDR at the end of the reporting year for 2023. Nearly all the patients enrolled in the NDR were diagnosed with T2DM (99.48%), followed by T1DM (0.47%) and others (0.05%).

The characteristics of patients are shown in Table 2. There were 57.08% women and 42.92% men, respectively. The ethnic distribution was as follows: Malay 60.13%, Chinese 19.27%, Indian 12.58%, and others at 8.02%.

The age at diagnosis of patients with diabetes is reported in Table 3. The mean age at diagnosis of T2DM patients registered in NDR was 65 years. The characteristics of patients according to states are shown in Table 4. There were more females than males with diabetes in all states except WP Putrajaya. The highest proportion of T2DM patients ranged between 65 to 69 years.



**Table 2 - Characteristics of Patients enrolled in National Diabetes Registry, 2023
[Registry Dataset]**

Variable	n	%
Sex		
Male	835,373	42.92
Female	1,110,760	57.08
Total	1,946,133	100.00
Ethnicity		
Malay	1,169,772	60.13
Chinese	375,398	19.27
Indian	244,904	12.58
Others	156,059	8.02
Total	1,946,133	100.00
Age Group (at Enrollment, years)		
<18	289	0.01
18-19	225	0.01
20-24	1,762	0.10
25-29	6,977	0.35
30-34	18,482	0.94
35-39	40,386	2.07
40-44	68,469	3.52
45-49	104,111	5.34
50-54	154,701	7.94
55-59	232,261	11.93
60-64	296,528	15.24
65-69	312,533	16.10
70-74	274,558	14.10
75-79	191,869	9.85
>80	242,982	12.50
Total	1,946,133	100.00
Type of Diabetes		
Type 2	1,946,133	99.48
Type 1	9,134	0.47
Others/Unknown	884	0.05
Total	1,956,151	100.00

**Table 3 - Age at Diagnosis of Type 2 Diabetes Mellitus Patients (in years)
[Registry Dataset]**

Age at diagnosis	
Mean age	65
Median	65
Inter-Quartile range	16

Most of the registered patients in NDR were diagnosed with diabetes between the age of 65-69 (16.10%) years old, followed by 60-64 (15.24%) years and 70-74 (14.10%) years age group, as shown in Figure 1.

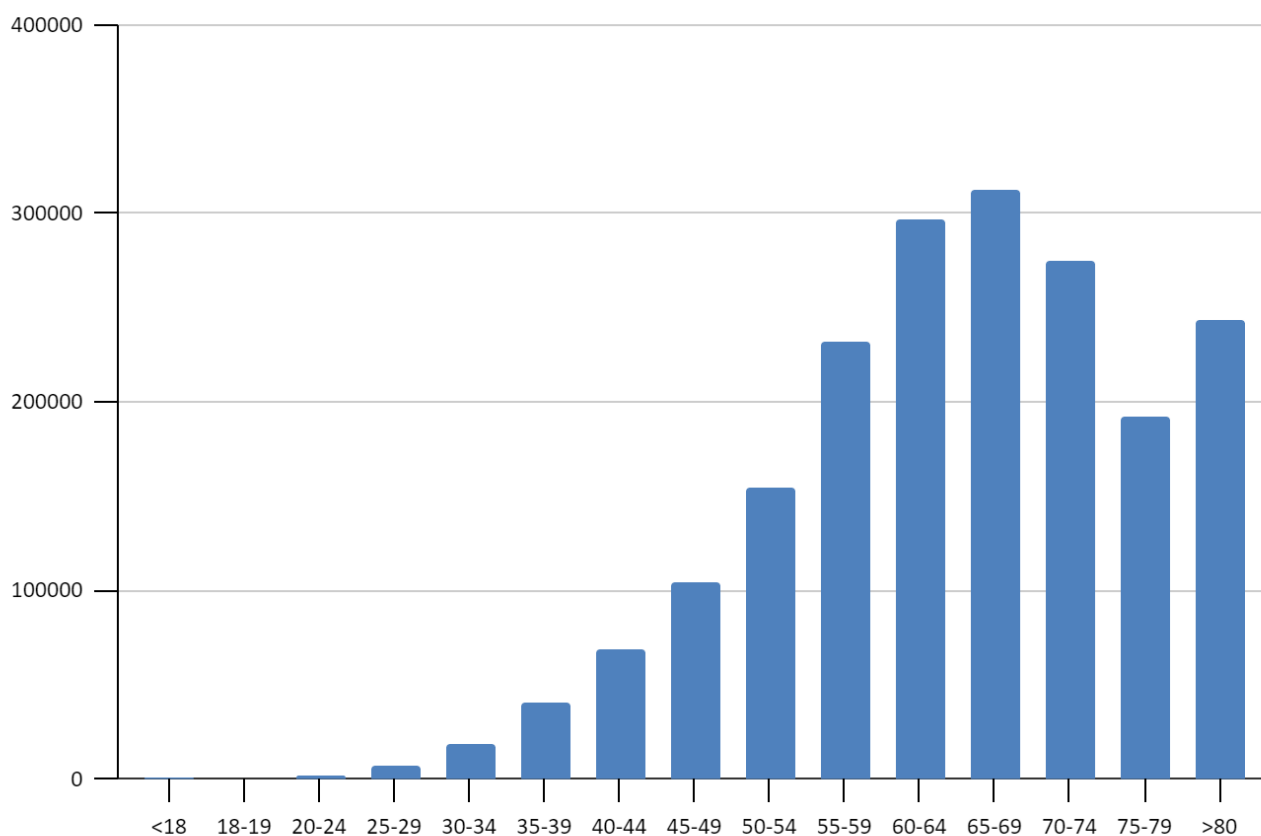


Figure 1 - Distribution of T2DM patients according to age at diagnosis [Registry Dataset]

Table 4- Characteristics of diabetes patients enrolled in National Diabetes Registry, 2023, by State

State	No. of patients n (%)	Male n (%)	Female n (%)	Mean age (95%CI)	Ethnicity, n (%)				
					Malay	Chinese	Indian	Other Malaysian	Foreigner/ Unknown
MALAYSIA	1,956,151 (100.00)	838,577 (42.87)	1,117,574(57.13)	65 (64.7-64.8)	1,176,011 (60.12)	377,157 (19.27)	245,826(12.57)	153,914 (7.87)	3,243 (0.17)
Johor	282,284 (14.43)	122,777 (43.49)	159,507(56.50)	65 (65.2-65.3)	178,712 963.31)	67,518 (23.92)	33,616 (11.91)	2,157 (0.76)	281 (0.10)
Kedah	175,429 (8.97)	72,176 (41.14)	103,253(58.85)	64 (63.5-63.6)	137,388 (78.32)	17,396 (9.92)	18,287 (10.42)	2,207 (1.26)	151 (0.09)
Kelantan	71,942 (3.68)	26,710 (37.13)	45,232(62.87)	65 (65.1-65.2)	68,393 (95.07)	2,516 (3.50)	306 (0.43)	682 (0.95)	45 (0.06)
Melaka	105,828 (5.41)	46,498 (43.94)	59,330(56.06)	66 (65.8-66.0)	72,457 968.47)	22,481 (21.24)	9,993 (9.44)	763 (0.72)	134 (0.13)
Negeri Sembilan	132,906 (6.79)	59,218 (44.56)	73,688(55.44)	66 (65.9-66.0)	80,394 (60.49)	23,311 (17.54)	28,290 (21.29)	806 (0.61)	105 (0.08)
Pahang	103,980 (5.32)	44,662 (42.95)	59,318(57.04)	65 (64.8-64.9)	82,874 (79.70)	13,234 (12.73)	6,909 (6.64)	844 (0.81)	119 (0.11)
Perak	191,881 (9.81)	84,094 (43.83)	107,787(56.17)	66 (66.2-66.4)	109,595 (57.12)	43,831 (22.84)	36,623 (19.09)	1,723 (0.90)	109 (0.06)
Perlis	36,264 (1.85)	14,819 (40.86)	21,445(59.13)	64 (64.1-64.4)	31,409 (86.61)	3,033 98.36)	766 (2.11)	1,028 (2.83)	28 (0.08)
Pulau Pinang	106,402 (5.44)	47,756 (44.88)	58,646(55.11)	66 (66.2-66.3)	49,685 (46.70)	37,701 (35.43)	18,313 (17.21)	579 (0.54)	124 (0.12)
Sabah	63,564 (3.25)	28,390 (44.66)	35,174(55.33)	63 (62.8-63.0)	3,072 (4.83)	13,668 (21.50)	482 (0.76)	45,644 (71.81)	698 (1.10)
Sarawak	186,943 (9.56)	75,895 (40.60)	111,048(59.40)	63 (62.9-63.0)	49,263 (26.35)	44,579 (23.85)	728 (0.39)	91,813 (49.11)	560 (0.30)
Selangor	316,316 (16.17)	138,503 (43.79)	177,813(56.21)	64 (64.1-64.2)	181,651 (57.43)	57,339 (18.13)	73,826 (23.34)	2,885 (0.91)	615 (0.19)
Terengganu	80,964 (4.14)	31,460 (38.86)	49,504(61.14)	63 (62.9-63.0)	79,480 (98.17)	1,222 (1.51)	82 (0.10)	147 (0.18)	33 (0.04)
WP Kuala Lumpur	85,634 (4.38)	37,934 (44.30)	47,700(55.70)	67 (66.9-67.0)	38,986 (45.53)	28,484 (33.26)	17,061 (19.92)	915 (1.07)	188 (0.22)
WP Labuan	3,514 (0.18)	1,507 (42.89)	2,007(57.11)	60 (59.5-60.3)	1,333 (37.93)	484 (13.77)	34 (0.97)	1,626 (46.27)	37 (1.05)
WP Putrajaya	12,300 (0.63)	6,158 (50.07)	6,142(49.93)	59 (58.7-59.1)	11,319 (92.02)	360 (2.93)	510 (4.15)	95 (0.77)	16 (0.13)

Comorbidities and Complications

Table 5 shows the presence of comorbidities and complications among diabetes patients in the clinical audit dataset.

The prevalence of hypertension among T2DM patients is 80.46% in 2022 and 81.10% in 2023. In the year 2023, WP Kuala Lumpur has the highest percentage of patients with hypertension (87.45%), followed by Sarawak (86.43%) and Johor (86.12%). Meanwhile, the prevalence of dyslipidaemia has increased from 76.64% in 2022 to 78.39% in 2023. In the year 2023, WP Labuan reported the highest proportion of patients with dyslipidemia (89.71%), followed by WP Kuala Lumpur (89.51%) and Perlis (89.25%).

The prevalence of nephropathy among diabetes patients has reduced from 13.10% in 2022 to 12.70% in 2023. Johor (27.26%), WP Kuala Lumpur (26.91%) and WP Putrajaya (24.24%) were the top three states with nephropathy in the year 2023. The proportion of patients diagnosed with retinopathy has increased from 10.29% in 2022 to 11.12% in 2023. Perlis (24.50%), WP Putrajaya (20.00%) and Pulau Pinang (16.97%) reported the highest proportion of patients with retinopathy in 2023.

The proportion of patients with Ischaemic Heart Disease (IHD) has reduced from 5.20% in 2022 to 5.11% in 2023. Pulau Pinang (10.95%), Johor (9.30%) and WP Kuala Lumpur (7.53%) reported the highest proportion of diabetes patients with IHD in 2023. The prevalence of cerebrovascular disease increased from 1.89% in 2022 to 2.02% in 2023. The proportion of patients with diabetic foot ulcers has reduced from 1.02% in 2022 to 1.00% in 2023. Similarly, the proportion of patients with amputations has reduced in 2022 to 2023 from 0.64% and 0.61% respectively. The prevalence of erectile dysfunction among the men screened increased from 15.38% in 2022 to 17.90% in 2023.

Nationally, in 2023, the proportion of “unknown” for each of the conditions ranged between 0% - 4.81%.



Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022-2023 [Audit Dataset]

Comorbidities								
Hypertension								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	85887 (80.46)	20,354 (19.07)	501 (0.47)	113,903	92,380(81.10)	20,962(18.40)	533(0.47)
Johor	7,570	6,590 (87.05)	976 (12.89)	4 (0.05)	7,530	6,485(86.12)	1,021(13.56)	8(0.11)
Kedah	7,718	6,026(78.08)	1,679 (21.75)	13 (0.17)	7,791	6,253(80.26)	1,534(19.69)	4(0.05)
Kelantan	8,657	6,950 (80.28)	1,687 (19.49)	20 (0.23)	9,995	8,054(80.58)	1,900(19.01)	41(0.41)
Melaka	13,522	10,109 (74.76)	3,381 (25.00)	32 (0.24)	13,378	9,976(74.57)	3,374(25.22)	27(0.20)
N. Sembilan	5,863	4,386 (74.81)	1,476 (25.17)	1 (0.02)	5,564	4,287(77.05)	1,270(22.83)	7(0.13)
Pahang	7,229	5,717 (79.08)	1,476 (20.42)	36 (0.50)	7,057	5,658(80.180)	1,360(19.27)	37(0.52)
Perak	8,348	6,790 (81.34)	1,424 (17.06)	134 (1.61)	9,207	7,337(80.12)	1,689(18.34)	141(1.53)
Perlis	789	660 (83.65)	129 (16.35)	0 (0.00)	800	651(81.38)	148(18.50)	1(0.13)
P. Pinang	4,316	3,635 (84.22)	672 (15.57)	9 (0.21)	4,668	3,909(83.74)	744(15.94)	12(0.26)
Sabah	10,819	8,983 (83.03)	1,749 (16.17)	87 (0.80)	14,099	11,840(83.98)	2,184(15.49)	72(0.51)
Sarawak	5,440	4,687 (86.16)	724 (13.31)	29 (0.53)	6,911	5,973(86.43)	883(12.78)	53(0.77)
Selangor	6,721	5,705 (84.88)	969 (14.42)	47 (0.70)	6,772	5,736(84.70)	1,004(14.83)	31(0.46)
Terengganu	15,336	12,018 (78.36)	3,256 (21.23)	62 (0.40)	15,681	12,456(79.43)	3,142(20.04)	83(0.53)
WP KL	3,073	2,632 (85.65)	423 (13.77)	18 (0.59)	3,107	2717(87.45)	378(12.17)	12(0.39)
WP Labuan	589	452 (76.74)	133 (22.58)	4 (0.68)	588	453(77.04)	132(22.45)	3(0.51)
WP Putrajaya	752	547 (72.74)	200 (26.60)	5 (0.66)	755	555(73.51)	199(26.36)	1(0.13)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Comorbidities								
Dyslipidemia								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	81,803 (76.64)	24,293 (22.76)	646 (0.61)	113,903	89,288(78.39)	23,942(21.02)	644(0.57)
Johor	7,570	6,586 (87.00)	976 (12.89)	8 (0.11)	7,530	6,558(87.09)	945(12.55)	10(0.13)
Kedah	7,718	6,356 (82.35)	1,353 (17.53)	9 (0.12)	7,791	6,572(84.35)	1,212(15.56)	7(0.09)
Kelantan	8,657	6,559 (75.77)	2,077 (23.99)	21 (0.24)	9,995	7,780(77.84)	2,158(21.59)	57(0.57)
Melaka	13,522	8,205 (60.68)	5,268 (38.96)	49 (0.36)	13,378	8,370(62.57)	4,975(37.19)	32(0.24)
N. Sembilan	5,863	3,946 (67.30)	1,912 (32.61)	5 (0.09)	5,564	3,921(70.47)	1,632(29.33)	11(0.20)
Pahang	7,229	5,366 (74.23)	1,820 (25.18)	43 (0.59)	7,057	5,457(77.33)	1,559(22.09)	39(0.55)
Perak	8,348	6,726 (80.57)	1,482 (17.75)	140 (1.68)	9,207	7,492(81.37)	1,587(17.24)	128(1.39)
Perlis	789	711 (90.11)	78 (9.89)	0 (0.00)	800	714(89.25)	86(10.75)	0(0.00)
P. Pinang	4,316	3,792 (87.86)	506 (11.72)	18 (0.42)	4,668	4,083(87.47)	569(12.19)	13(0.28)
Sabah	10,819	8,237 (76.13)	2,460 (22.74)	122 (1.13)	14,099	11,074(78.54)	2,928(20.77)	94(0.67)
Sarawak	5,440	4,147 (76.23)	1,237 (22.74)	56 (1.03)	6,911	5,259(76.10)	1,570(22.72)	80(1.16)
Selangor	6,721	5,624 (83.68)	1,030 (15.33)	67 (1.00)	6,772	5,743(84.81)	971(14.34)	57(0.84)
Terengganu	15,336	11,848 (77.26)	3,404 (22.20)	84 (0.55)	15,681	12,369(78.88)	3,210(20.47)	102(0.65)
WP KL	3,073	2704 (87.99)	354 (11.52)	15 (0.49)	3,107	2,781(89.51)	316(10.17)	10(0.32)
WP Labuan	589	375 (63.67)	209 (35.48)	5 (0.85)	588	504(85.71)	84(14.29)	0(0.00)
WP Putrajaya	752	621 (82.58)	127 (16.89)	4 (0.53)	755	611(80.93)	140(18.54)	4(0.53)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Nephropathy								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	13,986 (13.10)	90,770 (85.04)	1,986 (1.86)	113,903	14,460(12.70)	97,392(85.50)	2,024(1.78)
Johor	7,570	2,376 (31.39)	5,153(68.07)	41 (0.54)	7,530	2,053(27.26)	5,419(71.97)	42(0.56)
Kedah	7,718	1,071 (13.88)	6,602 (85.54)	45 (0.58)	7,791	1,304(16.74)	6,472(83.07)	15(0.19)
Kelantan	8,657	1,125 (13.00)	7,491 (86.53)	41 (0.47)	9,995	1,118(11.19)	8,793(87.97)	84(0.84)
Melaka	13,522	869 (6.43)	12,456 (92.12)	197 (1.46)	13,378	872(6.52)	12,390(92.61)	115(0.86)
N. Sembilan	5,863	430 (7.33)	5,418 (92.41)	15 (0.26)	5,564	427(7.67)	5,106(91.77)	31(0.56)
Pahang	7,229	857 (11.86)	6,228 (86.15)	144 (1.99)	7,057	922(13.07)	5,991(84.89)	143(2.03)
Perak	8,348	1,180 (14.14)	6,798 (81.43)	370 (4.43)	9,207	1,290(14.01)	7,552(82.02)	365(3.96)
Perlis	789	110 (13.94)	679 (86.06)	0 (0.00)	800	74(9.25)	723(90.38)	3(0.38)
P. Pinang	4,316	932 (21.59)	3,319 (76.90)	65 (1.51)	4,668	834(17.87)	3,752(80.38)	79(1.69)
Sabah	10,819	1,015 (9.38)	9,563 (88.39)	241 (2.23)	14,099	1,317(9.34)	12,465(88.41)	314(2.23)
Sarawak	5,440	280 (5.15)	4,980 (91.54)	180 (3.31)	6,911	499(7.22)	6,197(89.67)	213(3.08)
Selangor	6,721	1,242 (18.48)	5,202 (77.40)	277 (4.12)	6,772	1,209(17.85)	5,298(78.23)	264(3.90)
Terengganu	15,336	1,570 (10.24)	13,525 (88.19)	241 (1.57)	15,681	1,501(9.57)	13,920(88.77)	260(1.66)
WP KL	3,073	765 (24.89)	2,195 (71.43)	113 (3.68)	3,107	836(26.91)	2,188(70.42)	83(2.67)
WP Labuan	589	4 (0.68)	578 (98.13)	7 (1.19)	588	21(3.57)	560(95.24)	7(1.19)
WP Putrajaya	752	160 (21.28)	583 (77.53)	9 (1.20)	755	183(24.24)	566(74.97)	6(0.79)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Retinopathy								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	10,979 (10.29)	93,075 (87.20)	2,688 (2.52)	113,903	12663(11.12)	98577(86.54)	2,639(2.32)
Johor	7,570	1,127 (14.89)	6,389 (84.40)	54 (0.71)	7,530	1,085(14.41)	6,376(84.67)	56(0.74)
Kedah	7,718	939 (12.17)	6,711 (86.95)	68 (0.88)	7,791	1,199(15.39)	6,530(83.81)	62(0.80)
Kelantan	8,657	924 (10.67)	7,649 (88.36)	84 (0.97)	9,995	1,022(10.23)	8,863(88.67)	110(1.10)
Melaka	13,522	954 (7.06)	12,367 (91.46)	201 (1.49)	13,378	962(7.19)	12,293(91.89)	122(0.91)
N. Sembilan	5,863	317 (5.41)	5,531 (94.34)	15 (0.26)	5,564	351(6.31)	5,185(93.19)	28(0.50)
Pahang	7,229	484 (6.70)	6,565 (90.81)	180 (2.49)	7,057	616(8.73)	6,259(88.69)	181(2.56)
Perak	8,348	1,085 (13.00)	6,825 (81.76)	438 (5.25)	9,207	1,257(13.65)	7,521(81.69)	429(4.66)
Perlis	789	137 (17.36)	652 (82.64)	0 (0.00)	800	196(24.50)	602(75.25)	2(0.25)
P. Pinang	4,316	719 (16.66)	3,482 (80.68)	115 (2.66)	4,668	792(16.97)	3,751(80.36)	122(2.61)
Sabah	10,819	1,267 (11.71)	9115 (84.25)	437 (4.04)	14,099	1,838(13.04)	11,787(83.60)	471(3.34)
Sarawak	5,440	190 (3.49)	4998 (91.88)	252 (4.63)	6,911	274(3.96)	6,321(91.46)	314(4.54)
Selangor	6,721	809 (12.04)	5,549 (82.56)	363 (5.40)	6,772	847(12.51)	5,598(82.66)	326(4.81)
Terengganu	15,336	1,476 (9.62)	13,564 (88.45)	296 (1.93)	15,681	1,603(10.22)	13,793(87.96)	285(1.82)
WP KL	3,073	391 (12.72)	2,516 (81.87)	166 (5.40)	3,107	461(14.84)	2,533(81.53)	113(3.64)
WP Labuan	589	5 (0.85)	575 (97.62)	9 (1.53)	588	9(1.53)	571(97.11)	8(1.36)
WP Putrajaya	752	155 (20.61)	587 (78.06)	10 (1.33)	755	151(20.00)	594(76.68)	10(1.32)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Ischaemic Heart Disease								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	5,550 (5.20)	99,075 (92.82)	2,117 (1.98)	113,903	5,818(5.11)	105,952(93.02)	2,106(1.85)
Johor	7,570	797 (10.53)	6,724 (88.82)	49 (0.65)	7,530	700(9.30)	6,772(89.93)	42(0.56)
Kedah	7,718	421 (5.45)	7,249 (93.92)	48 (0.62)	7,791	558(7.16)	7,219(92.66)	14(0.18)
Kelantan	8,657	444 (5.13)	8,162 (94.28)	51 (0.59)	9,995	494(4.94)	9,411(94.16)	90(0.90)
Melaka	13,522	580 (4.29)	12,743 (94.24)	199 (1.47)	13,378	519(3.88)	12,744(95.26)	114(0.85)
N. Sembilan	5,863	252 (4.30)	5,600 (95.51)	11 (0.19)	5,564	219(3.94)	5,316(95.54)	29(0.52)
Pahang	7,229	393 (5.44)	6,688 (92.52)	148 (2.05)	7,057	332(4.70)	6,569(93.08)	155(2.20)
Perak	8,348	467 (5.59)	7,491 (89.73)	390 (4.67)	9,207	510(5.54)	8,303(90.18)	394(4.28)
Perlis	789	48 (6.08)	741 (93.92)	0 (0.00)	800	32(4.00)	765(95.63)	3(0.38)
P. Pinang	4,316	440 (10.19)	3800 (88.04)	76 (1.76)	4,668	511(10.95)	4,074(87.28)	80(1.71)
Sabah	10,819	296 (2.74)	10,261 (94.84)	262 (2.42)	14,099	393(2.79)	13,381(94.91)	322(2.28)
Sarawak	5,440	109 (2.00)	5,147 (94.61)	184 (3.38)	6,911	148(2.14)	6,541(94.65)	220(3.18)
Selangor	6,721	375 (5.58)	6,058 (90.14)	288 (4.29)	6,772	419(6.19)	6,072(89.66)	280(4.13)
Terengganu	15,336	696 (4.54)	14,399 (93.89)	241 (1.57)	15,681	711(4.53)	14,714(93.83)	256(1.63)
WP KL	3,073	197 (6.41)	2,723 (88.61)	153 (4.98)	3,107	234(7.53)	2,782(89.54)	91(2.93)
WP Labuan	589	6 (1.02)	575 (97.62)	8 (1.36)	588	5(0.85)	575(97.79)	8(1.36)
WP Putrajaya	752	29 (3.86)	714 (94.95)	9 (1.20)	755	33(4.37)	714(94.57)	8(1.06)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Cerebrovascular Disease								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	2,014 (1.89)	102,645 (96.16)	2,083 (1.95)	113,903	2,305(2.02)	109,463(96.10)	2,108(1.85)
Johor	7,570	215 (2.84)	7,304 (96.49)	51 (0.67)	7,530	228(3.03)	7240(96.15)	46(0.61)
Kedah	7,718	176 (2.28)	7,497 (97.14)	45 (0.58)	7,791	247(3.17)	7,530(96.65)	14(0.18)
Kelantan	8,657	178 (2.06)	8,435 (97.44)	44 (0.51)	9,995	179(1.79)	9,723(97.28)	93(0.93)
Melaka	13,522	96 (0.71)	13,227 (97.82)	199 (1.47)	13,378	109(0.81)	13,150(98.30)	118(0.88)
N. Sembilan	5,863	89 (1.52)	5,762 (98.28)	12 (0.20)	5,564	78(1.40)	5,459(98.11)	27(0.49)
Pahang	7,229	117 (1.62)	6,967 (96.38)	145 (2.01)	7,057	132(1.87)	6,771(95.95)	153(2.17)
Perak	8,348	196 (2.35)	7,750 (92.84)	402 (4.82)	9,207	203(2.20)	8,584(93.23)	420(4.56)
Perlis	789	11 (1.39)	778 (98.61)	0 (0.00)	800	14(1.75)	783(97.88)	3(0.38)
P. Pinang	4,316	191 (4.43)	4,062 (94.11)	63 (1.46)	4,668	231(4.95)	4,350(93.19)	84(1.80)
Sabah	10,819	164 (1.52)	10,401 (96.14)	254 (2.35)	14,099	221(1.57)	13,569(96.24)	306(2.17)
Sarawak	5,440	35 (0.64)	5,237 (96.27)	168 (3.09)	6,911	57(0.82)	6,650(96.22)	202(2.92)
Selangor	6,721	190 (2.83)	6,251 (93.01)	280 (4.17)	6,772	194(2.86)	6,316(93.27)	261(3.85)
Terengganu	15,336	265 (1.73)	14,818 (96.62)	253 (1.65)	15,681	310(1.98)	15,102(96.31)	269(1.72)
WP KL	3,073	79 (2.57)	2,845 (92.58)	149 (4.85)	3,107	75(2.41)	2,936(94.50)	96(3.09)
WP Labuan	589	3 (0.51)	578 (98.13)	8 (1.36)	588	5(0.85)	575(97.79)	8(1.36)
WP Putrajaya	752	9 (1.20)	733 (97.47)	10 (1.33)	755	22(2.91)	725(96.03)	8(1.06)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Diabetic Foot Ulcer								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	1,089 (1.02)	103,789 (97.23)	1,864 (1.75)	113,903	1,141(1.00)	110,905(97.37)	1,829(1.61)
Johor	7,570	119 (1.57)	7,401 (97.77)	50 (0.66)	7,530	126(1.6)	7342(97.50)	46(0.61)
Kedah	7,718	120 (1.55)	7,555 (97.89)	43 (0.56)	7,791	147(1.89)	7,632(97.96)	12(0.15)
Kelantan	8,657	114 (1.32)	8,502 (98.21)	41 (0.47)	9,995	118(1.18)	9,794(97.99)	83(0.83)
Melaka	13,522	103 (0.76)	13,222 (97.78)	197 (1.46)	13,378	94(0.7)	13,173(98.47)	110(0.82)
N. Sembilan	5,863	42 (0.72)	5,809 (99.08)	12 (0.20)	5,564	41(0.74)	5,498(98.81)	25(0.45)
Pahang	7,229	70 (0.97)	7,039 (97.37)	120 (1.66)	7,057	88(1.25)	6,857(97.17)	110(1.56)
Perak	8,348	134 (1.61)	7,835 (93.85)	379 (4.54)	9,207	132(1.43)	8,689(94.37)	386(4.19)
Perlis	789	13 (1.65)	776 (98.35)	0 (0.00)	800	9(1.13)	788(98.50)	3(0.38)
P. Pinang	4,316	55 (1.27)	4,206 (97.45)	55 (1.27)	4,668	45(0.96)	4,549(97.45)	71(1.52)
Sabah	10,819	64 (0.59)	10,553 (97.54)	202 (1.87)	14,099	76(0.54)	13,770(97.67)	250(1.77)
Sarawak	5,440	22 (0.40)	5,2373 (96.93)	145 (2.67)	6,911	31(0.45)	6,720(97.24)	158(2.29)
Selangor	6,721	79 (1.18)	6,433 (95.71)	209 (3.11)	6,772	89(1.31)	6,482(95.72)	200(2.95)
Terengganu	15,336	132 (0.86)	14,962 (97.56)	242 (1.58)	15,681	123(0.78)	15,298(97.56)	260(1.66)
WP KL	3,073	16 (0.52)	2,906 (94.57)	151 (4.91)	3,107	16(0.51)	2,993(96.33)	98(3.15)
WP Labuan	589	0 (0.00)	581 (98.64)	8 (1.36)	588	2(0.34)	577(98.13)	9(1.53)
WP Putrajaya	752	6 (0.80)	736 (97.87)	10 (1.33)	755	4(0.53)	743(98.41)	8(1.06)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications								
Amputation								
States	No. of patients audited	2022, n (%)			No. of patients audited	2023, n (%)		
		Yes	No	Unknown		Yes	No	Unknown
MALAYSIA	106,742	678 (0.64)	104,181 (97.60)	1,883 (1.76)	113,903	700(0.61)	111,329(97.74)	1,846(1.62)
Johor	7,570	73 (0.96)	7,444 (98.34)	53 (0.70)	7,350	80(1.06)	7389(98.13)	45(0.60)
Kedah	7,718	67 (0.87)	7,605 (98.54)	46 (0.60)	7,791	73(0.94)	7,705(98.90)	13(0.17)
Kelantan	8,657	49 (0.57)	8,567 (98.96)	41 (0.47)	9,995	46(0.46)	9,864(98.69)	85(0.85)
Melaka	13,522	61 (0.45)	13,265 (98.10)	196 (1.45)	13,378	58(0.43)	13,210(98.74)	109(0.81)
N. Sembilan	5,863	23 (0.39)	5,828 (99.40)	12 (0.20)	5,564	24(0.43)	5,515(99.12)	25(0.45)
Pahang	7,229	36 (0.50)	7,071 (97.81)	122 (1.69)	7,057	43(0.61)	6,900(97.78)	112(1.59)
Perak	8,348	108 (1.29)	7,864 (94.20)	376 (4.50)	9,207	97(1.05)	8,725(94.76)	385(4.18)
Perlis	789	6 (0.76)	783 (99.24)	0 (0.00)	800	4(0.50)	793(99.13)	3(0.38)
P. Pinang	4,316	35 (0.81)	4,226 (97.91)	55 (1.27)	4,668	27(0.58)	4,5565(97.79)	73(1.56)
Sabah	10,819	39 (0.36)	10,577 (97.76)	203 (1.88)	14,099	58(0.41)	13,782(97.75)	256(1.82)
Sarawak	5,440	25 (0.46)	5,268 (96.84)	147 (2.70)	6,911	23(0.33)	6,726(97.32)	160(2.32)
Selangor	6,721	59 (0.88)	6,454 (96.03)	208 (3.09)	6,772	58(0.86)	6,511(96.15)	202(2.98)
Terengganu	15,336	77 (0.50)	15,007 (97.85)	252 (1.64)	15,681	79(0.50)	15,339(97.82)	263(1.68)
WP KL	3,073	18 (0.59)	2,901 (94.40)	154 (5.01)	3,107	26(0.84)	2,982(95.98)	99(3.19)
WP Labuan	589	0 (0.00)	581 (98.64)	8 (1.36)	588	2(0.34)	578(98.30)	8(1.36)
WP Putrajaya	752	2 (0.27)	740 (98.40)	10 (1.33)	755	2(0.26)	745(96.68)	8(1.06)

Table 5 - Complications and Comorbidities among Type 2 Diabetes Mellitus patients, 2022–2023, continued [Audit Dataset]

Complications						
Erectile Dysfunction						
States	Total Male Tested / Total Male	2022, n (%)		Total Male Tested / Total Male	2023, n (%)	
		Abnormal	Normal		Abnormal	Normal
MALAYSIA	40,632 / 14,376	2,211 (15.38)	12165 (84.65)	43349/15989	2862(17.90)	13127(82.10)
Johor	2,962 / 841	228 (27.11)	613 (72.89)	2872/714	197(27.59)	517(72.41)
Kedah	2,699 / 663	138 (20.81)	525 (79.19)	2788/530	171(32.26)	359(67.74)
Kelantan	2,851 / 1,761	161 (9.14)	1,600 (90.86)	3340/2058	267(12.97)	1791(87.03)
Melaka	5,463 / 1,478	90 (6.09)	1388 (93.91)	5399/1399	122(8.72)	1277(91.28)
N. Sembilan	2,377 / 838	12 (1.43)	826 (98.57)	2208/801	38(4.74)	763(95.26)
Pahang	2,866 / 1,647	493 (29.93)	1,154 (70.07)	2719/1650	452(27.39)	1198(72.61)
Perak	3,163 / 1,266	248 (19.59)	1,018 (80.41)	3666/1260	237(18.18)	1023(81.19)
Perlis	285 / 30	0 (0.00)	30 (100.00)	258/44	1(1.27)	43(97.73)
P. Pinang	1,815 / 557	187 (33.57)	370 (66.43)	1941/936	310(33.12)	626(66.88)
Sabah	4,398 / 1,735	207 (11.93)	1,528 (88.07)	5717/2411	246(10.20)	2165(89.80)
Sarawak	1,952 / 603	48 (7.96)	555 (92.04)	2576/904	110(12.17)	794(87.83)
Selangor	2,730 / 370	114 (30.81)	256 (69.19)	2707/387	128(33.07)	259(66.93)
Terengganu	5,151 / 1,424	46 (3.23)	1,378 (96.77)	5289/1481	217(14.65)	1264(85.35)
WP KL	1,289 / 682	167 (24.49)	515 (75.51)	1268/911	257(28.21)	654(71.79)
WP Labuan	245 / 244	0 (0.00)	244 (100.00)	230/177	0	177(100.00)
WP Putrajaya	386 / 237	72 (30.38)	165 (69.62)	371/326	109(33.44)	217(66.56)

Clinical Findings

Table 6 shows the proportion of patients who had routine clinical tests performed. Overall, the proportion of patients receiving clinical investigations showed an increasing trend from 2022 to 2023.

The proportion of patients whose blood pressure (BP) was recorded has increased from 95.58% in 2022 to 96.54% in 2023. The proportion of patients who had at least one HbA1c test done annually has increased from 93.62% in 2022 to 95.19% in 2023. Other parameters related to blood glucose are shown in Table 6.

Blood creatinine examination for T2DM patients has increased from 88.72% in 2022 to 90.99% in 2023. Similarly, patients tested for total cholesterol has increased from 89.05% to 91.12% for both years. LDL-cholesterol investigations showed an increasing trend, from 78.59% in 2022 to 81.66% in 2023. Similarly, for HDL-cholesterol, the proportion has also increased from 79.05% in 2022 to 82.02% in 2023.

The proportion of patients tested for urine protein has increased from 74.20% in 2022 to 76.96% in 2023. In 2022, 78.88% of patients had a foot examination and this proportion had increased to 81.65% in 2023. In 2022, only 54.23% of patients had fundus examination and this proportion had increased to 61.76% in 2023. In 2022, 56.45% of patients had an electrocardiogram (ECG) performed and the figure had reduced to 53.51% in 2023.



Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023 [Audit Dataset]

Clinical Investigations												
States	HbA _{1c}						Blood Pressure					
	No. of patients audited	2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%		n	%		n	%
MALAYSIA	106,742	99,935	93.62	113,903	108,421	95.19	106,742	102,020	95.58	113,903	109,967	96.54
Johor	7,570	7,251	95.79	7,350	7,386	98.09	7,570	7,359	97.21	7,350	7,399	98.26
Kedah	7,718	6,628	85.88	7,791	7,362	94.49	7,718	7,192	93.18	7,791	7,648	98.16
Kelantan	8,657	8,369	96.67	9,995	9,698	97.03	8,657	8,463	97.76	9,995	9,769	97.73
Melaka	13,522	12,995	96.10	13,378	12,886	96.32	13,522	12,540	92.74	13,378	12,514	93.54
N. Sembilan	5,863	5,274	89.95	5,564	5,064	91.01	5,863	5,333	90.96	5,564	5,111	91.85
Pahang	7,229	7,093	98.12	7,057	6,972	98.80	7,229	7,095	98.15	7,057	6,982	98.93
Perak	8,348	7,716	92.43	9,207	8,640	93.84	8,348	7,984	95.64	9,207	8,737	94.89
Perlis	789	752	95.31	800	795	99.38	789	773	97.97	800	794	99.25
P. Pinang	4,316	3,933	91.13	4,668	4,286	91.82	4,316	4,183	96.92	4,668	4,570	97.90
Sabah	10,819	9,809	90.66	14,099	13,072	92.72	10,819	10,131	93.64	14,099	13,428	95.24
Sarawak	5,440	4,611	84.76	6,911	5,800	83.92	5,440	5,117	94.06	6,911	6,423	92.93
Selangor	6,721	6,125	91.13	6,772	6,548	96.69	6,721	6,419	95.51	6,772	6,666	98.43
Terengganu	15,336	15,113	98.55	15,681	15,534	99.06	15,336	15,112	98.54	15,681	15,522	98.98
WP KL	3,073	2,958	96.26	3,107	3,041	97.88	3,073	3,007	97.85	3,107	3,065	98.64
WP Labuan	589	589	100.00	588	587	99.83	589	589	100.00	588	587	99.82
WP Putrajaya	752	719	95.61	755	750	99.34	752	723	96.14	755	752	99.60

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023, continued [Audit Dataset]

States	Clinical Investigations											
	Fasting Blood Glucose (FBG)						Random Blood Glucose (RBG)					
	No. of patients audited	2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%		n	%		n	%
MALAYSIA	106,742	57,442	53.81	106,742	57,442	53.81	106,742	72,959	68.35	113,903	77,905	68.40
Johor	7,570	4217	55.71	113,903	62,027	54.46	7,570	4771	63.03	7,350	4,906	65.15
Kedah	7,718	3,435	44.51	7,350	3,944	52.38	7,718	6,107	79.13	7,791	6,611	84.85
Kelantan	8,657	3,041	35.13	7,791	3,495	44.86	8,657	6,901	79.72	9,995	7,993	79.97
Melaka	13,522	7,451	55.10	9,995	3,033	30.35	13,522	11,080	81.94	13,378	10,732	80.22
N. Sembilan	5,863	2,055	35.05	13,378	7,913	59.15	5,863	4,454	75.97	5,564	4,277	76.87
Pahang	7,229	3,996	55.28	5,564	2,113	37.98	7,229	5,016	69.39	7,057	5,148	72.95
Perak	8,348	5,648	67.66	7,057	4,200	59.52	8,348	5,357	64.17	9,207	5,614	60.98
Perlis	789	660	83.65	9,207	6,183	67.16	789	614	77.82	800	524	65.50
P. Pinang	4,316	3,234	74.93	800	713	89.13	4,316	3,410	79.01	4,668	3,632	77.81
Sabah	10,819	7,585	70.11	4,668	3,399	72.81	10,819	4,136	38.23	14,099	6,258	44.39
Sarawak	5,440	3,571	65.64	14,099	10,275	72.88	5,440	2,079	38.22	6,911	2,726	39.40
Selangor	6,721	2,532	37.67	6,911	4,404	63.72	6,721	5,156	76.71	6,772	5,428	80.15
Terengganu	15,336	6,141	40.04	6,772	2,623	38.73	15,336	10,028	65.39	15,681	10,582	67.48
WP KL	3,073	2,604	84.74	15,681	5,953	37.96	3,073	2,563	83.40	3,107	2,562	82.46
WP Labuan	589	589	100.00	3,107	2,713	87.32	589	589	100.00	588	364	61.90
WP Putrajaya	752	683	90.82	588	367	62.41	752	698	92.82	755	548	72.58

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023, continued [Audit Dataset]

Clinical Investigations												
States	2HPP						Creatinine					
	No. of patients audited	2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%		n	%		n	%
MALAYSIA	106,742	2,590	2.43	113,903	3,529	3.10	106,742	94,700	88.72	113,903	103,642	90.99
Johor	7,570	68	0.9	7,350	13	0.17	7,570	7,152	94.48	7,350	7,285	96.75
Kedah	7,718	57	0.74	7,791	212	2.72	7,718	6,569	85.11	7,791	7,242	92.95
Kelantan	8,657	314	3.63	9,995	359	3.59	8,657	8,119	93.79	9,995	9,513	95.18
Melaka	13,522	11	0.08	13,378	31	0.23	13,522	11,441	84.61	13,378	11,406	85.26
N. Sembilan	5,863	4	0.07	5,564	60	1.08	5,863	5,098	86.95	5,564	4,943	88.84
Pahang	7,229	16	0.22	7,057	62	0.88	7,229	6,675	92.34	7,057	6,663	94.42
Perak	8,348	182	2.18	9,207	157	1.71	8,348	7,424	88.93	9,207	8,283	89.96
Perlis	789	1	0.13	800	4	0.50	789	746	94.55	800	784	98.00
P. Pinang	4,316	59	1.37	4,668	48	1.03	4,316	3,894	90.22	4,668	4,292	91.95
Sabah	10,819	1215	11.23	14,099	1606	11.39	10,819	8,858	81.87	14,099	12,236	86.79
Sarawak	5,440	282	5.18	6,911	509	7.37	5,440	4,106	75.48	6,911	5,413	78.32
Selangor	6,721	104	1.55	6,772	131	1.93	6,721	5,734	85.31	6,772	6,146	90.76
Terengganu	15,336	167	1.09	15,681	204	1.30	15,336	14,894	97.12	15,681	15,352	97.90
WP KL	3,073	5	0.16	3,107	11	0.35	3,073	2,717	88.42	3,107	2,831	91.12
WP Labuan	589	0	0.00	588	58	9.86	589	589	100.00	588	529	89.97
WP Putrajaya	752	105	13.96	755	64	8.48	752	684	90.96	755	724	95.89

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023, continued [Audit Dataset]

Clinical Investigations												
States	Total Cholesterol						LDL					
	No. of patients audited	2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%		n	%		n	%
MALAYSIA	106,742	95,050	89.05	113,903	103,791	91.12	106,742	83,886	78.59	113,903	93,018	81.66
Johor	7,570	7,177	94.81	7,350	7,298	96.92	7,570	7,126	94.13	7,350	7,063	93.8
Kedah	7,718	6,527	84.57	7,791	7,063	90.66	7,718	6,419	83.17	7,791	6,920	88.82
Kelantan	8,657	8,209	94.82	9,995	9,602	96.07	8,657	7,875	90.97	9,995	9,433	94.38
Melaka	13,522	11,462	84.77	13,378	11,541	86.27	13,522	5,334	39.45	13,378	6,825	51.02
N. Sembilan	5,863	5,079	86.63	5,564	4,944	88.86	5,863	5,029	85.78	5,564	4,890	87.89
Pahang	7,229	6,841	94.63	7,057	6,623	93.85	7,229	5,573	77.09	7,057	5,473	77.55
Perak	8,348	7,462	89.39	9,207	8,364	90.84	8,348	7,314	87.61	9,207	8,315	90.31
Perlis	789	747	94.68	800	788	98.50	789	743	94.17	800	559	69.88
P. Pinang	4,316	3,878	89.85	4,668	4,292	92.95	4,316	3,851	89.23	4,668	4,134	88.56
Sabah	10,819	8,912	82.37	14,099	12,286	87.14	10,819	7,616	70.39	14,099	10,944	77.62
Sarawak	5,440	4,229	77.74	6,911	5,463	79.05	5,440	2,757	50.68	6,911	3,340	48.33
Selangor	6,721	5,665	84.29	6,772	6,093	89.97	6,721	5,497	81.79	6,772	6,008	88.72
Terengganu	15,336	14,906	97.20	15,681	15,342	97.84	15,336	14,799	96.50	15,681	15,044	95.94
WP KL	3,073	2,680	87.21	3,107	2,804	90.25	3,073	2,678	87.15	3,107	2,797	90.02
WP Labuan	589	589	100.00	588	575	97.79	589	589	100.00	588	559	95.07
WP Putrajaya	752	687	91.36	755	713	94.44	752	686	91.22	755	714	94.57

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023, continued [Audit Dataset]

Clinical Investigations												
States	HDL						Triglyceride					
	No. of patients audited	2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%		n	%		n	%
MALAYSIA	106,742	84,376	79.05	113,903	93,422	82.02	106,742	94,426	88.46	113,903	103,063	90.48
Johor	7,570	7,142	94.35	7,350	7,059	93.75	7,570	7,157	94.54	7,350	7,284	96.73
Kedah	7,718	6,456	83.65	7,791	6,970	89.46	7,718	6,517	84.44	7,791	7,030	90.23
Kelantan	8,657	7,914	91.42	9,995	9,444	94.49	8,657	8,207	94.80	9,995	9,574	95.79
Melaka	13,522	5,403	39.96	13,378	6,877	51.41	13,522	11,380	84.16	13,378	11,491	85.89
N. Sembilan	5,863	5,030	85.79	5,564	4,907	88.19	5,863	5,041	85.98	5,564	4,910	88.25
Pahang	7,229	5,631	77.89	7,057	5,558	78.76	7,229	6,817	94.30	7,057	6,541	92.69
Perak	8,348	7,382	88.43	9,207	8,340	90.58	8,348	7,407	88.73	9,207	8,343	90.62
Perlis	789	745	94.42	800	558	69.75	789	746	94.55	800	789	98.63
P. Pinang	4,316	3,853	89.27	4,668	4,158	89.07	4,316	3,876	89.81	4,668	4,279	91.67
Sabah	10,819	7,688	71.06	14,099	11,084	78.62	10,819	8,754	80.91	14,099	11,957	84.81
Sarawak	5,440	2,811	51.67	6,911	3,342	48.36	5,440	3,992	73.38	6,911	5,349	77.40
Selangor	6,721	5,493	81.73	6,772	5,940	87.71	6,721	5,671	84.38	6,772	6,082	89.81
Terengganu	15,336	14,874	96.99	15,681	15,109	96.35	15,336	14,907	97.20	15,681	15,343	97.84
WP KL	3,073	2,679	87.18	3,107	28	90.18	3,073	2,679	87.18	3,107	2,804	90.25
WP Labuan	589	589	100.00	588	562	95.58	589	589	100.00	588	574	97.62
WP Putrajaya	752	686	91.22	755	712	94.30	752	686	91.22	755	713	94.44

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2022-2023, continued [Audit Dataset]

States	Clinical Investigations											
	No. of patients audited	Urine Protein					Urine Microalbumin					
		2022		No. of patients audited	2023		2022		No. of patients audited	2023		
	n	%	n	%	n	%	n	%	n	%		
MALAYSIA	106,742	79,202	74.20	113,903	87,655	76.96	106,742	57,731	54.08	113,903	62,604	54.96
Johor	7,570	5,407	71.43	7,350	5,773	76.67	7,570	3,246	42.88	7,350	3,419	45.41
Kedah	7,718	5,444	70.54	7,791	6,205	79.64	7,718	3,697	47.90	7,791	3,997	51.30
Kelantan	8,657	7,124	82.29	9,995	8,184	81.88	8,657	6,082	70.26	9,995	6,622	66.25
Melaka	13,522	8,426	62.31	13,378	8,629	64.50	13,522	5,117	37.84	13,378	5,834	43.61
N. Sembilan	5,863	4,637	79.09	5,564	4,367	78.49	5,863	2,785	47.50	5,564	2,142	38.50
Pahang	7,229	6,064	83.88	7,057	6,189	87.70	7,229	4,629	64.03	7,057	4,978	70.54
Perak	8,348	5,965	71.45	9,207	6,506	70.66	8,348	4,384	52.52	9,207	4,724	51.31
Perlis	789	630	79.85	800	749	93.63	789	545	69.07	800	698	87.25
P. Pinang	4,316	2,776	64.32	4,668	3,235	69.30	4,316	2,158	50.00	4,668	2,565	54.95
Sabah	10,819	7,900	73.02	14,099	10,866	77.07	10,819	4,829	44.63	14,099	6,624	46.98
Sarawak	5,440	3,518	64.67	6,911	4,636	67.08	5,440	2,656	48.82	6,911	3,289	47.59
Selangor	6,721	4,457	66.31	6,772	4,815	71.10	6,721	3,781	56.26	6,772	3,746	55.32
Terengganu	15,336	13,429	87.57	15,681	13,858	88.37	15,336	11,227	73.21	15,681	11,247	71.72
WP KL	3,073	2,207	71.82	3,107	2,427	78.11	3,073	1,492	48.55	3,107	1,527	49.15
WP Labuan	589	587	99.66	588	548	93.20	589	503	85.40	588	546	92.86
WP Putrajaya	752	631	83.91	755	668	88.48	752	600	79.79	755	646	85.56

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2021-2022, continued [Audit Dataset]

States	Clinical Investigations											
	No. of patients audited	Foot Examination					Fundus Examination					
		2022		No. of patients audited	2023		No. of patients audited	2022		No. of patients audited	2023	
n	%	n	%		n	%		n	%			
MALAYSIA	106,742	84,203	78.88	113,903	93,003	81.65	106,742	57,888	54.23	113,903	70,344	61.76
Johor	7,570	5,624	74.29	7,350	5,597	74.33	7,570	3,788	50.04	7,350	3,745	49.73
Kedah	7,718	6,109	79.15	7,791	6,781	87.04	7,718	4,131	53.52	7,791	5,225	67.06
Kelantan	8,657	7,670	88.60	9,995	8,800	88.04	8,657	5,688	65.70	9,995	6,517	65.20
Melaka	13,522	10,988	81.26	13,378	11,098	82.96	13,522	5,607	41.47	13,378	6,080	45.45
N. Sembilan	5,863	4,177	71.24	5,564	4,106	73.80	5,863	3,773	64.35	5,564	3,616	64.99
Pahang	7,229	6,687	92.50	7,057	6,602	93.55	7,229	4,022	55.64	7,057	5,039	71.40
Perak	8,348	6,083	72.87	9,207	6,798	73.84	8,348	4,115	49.29	9,207	5,106	55.46
Perlis	789	489	61.98	800	707	88.38	789	388	49.18	800	594	74.25
P. Pinang	4,316	3,336	77.29	4,668	3,654	78.28	4,316	2,396	55.51	4,668	2,988	64.01
Sabah	10,819	8,226	76.03	14,099	11,275	79.97	10,819	5,119	47.31	14,099	8,665	61.46
Sarawak	5,440	3,320	61.03	6,911	4,662	67.46	5,440	2,227	40.94	6,911	3,520	50.93
Selangor	6,721	4,279	63.67	6,772	4,776	70.53	6,721	3,021	44.95	6,772	4,077	60.20
Terengganu	15,336	13,919	90.76	15,681	14,380	91.70	15,336	10,738	70.02	15,681	11,856	75.61
WP KL	3,073	2,071	67.39	3,107	2,449	78.82	3,073	1,689	54.96	3,107	2,080	66.95
WP Labuan	589	587	99.66	588	584	99.32	589	587	99.66	588	523	88.95
WP Putrajaya	752	638	84.84	755	734	97.22	752	599	79.65	755	713	94.44

Table 6 - Proportion of Type 2 Diabetes Mellitus patients receiving clinical investigations, 2021-2022, continued [Audit Dataset]

Clinical Investigations						
ECG						
States	No. of patients audited	2022		No. of patients audited	2023	
		n	%		n	%
MALAYSIA	106,742	60,255	56.45	113,903	60,946	53.51
Johor	7,570	4,389	58.02	7,350	3,590	47.69
Kedah	7,718	3,595	46.58	7,791	2,632	33.78
Kelantan	8,657	7,128	82.34	9,995	8,418	84.22
Melaka	13,522	5,119	37.86	13,378	5,269	39.39
N. Sembilan	5,863	3,997	68.24	5,564	3,945	71.02
Pahang	7,229	3,559	49.29	7,057	4,164	59.01
Perak	8,348	3,326	39.90	9,207	3,899	42.35
Perlis	789	387	49.05	800	494	61.75
P. Pinang	4,316	2,827	66.53	4,668	3,469	74.31
Sabah	10,819	5,878	54.40	14,099	8,906	63.17
Sarawak	5,440	2,931	53.34	6,911	3,854	55.78
Selangor	6,721	1,383	20.61	6,772	1,535	22.67
Terengganu	15,336	12,875	83.96	15,681	8,752	55.81
WP KL	3,073	1,675	54.51	3,107	1,204	38.75
WP Labuan	589	587	99.66	588	573	97.45
WP Putrajaya	752	599	79.65	755	242	32.05

Clinical Target Achievement

The quality of care of patients with diabetes in MOH KKs is monitored using the HbA1c level as a proxy. The Quality Assurance (QA) indicator is measured as the proportion of T2DM patients with HbA1c $\leq 6.5\%$ and is set at the optimum achievable standard, 30%. Table 7 shows the proportion of T2DM patients achieving HbA1c $\leq 6.5\%$, which has significantly increased from 27.64% in 2019 to 34.38% in 2023. However, the trend remained the same between 2022 (34.94%) and 2023 (34.38%).

Overall, there was a decreasing trend seen in majority of states in 2023 as compared to 2022 with significant decrease in Sarawak, WP Labuan and Negeri Sembilan with reduction of 8.77%, 4.49% and 4.30% respectively. Meanwhile 7 states had an increased trend whereby, the top three states were Terengganu, Johor and Perlis with an increase of 3.72%, 2.26% and 1.84% respectively.

However, the variation between states over the years in terms of HbA1c achievements must be interpreted with caution since the coverage of HbA1c testing also greatly differs between states. Despite this, the dataset is still useful for each individual state to monitor the changing trends of HbA1c achievements over time.

Table 8 reports the proportions of audited patients achieving treatment targets. Table 9 reports the mean clinical test values. Among audited patients, the proportion of those achieving treatment targets for urine protein were decreasing in trend. Improvements were seen for both systolic and diastolic blood pressure. The remaining parameters including total cholesterol, HDL, LDL, TG and Waist Circumference were all increasing in trend however BMI and remain unchanged.

Table 7 – Proportion of Type 2 Diabetes Mellitus Patients Achieving HbA_{1c} ≤6.5%*, 2013-2023

								% Achieved target (HbA_{1c} ≤6.5%) – QA Indicator			
State	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Malaysia	21.47	24.64	22.06	26.9	28	28.2	27.64	30.7	35.29	34.94	34.38
Johor	16.88	19.68	19.28	19.7	20.9	21.8	21.19	24.17	28.92	30.71	32.97
Kedah	18.44	22.31	19.2	16.13	17.5	20.6	24.8	23.23	29.47	30.45	30.12
Kelantan	12.73	16.57	18.53	21.79	29.3	28.5	26.89	29.65	35.06	34.8	32.42
Melaka	29.61	36.31	24.57	26.73	30.5	28.3	28.29	28.79	34.23	34.97	36.45
N. Sembilan	24.38	28.34	28.1	31.75	30.1	30.9	31.4	36.08	39.9	37.18	32.88
Pahang	19.06	19.42	14.73	20.8	24.7	24.5	34.19	38.82	40.44	38.57	39.79
Perak	22.49	25.29	24.39	28.94	32.5	32.9	29.46	31.8	37.3	37.34	34.73
Perlis	23.04	28.3	29.78	32.24	29.4	26	27.34	32.47	36.5	31.91	33.75
P. Pinang	18.25	24.95	18.92	23.3	28.8	30.3	28.64	34.02	35.56	33.66	31.34
Sabah	38.05	39.12	37.63	38.43	44.6	34.1	36.85	35.14	39.32	38.27	34.77
Sarawak	6.69	8.33	21.42	24.65	42.4	29.5	25.17	32.82	44.31	43.44	34.67
Selangor	21.82	23.54	25.05	27.39	25.7	25.5	28.19	28	0	30.56	31.27
Terengganu	20.91	24.84	20.51	22.41	27.5	26.7	28.3	32.06	33.57	31.91	35.63
WP. Kuala Lumpur	34.62	35.99	26.73	26.86	26.3	31.5	31.34	31.43	38.46	37.83	38.01
WP. Labuan	0	32.13	22.32	32.44	27.4	48.6	40.66	35.26	41.78	40.75	36.26
WP. Putrajaya	35.11	33.91	24.03	18.17	29.3	35.8	42.28	36.77	38.41	37.27	33.64

Note: *The denominator for the percentage is the total number of sampled patients for the audited year.

Table 8 - Target achievement based on clinical investigations, 2022-2023 [Audit Dataset]

Clinical Investigations						
Clinical Test	Blood Pressure: Systolic		Blood Pressure: Diastolic		Blood Pressure	
Treatment Target	≤135 mmHg		≤75 mmHg		≤135/75 mmHg	
	Percentage (%)					
	2022	2023	2022	2023	2022	2023
MALAYSIA	49	50.86	42.99	43.86	27.07	28.23
Johor	40.58	42.51	45.07	46.05	24.61	25.98
Kedah	47.33	51.64	40.41	42.46	25.88	28.18
Kelantan	53.59	55.86	42.7	43.75	29.09	30.26
Melaka	45.73	45.54	45.58	44.53	27.44	26.6
N. Sembilan	44.59	47.21	42.18	45.12	24.7	26.88
Pahang	50.77	52.75	45.67	45.26	28.95	29.88
Perak	50.29	52.47	48.1	50.55	30.83	33.03
Perlis	44.24	44.58	45.41	44.71	26	24.18
P. Pinang	55.03	53.1	54.75	52.25	36.05	34.33
Sabah	53.33	55.85	38.59	41.13	25.94	28.36
Sarawak	49.5	52.05	38.51	40.6	23.92	26.66
Selangor	44.51	47.95	44.36	42.62	25.9	26.92
Terengganu	50.61	50.71	37.13	38.55	24.35	25.47
WP KL	48.35	46.88	48.79	51.65	30.66	29.72
WP Labuan	61.46	64.8	53.65	53.15	37.69	37.65
WP Putrajaya	60.72	64.89	28.91	30.59	22.82	28.23
Clinical Test	Urine Protein		Urine Microalbumin		Total Cholesterol	
Treatment Target	Negative		Negative		<4.5 mmol/l	
	Percentage (%)					
	2022	2023	2022	2023	2022	2023
MALAYSIA	63.83	62.1	67.7	67.49	42.71	44.53
Johor	51.73	50.75	61.21	66.22	42.04	42.87
Kedah	70.11	65.41	71.25	63.67	40.48	45.94
Kelantan	77.25	75.73	78.74	79.25	33.07	36.67
Melaka	47.39	48.02	63.55	55.22	49.4	49.53
N. Sembilan	49.69	44.7	64.49	62.32	45.56	46.6
Pahang	68.3	69.82	65.28	68.48	38.87	39.39
Perak	65.47	64.69	74.2	76.12	50.96	52.1
Perlis	71.59	66.62	59.08	54.01	37.08	38.71
P. Pinang	58.11	58.83	55.65	59.65	49.61	51.79
Sabah	62.25	58.98	68.25	64.1	50.07	49.56
Sarawak	76.44	71.38	80.31	76.65	51	51.96
Selangor	66.55	64	66.89	67.71	44.98	47.54
Terengganu	72.05	70.28	65.63	69.25	29.53	31.37
WP KL	56.05	51.92	56.03	57.89	53.51	54.89
WP Labuan	39.18	21.17	73.76	84.07	48.22	54.78
WP Putrajaya	50.24	44.76	49.17	45.2	43.23	44.74

Table 8 - Target achievement based on clinical investigations, 2022-2023, continued [Audit Dataset]

Clinical Investigations								
Clinical Test	TG		HDL		LDL			
Treatment Target	≤1.7mmol/l		>1.2mmol/l (Male)		>1.0mmol/l (Female)		≤2.6 mmol/l	
	Percentage (%)							
	2022	2023	2022	2023	2022	2023	2022	2023
MALAYSIA	67.3	69.01	70.2	71.46	64.42	66.22	50.26	52.7
Johor	65.11	67.31	67.41	68.08	63.2	63.85	52.3	52.24
Kedah	64.2	67.17	70.18	72.81	61.67	65.78	47.48	53.74
Kelantan	64.4	65.89	73.81	73.8	67.35	68.41	43.3	44.77
Melaka	71.24	70.87	66.1	68.64	62.1	65.1	53.3	55.25
N. Sembilan	71.04	72.22	62.87	64.59	58.26	59.25	52.73	52.74
Pahang	69.36	70.91	78.47	80.92	72.65	74.63	51.62	52.24
Perak	66.91	70	63.07	64.37	56.13	57.07	58.71	60.88
Perlis	68.63	67.93	77.12	77.05	66.67	64.53	46.16	43.65
P. Pinang	72.11	70.51	63.95	63.37	59.98	59.79	58.35	59.58
Sabah	68.01	69.45	74.12	74.04	64.44	66.36	59.69	57.81
Sarawak	61.12	62.49	69.83	71.15	58.11	60.44	62.6	65.07
Selangor	64.73	68.4	66.79	70.27	62.55	63.4	52.32	55.05
Terengganu	66.24	69.26	77.36	77.99	72.27	75.32	35.33	39.33
WP KL	71.82	74.43	63.32	66.49	58.85	60.92	62.51	63.07
WP Labuan	71.14	75.26	62.04	66.82	50.29	57.6	52.97	59.57
WP Putrajaya	66.33	73.21	72.9	73.41	65.79	64.75	52.62	56.58
Clinical Test	BMI		Waist circumference					
Treatment Target	<23kg/m ²		<90cm (Male)		<80cm (Female)			
	Percentage (%)							
	2022	2023	2022	2023	2022	2023	2022	2023
MALAYSIA	15.84	15.87	29.6	28.62	11.18			10.38
Johor	16.4	16.1	26.2	25.76	9.23			8.87
Kedah	16.31	16.56	35.5	31.47	13.17			10.06
Kelantan	17.67	17.77	41.81	41.26	15.88			13.67
Melaka	14.86	14.79	24.92	24.72	9.64			9.21
N. Sembilan	16.23	15.68	22.41	20.43	7.7			6.85
Pahang	14.3	14.56	31.75	29.55	11.47			11.63
Perak	18.1	17.29	30.06	29.86	11.81			10.31
Perlis	16.56	16.12	31.91	27.33	10.53			8.16
P. Pinang	22.85	21.86	25.8	24.12	9.14			9.8
Sabah	14.75	15.05	28.22	27.41	12.02			12.2
Sarawak	15.29	15.06	33.62	29.31	16.44			13.64
Selangor	15.29	16.03	24.43	25.23	9.99			8.78
Terengganu	13.91	14.32	33.22	32.47	10.31			9.79
WP KL	17.1	18.39	21.09	22.5	8.88			8.68
WP Labuan	12.82	11.41	20.41	20.18	5.25			3.66
WP Putrajaya	11.08	8.77	16.67	12.95	3.63			3.99

Table 9 - Target achievements (Mean Values) based on clinical investigations [Audit Dataset]

Clinical Test	2022	2023
Blood Pressure: Systolic (mmHg)	136.2	135
Blood Pressure: Diastolic (mmHg)	77.2	77
Total Cholesterol (mmol/l)	4.8	4.6
TG (mmol/l)	1.7	1.4
HDL (Male) (mmol/l)	1.2	1.2
HDL (Female) (mmol/l)	1.4	1.4
LDL (mmol/l)	2.8	2.6
BMI (kg/m ²)	27.9	27.3
Waist circumference (Male) (cm)	95.6	95
Waist circumference (Female) (cm)	92.8	92



Drug Treatment

The use of anti-diabetic drugs is shown in Table 10. In 2023, 32.07% of patients were on monotherapy compared to 30.25% in 2022. Those on 2 or more OADs remained same from 35.15% in 2022 and 35.24% in 2023. Patients who were on insulin - OAD combination treatment had decreased from 23.54% in 2022 to 22.60% in 2023. The proportion of patients on diet management remain unchanged between 2022 (5.80%) and 2023 (5.58%).

In 2023, metformin (85.57%) was the most prescribed OADs followed by sulphonylureas (42.40%). These are followed by glitazones (0.63%) and alpha-glucosidase inhibitors (0.51%). The use of insulin has decreased from 28.80% in 2022 to 27.12% in 2023.

The use of other concomitant drugs is shown in Tables 11, 12 and 13. Calcium channel blockers (60.70%) and ACE-inhibitors (51.90%) were the most commonly used anti-hypertensives, followed by beta-blockers (25.30%). Aspirin was the most commonly used anti-platelet (14.70%) and statins (86.41%) were the most commonly used lipid-lowering agents.

Table 10 – Utilization of anti-diabetic drugs, 2022-2023 [Audit Dataset]

Anti-diabetic drugs used (Therapy)																
States	Monotherapy (OAD)				≥2 OAD				OAD + Insulin				Diet Only			
	2022		2023		2022		2023		2022		2023		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	32,290	30.25	36,534	32.07	37,525	35.15	40,139	35.24	25,124	23.54	25,745	22.6	6,191	5.8	6,354	5.58
Johor	2,222	29.35	2,311	30.68	2,596	34.29	2,624	34.84	1,858	24.54	1,771	23.51	330	4.36	327	4.34
Kedah	2,025	26.24	2,239	28.74	2,813	36.45	2,839	36.44	1,933	25.05	2,079	26.68	508	6.58	266	3.41
Kelantan	2,248	25.97	2,838	28.39	2,970	34.31	3,469	34.7	2,320	26.8	2,519	25.2	326	3.77	359	3.59
Melaka	4,704	34.79	4,941	36.93	4,176	30.88	4,078	30.48	2,595	19.19	2,337	17.47	1,421	10.51	1,498	11.2
N. Sembilan	1,849	79.09	1,803	32.4	1,834	31.28	1,657	29.78	1,179	20.11	1,191	21.41	666	11.36	603	10.84
Pahang	2,132	29.49	2,251	31.9	2,810	38.87	2,707	38.36	1,676	23.18	1,606	22.76	258	3.57	199	2.82
Perak	2,512	30.09	2,846	30.91	3,172	38	3,431	37.27	1,884	22.57	2,047	22.23	392	4.7	517	5.62
Perlis	293	37.14	295	36.88	249	31.56	256	32	183	23.19	188	23.5	30	3.8	29	3.63
P. Pinang	1284	29.75	1502	32.18	1,697	39.32	1,862	39.89	939	21.76	976	20.91	226	5.24	183	3.92
Sabah	3,588	33.16	4,933	34.98	4,065	37.57	5,339	37.86	2,098	19.39	2,689	19.07	781	7.22	812	5.76
Sarawak	2,032	37.35	2,517	36.41	1,974	36.29	2,420	35.01	1030	18.93	1,226	17.73	301	5.53	647	9.36
Selangor	1,830	27.22	1,943	28.68	2,356	35.05	2,523	37.25	1,903	28.31	1,750	25.83	287	4.27	241	3.56
Terengganu	4,156	27.1	4,630	29.52	5,171	33.72	5,263	33.56	4,488	29.26	4,348	27.73	469	3.06	510	3.25
WP KL	948	30.85	1003	32.28	1,112	36.19	1,173	37.75	770	25.06	717	23.08	140	4.56	129	4.15
WP Labuan	212	35.99	227	38.61	241	40.92	207	35.2	116	19.69	129	21.94	16	2.72	16	2.72
WP Putrajaya	255	33.91	255	33.77	289	38.43	291	38.54	152	20.21	172	22.78	40	5.32	18	2.38

Table 10 – Utilization of anti-diabetic drugs, 2022-2023, continued [Audit Dataset]

States	Anti-diabetic drugs used (Therapy)															
	Metformin				Sulphonylureas				α -Glucosidase Inhibitors				Meglitinides			
	2022		2023		2022		2023		2022		2023		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	90,408	84.7	97,479	85.57	45,884	42.99	48,296	42.4	610	0.57	577	0.51	106	0.1	73	0.06
Johor	6,342	83.78	6,405	85.04	3,134	41.4	3,078	40.87	54	0.71	57	0.76	10	0.13	1	0.01
Kedah	6,438	83.42	6,803	87.32	3,416	44.26	3,492	44.82	26	0.34	33	0.42	4	0.05	2	0.03
Kelantan	7,062	81.58	8,309	83.12	3,730	43.09	4,232	42.34	178	2.06	147	1.47	12	0.14	5	0.05
Melaka	10,978	81.19	10,891	81.4	4,977	36.81	4,916	36.74	16	0.12	12	0.09	21	0.16	5	0.04
N. Sembilan	4,637	79.09	4,451	80	2,131	36.35	1,993	35.82	3	0.05	2	0.04	18	0.31	1	0.02
Pahang	6,321	87.44	6,224	88.2	3,311	45.8	3,179	45.05	76	1.05	61	0.86	4	0.06	16	0.23
Perak	7,190	86.13	7,905	85.86	3,777	45.24	4,174	45.34	40	0.48	23	0.25	4	0.05	9	0.1
Perlis	691	87.58	710	88.75	289	36.63	284	35.5	1	0.13	1	0.13	0	0	0	0
P. Pinang	3,697	85.66	4,072	87.23	2,119	49.1	2,262	48.46	4	0.09	13	0.28	1	0.02	0	0
Sabah	9,338	86.31	12,378	87.77	4,780	44.18	6,032	42.77	92	0.85	103	0.73	4	0.04	6	0.04
Sarawak	4,808	88.38	5,890	85.2	2,375	43.66	2,865	41.44	23	0.42	40	0.58	5	0.09	4	0.06
Selangor	5,880	87.47	5,974	88.19	2,988	44.45	3,130	46.21	11	0.16	10	0.15	8	0.12	8	0.12
Terengganu	13,077	85.27	13,467	85.88	6,809	44.4	6,641	42.35	70	0.46	69	0.44	15	0.1	15	0.1
WP KL	2,726	88.71	2,775	89.31	1,407	45.79	1,422	45.77	14	0.46	6	0.19	0	0	0	0
WP Labuan	554	94.06	548	93.2	299	50.76	261	44.39	2	0.34	0	0	0	0	0	0
WP Putrajaya	669	88.96	677	89.67	342	45.48	335	44.37	0	0	0	0	0	0	1	0.13

Table 10 – Utilization of anti-diabetic drugs, 2022-2023, continued [Audit Dataset]

States	Anti-diabetic drugs used (Therapy)											
	Glitazones				Other OAD				Insulin			
	2022		2023		2022		2023		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	821	0.77	713	0.63	3,844	3.6	5,947	5.22	30,737	28.8	30,889	27.12
Johor	60	0.79	42	0.56	190	2.51	260	3.45	2,422	31.99	2,270	30.14
Kedah	48	0.62	8	0.1	181	2.35	347	4.45	2,372	30.73	2,447	31.41
Kelantan	33	0.38	29	0.29	313	3.62	412	4.12	3,113	35.96	3,330	33.31
Melaka	208	1.54	57	0.43	159	1.18	252	1.88	3,221	23.82	2,863	21.4
N. Sembilan	113	1.93	70	1.26	88	1.5	117	2.1	1,514	25.82	1,501	26.98
Pahang	17	0.24	94	1.33	299	4.14	374	5.3	2,029	28.07	1,900	26.92
Perak	93	1.11	38	0.41	341	4.08	452	4.91	2,272	27.22	2,413	26.21
Perlis	0	0	0	0	25	3.17	41	5.13	217	27.5	220	27.5
P. Pinang	1	0.02	3	0.06	260	6.02	334	7.16	1,109	25.7	1,121	24.01
Sabah	30	0.28	150	1.06	797	7.37	1,421	10.08	2,385	22.04	3,018	21.4
Sarawak	186	3.42	106	1.53	193	3.55	358	5.18	1,133	20.83	1,329	19.22
Selangor	5	0.07	1	0.01	172	2.56	331	4.89	2,249	33.46	2,067	30.51
Terengganu	24	0.16	111	0.71	628	4.09	975	6.22	5,540	36.12	5,279	33.66
WP KL	0	0	3	0.1	125	4.07	187	6.02	873	28.41	802	25.81
WP Labuan	0	0	0	0	4	0.68	5	0.85	120	20.37	138	23.47
WP Putrajaya	3	0.4	1	0.13	69	9.18	81	10.73	168	22.34	191	25.3

Table 11 – Utilization of concomitant drugs, Anti-Hypertensive, 2021-2022 [Audit Dataset]

Use of concomitant drugs (Anti-Hypertensives)																
States	ACE inhibitors				Angiotensin receptor blocker				Beta blockers				Calcium channel blockers			
	2022		2023		2022		2023		2022		2023		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	56,128	52.58	59,114	51.9	10,774	10.09	12,959	11.38	26,884	25.19	28,823	25.3	63,648	59.63	69,146	60.7
Johor	3,965	52.38	3,917	52.02	617	8.15	715	9.5	2,085	27.54	2,105	27.92	4,796	63.36	4,766	63.29
Kedah	3,756	48.67	4,022	51.62	593	7.68	621	7.97	1,812	23.48	1,981	25.43	4,301	55.73	4,718	60.56
Kelantan	4,704	54.34	5,211	52.14	897	10.36	1091	10.92	2,180	25.18	2,528	25.29	5,136	59.33	5,998	60.01
Melaka	6,857	50.71	6,558	49.02	967	7.15	1043	7.8	3,461	25.6	3,221	24.08	7,490	55.39	7,351	54.94
N. Sembilan	2,895	49.38	2,728	49.03	496	8.46	529	9.51	1,461	24.92	1,441	25.9	3,314	56.52	3,302	59.35
Pahang	3,915	54.16	3,847	54.51	589	8.15	694	9.83	1,753	24.25	1,649	23.37	4,210	58.24	4,284	60.71
Perak	4,682	56.09	4,959	53.86	820	9.82	945	10.26	2,287	27.4	2,475	26.88	4,931	59.07	5,257	57.1
Perlis	406	51.46	396	49.5	61	7.73	94	11.75	200	25.35	183	22.88	420	53.23	464	58
P. Pinang	2,323	53.82	2,432	52.1	515	11.93	622	13.32	1375	31.86	1492	31.96	2,540	58.85	2,758	59.08
Sabah	5,001	46.22	6,489	46.02	1493	13.8	2246	15.93	2,512	23.22	3,356	23.8	6,955	64.29	9,344	66.27
Sarawak	2,557	47	3,243	46.92	607	11.16	928	13.43	1551	28.51	1983	28.6	3,660	67.28	4,448	64.35
Selangor	4,005	59.59	3,975	56.68	648	9.64	680	10.04	1,668	24.82	1,770	26.13	4,040	60.11	4,226	62.39
Terengganu	8,638	56.32	8,731	55.68	1838	11.98	2077	13.12	3,553	23.17	3,626	23.12	9,409	61.35	9,732	62.06
WP KL	1,845	60.04	1,956	62.95	395	12.85	429	13.81	830	27.01	831	26.75	1,741	56.65	1,780	57.29
WP Labuan	216	36.67	251	42.69	101	17.15	107	18.2	66	11.21	71	12.07	355	60.27	347	59.01
WP Putrajaya	363	48.27	399	52.85	137	18.22	138	18.28	90	11.97	114	15.1	350	46.54	371	49.14

Table 11 – Utilization of concomitant drugs, Anti-Hypertensive, 2022-2023, continued [Audit Dataset]

Use of concomitant drugs (Anti-Hypertensives)																
States	Diuretics				Alpha blockers				Central-acting agents				Others			
	2022		2023		2022		2023		2022		2023		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	20,315	19.03	20,560	18.05	3,936	3.69	4,268	3.75	148	0.14	141	0.12	609	0.57	656	0.58
Johor	1,434	18.94	1,390	18.46	442	5.84	447	5.94	13	0.17	23	0.31	43	0.57	64	0.85
Kedah	1,466	18.99	1,571	20.16	186	2.41	199	2.55	14	0.18	5	0.06	32	0.41	67	0.86
Kelantan	2,003	23.14	2,184	21.85	286	3.3	277	2.77	5	0.06	3	0.03	22	0.25	35	0.35
Melaka	2,188	16.18	1,897	14.18	655	4.84	563	4.21	17	0.13	17	0.13	9	0.07	24	0.18
N. Sembilan	783	13.35	834	14.99	227	3.87	253	4.55	3	0.05	1	0.02	15	0.26	9	0.16
Pahang	1,346	18.62	1,335	18.92	145	2.01	169	2.39	27	0.37	9	0.13	41	0.57	41	0.58
Perak	1,721	20.62	1,709	18.56	331	3.97	352	3.82	15	0.18	11	0.2	28	0.34	28	0.3
Perlis	172	21.8	138	17.25	28	3.55	26	3.25	0	0	0	0	0	0	1	0.13
P. Pinang	844	19.56	839	17.97	155	3.59	164	3.51	1	0.02	2	0.04	26	0.6	15	0.32
Sabah	1,829	16.91	2,151	15.26	348	3.22	516	3.66	20	0.18	18	0.13	114	1.05	137	0.97
Sarawak	945	17.37	1,065	15.41	230	4.23	282	4.08	4	0.07	22	0.32	57	1.05	39	0.56
Selangor	1,347	20.04	1,341	19.8	277	4.12	309	4.56	15	0.22	9	0.13	26	0.39	32	0.7
Terengganu	3,649	23.79	3,483	22.21	492	3.21	601	3.83	10	0.07	20	0.13	188	1.23	144	0.92
WP KL	433	14.09	464	14.93	110	3.58	91	2.93	3	0.1	1	0.03	7	0.23	17	0.55
WP Labuan	75	12.73	76	12.93	6	1.02	4	0.68	0	0	0	0	0	0	1	0.17
WP Putrajaya	80	10.64	83	10.99	18	2.39	15	1.99	1	0.13	0	0	1	0.13	2	0.26

Table 12 - Utilization of concomitant drugs, Anti-Platelet, 2022-2023 [Audit Dataset]

States	Acetyl Salicylic Acid				Ticlopidine			
	2022		2023		2022		2023	
	n	%	n	%	n	%	n	%
MALAYSIA	16,917	15.85	16,738	14.7	377	0.35	354	0.31
Johor	1,467	19.38	1,462	19.42	52	0.69	29	0.39
Kedah	1,127	14.6	1,126	14.45	39	0.51	50	0.64
Kelantan	1,227	14.17	1,253	12.54	10	0.12	27	0.27
Melaka	2,493	18.44	2,084	15.58	27	0.2	25	0.19
N. Sembilan	804	13.71	761	13.68	41	0.7	29	0.52
Pahang	1,308	18.09	1,225	17.36	47	0.65	42	0.6
Perak	1,649	19.75	1,766	19.18	26	0.31	28	0.3
Perlis	146	18.5	105	13.13	1	0.13	1	0.13
P. Pinang	948	21.96	975	20.89	44	1.02	40	0.86
Sabah	1016	9.39	1243	8.82	14	0.13	18	0.13
Sarawak	552	10.15	682	9.87	7	0.13	6	0.09
Selangor	1,032	15.35	965	14.25	28	0.42	19	0.28
Terengganu	2,516	16.41	2,465	15.72	24	0.16	20	0.13
WP KL	507	16.5	516	16.61	12	0.39	17	0.55
WP Labuan	53	9	16	2.72	0	0	1	0.17

Table 13 - Utilization of concomitant drugs, Anti-Lipid, 2022-202 [Audit Dataset]

States	Statins						Fibrates						Others					
	2021		2022		2023		2021		2022		2023		2021		2022		2023	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MALAYSIA	69,526	83.05	89,814	84.14	98,426	86.41	1,075	1.28	1,183	1.11	1,053	0.92	109	0.13	115	0.11	131	0.12
Johor	6,386	86.46	6,630	87.58	6,794	90.23	108	1.46	103	1.36	70	0.93	4	0.05	6	0.08	8	0.11
Kedah	6,461	83.75	6,520	84.48	7,096	91.08	230	2.98	167	2.16	159	2.04	17	0.22	9	0.12	20	0.26
Kelantan	4,139	86.97	7,449	86.05	8,912	89.16	23	0.48	71	0.82	29	0.29	3	0.06	4	0.05	13	0.13
Melaka	9,789	72.42	10,306	76.22	10,459	78.17	132	0.98	171	1.26	83	0.62	15	0.11	10	0.07	7	0.05
N. Sembilan	3,992	76.99	4,488	76.55	4,403	79.13	62	1.2	68	1.16	51	0.92	2	0.04	8	0.14	5	0.09
Pahang	6,061	82.93	6,065	83.9	6,062	85.9	92	1.26	68	0.94	56	0.79	7	0.1	11	0.15	8	0.11
Perak	6,570	85.32	7,159	85.76	7,972	86.59	79	1.03	76	0.91	87	0.94	12	0.16	10	0.12	8	0.09
Perlis	701	89.19	696	88.21	709	88.63	48	6.11	35	4.44	37	4.63	2	0.25	4	0.51	0	0
P. Pinang	2,787	85.23	3,869	89.64	4,204	90.06	112	3.43	136	3.15	142	3.04	14	0.43	16	0.37	14	0.3
Sabah	2,419	82.5	8,677	80.2	11,829	83.9	24	0.82	66	0.61	101	0.72	4	0.14	8	0.07	13	0.09
Sarawak	2,247	80.89	4,398	80.85	5,433	78.6	20	0.72	39	0.72	77	1.11	5	0.18	10	0.18	8	0.12
Selangor	0	0	5,930	88.23	6,127	90.45	0	0	76	1.13	65	0.96	0	0	2	0.03	2	0.03
Terengganu	14,223	88.99	13,750	89.66	14,371	91.65	66	0.41	58	0.38	58	0.37	17	0.11	9	0.06	17	0.11
WP KL	2,666	86.64	2,756	89.68	2,865	92.21	69	2.24	33	1.07	26	0.84	5	0.16	5	0.16	6	0.19
WP Labuan	458	78.16	484	82.17	531	90.31	0	0	0	0	0	0	0	0	0	0	0	0
WP Putrajaya	627	85.07	637	84.71	659	87.28	10	1.36	16	2.13	12	1.59	2	0.27	3	0.4	2	0.26

Summary and Conclusion

There are several key features that we wish to emphasize in this report.

With reference to National Health and Morbidity Survey 2019, it was estimated that approximately 1,999,450 people in Malaysia are known diabetes and 89.3% of patients with known diabetes are on follow-up at MOH KFs. Therefore, it is estimated that approximately 1,785,546 patients seek care at MOH KFs. In the NDR, for the assessment year ending in 2023, there were 870,771 active diabetes patients, which means only 48.77% of diagnosed patients who claim to seek treatment at MOH primary care facilities are on active follow up. However this number has increased compared to 2022 whereby only 46.0% were on active follow up.

Utmost attention should be placed on continuous improvement of documentation by all healthcare providers providing care to patients with diabetes, regardless of level of care, since the methodology of the Diabetes Clinical Audit is heavily dependent on the quality of documentation of the patients' case notes. Data accuracy on diabetes-related complications in the NDR should be improved further to reduce "unknown" records.

Despite limitations in the NDR dataset, it is a useful tool for monitoring and to assess the quality of care for diabetic patients in MOH health clinics. In 2023, Malaysia once again successfully achieved the target for the QA indicator. However, despite the overall achievement, the proportion of T2DM patients achieving HbA1c ≤ 6.5 in majority of states specifically Sarawak, WP Labuan and Negeri Sembilan has decreased significantly in 2023 as compared to 2022, which should be addressed moving forward. With the publication of this report, it is hoped comprehensive and active action can be taken to ensure good quality of care among diabetic patients.

e ISBN 978-967-2469-73-5



Published by:
Disease Control Division
Ministry of Health Malaysia