



Malaysian STATISTICS ON MEDICINE 2005

	A02B A02	Ranitidine	3.1843	
	C03A A03	Hydrochlorothiazide	3.0603	
	J01C R02	Amoxicillin+enzyme inhibitor	2.9569	
ATC	R06A E07	Cetirizine	2.6469	population/day
A10B B01	R03B A02	Budesonide	2.5996	4.4913
C07A B01	C02C A01	Prazosin	2.4520	
A10B A01	R06A D02	Promethazine	2.2757	3.0782
C07A B02	C03B A11	Indapamide	2.1897	1.7436
C08C A01	C01E B15	Trimetazidine	2.0636	0.9895
C10A A01	C09C A01	Losartan	1.9803	
C08C A02	R03D A04	Theophylline	1.8599	5.7326
C10A A02	J01A A02	Doxycycline	1.7350	5.6477
C08C A03	R03B B04	Tiotropium bromide	1.7158	
R03A C01	C09A A03	Lisinopril	1.6354	5.4231
R06A B01	M04A A01	Allopurinol	1.5786	5.3498
A10A B01	A10A B01	Insulin, fast-acting (human)	1.4590	
	M01A G01	Metenamic acid		4.7901
C09A A01	R06A X13	Loratadine		4.6098
C09A A02	C03C A01	Furosemide		4.4716
H02A B06	C03A A04	Chlorothiazide		4.0854
A02B A02	C10A A02	Lovastatin		4.0799
C03A A03	J01C A04	Amoxicillin		4.0243
J01C R02	C09A A04	Perindopril		4.0141
R06A E07	C10A A05	Atorvastatin		3.9146
R03B A02	C09A A01	Captopril		3.8928
C02C A01	C09A A02	Enalapril		3.8315
R06A D02			2.0636	
C03B A11			1.9803	
C01E B15				
C09C A01				

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Abdul Razak M, Norzila Z, Shamsinah H

A publication of the
Pharmaceutical Services Division and the Clinical Research Centre
Ministry of Health Malaysia

NATIONAL MEDICINES USE SURVEY

Promoting the Quality use of Medicines

DO YOUR PART
FOR MALAYSIA.
FOR OUR OWN
INDEPENDENT DATA.



The NMUS is supported by the Pharmaceutical Services Division and the Clinical Research Centre MOH

CRC
Research that matters to patients

Malaysian Statistics On Medicine

2005

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PREFACE

Ensuring access to quality and affordable medicines is one important objective of Malaysia's National Medicines Policy. The National Medicines Use Survey (NMUS) was conducted with the intent to continuously and systematically collect data on medicines in the hope to further improve its use as well as providing a tool for better decision making in the allocation of healthcare resources for the Malaysian population.

NMUS is into its third year and we are glad to announce the successful publication of its second report, the Malaysian Statistics on Medicine (MSOM) 2005. It is worthwhile to note that the first report MSOM2004 presented results largely from pilot surveys and using test methods basically to demonstrate that such a project was feasible in a healthcare system such as Malaysia that has many players. In 2005, we have not only scaled up the survey with larger sample size and wider distribution, but also refined data processing and statistical methods. The statistical estimates in MSOM2005 are derived using highly elaborate data processing and complex statistical methods as explained in the Methods section of this publication. Hence results in MSOM2005, in our opinion are more reliable, more representative and more robust.

Three additional chapters namely Use of Drugs for Acid Related Disorders, Use of Systemic Corticosteroids and Immunosuppressive Agents and Use of Opioid Analgesics were included in MSOM2005. We are optimistic that more chapters will be reported in future publications of MSOM.

We hope that this MSOM2005 report will be useful to relevant healthcare professionals serving as a source of reference and baseline for embark in future research or clinical audits towards improving rational prescribing.

We would like to thank all staff who had worked very hard in ensuring the success of the survey, all agencies and institutions that had helped in providing data, all expert panel members for their enthusiasm and contributions in completing the chapter reports and each and everyone who have in one way or another contributed to the success of NMUS and this publication.

Pharmaceutical Services Division
Clinical Research Centre
Ministry of Health Malaysia

NATIONAL MEDICINES USE SURVEY

Promoting the Quality use of Medicines

“ THANK YOU ”

Your data is
contributing
to improving the
use of medicines
in MALAYSIA

The NMUS is supported by the Pharmaceutical Services Division and the Clinical Research Centre MOH

CRC
Research that matters to patients

ACKNOWLEDGEMENTS

The National Medicines Use Survey would like to thank the following:

- All the medical doctors, pharmacists and pharmacy assistants who participated in NMUS surveys
- The Association of Private Hospitals Malaysia, Malaysian Organisation of Pharmaceutical Industries and Pharmaceutical Association of Malaysia for encouraging their members to contribute data to the NMUS
- Participating private hospitals for allowing access to their medicines procurement data
- Pharmaniaga Sdn Bhd for assistance in downloading MOH procurement data
- The National Pharmaceutical Control Bureau, Family Health Development Division, Procurement Division, all of the MOH, for their valuable assistance
- The Malaysian Royal Custom Service for permission to download pharmaceutical import data
- The Malaysian Medical Council, Malaysian Medical Association, The Academy of Family Physicians, Primary Care Doctors Association Malaysia, Malaysian Dental Association, Malaysian Private Dental Practitioner's Association, Malaysian Pharmaceutical Society, University Malaya Medical Centre, Hospital University Kebangsaan and Hospital Universiti Sains Malaysia and Lumut Armed Forces Hospital for supporting this project AND
- All who have in one way or another supported and/or contributed to the success of the NMUS and this report

Mr. Lai Lim Swee
Chairman

Dr Lim Teck Onn
Co-Chairman

National Medicines Use Survey
Ministry of Health Malaysia

ABOUT THE NATIONAL MEDICINES USE SURVEY

The National Medicines Survey (NMUS) is a service initiated and supported by the Ministry of Health (MOH) to collect information on the supply, procurement, prescription, dispensing and use of drugs in Malaysia. The NMUS is designed to support the implementation of our proposed National Medicines Policy (NMP).

The objectives of NMP are to ensure only safe, efficacious and good quality medicines are available for use in Malaysia, as well as to promote equitable access to, rational and cost-effective use of these medicines, ultimately leading to improved health for all Malaysians. In supporting this, the NMUS provides the functional capacity for the collection, analysis, reporting and dissemination of data on drug utilisation in Malaysia

Sponsors and Governance of the NMUS

The NMUS is jointly sponsored by Pharmaceutical Services Division and the Clinical Research Centre, Ministry of Health Malaysia.

A Governance Board is established to oversee the operations of the NMUS. Governance via a Board is necessary to ensure that the NMUS meets the needs and expectations of all interested parties, and thereby to assure the continuing relevance and justification of the NMUS. All major groups involved in pharmaceutical issues in Malaysia such as the MOH, Universities, professional bodies, private healthcare providers and the pharmaceutical industry are represented on this board. The board also works as a consultative forum and provide advice on issues pertaining to the NMUS and other aspects of the quality use of medicines.

Purpose of the NMUS

The availability of high quality, reliable and timely information on medicines use is crucial for any discussion on improving the use of medicines in Malaysia.

The objective of the NMUS is therefore to quantify the present state and time trends of medicines utilisation at various level of our health care system, whether national, regional, local or institutional.

Routinely compiled statistics on medicines utilisation have many uses, such as to:

1. Estimate the number of medicine users overall, by age, sex and geography and over time
2. Estimate on the basis of known disease epidemiology to what extent medicines are under or over-used.
3. Describe pattern of medicines use through assessing which alternative drugs are being used for particular conditions and to what extent.
4. Relate the number of adverse drug reactions reported to our pharmacovigilance system to the number of people exposed to the drug in order to assess the magnitude of the problem, or to estimate the degree of under-reporting of adverse events
5. Provide a crude estimate of disease prevalence based on its prescription rate.
6. Estimate expenditure on pharmaceuticals, which constitutes a significant proportion of our healthcare expenditure.
7. Monitor and evaluate the effects of interventions to improve the use of medicines. These interventions may be educational effort, promotional campaign, formulary restriction, medicines reimbursement scheme or regulatory measures.

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METHODS

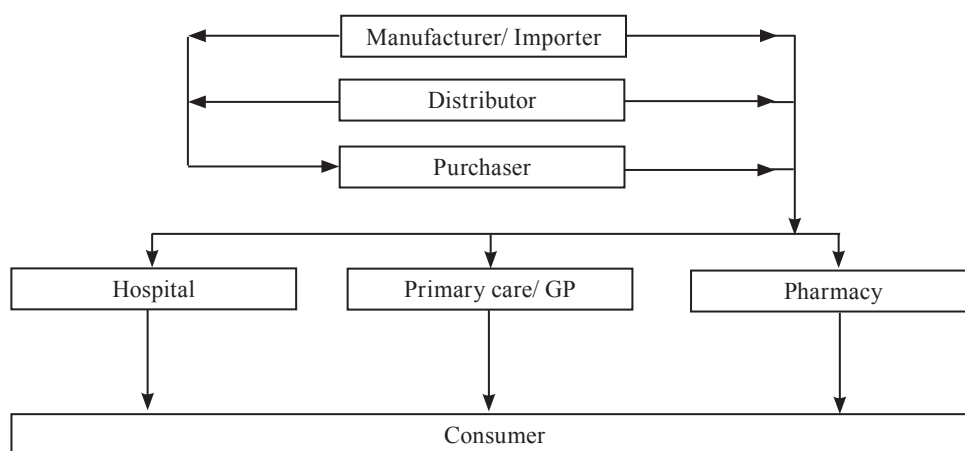
Authors:

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Introduction

The NMUS is designed, broadly speaking, to estimate the quantity and pattern of use of medicines in Malaysia, as well as to estimate our expenditure on pharmaceutical. This is an ambitious project, which requires multiple surveys at the various levels of the medicines supply and distribution chain in the country (Figure 1) in order to capture all the required data to meet its purpose. We had therefore realistically targeted data sources that are absolutely critical and accessible.

Figure 1: Medicines supply & distribution system and Sources of medicines data



Hence, the statistics on medicines use and expenditure in this report are estimated based on data from only a limited number of surveys (though they were the critical ones) that could be successfully completed nation-wide. The scope was also deliberately limited to mostly prescription only medicines (obviously the pharmaceuticals of greatest interest), a few Over-the-Counter (OTC) medicines of interest were included, but it excluded traditional or herbal products and food supplements.

NMUS Surveys

The NMUS conducts several surveys in order to capture data at the various levels of the medicines supply and distribution system in the country. The sources of data, surveys to collect the data, data availability, and their use in this report are summarized in the table below.

#	Data sources and Surveys	Year data available	Uses in present report
1.	Medicines import or production data		
	1.1 Medicines import data from Royal Malaysian Custom	2004, 2005	Reference only
	1.2 Local pharmaceutical manufacture	Data not collected	Not used
2.	Domestic sales data		
	2.1 Domestic sales data from local pharmaceutical companies	Limited availability	Reference only
3.	Medicines procurement data		
	3.1 Public hospitals' medicines procurement data from several sources:		
	a. MOH procurement through central tender	2001 to 2005	Used in estimates
	b. MOH individual hospitals' local purchases	2001 to 2005	Used in estimates
	c. University and Armed forces hospitals' procurement	2004, 2005	Used in estimates
	3.2 Private hospitals procurement	2000 to 2005	Used in estimates
	3.3 Private GPs procurement	Limited availability	Not used
	3.4 Private specialist practice procurement	Limited availability	Reference only
	3.5 Private pharmacies' procurement	Limited availability	Reference only
4.	Medicines prescription data		
	4.1 Public (MOH) primary care practice prescription	Data not collected	Not used
	4.2 Private GP prescription	2005	Used in estimates
	4.3 Private specialist practice prescription of highly specialized medicines	Limited availability	Reference only
	4.4 Hospital practice prescription	Data not collected	Not used
5.	Medicines dispensing data		
	5.1 Public hospital pharmacy dispensing	Data not collected	Not used
	5.2 Private free-standing retail pharmacy dispensing	2005	Used in estimates
6.	Household medicines consumption data		
	6.1 Household survey on medicines consumption	Data not collected	Not used

Thus, the statistics presented in this report are derived from only a limited number of data sources. As shown above:

- Of the 6 theoretical data sources, NMUS primarily targeted data sources on medicines procurement and prescription.
- Collection of prescription data is limited to clinic practices, while hospital prescription is assumed to be included in hospital procurement data
- Many private medical specialists however may self-procure and dispense, rather than use hospital pharmacy dispensing service. Hence, separate procurement and prescription survey on highly specialized medicines are required, and are being piloted. Thus in so far that prescription of highly specialized medicines for a particular condition is concentrated in private ambulatory specialist practices (unlikely as most are probably prescribed in hospital setting), they will be under-estimated in this report
- Similarly, hospital dispensing data are assumed to be included in hospital procurement data, except of course for private freestanding pharmacies. Dispensing survey is therefore limited to this only.
- It is well known that consumers do access medicines through both formal as well as informal channels. Household survey will be required to obtain information on such use of medicine in the community.
- Finally, medicines import data and sales data from pharmaceutical companies, where available, are used for reference only. That is, they are used for crosschecking the reliability of results estimated from the other data sources.

Survey population, sampling and response or coverage rate

The surveys conducted by NMUS, its survey population, its sampling unit and sample size, and the survey response or coverage rates are summarized in the table below.

#	Surveys	Survey population and sampling unit	Sample size	Response Rate
1.	MOH Pharmaceutical procurement	132 MOH hospitals APPL LP	132 100	100% for APPL 75% for non-APPL
2.	Private hospitals' pharmaceutical procurement	114 Private Hospitals	33 hospitals	29%
3.	University and Armed Forces' hospital pharmaceutical procurement	3 University hospitals 3 Armed Forces hospitals	2 University 1 Armed Forces hospital	67% for University 33% for Armed Forces
4.	Private GP prescription	4459 in Malaysia	411	9%
5.	Private pharmacy dispensing	466	55	12%

Data collection

The surveys conducted by NMUS collected the data either by:

1. Download from existing databases
2. Primary data collection

These are described below:

#	Surveys	Data download from existing databases
1.	MOH Pharmaceutical procurement	Pharmaniaga pharmaceutical procurement databases, central database as well as local individual hospitals' databases.
2.	Private hospitals' pharmaceutical procurement	Individual hospitals' pharmaceutical procurement databases
3.	University and Armed Forces' hospital pharmaceutical procurement	Individual hospitals' pharmaceutical procurement databases

#	Surveys	Primary data collection
4.	Private GP prescription	A sample of GPs collected prescription data in a randomly selected week. The sample being distributed over two half yearly cycle
5.	Specialist practice prescription	All dialysis facilities collected data on prescription of certain highly specialized medicines for all patients in their facility at the end of each year
6.	Private pharmacy dispensing	A sample of pharmacies with resident pharmacist collected dispensing data in a randomly selected week. The sample being distributed over two half yearly cycle.

Data management

The collected data, whether in databases or in paper or electronic data collection form must be compiled into a single database, appropriately processed and coded prior to statistical analysis.

The NMUS database was created in Ms SQL Server 2000. The application has 3 modules: Contact Management, Data Entry and Data Processing.

- Contact Management module is used to collect the establishment survey details, log and track all the correspondence documents with SDP, and forecast, plan and schedule the conduct of the survey.
- Data Entry module is used to collect the data submitted by the SDP in paper form. It has been designed to collect data from GP prescription survey and pharmacy dispensing survey using paper CRF.
- Data Processing module is used to clean, manage and process the medical data prior to statistical analysis. The automated data processing functionalities include ATC coding, DDD Assignment, Total Dosage Calculation and Unit Conversion.

The database server is running on Windows 2000 Server. The server environment is Intel Xeon 2.4 Mhz, with a total of 2GB RAM memory and 67.8GP Raid5 Hard disk

The data processing steps are as follows:

#	Data processing for downloaded database
1.	Data were downloaded from the existing database of the following data sources <ul style="list-style-type: none">• MOH APPL Procurement• MOH Non-APPL Procurement• Private Hospital Procurement• University Hospital Procurement• Armed Forces Hospital Procurement• Chain Pharmacy Procurement• GP Prescription <p>The data downloaded are in flat file format, e.g. TXT/ XLS and etc, or database files such as Access/ Oracle/ SQL and etc.</p>
2.	The structure of each of the downloaded database/ data file would be studied and analyzed to identify the required data fields/ variables. The required variables are registration number, drug description, packaging description, supplier name, value procured, quantity procured, year procured and etc.
3.	Next, the required fields/ variables would be extracted using SQL queries. The extracted data would then be normalized by separating into multiple, related tables in a single compiled database.
4.	The data would then be linked to the respective SDP in the main contact table.

#	Data processing for primary survey data
1.	<i>Data entry</i> Data is entered into the Data Entry module of the database. Prior to data entry, data entry personnel are briefed on how to use the application and enter the data. Necessary precautions were given verbally for example to check each clinic by office id and name, as they are clinics with many branches of the same name. A demonstration was done on data entry during the briefing. Personnel were supervised while doing the first few entries to make sure they know how to do it correctly. A standard document on steps/ precautions of data entry is given. They are also given a softcopy of the list of brand names for reference.

#	Data processing for primary survey data
2.	<p><i>Edit checks</i></p> <p>Survey forms are crosschecked against the database. Selection of survey form is by data entry personnel, randomly by survey date. If number of drug entries of selected date is not sufficient, more survey dates are included.</p> <p>Items to check:</p> <ol style="list-style-type: none"> Number of patients are same in survey form and database Number of drug entry/ drug prescribed is same in survey form and database. Age, sex of patient is entered correctly. Drug particulars are entered correctly.
3.	<p>Calculations and Derived variables</p> <ul style="list-style-type: none"> Dose per day is obtained by Dosage*frequency Dose per visit is obtained by Dosage*frequency* duration
4.	Visual review and manual assessment of entries if they are misspellings.

#	Common data processing steps
1.	<p><i>BPFK Registered Product List</i></p> <p>An estimated 7000 poison products registered with NPCB were manually coded to ATC INN (Level 5). The coded NPCB drug list would serve as an internal drug dictionary for medicines data coding later.</p>
2.	<p><i>Data Parsing by programming</i></p> <p>The variables ‘Drug description’ and ‘Packaging Description’ in medicines (procurement/ prescription/ dispensing) data are parsed into smaller parts using specially written computer program. Parsing help facilitating auto coding process and dosage calculation later.</p> <p>The variable ‘Drug description’ will be parsed into ‘Brand’, ‘INN’, ‘Dosage’, ‘Unit’ and ‘Route’ e.g. Zocor Tab 80 mg Brand – Zocor Inn – none Dosage – 80 Unit- mg Route – Tab</p> <p>The variable ‘Packaging Description’ will be parsed into ‘Big Unit’, ‘Small Unit’ and ‘Factor’ e.g. Pack of 10 tabs Big Unit – Pack Small Unit – tabs Factor – 10</p>
3.	<p><i>ATC Coding</i></p> <ul style="list-style-type: none"> The parsed ‘Brand’ would then be linked to the coded BPFK drug list to obtain the ATC INN and DDD. However, if a certain brand has more than 1 DDD, the administration route has to be considered when assigning the DDD. On the other hand, the parsed ‘INN’ would be linked to the ATC Level 5 to obtain the INN and DDD. Similarly, if a certain INN has more than 1 DDD, the administration route has to be considered when assigning the DDD. Visual review and manual coding of residual medicines data to ATC; most of these residual data are due to incomplete or inconsistent data.
4.	<p><i>Drug Description Dosage and Unit</i></p> <p>The Drug Description Dosage and Unit would be the parsed ‘Dosage’ and ‘Unit’ unless more than 1 dosage exists, e.g. 2MG/ML 100ML. This kind of data would require further processing. The results of this step are ‘Total Drug Description Dosage’ and ‘Total Drug Description Unit’. Remaining residual has been handled manually</p>

#	Common data processing steps
5.	<p><i>Packaging Description Dosage</i></p> <p>The packaging description dosage would be taking the parsed ‘Factor’ and calculated with reference to the ‘SKU’ or ‘UOM’.</p> <p>The result of this step is the ‘Total Packaging Description Dosage’</p> <p>Remaining residual has been handled manually</p>
6.	<p><i>Total Dosage Calculation</i></p> <p>Total Dosage = Total Drug Description Dosage * Total Packaging Description Dosage * Quantity procured</p> <p>Total Dosage Unit = Total Drug Description Unit</p>

Statistical report

This statistics on use of medicines in this report are presented using the Anatomical Therapeutic Chemical (ATC) classification system, and the unit of measurement is expressed in defined daily dose (DDD). This is recommended by the WHO to be used for drug utilisation research and for purpose of comparisons of drug consumption statistics between countries, between regions or population groups within country and to evaluate trends in drug use over time.

Structure of the ATC Classification system

In this system, medicines are divided into different groups according to the organ or system on which they act, and on their chemical, pharmacological and therapeutic properties.

Medicines are classified in groups at 5 different levels as follows:

Level	Group and subgroups
1.	Anatomical main group. There are 14 of these, eg C cardiovascular, M musculo-skeletal, R respiratory, etc
2.	Therapeutic main group
3.	Therapeutic subgroup
4.	Chemical or Therapeutic subgroup
5.	Drug chemical substance

An example should make this clear. Simvastatin is coded C10AA01. The structure of its code is as follows:

Level	Code	Group and subgroups
1.	C	Cardiovascular system
2.	C10	Serum lipid reducing agents
3.	C10A	Cholesterol or triglyceride reducers
4.	C10AA	HMG CoA reductase inhibitors
5.	C10AA01	Simvastatin

Refer to the publication Guidelines for ATC Classification and DDD Assignment (WHO Collaborating Centre for Drug Statistics Methodology 2006; www.whocc.no) for details

Concept of the Defined Daily Dose (DDD)

The measurement unit for medicines use adopted in this report is the DDD.

The DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. The DDD is simply a technical measure of drug utilisation; it does not necessarily agree with the recommended or prescribed daily dose. Doses for individual patients and patient groups will often differ from the DDD. The DDD is often a compromise based on review of the available information about doses used in various countries. The DDD may even be a dose rarely prescribed because it is an average of two or more commonly used doses.

Medicines use statistics in this report are presented for most drugs as numbers of DDDs per 1000 inhabitants per day. Some interpretative notes as follows:

- The DDDs/1000 inhabitants/day provides a rough estimate of the proportion of population treated daily with certain drugs. For example, the figure 10 DDDs/1000 inhabitants/day indicates that 1% (10/1000) of the population on average might get a certain drug or group of drugs every day in the year.
- The DDDs/1000 inhabitants/day is most useful for drugs used in the treatment of chronic diseases and especially when there is a good agreement between the average prescribed daily dose and the DDD.
- For most drugs, their DDDs/1000 inhabitants/day are calculated for the total population including all age and sex groups. Where a drug use is limited to particular age or sex groups, then it will be more meaningful to express the figure for the relevant age-sex groups only. For example DDDs/1000 children age<12 /day, or DDDs/1000 women in reproductive age groups/day.

For anti-infectives (or other drugs normally used in short duration), the medicine use statistics are presented as DDD per inhabitant per year. This gives an estimate of the number of days for which each inhabitant is, on average, treated annually. For example, 5 DDDs/inhabitant/year indicates that the utilisation is equivalent to the treatment of every inhabitant with a 5-days course in the year.

In interpreting drug utilisation statistics expressed using DDD as in this report, readers are caution to bear in mind the following limitations:

- A medicine may have several indications while the DDD is based on the main indication in adults.
- Medicines procured or prescribed or dispensed, as presented here, may not necessarily be consumed
- DDD may be difficult to assign or not assign at all for certain medicines, for examples medicines with multiple ingredients, topical products, anti-neoplastic drugs and anaesthetic agents.
- Medicines newly introduced into the market may yet have ATC and DDD assigned to it.
- The DDD assigned to a drug is primarily based on other countries' experience and may not reflect the commonly prescribed adult dose in Malaysia

Statistical methods

In this report, as explained above, the quantity of use of a medicine is expressed as, depending on the type of medicine, the number of DDDs per 1000 inhabitants per day or DDDs per inhabitants per year. These statistics are calculated as follows:

$$\text{DDD}/1000 \text{ inhabitants}/\text{day} = \frac{T*1000}{\text{DDD} * P*365}$$

$$\text{DDD}/\text{inhabitant}/\text{year} = \frac{T}{\text{DDD} * P}$$

Where

T is an estimate of the total quantity of the drug utilized in the year under consideration

DDD is the DDD assigned for the drug according to the ATC/DDD system

P is the mid-year population of Malaysia or the relevant area where the survey was conducted

365 refers to the 365 days in a year

In either case, an estimate of the total quantity of the drug being utilized in the year is required, and this must be expressed in the same unit as the DDD assigned for the drug.

The statistical estimation of the total utilisation varies depending on the survey method and the sampling design employed to collect the data, and if necessary with adjustment for incomplete data. These are described below.

#	Surveys	Estimation procedure
1.	MOH Pharmaceutical procurement	No sampling was employed in the survey. The total is therefore simply estimated by the sum of all the quantities of the drug procured in all procurement records in the year. Adjustment is made for the 92 hospitals with incomplete procurement records.
2.	Private hospitals' pharmaceutical procurement	Data were available for only a sample of hospitals. The total is estimated by $T = \sum W_i T_i$ Where; T_i is the value of the quantity of drug procured of the i^{th} hospital in the year W_i is the sampling weight of the i^{th} hospital $W_i = (B/b) * (b_i/B)$ Where B is total number of beds in the population, b is number of beds of the responding hospitals (sample), b_i is number of beds in the i^{th} hospital, and B the mean number of beds in the population.
3.	University and Armed Forces' hospital pharmaceutical procurement	Data were available for only a sample of hospitals. The total is estimated by $T = \sum W_i T_i$ Where; W_i is the sampling weight of the i^{th} hospital adjusted for non-response and incomplete procurement records T_i is the value of the quantity of drug procured of the i^{th} hospital in the year
4.	Private GP prescription	Data were collected only for a sample of GPs and for each respondent, data collected only for a sample of days in a year (working days only). The total is estimated by $T = \sum W_{ij} T_{ij}$ Where; W_{ij} is the sampling weight for the i^{th} day of the j^{th} GP T_{ij} is the value of the quantity of drug prescribed by the j^{th} GP on the i^{th} day
5.	Private specialist practice prescription (Nephrology and dialysis practices only)	No sampling was employed in the survey. The total is therefore simply estimated by the sum of all the quantities of the drug prescribed for all patients dialyzing in the facility.
6.	Private pharmacy dispensing	Data were collected only for a sample of pharmacies and for each respondent, data collected only for a sample of days in a year (working days only). The total is estimated by $T = \sum W_{ij} T_{ij}$ Where; W_{ij} is the sampling weight for the i^{th} day of the j^{th} Pharmacy T_{ij} is the value of the quantity of drug dispensed by the j^{th} Pharmacy on the i^{th} day

Where there is sampling or where response rate of the survey was less than 100%, the procedures described above incorporate the sampling weight of the sampling unit in the estimation of total.

The sampling weight for each sampling unit or unit of analysis has the following components:

1. Probability of selection.

The basic weight is obtained by multiplying the reciprocals of the probability of selection at each step of sampling design. Example, for GP prescription survey, this is GP practice and prescription day.

2. Adjustment for non-response.

The response rate was less than 100% for some surveys; an adjustment to the sampling weight is required. The non-response adjustment weight is a ratio with the number of units in the population as the numerator and the number of responding sampling units as the denominator. The adjustment reduces the bias in an estimate to the extent that non-responding units have same characteristics as responding units. Where this is unlikely, some adjustments took into account differences in some relevant characteristics between responding and non-responding units that may influence drug utilisation, such as bed strength, staff strength, scope of services for hospitals etc.

Finally, adjustments are also made to the statistical estimates to approximate known values from pharmaceutical import and sales data from companies, where these are available.

Expenditure estimation methodology

Study Population

The MSOM encompasses private & public healthcare providers in Malaysia consisting of

1. The public health sector which consists of hospitals and primary care clinics of the Ministry of Health, University Hospitals under the Ministry of Higher Education and Military Hospitals under the Ministry of Defence.
2. The Private health sector consisting of private hospitals and general practitioners in Malaysia
3. Private sector retail pharmacies

Methodology

The expenditure on a particular drug in a given year is the quantity of drug used in that year multiplied by the price of the drug;

Total expenditure = Quantity of drug utilisation * Price of drug

Quantity of drug utilisation is determined from the drug utilisation data presented elsewhere in this report.

Similar to the treatment of drug utilisation elsewhere in this report, prices were determined for each drug chemical substance (5th level ATC classification) and denominated in Daily Defined Doses (DDD) for the public and private sectors taking into account the availability of price data and analytical considerations. Thus there are two prices (i.e. public sector and private sector price) for each drug chemical substance.

The prices generated for calculating were calculated by weighting prices against the quantities of DDDs. To normalise the effects of extreme values, only prices within the inter-quartile range were used in the weighting and price calculation process.

The process generating DDD weighted prices were conducted as follows. All procurement items for the ATC & sector were ordered by price per DDD and items beyond the IQR (i.e. lower than 25th percentile and higher than 75th percentile) were omitted from price calculation. Weights are then generated from the DDDs of the remaining data where $w_i = \text{DDD}_i / \sum \text{DDD}$. The weighted price then is $p_w = \sum (p_{is} * w_{is})$.

Expenditure for each procurement item is then calculated as $E_i = p_w * \text{DDD}_i$ and the sum of all procurement items in the sector is the total expenditure on that drug chemical substance in the sector.

DDD-weighted prices were determined for the public sector from procurement data of MOH, University and Armed Forces health establishments surveyed by NMUS while private sector prices were determined from procurement data of private hospitals surveyed by NMUS. As the GP prescription & retail pharmacy dispensing data obtained by NMUS did not contain any data usable for calculating prices, the prices estimated from private hospitals were applied to GP and Pharmacy data as well.

ABBREVIATIONS

ACEI	Angiotensin Converting Enzyme Inhibitors
AF	Atrial Fibrillation
APPL	Approved Product Price List
ARB	Angiotensin II Antagonists/ Angiotensin Receptor Blocker
ASR	Age Standardized Rate
ATC	Anatomical Therapeutic Chemical
BCF	Bias Correction Factor
BPFK	Biro Pengawalan Farmaseutikal Kebangsaan
CCB	Calcium Channel Blockers
CCF	Congestive Cardiac Failure
COAD	Chronic Obstructive Airway Disease
CPG	Clinical Practice Guidelines
CTZ	Chlorothiazide
DALYs	Disability Life Years
DDD	Defined Daily Dose
Dept	Department
FDA	Food And Drug Administration
GERD	Gastroesophageal Reflux Disease
GP	General Practitioner
HCTZ	Hydrochlorothiazide
HDL	High Density Lipoprotein
HMG CoA	3-hydroxy-3-methylglutaryl coenzyme A
H ₂ RA	H ₂ Receptor Antagonist
ICU	Intensive Care Unit
INN	International Nonproprietary Name
ISAAC	International Study of Asthma and Allergies in Childhood
KL	Kuala Lumpur
LDL	Low Density Lipoprotein
LMWH	Low Molecular Weight Heparin
MOH	Ministry of Health
NCC	National Cancer Centre
NCI	National Cancer Institute
NMP	National Medicines Policy
NMUS	National Medicines Use Survey
NPCB	National Pharmaceutical Control Bureau
NSAIDs	Non Steroidal Anti- Inflammatory Drugs
OTC	Over-the-Counter
PCDOM	Primary Care Doctors Organisation Malaysia
PPI	Proton Pump Inhibitors
RE	Reflux Esophagitis
SDP	Source Data Producer
SERM	Selective Estrogen Receptor Modulator
SKU	Stock Keeping Unit
SSRI	Serotonin Selective Reuptake Inhibitor
UOM	Unit of Measurement
URTI	Upper Respiratory Tract Infection
WHO	World Health Organization
WP	Wilayah Persekutuan

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In this chapter, we report the national estimates of the use of medicines. It describes the most commonly used medicines by therapeutic groups and by specific drugs. Certain medicines however were deliberately excluded in this chapter for various reasons as follows:

1. Most OTC medicines, health supplements and traditional complementary medicines are outside the scope of the NMUS
2. Medicines without DDD assignment such as anti-neoplastic drugs, anaesthetic agents
3. Predominantly topical medicines (Dermatologicals, Ophthalmologicals, Otologicals, Gynaecologicals, Nasal and Throat preparations, Stomologicals)

The most commonly used medicines in 2005 in Malaysia were anti-diabetic medications (3.6% of the population was on this), of which Glibenclamide (1.3% of population) and Metformin (1.2% of population) were the most commonly used drugs.

The various anti-hypertensive medications also figured very high on the top 30 list; beta-blockers were second (2.4% of population on this), followed by agents acting on the renin-angiotensin system (third on list, 2.1%), calcium channel blockers (fourth on list, 1.9%), and diuretics (seventh on list, 1.2%; though this include high ceiling diuretics not used for hypertension). Collectively, these anti-hypertensive medicines were more commonly used than anti-diabetics. Hypertension and Diabetes mellitus are the two most prevalent chronic disorders in the country (in 1996, prevalence of hypertension was 33% [1] and Diabetes mellitus 8% [2]); thus in the light of known disease epidemiology, such high medicines utilisation rates for these conditions are to be expected. Indeed one may question whether they were sufficiently high to ensure all in need of therapy were on treatment and properly controlled. From general practice prescription data, we estimated a patient with hypertension was prescribed a median of only one (1) anti-hypertensive medication. That is, the vast majority of patients (81%) were on mono-therapy, which is hardly sufficient to achieve treatment target [3]. Clearly then, given the prevalence of hypertension, many patients were not on drug treatment at all, and of those treated, their drug treatment are likely to be inadequate, consistent with survey showing only 6% of Malaysian patients with hypertension on drug treatment did achieve blood pressure control [1].

This utilisation pattern is in sharp contrast to Australia (the only country in the region with available medicine use statistics [4]), where lipid reducers (top) and anti-asthmatics (second on list) dominated its top-10 drug list in year 2000. The latter only ranked sixth on the Malaysian top-10 list, which is to be expected considering the difference in asthma prevalence between the 2 countries [5], while the relatively lower use of lipid reducers (only 1.9% of population compared with 7% or higher in Australia) definitely suggests under-utilisation of lipid reducers, even if past survey had shown lower prevalence of hypercholesterolaemias in Malaysia [6]. Another interesting contrast is simvastatin (sixth on our list) and lovastatin (tenth on our list) are commonly used here, while atorvastatin topped the Australian list (atorvastatin is twenty-ninth on the Malaysian list), clearly indicating preference for low-priced generics in Malaysian practice, in the absence of public reimbursement unlike in Australia.

A surprisingly highly used medicine is anti-histamines for systemic use (1.1% of population), mostly chlorpheniramine and loratadine, which deserve further investigation.

Anti-bacterial medicines not surprisingly were widely used; Amoxicillin was the most popular item in the group. Similarly, anti-rheumatic medicines were also commonly used (1.2% of population).

Refer to individual chapters for detailed discussion on these specific therapeutic groups.

Certain perhaps surprising levels of medicine utilisation observed (in terms of % of population on), whether expectedly or unexpectedly high or low, were:

- Drugs for acid related disorders such as peptic ulcers -0.5%
- Systemic corticosteroids -0.5%
- Psycholeptics -0.5%
- Thyroid therapy 0.4% (mostly accounted by Carbimazole- 0.3%)
- Anti-epileptics - 0.16%
- Anti-gout medicines - 0.18%

For the disorders for which these medicines are indicated, little is known about their epidemiology and treatment in this country to aid interpretation of these medicines use statistics. They deserve further investigation. Refer to individual chapters for further discussion on some of these specific therapeutic groups.

Table 1.1: Top 30 Therapeutic groups by Utilisation in DDD/1000 population/day 2005

#	ATC	Therapeutic group	Public	Private	Total
1.	A10	DRUGS USED IN DIABETES	27.2982	8.5582	35.8564
2.	C07	BETA BLOCKING AGENTS	17.6430	6.0770	23.7199
3.	C09	AGENTS ACTING ON THE RENIN-ANGIOTENSIN SYSTEM	14.0994	7.0660	21.1654
4.	C08	CALCIUM CHANNEL BLOCKERS	14.4420	4.8424	19.2844
5.	C10	LIPID MODIFYING AGENTS	9.5495	9.0349	18.5844
6.	R03	DRUGS FOR OBSTRUCTIVE AIRWAY DISEASES	8.8141	4.7442	13.5583
7.	C03	DIURETICS	8.1720	4.0487	12.2207
8.	M01	ANTIINFLAMMATORY AND ANTIRHEUMATIC PRODUCTS	4.2187	7.5511	11.7698
9.	R06	ANTIHISTAMINES FOR SYSTEMIC USE	5.7836	5.3744	11.1580
10.	J01	ANTIBACTERIALS FOR SYSTEMIC USE	3.5320	6.0044	9.5363
11.	B01	ANTITHROMBOTIC AGENTS	4.9768	4.3798	9.3566
12.	C01	CARDIAC THERAPY	3.2021	3.3546	6.5567
13.	N05	PSYCHOLEPTICS	3.8167	1.9859	5.8026
14.	A02	DRUGS FOR ACID RELATED DISORDERS	2.0122	3.1497	5.1619
15.	H02	CORTICOSTEROIDS FOR SYSTEMIC USE	1.5774	3.5370	5.1144
16.	H03	THYROID THERAPY	1.3160	2.9791	4.2951
17.	C02	ANTIHYPERTENSIVES	3.1635	0.3405	3.5040
18.	M04	ANTIGOUT PREPARATIONS	1.0330	0.7430	1.7760
19.	N03	ANTIEPILEPTICS	1.3009	0.3089	1.6099
20.	N06	PSYCHOANALEPTICS	0.8536	0.6957	1.5492
21.	N07	OTHER NERVOUS SYSTEM DRUGS	0.4368	0.7994	1.2363
22.	J04	ANTIMYCOBACTERIALS	0.8000	0.2633	1.0633
23.	N04	ANTI-PARKINSON DRUGS	0.7075	0.1996	0.9072
24.	M05	DRUGS FOR TREATMENT OF BONE DISEASES	0.4807	0.3043	0.7851
25.	P01	ANTIPROTOZOALS	0.4789	0.1770	0.6559
26.	N02	ANALGESICS	0.3333	0.1487	0.4819
27.	J02	ANTIMYCOTICS FOR SYSTEMIC USE	0.0628	0.2903	0.3531
28.	L02	ENDOCRINE THERAPY	0.1598	0.1812	0.3410
29.	J05	ANTIVIRALS FOR SYSTEMIC USE	0.1908	0.0887	0.2794
30.	B03	ANTI-ANEMIC PREPARATIONS	0.1309	0.1026	0.2335

Table 1.2: Top 40 Drugs by Utilisation in DDD/1000 population/day 2005

#	ATC	Drugs	Public	Private	Total
1.	A10B B01	Glibenclamide	10.9231	1.9997	12.9228
2.	A10B A02	Metformin	9.1975	2.7895	11.9870
3.	C07A B02	Metoprolol	10.6187	1.0397	11.6584
4.	C08C A05	Nifedipine	9.5203	1.0908	10.6112
5.	C07A B03	Atenolol	6.4350	3.9213	10.3563
6.	C10A A01	Simvastatin	2.8973	5.4087	8.3060
7.	C09A A04	Perindopril	6.0259	1.0429	7.0689
8.	C08C A01	Amlodipine	3.9237	2.6909	6.6146
9.	B01A C06	Acetylsalicylic acid	3.7934	2.4324	6.2258
10.	C10A A02	Lovastatin	5.3584	0.6636	6.0220
11.	A10B B09	Gliclazide	3.4366	1.8662	5.3028
12.	C03C A01	Furosemide	3.3789	1.3548	4.7337
13.	C09A A02	Enalapril	3.1080	1.1079	4.2159
14.	C09A A01	Captopril	3.5133	0.3598	3.8731
15.	C03A A04	Chlorothiazide	3.7072	0.0359	3.7431
16.	M01A B05	Diclofenac	1.4783	2.2399	3.7183
17.	R03A C02	Salbutamol	3.4157	0.2726	3.6883
18.	R06A B04	Chlorphenamine	2.7969	0.3991	3.1960
19.	H03B B01	Carbimazole	0.5594	2.5261	3.0855
20.	M01A G01	Mefenamic acid	1.3606	1.7135	3.0741
21.	R03B A02	Budesonide	1.1585	1.7650	2.9235
22.	H02A B06	Prednisolone	1.0848	1.5624	2.6472
23.	C02C A01	Prazosin	2.2932	0.1050	2.3982
24.	A10A D01	Insulin (human), intermediate-acting combined with fast acting	1.8981	0.2938	2.1920
25.	J01C A04	Amoxicillin	0.6914	1.4541	2.1455
26.	C01E B15	Trimetazidine	1.0461	1.0695	2.1156
27.	R06A X13	Loratadine	0.5321	1.3401	1.8722
28.	R06A E07	Cetirizine	0.3803	1.4465	1.8268
29.	C10A A05	Atorvastatin	0.2281	1.5762	1.8042
30.	R03D A04	Theophylline	1.3809	0.4001	1.7810
31.	H02A B02	Dexamethasone	0.2967	1.4303	1.7270
32.	A02B C01	Omeprazole	0.4546	1.2120	1.6666
33.	A02B A02	Ranitidine	0.8601	0.7352	1.5953
34.	C09C A01	Losartan	0.6740	0.8777	1.5517
35.	M04A A01	Allopurinol	0.9639	0.5355	1.4994
36.	C01D A08	Isosorbide dinitrate	1.2741	0.1517	1.4258
37.	R06A D02	Promethazine	1.1025	0.3044	1.4069
38.	R03C C02	Salbutamol	0.7096	0.6626	1.3722
39.	C03A A03	Hydrochlorothiazide	0.2448	1.0941	1.3389
40.	B01A C05	Ticlopidine	0.6441	0.6647	1.3088

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Total drug expenditure in Malaysia was estimated to be RM 2.24 billion in 2005 with expenditure equally divided between the public and private sectors at RM1.12 billion and RM1.13 billion respectively. Expenditure for the top 40 drugs used in Malaysia is estimated at RM652.1 million which accounted for 29.1% of total medicines expenditure.

Among the top 40 drugs utilised, the highest expenditure was for amlodipine (RM69.8 million) followed by simvastatin (RM67.2 million), diclofenac, omeprazole and insulin (Table 2.1). Analysis of the top 40 utilised medicines at the therapeutic group level showed that expenditure was concentrated towards hypertensive medicines (C07, C08, C09) which accounted for RM215.9 million, followed by lipid modifying agents (C10) at RM108.5 million and diabetic medicines (A10) at RM91.5 million. Together they accounted for 63.8% of the expenditure on top 40 utilised medicines and for 18.5% of all prescribed medicines expenditure for the year (Table 2.2).

When compared against the rankings of community prescribed medicines expenditure in Australia, lipid-modifying agents were the highest ranked expenditure items in both countries (Table 2.3). Interestingly for hypertensive medicines, Australian expenditures appear to have largely shifted from beta blocking agents (C07) and calcium channel blockers (C08) to agents acting on the renin-angiotensin system (C09) class of medicines while all three types appear to be still widely used in Malaysia.

Table 2.1: Estimated expenditure on the Top 40 Utilised Drugs, 2005 (RM '000)

#	ATC	Drugs Chemical Substance	Public Sector	Private Sector	Total
1.	C08C A01	Amlodipine	36,473.4	33,356.8	69,830.1
2.	C10A A01	Simvastatin	23,897.0	43,351.2	67,248.2
3.	M01A B05	Diclofenac	1,466.4	43,991.2	45,457.6
4.	A02B C01	Omeprazole	8,386.1	24,670.3	33,056.4
5.	A10A D01	Insulin (human)	23,507.9	6,556.3	30,064.2
6.	C10A A05	Atorvastatin	3,266.9	26,115.7	29,382.6
7.	A10B A02	Metformin	11,639.5	17,259.4	28,898.9
8.	C09A A04	Perindopril	20,990.2	6,150.4	27,140.6
9.	A10B B09	Gliclazide	10,767.0	16,039.6	26,806.7
10.	B01A C05	Ticlopidine	9,150.6	17,013.2	26,163.7
11.	C09C A01	Losartan	10,341.2	13,335.9	23,677.1
12.	C07A B02	Metoprolol	19,877.6	2,854.6	22,732.2
13.	C08C A05	Nifedipine	8,655.2	11,704.9	20,360.0
14.	C07A B03	Atenolol	5,127.6	14,308.9	19,436.4
15.	C09A A01	Captopril	15,552.3	2,271.2	17,823.6
16.	C09A A02	Enalapril	10,280.3	4,599.9	14,880.2
17.	A02B A02	Ranitidine	5,761.9	8,532.9	14,294.8
18.	R06A X13	Loratadine	4,347.0	9,465.3	13,812.3
19.	R06A E07	Cetirizine	474.9	12,369.0	12,843.9
20.	C10A A02	Lovastatin	10,025.8	1,804.5	11,830.2

Table 2.1: Estimated expenditure on the Top 40 Utilised Drugs, 2005 (RM '000)

#	ATC	Drugs Chemical Substance	Public Sector	Private Sector	Total
21.	R03A C02	Salbutamol	6,442.3	2,901.3	9,343.7
22.	C01E B15	Trimetazidine	3,062.7	5,889.4	8,952.1
23.	J01C A04	Amoxicillin	2,058.7	6,007.3	8,066.0
24.	R03C C02	Salbutamol	712.9	7,049.8	7,762.7
25.	R03B A02	Budesonide	4,505.5	3,212.1	7,717.6
26.	B01A C06	Acetylsalicylic acid	1,220.6	4,672.9	5,893.5
27.	C02C A01	Prazosin	5,196.5	660.9	5,857.4
28.	A10B B01	Glibenclamide	1,916.1	3,771.8	5,687.9
29.	H02A B02	Dexamethasone	484.8	5,060.1	5,544.9
30.	M01A G01	Mefenamic acid	1,592.0	3,602.4	5,194.5
31.	C03C A01	Furosemide	900.3	3,352.9	4,253.2
32.	R06A B04	Chlorphenamine	920.2	2,956.9	3,877.1
33.	M04A A01	Allopurinol	999.5	2,804.7	3,804.1
34.	R03D A04	Theophylline	1,579.0	1,992.0	3,571.0
35.	R06A D02	Promethazine	1,509.7	1,052.7	2,562.3
36.	C03A A04	Chlorothiazide	2,494.6	44.0	2,538.6
37.	C01D A08	Isosorbide dinitrate	1,562.0	517.7	2,079.7
38.	H02A B06	Prednisolone	495.3	1,451.9	1,947.2
39.	H03B B01	Carbimazole	596.8	752.9	1,349.7
40.	C03A A03	Hydrochlorothiazide	27.5	303.9	331.4
	Total All Drugs		1,115,912	1,126,739	2,2432,651

Table 2.2: Distribution of Expenditure by Therapeutic Group, 2005

#	ATC	Therapeutic Group	Public Sector		Private Sector		Total	
			RM mill	%	RM mill	%	RM mill	%
1.	C10	Lipid modifying agents	37.2	13.4	71.3	19.1	108.5	16.6
2.	A10	Drugs used in diabetes	47.8	17.2	43.6	11.7	91.5	14.0
3.	C08	Calcium channel blockers	45.1	16.2	45.1	12.1	90.2	13.8
4.	C09	Agents acting on the renin-angiotensin system	57.2	20.5	26.4	7.1	83.5	12.8
5.	M01	Antiinflammatory and antirheumatic products	3.1	1.1	47.6	12.7	50.7	7.8
6.	A02	Drugs for acid related disorders	14.1	5.1	33.2	8.9	47.4	7.3
7.	C07	Beta blocking agents	25.0	9.0	17.2	4.6	42.2	6.5
8.	R06	Antihistamines for systemic use	7.3	2.6	25.8	6.9	33.1	5.1
9.	B01	Antithrombotic agents	10.4	3.7	21.7	5.8	32.1	4.9
10.	R03	Drugs for obstructive airway diseases	13.2	4.8	15.2	4.1	28.4	4.4
	Total, Top 40 utilised medicines		278.3	100	373.8	100	652.1	100%

Table 2.3: Ranking of Expenditure on Top 10 Therapeutic Groups

ATC	Therapeutic Group	Malaysia (2005)	Australia (2004/5)
C10	Lipid modifying agents	1	1
A10	Drugs used in diabetes	2	7
C08	Calcium channel blockers	3	11
C09	Agents acting on the renin-angiotensin system	4	3
M01	Antiinflammatory and antirheumatic products	5	8
A02	Drugs for acid related disorders	6	2
C07	Beta blocking agents	7	>15
R06	Antihistamines for systemic use	8	>15
B01	Antithrombotic agents	9	10
R03	Drugs for obstructive airway diseases	10	5

Note: Australian ranking refers to costs for community prescribing

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The common acid related disorders include Gastroesophageal Reflux Disease (GERD), Peptic Ulcer Disease and Non Ulcer Dyspepsia. Prevalence rate of Reflux Esophagitis (RE) in Malaysia has been estimated at 13.4% [1]. In Western Countries such as the UK and the USA the prevalence of monthly heartburn had been estimated to be about 29–44% [2]. In Singapore and Hong Kong, the monthly prevalence rates of heart burn and/or acid regurgitation had been reported to be below 10% of their population [2]. GERD is currently the commonest among acid related disorders with increasing trends both locally and globally.

From our study, the drug utilisation for acid related disorders is at 5.16 DDD/1000 population/ day. This indicates that 0.5% of the population on average used this group of drugs every day in the year 2005. In comparison with other countries, the usage is comparatively small. For example in 2003, the consumption of drugs for acid related disorder in the Nordic countries ranged from 18.3DDD/1000inhabitants/day in Greenland to 56.5DDD/1000 inhabitants/day in Iceland [3], which evidently far exceeded our figures. Utilisation data of antacid and alginates were not available in this study, thus leading to the apparent lower quoted rate for this class of drugs.

In proportion to other classes of drugs, utilisation of drugs for acid related disorders is relatively small. This could be explained by the fact that acid related disorders currently have a lower prevalence in our population and merely requires treatment of a short duration. Among the 4 different classes of drugs, H₂ Receptor Antagonist (H₂RA) tops the list with usage of 2.7 DDD/ 1000 population/day in 2005, followed very closely by Proton Pump Inhibitors (PPI) at (2.4). This pattern is somewhat dissimilar to other countries where PPIs are more commonly used as compared to H₂RA. For example, in Denmark the usage of PPI is four times higher (23.4) compared to usage of H₂RA (6). H₂RA constituted 52.9% of all drugs used for acid related disorders, and ranitidine (58.5%) is the most popular, followed by cimetidine (29.3%), famotidine (11.9%) and nizatidine (0.3%). In private practice, famotidine (0.3) is used as frequently to cimetidine (0.30).

PPI constituted (46.8%) by drug class with the breakdown of omeprazole (68.9%), esomeprazole (11.2%), lansoprazole (10.3%), pantoprazole (7.1%) and rabeprazole (2.5%). The utilisation of H₂RA is similar between the public (50.2%) compared to private sector (49.8%). However the consumption of PPI is higher in the private sector (73.6%) compared to the public sector (26.4%).

In 2005, omeprazole was the only PPI in generic formulation available in Malaysia. The utilisation of omeprazole exceeded that of ranitidine and this pattern of usage is driven by the private sector. Consumption of other drugs for acid related disorders namely misoprostol and carbenoxolone was almost negligible.

The current prescribing practice restrictions, availability and cost considerations may explain this pattern of usage reported in this study. In the public sector the usage of PPIs are limited to specialists whilst H₂RA are readily available in most primary clinics and health care centers. In developed countries, there is an apparent consensus among physicians on using PPIs as first line treatment for GERD as it is more potent, effective and possess good safety profile [4]. We foresee that the usage of PPIs will soon supersede H₂RA following the trend in the western population. Based on the changing trend of prevalence locally and globally, we anticipate that the overall utilisation trend of acid related disorders would further increase in the future.

The data for antacid and alginates, an important class of drugs for acid related disorders, which are widely used as first line treatment and self-medication in Malaysia, was not included in this report. This may have skewed the figures for drug utilisation for acid related disorders.

Table 3.1: Use of Medicines for Acid Related Disorders by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
A02B A	H2-receptor antagonists	2.7288
A02B B	Prostaglandins	0.0020
A02B C	Proton pump inhibitors	2.4180
A02B X	Other drugs for peptic ulcer and gastro-oesophageal reflux disease (GORD)	0.0131

Table 3.2: Use of Medicines for Acid Related Disorders by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
A02B A	H2-receptor antagonists		
A02B A01	Cimetidine	Total	0.8002
		Public	0.4951
		Private	0.3051
A02B A02	Ranitidine	Total	1.5953
		Public	0.8601
		Private	0.7352
A02B A03	Famotidine	Total	0.3247
		Public	0.0197
		Private	0.3050
A02B A04	Nizatidine	Total	0.0086
		Public	-
		Private	0.0086
A02B B	Prostaglandins		
A02B B01	Misoprostol	Total	0.0020
		Public	0.0001
		Private	0.0019
A02B C	Proton pump inhibitors		
A02B C01	Omeprazole	Total	1.6666
		Public	0.4546
		Private	1.2120
A02B C02	Pantoprazole	Total	0.1727
		Public	0.0131
		Private	0.1596
A02B C03	Lansoprazole	Total	0.2485
		Public	0.1607
		Private	0.0878
A02B C04	Rabeprazole	Total	0.0597
		Public	0.0029
		Private	0.0568
A02B C05	Esomeprazole	Total	0.2705
		Public	0.0060
		Private	0.2645

ATC	Drug Class and Agents		2005
A02B X	Other drugs for peptic ulcer and gastro-oesophageal reflux disease (GORD)		
A02B X01	Carbenoxolone	Total	0.0131
		Public	-
		Private	0.0131

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CHAPTER 4: USE OF ANTI-OBESITY MEDICINES (RESERVE)

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The total use of antidiabetic drugs in 2005 in Malaysia was 35.9DDD/1000 population/day. The most utilised class of drugs was the sulphonylurea group, followed by the biguanides and insulins that is the intermediate acting combined with fast acting insulin, fast acting, intermediate-acting and long acting respectively. Total antidiabetic drugs dispensed in Malaysia in 2005 (35.9DDD/1000 population/day) were slightly lower to that in Australia 2005 (37.6DDD/1000 population/day).

The amount of insulins dispensed in relation to the annual total antidiabetic drug utilisation in 2005 was low (10.64%). This was contrary to what was expected. The insulin consumption is expected to increase as more Type 2 diabetics are started on insulin and more Type 1 diabetics are diagnosed. In contrast, Australia in 2005 had an insulin utilisation of 35.68% [1]. This result portrayed a less aggressive approach in prescribing insulin among Malaysian physicians compared to our Australian counterparts. The pattern of prescribing insulin, however, was consistent to that in Australia with the most preferred type of insulin being the combined intermediate/fast acting insulin, followed by fast-acting, intermediate-acting and lastly long-acting insulin. Preference for the intermediate/fast acting insulin was much higher among the Malaysians (57.6%) compared to the Australians (42.27%). Public usage was far greater than that in private sector reflective of the burden of patients seen and managed by the public sector. It is likely that the elderly, those who require insulin, tend to seek treatment from the public sector because of economic reasons. It cannot be denied that the private sector may be less aggressive in initiating insulin therapy because of patient perception and acceptance. The greater use of combination of intermediate/fast acting insulin was not in line with the current guidelines. There should be more emphasis on the use of long acting insulin in combination with oral anti-diabetics or basal-bolus insulin regimes.

For Oral Hypoglycaemic Agents (OHA), sulphonylureas (19.2DDD/1000 population/day) were the most common antidiabetic drugs dispensed in Malaysia in 2005, followed by metformin (11.99DDD/1000 population/day). The amount of metformin utilised in Malaysia (2005) was comparable to that in Australia (11.62DDD/1000 population/day) in 2005. This was in contrast to current guidelines, which clearly recommends metformin as first line therapy and reflects a need to emphasise on the use of guidelines in clinical practice by prescribers. Chlorpropamide was still being used in Malaysia compared to Australia where its use was negligible. The use of chlorpropamide should be discouraged because of its tendency to cause severe and prolonged hypoglycaemia. Based on the MSOM data 2005, there appeared to be a preference to prescribe glibenclamide rather than the newer second-generation sulphonylureas and could indicate cost factor particularly in the public setting.

The low use of alpha-glucosidase inhibitor, combination antidiabetics, thiazolidinediones and other OHAs was expected because apart from being expensive, they are usually used as third line antidiabetic treatment that is, they are only used when metformin, sulphonylureas and other therapies are not tolerated or have failed. The use of this group of antidiabetic drugs in Malaysia was much lower than that in Australia. This may reflect the tendency in Malaysia to prescribe these drugs as third line oral antidiabetic agents as a means to delay initiation of insulin therapy due to both patient and physician factors.

Table 5.1: Use of Anti-Diabetics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
A10A	INSULINS AND ANALOGUES	3.8166
A10B A	Biguanides	11.987
A10B B	Sulfonamides, urea derivatives	19.218
A10B D	Combinations of oral blood glucose lowering drugs	0.0407
A10B F	Alpha glucosidase inhibitors	0.4977
A10B G	Thiazolidinediones	0.2127
A10B X	Other oral blood glucose lowering drugs	0.0829

Table 5.2: Use of Anti-Diabetics by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
A10A B	Insulins and analogues, fast-acting		
A10A B01	Insulin (human)	Total	0.8578
		Public	0.7772
		Private	0.0806
A10A B04	Insulin lispro	Total	0.0018
		Public	<0.0001
		Private	0.0018
A10A B05	Insulin aspart	Total	0.0075
		Public	0.0023
		Private	0.0053
A10A C	Insulins and analogues, intermediate-acting		
A10A C01	Insulin (human)	Total	0.7055
		Public	0.6040
		Private	0.1015
A10A D	Insulins and analogues, intermediate-acting combined with fast-acting		
A10A D01	Insulin (human)	Total	2.192
		Public	1.8981
		Private	0.2938
A10A D05	Insulin aspart	Total	0.0065
		Public	-
		Private	0.0065
A10A E	Insulins and analogues, long-acting		
A10A E04	Insulin glargine	Total	0.0455
		Public	0.0029
		Private	0.0425
A10B A	Biguanides		
A10B A02	Metformin	Total	11.987
		Public	9.1975
		Private	2.7895

ATC	Drug Class and Agents		2005
A10B B	Sulfonamides, urea derivatives		
A10B B01	Glibenclamide	Total	12.9228
		Public	10.9231
		Private	1.9997
A10B B02	Chlorpropamide	Total	0.0517
		Public	0.0137
		Private	0.0379
A10B B07	Glipizide	Total	0.1944
		Public	0.0315
		Private	0.1629
A10B B09	Gliclazide	Total	5.3028
		Public	3.4366
		Private	1.8662
A10B B12	Glimepiride	Total	0.7463
		Public	0.022
		Private	0.7244
A10B D	Combinations of oral blood glucose lowering drugs		
A10B D03	Metformin and rosiglitazone	Total	0.0407
		Public	-
		Private	0.0407
A10B F	Alpha glucosidase inhibitors		
A10B F01	Acarbose	Total	0.4977
		Public	0.3547
		Private	0.1431
A10B G	Thiazolidinediones		
A10B G02	Rosiglitazone	Total	0.2127
		Public	0.0164
		Private	0.1962
A10B X	Other oral blood glucose lowering drugs		
A10B X02	Repaglinide	Total	0.0693
		Public	0.0183
		Private	0.0510
A10B X03	Nateglinide	Total	0.0136
		Public	-
		Private	0.0136

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CHAPTER 6: USE OF ANTIANAEMIC DRUGS (RESERVE)

CHAPTER 7: USE OF ANTIHAEMORRHAGIC DRUGS (RESERVE)

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The survey on cardiovascular drugs in 2005 had provided us with an unprecedented overview of its use in Malaysia. The national usage of beta-blockers, calcium channel antagonists, angiotensin converting enzyme antagonists, angiotensin receptor blockers and lipid lowering agents, all also commonly prescribed in patients with cardiovascular disorders, are found in other sections of this survey. In this section, usage of the following classes of cardiovascular drugs were explored: antithrombotic agents, cardiac glycosides, Class I and III antiarrhythmics, cardiac stimulants, vasodilators used in cardiac disease (excluding calcium channel antagonists and some beta-blockers), diuretics and peripheral vasodilators.

The use of antithrombotic agents was common with a DDD/1000 population/day of 9.36, which is the second behind the ubiquitous diuretics (12.2DDD/1000 population/day). Amongst the antithrombotic agents, platelet aggregation inhibitors excluding heparin ranked the highest: with use 8.62DDD/1000 population/day. Within this subgroup, aspirin ranked highest and constituted 72% of total use. Thienopyridine inhibitors such as ticlodipine and clopidogrel were the next most common, with DDD/1000 population/day of 1.31 and 1.02, respectively. It was interesting to note that ticlodipine was being prescribed as much in the public sector when compared to the private sector, but clopidogrel approximately eight times as much in the private sector compared to the public sector. Intravenous platelet aggregation inhibitors such as tirofiban and abciximab have shown its effectiveness in recent clinical trials [1,2,3]. However, its usage was still sparse, with DDD/1000 population/day of <0.0001.

Warfarin remained the mainstay of the Vitamin K antagonist group, with a DDD/1000 population/day of 0.47. In the Heparin group of antithrombotic agents, the use of enoxaparin was almost comparable to heparin with DDD/1000 population/day of 0.11 and 0.13 respectively. This was most likely due to studies demonstrating the effectiveness of enoxaparin [4,5] as well as ease of administration to the patient via the subcutaneous route.

In the Enzymes group, also known as thrombolytics, intravenous streptokinase remained the primary agent used in Malaysia. It had DDD/1000 population/day score of 0.0008 with the public sector using 3 times more than the private sector. This gave some insight to the distribution of presentation sites of serious thromboembolic events in the cardiopulmonary circulation. Since the majority of thrombolytic use is for acute ST-elevation myocardial infarction, the distribution of use favouring the public sector may mean that more myocardial infarction patients present to the public sector hospitals compared with the private hospitals, or that its use in the private sector had declined with increasing use of primary angioplasty and stenting as a preferential therapeutic option for private paying or insured patients. Also it is generally known that while private sector doctors constitute some 55% of the doctors in the country, they look after about 30% of the inpatients compared with the public sector doctors.

Digoxin, a cardiac glycoside had been reported to be prescribed with a DDD/1000 population/day of approximately 0.80. This drug has long been used in the management of atrial fibrillation and heart failure. However, with increasing data supporting the use of beta-blockers in the group of patients [6,7,8], it is likely we will see a plateau or even decline in the prescription of this drug.

In the Antiarrhythmic group, class III agent Amiodarone was most used in 2005 with DDD/1000 population/day of 0.21. Despite having a wide spectrum of potential side effects, its efficacy has made it a popular choice amongst clinicians choosing an antiarrhythmic agent for treating most supraventricular and ventricular arrhythmias [9,10]. It also has a place in the treatment of cardiac arrests due to most life-threatening arrhythmias. Propafenone and

flecainide are established antiarrhythmic agents, but were less used as compared to amiodarone at DDD/1000 population/day scores of 0.010 and 0.013, respectively. These Class I antiarrhythmic agents had seen a decline in use most likely due to the convincing evidence that in patients with structural heart disorders, their use might be associated with increased mortality and poorer long-term outcomes [11]. Further, intravenous agents such as lidocaine had a DDD/1000 population/day use of 0.010, again a lower usage pattern consistent with the decreasing physician perception that rhythm disorders or warning signals carry very serious outcomes (which used to require urgent lidocaine suppression), particularly in this era of early reperfusion therapy.

In the Cardiac stimulant group, the most widely prescribed inotropic agents were epinephrine and norepinephrine, with DDD/1000 population/day use of 0.19 and 0.013 respectively. This wide disparity could perhaps be part explained by that epinephrine is the cardiac stimulant of choice during a cardiac arrest. Other cardiac stimulants such as dobutamine and dopamine, administered intravenously, had a similar DDD/1000 population/day use of 0.01. Of note, milrinone, a phosphodiesterase inhibitor, had a higher use of 0.008, with nearly all prescriptions coming from the private sector. Its use is mainly in acute heart failure as a stopgap measure to induce vasodilation, diuresis and/or raise blood pressure.

For the Vasodilators, the only subgroup analysed here was organic nitrates, of which the predominant drug was isosorbide dinitrate with a use of 1.43 DDD/1000 population/day, majority prescribed by the public sector. Isosorbide mononitrate, the long acting oral formulation, had a DDD/1000 population/day score of 0.97, with the private sector prescribing approximately six times more than the public sector. Glyceryl trinitrate, in both its oral and intravenous forms, accounted for 0.30 DDD/1000 population/day with almost equal use by the private and public sectors.

Unquestionably, diuretic use was the highest with 12.2 DDD/1000 population/day as also in the section of Drugs used in the treatment of Hypertension. In this group of drugs, chlorothiazide and frusemide were most used especially by the public sector with 3.74 and 4.73 DDD/1000 population/day respectively. Newer agents such as indapamide and bumetanide had DDD/1000 population/day scores of 0.74 and 0.04, respectively. Combining different agents, such as a loop or thiazide diuretic with a potassium-sparing agent seemed to have gained popularity, with a DDD/1000 population/day score of 1.11, with equal use by both the private and public sector.

It is worthwhile to note that the drugs with the highest DDD/1000 population/day are probably the most cost-effective in our current socio-economic climate. In the treatment of cardiovascular disease, polypharmacy is common, so whilst we look to provide the most effective treatments for our patients, we cannot discount the value of combination therapy.

Table 8.1: Use of Drugs for Cardiovascular disorders, in DDD/1000 population/day 2005

ATC	Drug Class	2005
B01	ANTITHROMBOTIC AGENTS	9.3566
C01A	CARDIAC GLYCOSIDES	1.2590
C01B	ANTIARRHYTHMICS, CLASS I AND III	0.2453
C01C	CARDIAC STIMULANTS EXCL. CARDIAC GLYCOSIDES	0.2401
C01D	VASODILATORS USED IN CARDIAC DISEASES	2.6949
C03	DIURETICS	12.2207
C04	PERIPHERAL VASODILATORS	0.0630

Table 8.2.1: Use of Anti-Thrombotic drugs by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
B01A A	Vitamin K antagonists	0.4651
B01A B	Heparin group	0.2743
B01A C	Platelet aggregation inhibitors excl. heparin	8.6162
B01A D	Enzymes	0.0008
B01A X	Other antithrombotic agents	<0.0001

Table 8.2.2: Use of Anti-Thrombotic drugs by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
B01A A	Vitamin K antagonists		
B01A A03	Warfarin	Total	0.4651
		Public	0.2707
		Private	0.1944
B01A B	Heparin group		
B01A B01	Heparin	Total	0.1332
		Public	0.0385
		Private	0.0947
B01A B05	Enoxaparin	Total	0.1085
		Public	0.0584
		Private	0.0501
B01A B06	Nadroparin	Total	0.0105
		Public	0.0048
		Private	0.0057
B01A B10	Tinzaparin	Total	0.0023
		Public	<0.0001
		Private	0.0023
B01A B11	Sulodexide	Total	0.0197
		Public	-
		Private	0.0197
B01A C	Platelet aggregation inhibitors excl. heparin		
B01A C04	Clopidogrel	Total	1.0243
		Public	0.1201
		Private	0.9043
B01A C05	Ticlopidine	Total	1.3088
		Public	0.6441
		Private	0.6647
B01A C06	Acetylsalicylic acid	Total	6.2258
		Public	3.7934
		Private	2.4324
B01A C07	Dipyridamole	Total	0.0572
		Public	0.0461
		Private	0.0111
B01A C11	Iloprost	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
B01A C13	Abciximab	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
B01A C17	Tirofiban	Total	<0.0001
		Public	<0.0001
		Private	<0.0001

ATC	Drug Class and Agents		2005
B01A D	Enzymes		
B01A D01	Streptokinase	Total	0.0008
		Public	0.0006
		Private	0.0002
B01A D02	Alteplase	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
B01A D04	Urokinase	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
B01A D10	Drotrecogin alfa (activated)	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
B01A X	Other antithrombotic agents		
B01A X05	Fondaparinux	Total	<0.0001
		Public	-
		Private	<0.0001

Table 8.3.1: Use of Cardiac Glycosides by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C01A	CARDIAC GLYCOSIDES		
C01A A05	Digoxin	Total	0.7962
		Public	0.3798
		Private	0.4165

Table 8.4.1: Use of Anti-Arrhythmics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C01B A	Antiarrhythmics, class Ia		
C01B A03	Disopyramide	Total	-
		Public	-
		Private	-
C01B B	Antiarrhythmics, class Ib		
C01B B01	Lidocaine	Total	0.0096
		Public	0.0073
		Private	0.0023
C01B B02	Mexiletine	Total	<0.0001
		Public	<0.0001
		Private	<0.0001

ATC	Drug Class and Agents		2005
C01B C	Antiarrhythmics, class Ic		
C01B C03	Propafenone	Total	0.0101
		Public	0.0004
		Private	0.0098
C01B C04	Flecainide	Total	0.0134
		Public	0.0012
		Private	0.0123
C01B D	Antiarrhythmics, class III		
C01B D01	Amiodarone	Total	0.2121
		Public	0.0520
		Private	0.1601

Table 8.5.1: Use of Cardiac stimulants by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C01C A	Adrenergic and dopaminergic agents		
C01C A02	Isoprenaline	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
C01C A03	Norepinephrine	Total	0.013
		Public	0.0107
		Private	0.0023
C01C A04	Dopamine	Total	0.0128
		Public	0.0051
		Private	0.0077
C01C A06	Phenylephrine	Total	0.0061
		Public	0.0009
		Private	0.0053
C01C A07	Dobutamine	Total	0.0121
		Public	0.0090
		Private	0.0031
C01C A09	Metaraminol	Total	-
		Public	-
		Private	-
C01C A24	Epinephrine	Total	0.1884
		Public	0.1193
		Private	0.0690
C01C E	Phosphodiesterase inhibitors		
C01C E02	Milrinone	Total	0.0077
		Public	<0.0001
		Private	0.0077
C01C X	Other cardiac stimulants		
C01C X08	Levosimendan	Total	<0.0001
		Public	-
		Private	<0.0001

Table 8.6.1: Use of Vasodilators in Cardiac diseases by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C01D A	Organic nitrates		
C01D A02	Glyceryl trinitrate	Total	0.3015
		Public	0.1285
		Private	0.1731
C01D A08	Isosorbide dinitrate	Total	1.4258
		Public	1.2741
		Private	0.1517
C01D A14	Isosorbide mononitrate	Total	0.9676
		Public	0.1665
		Private	0.8011

Table 8.7.1: Use of Diuretics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C03A	LOW-CEILING DIURETICS, THIAZIDES		
C03A A03	Hydrochlorothiazide	Total	1.3389
		Public	0.2448
		Private	1.0941
C03A A04	Chlorothiazide	Total	3.7431
		Public	3.7072
		Private	0.0359
C03B	LOW-CEILING DIURETICS, EXCL. THIAZIDES		
C03B A04	Chlortalidone	Total	0.0111
		Public	-
		Private	0.0111
C03B A11	Indapamide	Total	0.7424
		Public	0.0383
		Private	0.7041
C03C	HIGH-CEILING DIURETICS		
C03C A01	Furosemide	Total	4.7337
		Public	3.3789
		Private	1.3548
C03C A02	Bumetanide	Total	0.0387
		Public	0.0041
		Private	0.0346
C03D	POTASSIUM-SPARING AGENTS		
C03D A01	Spironolactone	Total	0.4492
		Public	0.2471
		Private	0.2022
C03D B01	Amiloride	Total	0.0573
		Public	0.0010
		Private	0.0563

ATC	Drug Class and Agents		2005
C03E	DIURETICS AND POTASSIUM-SPARING AGENTS IN COMBINATION		
C03E A01	Hydrochlorothiazide and potassium-sparing agents	Total	1.1064
		Public	0.5507
		Private	0.5557

Table 8.8.1: Use of Peripheral vasodilators by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C04A B	Imidazoline derivatives		
C04A B01	Phentolamine	Total	-
		Public	-
		Private	-
C04A D	Purine derivatives		
C04A D03	Pentoxifylline	Total	0.0567
		Public	0.0304
		Private	0.0263
C04A E	Ergot alkaloids		
C04A E01	Ergoloid mesylates	Total	0.0063
		Public	0.0002
		Private	0.0062

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Beta-blockers were the most commonly prescribed anti-hypertensive medication (23.7 DDD/1000 population/day) in 2005 followed by the calcium channel blockers (19.3). ACE inhibitors (16.5), diuretics (5.8) and angiotensin II antagonists (4.6) were also commonly used. Usage of alpha-blockers and centrally acting drugs was low.

In the category of beta-blockers there was a small amount, which was prescribed in combination with diuretics. The second largest category was the drugs antagonising the renin-angiotensin system (ACEIs and ARBs) some of which were in combination with diuretics (total 21.2 DDD/1000 population/day). The calcium channel blockers (CCBs) included those with vascular effects (e.g. amlodipine and nifedipine) and those with cardiac effects (e.g. diltiazem). Diuretics were prescribed alone (5.8) or in combination with other drugs (beta blocker or ACEI or ARB) in the same tablet (1.8) which made its overall usage quite high (total 7.6 DDD/1000 population/day).

The total utilisation of antihypertensives was 73.5 DDD/1000 population/day. From general practice prescription data, we estimated a patient with hypertension was prescribed a median of only one (1) anti-hypertensive medication. That is, the vast majority of patients (81%) in Malaysia were on mono-therapy. Thus, the utilisation statistic of 73.5 DDD/1000 population/day suggests about 6 to 7% of the population were on drug treatment for hypertension. About 40% of the population was aged > 30 years in 2004. This means that about 16% of the population aged 30 and above was taking an antihypertensive drug in 2005. There is a high prevalence of hypertension in Malaysia (33% in 1996) and a substantial number of patients were not on drug therapy or had undiagnosed hypertension [1]. People with hypertension in Malaysia may need more drug treatment as only about half of those who are hypertensive were on antihypertensives. This shortfall may be greater than stated, as many on treatment need more than one category of drug to control their blood pressure to the recommended target.

The local Clinical Practice Guideline (CPG) on hypertension [2] recommends beta-blockers or diuretics as drugs of first choice for control of uncomplicated hypertension. The utilisation pattern for 2005 is not consistent with the CPG as antagonists of the renin-angiotensin system were almost as popular as beta blockers followed by the calcium channel blockers. Diuretics lagged behind in fourth place. Many of the drugs in all 4 categories except the ARBs are generic and the order of preference may not reflect economic considerations. The ACEIs and ARBs are weak antihypertensives but have effects beyond blood pressure lowering. These include cardioprotection post myocardial infarction, reduction of proteinuria and renoprotection in diabetic and non-diabetic renal disease. The incidence of diabetes mellitus in Malaysia is high (7%) [3] and many diabetics are hypertensive. This may have some bearing when physicians in Malaysia choose an antihypertensive drug for their diabetic patients [2,4]. The calcium channel blockers have few side effects and are efficacious. Diuretics may be less used in spite of their extremely low cost because of marketing of other (more expensive) drugs by the pharmaceutical industry or the belief that they have side effects.

There were 3 drugs whose contribution each made up more than 10% of total utilisation – metoprolol (11.7 DDD/1000 population/day), nifedipine (10.6) and atenolol (10.4). Of these, two are beta-blockers and one is a CCB. These 3 drugs were used mainly in the public sector (81%).

Overall 73% of all antihypertensives were utilised in the public sector and 27% in the private sector. The most popular drugs in the private sector were atenolol (3.9 DDD/1000 population/day), amlodipine (2.7) and enalapril (1.1). There was a tendency to use more expensive drugs in the private sector. The use of antihypertensives should be encouraged in the private sector to reduce the burden of prescribing in the public sector. Economic considerations about treating a chronic disease in the private sector may be a deterring factor. Hypertension

is a silent disease (killer) and without counseling and education the public may not be willing to pay for its long-term control. Generic drugs that are efficacious should be the ones of choice. Aggressive marketing by the pharmaceutical industry may have unduly influenced drug prescribing.

Among the beta blockers the most popular were metoprolol and atenolol. They were favoured over the older generation beta-blocker propranolol. Among the ACEIs, perindopril was the most commonly used followed by enalapril and captopril. Perindopril is relatively cheap and its daily dosing is an advantage. The use of ACEIs should be encouraged as they have cardio- and renoprotective effects. The incidence of diabetes mellitus in new patients with end-stage renal failure (ESRF) was 52% in 2005 in Malaysia [5]. In the early stages of diabetic nephropathy ACEIs and ARBs may help to prevent progression to ESRF. The most commonly used ARB (with or without combination diuretics) was losartan followed by irbesartan, valsartan and candesartan. These drugs are expensive.

Among the CCBs nifedipine and amlodipine were the most commonly used. Nifedipine was extensively used, 90% in the public sector. Amlodipine was popular in both the public and private sector in spite of its high cost. Its daily dosing is an advantage for patient compliance over the three times a day dosing of nifedipine. It is a long acting dihydropyridine CCB and is not contraindicated in cardiovascular disease unlike the short acting nifedipine. Among the diuretics, chlorothiazide (CTZ) and HCTZ were the most commonly prescribed. The former was used by the public sector while HCTZ was used by the private sector. Their usage was low considering that they are the recommended first line drugs for hypertension.

The alpha antagonists were not popular although they may be useful in hypertensive men with prostatic hypertrophy who are not at high risk of heart failure. The use of centrally acting agents was low and this may be due to their unpleasant side effects. They are still useful as a third line drug and methyldopa is used in hypertension during pregnancy. Hydralazine should not be removed from the national drug formulary, as it is useful in severe hypertension during pregnancy. Minoxidil is a third line drug that sometimes controls severe hypertension although it was used sparingly as there are side effects. Nitroprusside is an intravenous drug that was used only in ICUs to control blood pressure temporarily.

Table 9.1: Use of Anti-Hypertensives by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
C02A	ANTIADRENERGIC AGENTS, CENTRALLY ACTING	0.6866
C02C A	ALPHA-ADRENORECEPTOR ANTAGONISTS	2.8100
C02D	ARTERIOLAR SMOOTH MUSCLE, AGENTS ACTING ON	0.0071
C02K	OTHER ANTIHYPERTENSIVES	0.0002
C03A	LOW-CEILING DIURETICS, THIAZIDES	5.0820
C03B	LOW-CEILING DIURETICS, EXCL. THIAZIDES	0.7535
C07	BETA BLOCKING AGENTS	23.7199
C08	CALCIUM CHANNEL BLOCKERS	19.2844
C09A	ACE INHIBITORS, PLAIN	16.4659
C09B	ACE INHIBITORS, COMBINATIONS	0.0639
C09C	ANGIOTENSIN II ANTAGONISTS, PLAIN	3.0205
C09D	ANGIOTENSIN II ANTAGONISTS, COMBINATIONS	1.6150
	TOTAL	73.509

Table 9.2: Use of Anti-Hypertensives by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C02A	ANTIADRENERGIC AGENTS, CENTRALLY ACTING		
C02A B01	Methyldopa (levorotatory)	Total	0.6277
		Public	0.5901
		Private	0.0376
C02A C01	Clonidine	Total	<0.0001
		Public	<0.0001
		Private	-
C02A C05	Moxonidine	Total	0.0589
		Public	-
		Private	0.0589
C02C A	ALPHA-ADRENORECEPTOR ANTAGONISTS		
C02C A01	Prazosin	Total	2.3982
		Public	2.2932
		Private	0.1050
C02C A04	Doxazosin	Total	0.4117
		Public	0.2762
		Private	0.1355
C02D	ARTERIOLAR SMOOTH MUSCLE AGENTS		
C02D B01	Dihydralazine	Total	0.0009
		Public	0.0009
		Private	<0.0001
C02D B02	Hydralazine	Total	<0.0001
		Public	<0.0001
		Private	-
C02D C01	Minoxidil	Total	0.0045
		Public	0.0028
		Private	0.0016
C02D D01	Nitroprusside	Total	0.0017
		Public	0.0002
		Private	0.0015
C02K	OTHER ANTIHYPERTENSIVES		
C02K X01	Bosentan	Total	0.0002
		Public	-
		Private	0.0002
C03A	LOW-CEILING DIURETICS, THIAZIDES		
C03A A03	Hydrochlorothiazide	Total	1.3389
		Public	0.2448
		Private	1.0941
C03A A04	Chlorothiazide	Total	3.7431
		Public	3.7072
		Private	0.0359

ATC	Drug Class and Agents		2005
C03B	LOW-CEILING DIURETICS, EXCL. THIAZIDES		
C03B A04	Chlortalidone	Total	0.0111
		Public	-
		Private	0.0111
C03B A11	Indapamide	Total	0.7424
		Public	0.0383
		Private	0.7041
C07A	BETA BLOCKING AGENTS		
C07A A05	Propranolol	Total	0.6201
		Public	0.3596
		Private	0.2605
C07A A06	Timolol	Total	-
		Public	-
		Private	-
C07A A07	Sotalol	Total	0.0245
		Public	0.0023
		Private	0.0222
C07A B02	Metoprolol	Total	11.6584
		Public	10.6187
		Private	1.0397
C07A B03	Atenolol	Total	10.3563
		Public	6.4350
		Private	3.9213
C07A B04	Acebutolol	Total	0.0022
		Public	-
		Private	0.0022
C07A B05	Betaxolol	Total	0.0576
		Public	-
		Private	0.0576
C07A B07	Bisoprolol	Total	0.2098
		Public	0.0112
		Private	0.1987
C07A B09	Esmolol	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
C07A G01	Labetalol	Total	0.1577
		Public	0.1265
		Private	0.0313
C07A G02	Carvedilol	Total	0.4887
		Public	0.0896
		Private	0.3991

ATC	Drug Class and Agents		2005
C07C	BETA BLOCKING AGENTS AND OTHER DIURETICS		
C07C A03	Pindolol and other diuretics	Total	0.0021
		Public	-
		Private	0.0021
C07C B02	Metoprolol and other diuretics	Total	0.0094
		Public	-
		Private	0.0094
C07C B03	Atenolol and other diuretics	Total	0.1329
		Public	-
		Private	0.1329
C08C	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH MAINLY VASCULAR EFFECTS		
C08C A01	Amlodipine	Total	6.6146
		Public	3.9237
		Private	2.6909
C08C A02	Felodipine	Total	1.2082
		Public	0.7049
		Private	0.5034
C08C A03	Isradipine	Total	0.0115
		Public	-
		Private	0.0115
C08C A04	Nicardipine	Total	0.0037
		Public	<0.0001
		Private	0.0037
C08C A05	Nifedipine	Total	10.6112
		Public	9.5203
		Private	1.0908
C08C A06	Nimodipine	Total	0.0027
		Public	0.0014
		Private	0.0013
C08C A09	Lacidipine	Total	0.0243
		Public	-
		Private	0.0243
C08C A13	Lercanidipine	Total	0.0818
		Public	-
		Private	0.0818
C08D	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH DIRECT CARDIAC EFFECTS		
C08D A01	Verapamil	Total	0.1273
		Public	0.0301
		Private	0.0972
C08D B01	Diltiazem	Total	0.5990
		Public	0.2616
		Private	0.3374

ATC	Drug Class and Agents		2005
C09A	ACE INHIBITORS, PLAIN		
C09A A01	Captopril	Total	3.8731
		Public	3.5133
		Private	0.3598
C09A A02	Enalapril	Total	4.2159
		Public	3.1080
		Private	1.1079
C09A A03	Lisinopril	Total	0.7529
		Public	0.1591
		Private	0.5939
C09A A04	Perindopril	Total	7.0689
		Public	6.0259
		Private	1.0429
C09A A05	Ramipril	Total	0.5405
		Public	0.0750
		Private	0.4655
C09A A06	Quinapril	Total	0.0051
		Public	-
		Private	0.0051
C09A A09	Fosinopril	Total	0.0096
		Public	0.0012
		Private	0.0083
C09B	ACE INHIBITORS, COMBINATIONS		
C09B A04	Perindopril and diuretics	Total	0.0639
		Public	-
		Private	0.0639
C09C	ANGIOTENSIN II ANTAGONISTS, PLAIN		
C09C A01	Losartan	Total	1.5517
		Public	0.6740
		Private	0.8777
C09C A03	Valsartan	Total	0.2704
		Public	0.0716
		Private	0.1988
C09C A04	Irbesartan	Total	0.5669
		Public	0.1505
		Private	0.4164
C09C A06	Candesartan	Total	0.3216
		Public	0.0001
		Private	0.3214
C09C A07	Telmisartan	Total	0.3085
		Public	0.0681
		Private	0.2404
C09C A08	Olmesartan medoxomil	Total	0.0014
		Public	-
		Private	0.0014

ATC	Drug Class and Agents		2005
C09D	ANGIOTENSIN II ANTAGONISTS, COMBINATIONS		
C09D A01	Losartan and diuretics	Total	0.7051
		Public	0.1527
		Private	0.5524
C09D A03	Valsartan and diuretics	Total	0.4217
		Public	0.0686
		Private	0.3531
C09D A04	Irbesartan and diuretics	Total	0.3123
		Public	0.0312
		Private	0.2812
C09D A06	Candesartan and diuretics	Total	0.1037
		Public	-
		Private	0.1037
C09D A07	Telmisartan and diuretics	Total	0.0722
		Public	-
		Private	0.0722

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When compared with data from 2004, the national use of Lipid Lowering Medicines in 2005 was again found to be significant – remaining in the top 10 of the list of therapeutic groups of medicines prescribed. This is unsurprising, given its effectiveness in reducing cardiovascular events across the entire cardiovascular disease continuum [1,2]. This effect is most pronounced in those found to be at higher cardiovascular risk [3]. Recent published safety data has also supported its use across this spectrum. [4,5].

The most recent national statistics from the Non-Communicable Diseases Surveillance Programme revealed the prevalence of hypercholesterolaemia in Malaysia to be at 53.5% [6]. Together with the population without significant dyslipidaemia, but have been diagnosed with a cardiovascular event, it is therefore not surprising that the DDD/1000 population/day for lipid lowering medicines in the country was found to be at 17.41 in 2005.

Amongst the lipid lowering medicines, 3-hydro-3-methylglutaryl-CoEnzyme A (HMG CoA) reductase inhibitors ('Statins') form the predominant group, with a DDD/1000 population/day of 16.27. Statins are the most effective agents to reduce low-density lipoprotein levels (LDL) with minimal adverse effects, hence the high usage. Within the group of HMG CoA reductase inhibitors, data on six prescribed statins were obtained. Most commonly prescribed was simvastatin, with a DDD/1000 population/day of 6.36, at similar amounts prescribed from the public and private healthcare sectors. Generic lovastatin had a DDD/1000 population/day of 5.83, with approximately 90% prescribed by the public healthcare sector. Atorvastatin had a DDD/1000 population/day of 3.15, with approximately 60% prescribed by the private healthcare sector. The other statins: pravastatin, fluvastatin and rosuvastatin, recorded DDD/1000 population/day of 0.65, 0.19 and 0.09 respectively; with the latter two only prescribed by the private healthcare sector.

Rosuvastatin usage is low since it has only been introduced in the country over the last 2 years. The cost factor appears to be an important aspect of prescription as generic lovastatin has relatively high usage. There are no data on dosages prescribed. Therefore it is difficult to assess if prescription pattern aims towards achieving LDL targets. The high usage of less potent status such as generic lovastatin may suggest inadequate LDL reduction.

Fibrates, bile salt sequestrants and other lipid modifying medicines had values of 1.04, 0.002 and 0.10 respectively. In the Fibrate group, the predominant two drugs prescribed in the country were gemfibrozil and fenofibrate, with DDD/1000 population/day of 0.52 and 0.48 respectively. The low usage of fibrates is an indicator of poor emphasis on high-density lipoprotein elevation (HDL). This is especially worrying as we have a large diabetic population in whom low HDL is prevalent.

Finally, the emergence of other lipid lowering medicine classes such as ezetimibe, predominantly prescribed by the private healthcare sector, recorded a combined DDD/1000 population/day of 0.10.

Improved screening and public health awareness programmes, patient advice and empowerment, availability of affordable point-of-care lipid profile measurement devices, in conjunction with easily available treatment are likely to result in a steady increase in the use of statins in the future. It is hoped that importance is paid to both LDL and HDL targets in future.

Table 10.1: Use of Lipid Lowering Medicines by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
C10A A	HMG CoA reductase inhibitors	17.2359
C10A B	Fibrates	1.2629
C10A C	Bile acid sequestrants	0.0042
C10A D	Nicotinic acid and derivatives	-
C10A X	Other lipid modifying agents	0.1124

Table 10.2: Use of Lipid Lowering Medicines by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
C10A A	HMG CoA reductase inhibitors		
C10A A01	Simvastatin	Total	8.306
		Public	2.8973
		Private	5.4087
C10A A02	Lovastatin	Total	6.022
		Public	5.3584
		Private	0.6636
C10A A03	Pravastatin	Total	0.8271
		Public	0.459
		Private	0.3681
C10A A04	Fluvastatin	Total	0.1892
		Public	-
		Private	0.1892
C10A A05	Atorvastatin	Total	1.7917
		Public	0.2239
		Private	1.5678
C10A A07	Rosuvastatin	Total	0.0999
		Public	-
		Private	0.0999
C10A B	Fibrates		
C10A B02	Bezafibrate	Total	0.0003
		Public	-
		Private	0.0003
C10A B04	Gemfibrozil	Total	0.5448
		Public	0.4816
		Private	0.0632
C10A B05	Fenofibrate	Total	0.6759
		Public	0.1161
		Private	0.5598
C10A B08	Ciprofibrate	Total	0.0419
		Public	-
		Private	0.0419

ATC	Drug Class and Agents		2005
C10A C	Bile acid sequestrants		
C10A C01	Colestyramine	Total	0.0042
		Public	0.0006
		Private	0.0037
C10A D	Nicotinic acid and derivatives		
C10A D06	Acipimox	Total	-
		Public	-
		Private	-
C10A X	Other lipid modifying agents		
C10A X09	Ezetimibe	Total	0.1124
		Public	0.0093
		Private	0.1030

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CHAPTER 11 : USE OF DERMATOLOGICALS (RESERVE)

CHAPTER 12 : USE GYNAECOLOGICALS, SEX HORMONES AND HORMONAL
ONTRACEPTIVES (RESERVE)

CHAPTER 13 : USE OF UROLOGICALS (RESERVE)

CHAPTER 14 : USE OF DRUGS FOR ENDOCRINE DISORDERS (RESERVE)

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The most commonly prescribed antiinfectives in 2005 were Antibacterials (DDD 9.55/1000 population/day), followed by Antimycobacterials (1.06), Antimalarials (0.45), Antimycotics for systemic use (0.35) and Antivirals for systemic use (0.28). Among the classes of antibacterials prescribed, Penicillins were most commonly used constituting 47% of total use of antibacterials, followed by Macrolides, Lincosamides and Streptogramins group (17.6%), Tetracyclines (14%), other Beta-lactam Antibacterials (11%), Quinolones (5%) and Sulfonamides and Trimethoprim group (3%).

Among the penicillin class, penicillins with extended spectrum were the most commonly prescribed (2.6 DDD/1000 population/day) constituting 58% of total use. Penicillin combinations with beta-lactamase inhibitors constitute almost 20% of penicillin use and beta-lactamase resistant penicillins were equally used. The most used beta-lactamase resistant penicillin was cloxacillin with almost 80% being prescribed by the public sector. Among penicillin combinations with beta-lactamase inhibitors, amoxicillin/clavulanic acid was the most popular constituting more than 85% of use. For ampicillin and enzyme inhibitor, the oral and injection formulations were equally used with 0.05DDD/1000 population/day. Beta-lactamase sensitive penicillins were much less used and constitute only 5% of penicillin use. The five most frequently prescribed antibacterial agents were amoxicillin (2.15), doxycycline (1.12), erythromycin (1.11), cloxacillin (0.79) and amoxicillin and enzyme inhibitor (0.71). The consumption of amoxicillin was greater in the private sector (1.45), where it is twice that of the public sector (0.69). While the use of bacampicillin is low (12% of this group) perhaps limited by its cost, it is observed that the public sector used 3 times more than the private sector.

Cephalosporins constitute 11% of total antibacterial use. The first and second generation cephalosporins were the most used and use between both groups was comparable with 0.45 and 0.47 DDD/1000 population/day respectively. The first and second-generation groups constitute 87% of use while the 3rd generation 11% and 4th generation only 1%. Cefalexin (0.41) was the most widely prescribed cephalosporin followed by cefuroxime (0.38) and cefaclor (0.08). It was noted that 85% of cefalexin and almost 60% of cefuroxime was used by the private sector. The consumption of other cephalosporins such as cefadroxil, cefaclor, ceftibuten and cefprozil were also predominantly used by the private sector. Ceftriaxone was the most widely prescribed third-generation cephalosporin and the usage was almost 70% higher in the private sector. Cefotaxime was the least prescribed third-generation cephalosporin and predominantly used by the public sector. The total use of ceftazidime and cefoperazone was comparable with cefoperazone negligibly used by the private sector. The fourth-generation cephalosporin was far more commonly prescribed in the private sector, where consumption of cefepime was three-fold higher than public sector. The Carbapenems constitute 1% of total use and imipenem was the most frequently prescribed carbapenem, twice higher than meropenem. While meropenem was slightly more frequently prescribed in the public sector (40% higher), imipenem however was more often prescribed in the private sector (70% higher). Although ertapenem was the least prescribed carbapenem, its consumption was predominantly in the private sector. Consumption of ertapenem was almost equivalent to that of meropenem.

Sulphonamides and trimethoprim constituted only 3% of antibacterial use and the combination sulphamethoxazole/trimethoprim (cotrimoxazole) was the most used (90%). Co-trimoxazole was predominantly used by the private sector (92%). For Macrolides, erythromycin was most widely prescribed (1.11), followed by clarithromycin (0.28) and azithromycin (0.15). Consumption of clarithromycin and azithromycin was far higher in the private compared to public sector, five and thirteen-fold higher respectively. For quinolones, ciprofloxacin (0.17) was the most commonly prescribed, followed by ofloxacin (0.16) and norfloxacin (0.09). Quinolone consumption was generally higher in the private compared to public sector. The newer quinolones such as gatifloxacin, moxifloxacin and levofloxacin were almost universally prescribed in the private sector. Vancomycin was the most frequently

prescribed glycopeptide antibiotic, almost seven-fold higher than teicoplanin. Vancomycin consumption was equal in both the public and private sector.

Among the antifungals, ketoconazole (0.24) was the most frequently prescribed, followed by itraconazole (0.07) and fluconazole (0.04). Amphotericin B was rarely prescribed, as was flucytosine, caspofungin and voriconazole. Ketoconazole (95%) and fluconazole (70%) was more frequently prescribed in the private sector, amphotericin B (75%) mainly by the public sector while itraconazole consumption was almost equal in both the public and private sectors.

Among the anti-mycobacterials, isoniazid (0.45) was the most frequently prescribed followed by rifampicin (0.2), pyrazinamide (0.14) and ethambutol (0.12). Usage of these drugs was predominantly in the public sector. Usage of second-line anti-mycobacterial drugs was relatively infrequent. Aminoquinolones were the most commonly prescribed anti-protozoal drugs (0.41), of which chloroquine was the most frequently prescribed agent (50%) followed by primaquine (36%).

For the antivirals, nucleoside and nucleotide reverse transcriptase inhibitors (0.16) were the most commonly prescribed agents (60% of total drugs used), followed by non-nucleoside reverse transcriptase inhibitors (0.06). Stavudine (0.05) was the most commonly prescribed antiviral, followed by aciclovir and lamivudine (0.04). While stavudine was predominantly prescribed by the public sector (sixty two-fold higher), aciclovir was more commonly used in the private sector (seven-fold higher).

Antibacterial use in Malaysia (9.55) is lower when compared to the United States (24.92), Europe (19.04) and British Columbia (17.9) [1,2]. It is however comparable to countries with relatively lower antibiotic consumption such as Austria (12.5), Latvia (11.7) and the Netherlands (9.78). Antibiotic use in Malaysia was also lower than Greece (31.4), France (28.97), Luxembourg (27.34), Hungary (19.63) and Slovenia (17.1) [3]. The most frequently prescribed class of antibacterials in Malaysia was penicillins (J01C) and this was also the case for the United States and Europe. However, consumption of penicillins was twice as much in the United States (9.70) and Europe (8.71) as compared to Malaysia (4.46). Among the penicillin subclasses, penicillins with extended spectrum (2.60) were the most frequently prescribed in Malaysia, similar to the United States (5.68) and Europe (4.49) [2]. Amoxicillin was the most commonly prescribed antibacterial agent in Malaysia (2.15) and this was also similar to the United States (5.59) and Europe (4.26). However, amoxicillin consumption in Malaysia was lower than the lowest DDD in Europe, the Netherlands (3.76). The second most common antibacterial agent prescribed in Malaysia was doxycycline while co-amoxiclav was the second most commonly prescribed antibacterial agent in the United States and Europe. The third most common antibacterial agent prescribed in Malaysia was erythromycin, while doxycycline was the third most common in United States and Europe. While erythromycin was the most common macrolide prescribed in Malaysia, azithromycin was the most common macrolide prescribed in the United States and Europe. Cloxacillin consumption was rather uncommon in the United States and Europe, while it was the fourth most common antibacterial agent prescribed in Malaysia. Levofloxacin was the most commonly prescribed fluoroquinolone in the United States and Europe, while ciprofloxacin was the most commonly prescribed quinolone in Malaysia.

Antibiotic overuse and misuse are major factors contributing to the development of antimicrobial resistance [4]. Information on the trends and patterns of antibiotic consumption is essential to formulate control measures on antibiotic prescribing, although this is mainly feasible in the public sector. Restrictive measures to decrease outpatient use of antibiotics, as practised in Central and Eastern Europe, may need further consideration [5]. This approach may be useful as a cost-containment measure, although more studies are needed to evaluate its impact on antimicrobial resistance.

In conclusion, antibacterial agents were the most commonly prescribed antiinfective agent in Malaysia and amoxicillin was the most frequently prescribed antibiotic. There were significant prescribing differences between the government and private sectors, with the private sector consuming more beta-lactam/beta-lactamase combinations, clarithromycin, azithromycin, newer generation fluoroquinolones and ertapenem.

Table 15.1: Use of Anti-Infectives, in DDD/1000 population/day 2005 and DDD/population/year

ATC	Drug Class	2005	2005 (DDDs/population/year)
J01	ANTIBACTERIALS FOR SYSTEMIC USE	9.5464	3.4844
J02	ANTIMYCOTICS FOR SYSTEMIC USE	0.3516	0.1283
J04	ANTIMYCOBACTERIALS	1.0633	0.3881
J05	ANTIVIRALS FOR SYSTEMIC USE	0.2761	0.1008
P01B	ANTIMALARIALS	0.4536	0.1655

Table 15.2.1: Use of Anti-Bacterials by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005	2005 (DDDs/population/year)
J01A	TETRACYCLINES	1.3422	0.4899
J01B	AMPHENICOLS	0.0063	0.0023
J01C	BETA-LACTAM ANTIBACTERIALS, PENICILLINS	4.4573	1.6269
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	1.0711	0.3910
J01E	SULFONAMIDES AND TRIMETHOPRIM	0.3192	0.1165
J01F	MACROLIDES, LINCOSAMIDES AND STREPTOGRAMINS	1.6807	0.6135
J01G	AMINOGLYCOSIDE ANTIBACTERIALS	0.0529	0.0193
J01M	QUINOLONE ANTIBACTERIALS	0.5140	0.1876
J01X	OTHER ANTIBACTERIALS	0.1026	0.0375

Table 15.2.2: Use of Anti-Bacterials by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	2005 (DDDs/population/year)	
J01A A	Tetracyclines			
J01A A02	Doxycycline	Total	1.1159	0.4073
		Public	0.2476	0.0904
		Private	0.8683	0.3169
J01A A06	Oxytetracycline	Total	<0.0001	<0.0001
		Public	-	-
		Private	<0.0001	<0.0001
J01A A07	Tetracycline	Total	0.1805	0.0659
		Public	0.0750	0.0274
		Private	0.1055	0.0385
J01A A08	Minocycline	Total	0.0458	0.0167
		Public	0.0006	0.0002
		Private	0.0452	0.0165
J01B A	Amphenicols			
J01B A01	Chloramphenicol	Total	0.0063	0.0023
		Public	0.0028	0.0010
		Private	0.0035	0.0013
J01C A	Penicillins with extended spectrum			
J01C A01	Ampicillin	Total	0.1453	0.0530
		Public	0.0801	0.0292
		Private	0.0652	0.0238
J01C A04	Amoxicillin	Total	2.1455	0.7831
		Public	0.6914	0.2523
		Private	1.4541	0.5307

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J01C A06	Bacampicillin	Total	0.3097	0.1130
		Public	0.2328	0.0850
		Private	0.0769	0.0281
J01C E	Beta-lactamase sensitive penicillins			
J01C E01	Benzylpenicillin	Total	0.0201	0.0073
		Public	0.0173	0.0063
		Private	0.0028	0.0010
J01C E02	Phenoxymethylpenicillin	Total	0.2141	0.0781
		Public	0.1968	0.0718
		Private	0.0172	0.0063
J01C E08	Benzathine benzylpenicillin	Total	0.0025	0.0009
		Public	0.0024	0.0009
		Private	0.0001	<0.0001
J01C F	Beta-lactamase resistant penicillins			
J01C F02	Cloxacillin	Total	0.7913	0.2888
		Public	0.6149	0.2244
		Private	0.1764	0.0644
J01C F05	Flucloxacillin	Total	0.0132	0.0048
		Public	0.0004	0.0001
		Private	0.0128	0.0047
J01C R	Combinations of penicillins, including beta-lactamase inhibitors			
J01C R01	Ampicillin and enzyme inhibitor	Total	0.0509	0.0186
		Public	0.0286	0.0104
		Private	0.0223	0.0081
J01C R02	Amoxicillin and enzyme inhibitor	Total	0.7144	0.2607
		Public	0.0811	0.0296
		Private	0.6333	0.2312
J01C R04	Sultamicillin	Total	0.0497	0.0181
		Public	0.0081	0.0029
		Private	0.0416	0.0152
J01C R05	Piperacillin and enzyme inhibitor	Total	0.0007	0.0003
		Public	0.0004	0.0001
		Private	0.0004	0.0001
J01D B	First-generation cephalosporins			
J01D B01	Cefalexin	Total	0.4059	0.1482
		Public	0.0596	0.0218
		Private	0.3463	0.1264
J01D B04	Cefazolin	Total	0.0045	0.0016
		Public	<0.0001	<0.0001
		Private	0.0044	0.0016
J01D B05	Cefadroxil	Total	0.0441	0.0161
		Public	-	-
		Private	0.0441	0.0161
J01D B09	Cefradine	Total	0.0002	<0.0001
		Public	-	-
		Private	0.0002	<0.0001

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J01D C	Second-generation cephalosporins			
J01D C02	Cefuroxime	Total	0.3818	0.1394
		Public	0.1622	0.0592
		Private	0.2196	0.0801
J01D C04	Cefaclor	Total	0.0761	0.0278
		Public	0.0027	0.0010
		Private	0.0735	0.0268
J01D C10	Cefprozil	Total	0.0158	0.0058
		Public	0.0001	<0.0001
		Private	0.0157	0.0057
J01D D	Third-generation cephalosporins			
J01D D01	Cefotaxime	Total	0.0041	0.0015
		Public	0.0031	0.0011
		Private	0.0011	0.0004
J01D D02	Ceftazidime	Total	0.0133	0.0049
		Public	0.0079	0.0029
		Private	0.0054	0.0020
J01D D04	Ceftriaxone	Total	0.0547	0.0200
		Public	0.0197	0.0072
		Private	0.0350	0.0128
J01D D12	Cefoperazone	Total	0.0117	0.0043
		Public	0.0109	0.0040
		Private	0.0008	0.0003
J01D D14	Ceftibuten	Total	0.0370	0.0135
		Public	-	-
		Private	0.0370	0.0135
J01D E	Fourth-generation cephalosporins			
J01D E01	Cefepime	Total	0.0122	0.0044
		Public	0.0029	0.0011
		Private	0.0093	0.0034
J01D H	Carbapenems			
J01D H02	Meropenem	Total	0.0024	0.0009
		Public	0.0014	0.0005
		Private	0.0010	0.0004
J01D H03	Ertapenem	Total	0.0023	0.0008
		Public	<0.0001	<0.0001
		Private	0.0023	0.0008
J01D H51	Imipenem and enzyme inhibitor	Total	0.0049	0.0018
		Public	0.0018	0.0007
		Private	0.0030	0.0011
J01E A	Trimethoprim and derivatives			
J01E A01	Trimethoprim	Total	0.0129	0.0047
		Public	0.0065	0.0024
		Private	0.0064	0.0023

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J01E E	Combinations of sulfonamides and trimethoprim, incl. derivatives			
J01E E01	Sulfamethoxazole and trimethoprim	Total	0.2879	0.1051
		Public	0.0224	0.0082
		Private	0.2655	0.0969
J01E E02	Sulfadiazine and trimethoprim	Total	0.0185	0.0068
		Public	0.0002	<0.0001
		Private	0.0183	0.0067
J01F A	Macrolides			
J01F A01	Erythromycin	Total	1.1089	0.4048
		Public	0.7175	0.2619
		Private	0.3914	0.1429
J01F A02	Spiramycin	Total	0.0002	<0.0001
		Public	<0.0001	<0.0001
		Private	0.0002	<0.0001
J01F A06	Roxithromycin	Total	0.1182	0.0431
		Public	-	-
		Private	0.1182	0.0431
J01F A09	Clarithromycin	Total	0.2835	0.1035
		Public	0.0437	0.0160
		Private	0.2398	0.0875
J01F A10	Azithromycin	Total	0.1506	0.0550
		Public	0.0107	0.0039
		Private	0.1399	0.0511
J01F F	Lincosamides			
J01F F01	Clindamycin	Total	0.0159	0.0058
		Public	0.0057	0.0021
		Private	0.0102	0.0037
J01F F02	Lincomycin	Total	0.0034	0.0012
		Public	-	-
		Private	0.0034	0.0012
J01G A	Streptomycins			
J01G A01	Streptomycin	Total	0.0291	0.0106
		Public	0.0282	0.0103
		Private	0.0009	0.0003
J01G B	Other aminoglycosides			
J01G B03	Gentamicin	Total	0.0144	0.0052
		Public	0.0064	0.0024
		Private	0.0079	0.0029
J01G B04	Kanamycin	Total	0.0012	0.0004
		Public	0.0004	0.0001
		Private	0.0008	0.0003
J01G B06	Amikacin	Total	0.0053	0.0019
		Public	0.0030	0.0011
		Private	0.0023	0.0008
J01G B07	Netilmicin	Total	0.0029	0.0011
		Public	0.0006	0.0002
		Private	0.0024	0.0009

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J01M A	Fluoroquinolones			
J01M A01	Ofloxacin	Total	0.1563	0.0571
		Public	0.0188	0.0068
		Private	0.1376	0.0502
J01M A02	Ciprofloxacin	Total	0.1727	0.0630
		Public	0.0363	0.0132
		Private	0.1364	0.0498
J01M A03	Pefloxacin	Total	0.0128	0.0047
		Public	0.0064	0.0024
		Private	0.0063	0.0023
J01M A04	Enoxacin	Total	-	-
		Public	-	-
		Private	-	-
J01M A06	Norfloxacin	Total	0.0866	0.0316
		Public	0.0022	0.0008
		Private	0.0844	0.0308
J01M A12	Levofloxacin	Total	0.0336	0.0123
		Public	0.0002	<0.0001
		Private	0.0334	0.0122
J01M A14	Moxifloxacin	Total	0.0244	0.0089
		Public	<0.0001	<0.0001
		Private	0.0244	0.0089
J01M A16	Gatifloxacin	Total	0.0120	0.0044
		Public	0.0001	<0.0001
		Private	0.0119	0.0043
J01M B	Other quinolones			
J01M B02	Nalidixic acid	Total	<0.0001	<0.0001
		Public	<0.0001	<0.0001
		Private	-	-
J01M B04	Pipemidic acid	Total	0.0156	0.0057
		Public	-	-
		Private	0.0156	0.0057
J01M B07	Flumequine	Total	<0.0001	<0.0001
		Public	-	-
		Private	<0.0001	<0.0001
J01X A	Glycopeptide antibacterials			
J01X A01	Vancomycin	Total	0.0055	0.0020
		Public	0.0028	0.0010
		Private	0.0026	0.0010
J01X A02	Teicoplanin	Total	0.0008	0.0003
		Public	<0.0001	<0.0001
		Private	0.0007	0.0003
J01X B	Polymyxins			
J01X B02	Polymyxin B	Total	<0.0001	<0.0001
		Public	<0.0001	<0.0001
		Private	<0.0001	<0.0001

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J01X C	Steroid antibacterials			
J01X C01	Fusidic acid	Total	0.0152	0.0056
		Public	0.0126	0.0046
		Private	0.0027	0.0010
J01X D	Imidazole derivatives			
J01X D01	Metronidazole	Total	0.0488	0.0178
		Public	0.0336	0.0123
		Private	0.0152	0.0055
J01X D02	Tinidazole	Total	0.0038	0.0014
		Public	-	-
		Private	0.0038	0.0014
J01X E	Nitrofurantoin derivatives			
J01X E01	Nitrofurantoin	Total	0.0261	0.0095
		Public	0.0229	0.0084
		Private	0.0031	0.0011
J01X X	Other antibacterials			
J01X X01	Fosfomicin	Total	0.0021	0.0008
		Public	-	-
		Private	0.0021	0.0008
J01X X04	Spectinomycin	Total	-	-
		Public	-	-
		Private	-	-
J01X X08	Linezolid	Total	0.0003	0.0001
		Public	0.0003	<0.0001
		Private	<0.0001	<0.0001

Table 15.3.1: Use of Anti-Mycotics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005	2005 (DDDs/population/year)
J02A A	Antibiotics	0.0024	0.0009
J02A B	Imidazole derivatives	0.2364	0.0863
J02A C	Triazole derivatives	0.1122	0.0410
J02A X	Other antimycotics for systemic use	0.0005	0.0002

Table 15.3.2: Use of Anti-Mycotics by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J02A A	Antibiotics			
J02A A01	Amphotericin B	Total	0.0024	0.0009
		Public	0.0018	0.0007
		Private	0.0006	0.0002
J02A B	Imidazole derivatives			
J02A B01	Miconazole	Total	-	-
		Public	-	-
		Private	-	-
J02A B02	Ketoconazole	Total	0.2364	0.0863
		Public	0.0135	0.0049
		Private	0.2229	0.0814

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J02A C	Triazole derivatives			
J02A C01	Fluconazole	Total	0.0380	0.0139
		Public	0.0113	0.0041
		Private	0.0267	0.0098
J02A C02	Itraconazole	Total	0.0741	0.0270
		Public	0.0362	0.0132
		Private	0.0379	0.0138
J02A C03	Voriconazole	Total	0.0001	<0.0001
		Public	<0.0001	<0.0001
		Private	0.0001	<0.0001
J02A X	Other antimycotics for systemic use			
J02A X01	Flucytosine	Total	<0.0001	<0.0001
		Public	<0.0001	<0.0001
		Private	-	-
J02A X04	Caspofungin	Total	0.0005	0.0002
		Public	<0.0001	<0.0001
		Private	0.0005	0.0002

Table 15.4.1: Use of Anti-Mycobacterials by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J04A B	Antibiotics			
J04A B01	Cycloserine	Total	0.0003	<0.0001
		Public	0.0003	<0.0001
		Private	-	-
J04A B02	Rifampicin	Total	0.2340	0.0854
		Public	0.1770	0.0646
		Private	0.0570	0.0208
J04A C	Hydrazides			
J04A C01	Isoniazid	Total	0.4485	0.1637
		Public	0.3512	0.1282
		Private	0.0972	0.0355
J04A D03	Ethionamide	Total	0.0014	0.0005
		Public	0.0014	0.0005
		Private	-	-
J04A K	Other drugs for treatment of tuberculosis			
J04A K01	Pyrazinamide	Total	0.1410	0.0515
		Public	0.0990	0.0362
		Private	0.0419	0.0153
J04A K02	Ethambutol	Total	0.1231	0.0449
		Public	0.0844	0.0308
		Private	0.0387	0.0141
J04A M02	Rifampicin and Isoniazid	Total	0.0279	0.0102
		Public	-	-
		Private	0.0279	0.0102

ATC	Drug Class and Agents	2005	2005 (DDDs/population/year)
J04B A	Drugs for treatment of lepra		
J04B A01	Clofazimine	Total	0.0066
		Public	0.0066
		Private	-

Table 15.5.1: Use of Anti-Malarials by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005	2005 (DDDs/population/year)
P01A	AGENTS AGAINST AMOEBIASIS AND OTHER PROTOZOAL DISEASES	0.2075	0.0757
P01B A	Aminoquinolines	0.4078	0.1488
P01B C	Methanolquinolines	0.0043	0.0016
P01B D	Diaminopyrimidines	0.0415	0.0152

Table 15.5.2: Use of Anti-Malarials by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	2005 (DDDs/population/year)
P01A	AGENTS AGAINST AMOEBIASIS AND OTHER PROTOZOAL DISEASES		
P01A B01	Metronidazole	Total	0.2024
		Public	0.1140
		Private	0.0884
P01A B02	Tinidazole	Total	0.0051
		Public	-
		Private	0.0051
P01B A	Aminoquinolines		
P01B A01	Chloroquine	Total	0.2318
		Public	0.1682
		Private	0.0636
P01B A02	Hydroxychloroquine	Total	0.0299
		Public	0.0131
		Private	0.0167
P01B A03	Primaquine	Total	0.1461
		Public	0.1435
		Private	0.0026
P01B C	Methanolquinolines		
P01B C01	Quinine	Total	0.0041
		Public	0.0032
		Private	0.0009
P01B C02	Mefloquine	Total	0.0002
		Public	<0.0001
		Private	0.0002
P01B D	Diaminopyrimidines		
P01B D01	Pyrimethamine	Total	0.0007
		Public	0.0007
		Private	-
P01B D51	Pyrimethamine, combinations	Total	0.0409
		Public	0.0406
		Private	0.0003

Table 15.6.1: Use of Anti-Virals by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005	2005 (DDDs/population/year)
J05A B	Nucleosides and nucleotides excl. reverse transcriptase inhibitors	0.0469	0.0171
J05A E	Protease inhibitors	0.0097	0.0036
J05A F	Nucleoside and nucleotide reverse transcriptase inhibitors	0.1624	0.0593
J05A G	Non-nucleoside reverse transcriptase inhibitors	0.0557	0.0203
J05A H	Neuraminidase inhibitors	0.0013	0.0005

Table 15.6.2: Use of Anti-Virals by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	2005 (DDDs/population/year)	
J05A B	Nucleosides and nucleotides excl. reverse transcriptase inhibitors			
J05A B01	Aciclovir	Total	0.0395	0.0144
		Public	0.0047	0.0017
		Private	0.0348	0.0127
J05A B04	Ribavirin	Total	0.0041	0.0015
		Public	0.0019	0.0007
		Private	0.0022	0.0008
J05A B06	Ganciclovir	Total	0.0010	0.0004
		Public	0.0007	0.0002
		Private	0.0003	0.0001
J05A B09	Famciclovir	Total	<0.0001	<0.0001
		Public	-	-
		Private	<0.0001	<0.0001
J05A B11	Valaciclovir	Total	0.0021	0.0008
		Public	-	-
		Private	0.0021	0.0008
J05A B14	Valganciclovir	Total	0.0002	<0.0001
		Public	<0.0001	<0.0001
		Private	0.0002	<0.0001
J05A E	Protease inhibitors			
J05A E01	Saquinavir	Total	<0.0001	<0.0001
		Public	-	-
		Private	<0.0001	<0.0001
J05A E02	Indinavir	Total	0.0050	0.0018
		Public	0.0039	0.0014
		Private	0.0011	0.0004
J05A E03	Ritonavir	Total	0.0047	0.0017
		Public	0.0047	0.0017
		Private	-	-
J05A E04	Nelfinavir	Total	<0.0001	<0.0001
		Public	<0.0001	<0.0001
		Private	-	-
J05A F	Nucleoside and nucleotide reverse transcriptase inhibitors			
J05A F01	Zidovudine	Total	0.0036	0.0013
		Public	0.0035	0.0013
		Private	<0.0001	<0.0001

ATC	Drug Class and Agents		2005	2005 (DDDs/population/year)
J05A F02	Didanosine	Total	0.0132	0.0048
		Public	0.0088	0.0032
		Private	0.0043	0.0016
J05A F04	Stavudine	Total	0.0517	0.0189
		Public	0.0509	0.0186
		Private	0.0007	0.0003
J05A F05	Lamivudine	Total	0.0336	0.0123
		Public	0.0123	0.0045
		Private	0.0213	0.0078
J05A F08	Adefovir dipivoxil	Total	0.0058	0.0021
		Public	<0.0001	<0.0001
		Private	0.0058	0.0021
J05A F30	Combinations	Total	0.0546	0.0199
		Public	0.0502	0.0183
		Private	0.0043	0.0016
J05A G	Non-nucleoside reverse transcriptase inhibitors			
J05A G01	Nevirapine	Total	0.0171	0.0062
		Public	0.0170	0.0062
		Private	0.0001	<0.0001
J05A G03	Efavirenz	Total	0.0386	0.0141
		Public	0.0314	0.0115
		Private	0.0073	0.0027
J05A H	Neuraminidase inhibitors			
J05A H02	Oseltamivir	Total	0.0013	0.0005
		Public	-	-
		Private	0.0013	0.0005

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Cancer is the leading cause of death worldwide. In one of the WHO estimate, the current global cancer prevalence is 10 million [1]. If effective cancer control program is not in place, by the year 2020 there will be about 15 million new cancer cases worldwide [2]. In developing countries, the cancer burden is a significant public health problem and most of the cases present at late stages. In Malaysia breast cancer in females and lung cancer in males are among the most common cancer according to the National Cancer Registry [3].

Surgery, Radiotherapy and Chemotherapy are the main modalities of core cancer management. Currently newer targeted therapy, biologicals and hormone-therapy complement the mainstream of cancer treatment. According to one estimate by World Health Organisation (WHO), there are 17 essential anticancer drugs that are sufficient for most malignancies [4]. Most commonly chemotherapy drugs are used in combination. Due to discovery of newer and costly new anti-cancer drugs, it is getting more difficult to formulate consensus guidelines and standard of practice that match with the scientific development in developing countries [5,6]. The newer agents are expensive and pharmacoeconomically non-viable considering their marginal positive efficacy and extremely high cost which affects the sustainability of the program.

This is the second analysis of the oncology medicine utilisation in Malaysia. In year 2005, the data was collected from 33/114 (29%) private hospitals, 132/132 (100%) Ministry of Health hospitals for APPL and 100/132 (75%) for non-APPL, 1/3 (33%) armed forces hospital and 2/3 (67%) university hospitals in Malaysia.

This analysis expressed index for drug utilisation as total dose in milligrams/1000 population, which is a rough measure of medicine utilisation internationally. The defined daily dose (DDD) is the average maintenance dose used by adult for the main indication of the drug but is not assigned to antineoplastics. This data was only a rough estimate of usage as total dose/1000 population is influenced by many confounding variables like drug dose and number of patients used. Furthermore the uses are being influenced by oncologists' experiences and preferences, patients' performance status, current but ever evolving trends and evidence-based data, cost effectiveness and availability of the drugs in public hospitals.

In this analysis 53 varieties of agents were used for the treatment of malignant diseases. The top 5-common cytotoxic drugs used were hydroxycarbamide, capecitabine, 5-fluorouracil, l-asparaginase and cytarabine. The least used agents were dactinomycin, thiotepa, lomustine, cladribine and teniposide. Hydroxyurea had the highest mg/1000 population which would appear that it is rampantly used when in fact it has relatively few indications but used in large doses such as 500-3000mg per day or 10-30 mg/kg per day. The most common targeted biologicals were trastuzumab, imatinib, gefitinib, rituximab and cetuximab. With the exception of rituximab, the other targeted therapy agents are not included in the Ministry of Health Formulary yet. Interestingly bevacizumab was only used in the private hospitals whereas other targeted agents were used in Ministry hospitals for selected cases with the Director General of Health's approval.

So far very few countries have documentation of utilisation of cytotoxics in malignant diseases. Food and Drug Administration of USA, UK and Canada provide drug information for anticancer agents and their use for cancer treatment [7-11]. In developing countries the data is almost non-existent. The Government of Zimbabwe has recently published cytotoxic drug uses for cancer patients that limit to very basic drugs for masses considering their costs [12]. In our analysis there were 53 different drugs used for cancer treatment. Surprisingly newer effective drugs were more used in private hospitals and very rarely in Ministry of Health hospitals in selected cases (as non-APPL items).

There is yet a novel model waiting to be discovered for meaningful interpretation of antineoplastics usage nationwide based on chronological surveys.

Table 16.1: Use of Anti-Neoplastic Agents by Drug Class and Agents, in total dosage/1000 population 2005

ATC	Drug Class and Agents	Unit		2005
L01A A	Nitrogen mustard analogues			
L01A A01	Cyclophosphamide	mg	Total	3.1239
			Public	2.1998
			Private	0.9241
L01A A02	Chlorambucil	mg	Total	0.0118
			Public	0.0053
			Private	0.0065
L01A A03	Melphalan	mg	Total	0.0058
			Public	0.0007
			Private	0.0050
L01A A06	Ifosfamide	g	Total	0.0012
			Public	0.0010
			Private	0.0002
L01A B	Alkyl sulfonates			
L01A B01	Busulfan	mg	Total	0.0116
			Public	0.0050
			Private	0.0067
L01A C	Ethylene imines			
L01A C01	Thiotepa	mg	Total	0.0002
			Public	-
			Private	0.0002
L01A D	Nitrosoureas			
L01A D01	Carmustine	mg	Total	0.0022
			Public	0.0006
			Private	0.0016
L01A D02	Lomustine	mg	Total	0.0011
			Public	0.0008
			Private	0.0003
L01A X	Other alkylating agents			
L01A X03	Temozolomide	mg	Total	0.0201
			Public	-
			Private	0.0201
L01A X04	Dacarbazine	mg	Total	0.1527
			Public	0.1157
			Private	0.0370

Table 16.2: Use of Anti-Neoplastic Agents by Drug Class, in total dosage/1000 population 2005

ATC	Drug Class and Agents	Unit		2005
L01B A	Folic acid analogues			
L01B A01	Methotrexate	mg	Total	0.7835
			Public	0.7223
			Private	0.0612
L01B A04	Pemetrexed	mg	Total	0.0058
			Public	-
			Private	0.0058
L01B B	Purine analogues			
L01B B02	Mercaptopurine	mg	Total	0.7388
			Public	0.5979
			Private	0.1408
L01B B03	Tioguanine	mg	Total	0.0114
			Public	0.0050
			Private	0.0064
L01B B04	Cladribine	mg	Total	<0.0001
			Public	<0.0001
			Private	-
L01B B05	Fludarabine	mg	Total	0.0054
			Public	0.0047
			Private	0.0008
L01B C	Pyrimidine analogues			
L01B C01	Cytarabine	mg	Total	1.4825
			Public	1.1697
			Private	0.3128
L01B C02	Fluorouracil	mg	Total	5.2411
			Public	4.0781
			Private	1.1630
L01B C05	Gemcitabine	mg	Total	0.8976
			Public	0.5734
			Private	0.3241
L01B C06	Capecitabine	mg	Total	16.9531
			Public	7.2788
			Private	9.6744

Table 16.3: Use of Anti-Neoplastic Agents by Drug Class and Agents, in total dosage/1000 population 2005

ATC	Drug Class and Agents	Unit		2005
L01C A	Vinca alkaloids and analogues			
L01C A01	Vinblastine	mg	Total	0.0034
			Public	0.0026
			Private	0.0009
L01C A02	Vincristine	mg	Total	0.0021
			Public	0.0016
			Private	0.0005
L01C A04	Vinorelbine	mg	Total	0.0387
			Public	0.0320
			Private	0.0067
L01C B	Podophyllotoxin derivatives			
L01C B01	Etoposide	mg	Total	0.2193
			Public	0.1834
			Private	0.0358
L01C B02	Teniposide	mg	Total	0.0042
			Public	0.0034
			Private	0.0008
L01C D	Taxanes			
L01C D01	Paclitaxel	mg	Total	0.0906
			Public	0.0532
			Private	0.0375
L01C D02	Docetaxel	mg	Total	0.0199
			Public	0.0135
			Private	0.0065

Table 16.4: Use of Anti-Neoplastic Agents by Drug Class, in total dosage/1000 population 2005

ATC	Drug Class and Agents	Unit		2005
L01D A	Actinomycines			
L01D A01	Dactinomycin	mg	Total	<0.0001
			Public	<0.0001
			Private	<0.0001
L01D B	Anthracyclines and related substances			
L01D B01	Doxorubicin	mg	Total	0.0908
			Public	0.0722
			Private	0.0186
L01D B02	Daunorubicin	mg	Total	0.0137
			Public	0.0119
			Private	0.0019
L01D B03	Epirubicin	mg	Total	0.0862
			Public	0.0721
			Private	0.0141
L01D B06	Idarubicin	mg	Total	0.0012
			Public	0.0009
			Private	0.0003

ATC	Drug Class and Agents	Unit		2005
L01D B07	Mitoxantrone	mg	Total	0.0037
			Public	0.0033
			Private	0.0004
L01D C	Other cytotoxic antibiotics			
L01D C01	Bleomycin	mg	Total	0.0076
			Public	0.0060
			Private	0.0016
L01D C03	Mitomycin	mg	Total	0.0044
			Public	0.0028
			Private	0.0016

Table 16.5: Use of Anti-Neoplastic Agents by Drug Class and Agents, in total dosage/1000 population 2005

ATC	Drug Class and Agents	Unit		2005
L01X A	Platinum compounds			
L01X A01	Cisplatin	mg	Total	0.1237
			Public	0.0875
			Private	0.0363
L01X A02	Carboplatin	mg	Total	0.4210
			Public	0.2754
			Private	0.1456
L01X A03	Oxaliplatin	mg	Total	0.0301
			Public	0.0087
			Private	0.0213
L01X B	Methylhydrazines			
L01X B01	Procarbazine	mg	Total	0.2307
			Public	0.2031
			Private	0.0276
L01X C	Monoclonal antibodies			
L01X C02	Rituximab	mg	Total	0.0580
			Public	0.0259
			Private	0.0321
L01X C03	Trastuzumab	mg	Total	0.0039
			Public	-
			Private	0.0039
L01X C06	Cetuximab	mg	Total	0.0051
			Public	0.0005
			Private	0.0046
L01X C07	Bevacizumab	mg	Total	0.0023
			Public	-
			Private	0.0023
L01XD	Sensitizers used in photodynamic/radiation therapy			
L01X D02	Verteporfin	mg	Total	0.0002
			Public	0.0001
			Private	0.0001

ATC	Drug Class and Agents	Unit		2005
L01X X	Other antineoplastic agents			
L01X X02	Asparaginase	U	Total	3.9803
			Public	3.9270
			Private	0.0533
L01X X05	Hydroxycarbamide	mg	Total	45.8816
			Public	39.4490
			Private	6.4326
L01X X11	Estramustine	mg	Total	0.0108
			Public	-
			Private	0.0108
L01X X14	Tretinoin	mg	Total	0.0296
			Public	0.0238
			Private	0.0058
L01X X19	Irinotecan	mg	Total	0.0310
			Public	0.0203
			Private	0.0107
L01X X27	Arsenic trioxide	mg	Total	0.0001
			Public	0.0001
			Private	-
L01X X28	Imatinib	mg	Total	0.4381
			Public	0.0365
			Private	0.4015
L01X X31	Gefitinib	mg	Total	0.2286
			Public	0.0083
			Private	0.2203
L01X X35	Anagrelide	mg	Total	0.0046
			Public	0.0020
			Private	0.0026

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The list of drugs in this chapter include steroids, progestogens, gonadotropin releasing hormone (GnRH) analogues, tamoxifen, anti-androgens, enzyme inhibitors, granulocyte colony stimulating factor, interferons and immunosuppressants like calcineurin inhibitors, mycophenolate acid, sirolimus, etanercept, infliximab, azathioprine, thalidomide and methotrexate. The concept of reporting by DDD/1000 population/day probably is not appropriate as some of these drugs are used intermittently and not chronically in a fixed dose. The amounts used were small but these drugs are costly except for steroids.

The main drug in this chapter is prednisolone, which was used more often in the private sector than public. Systemic glucocorticoids have non-specific anti-inflammatory and immunosuppressant properties but the side effects are protean. The usage in 0.51% of the general population in 2005 is surprisingly high. This amounts to 133,000 people on glucocorticoids daily assuming the population of Malaysia was 26 million in 2005 (table 17.1). About 70,000 people per day were on prednisolone (table 17.2). Steroids were used for endocrine therapy and for immunosuppression in about 21,000 people per day (table 17.3), which is 15% of the total usage. It is unclear what the indications of use of the other 85% were. Legitimate indications may be acute asthma, anaphylactic shock, intraarticular injection for joint diseases. There is a possibility that steroids are commonly abused for the wrong indications in Malaysia.

The use of medroxyprogesterone is too low (0.0009 DD/1000 population i.e. 23 patients per day) as this drug is widely used for dysfunctional uterine bleeding, contraception and endometriosis. The progestogens are also used to treat prostatic cancer. There were a total of 1,000 patients treated with GnRH analogues (for cancer of the prostate), 6,900 on tamoxifen (for cancer of the breast), 260 on the anti-androgens (for cancer of the prostate) and 370 on the enzyme inhibitors (for cancer of the breast). Granulocyte colony stimulating factor was used very little (90 per day) and the use of interferon appeared surprisingly low in view of the large numbers of patients with hepatitis B and hepatitis C in Malaysia. Multiple sclerosis is a rare disease here and the use of interferon beta 1a is low. The total usage of all classes of interferon was 300 people per day. There may be under-reporting and under-usage of these drugs for their justified indications but this may also reflect their high cost. There were only about 1,300 people on ciclosporin, 130 on tacrolimus and 620 on mycophenolic acid from the data available. From the National Transplant registry data of 2005 there were 1,215 patients with functioning kidney transplants on ciclosporin in 2005 [1]. This drug is also indicated for other solid organ transplants, nephrotic syndrome in childhood and psoriasis. It is used mainly in the public sector, as there is a specific allocation for its use for renal transplantation. There were 221 renal transplant patients on tacrolimus in 2005 and 679 on mycophenolate mofetil [1]. The figures for the use of these 3 immunosuppressants were therefore lower than expected even if they were used solely for renal transplantation.

There were a handful of patients on sirolimus, etanercept and infliximab. The last 2 mainly for rheumatoid arthritis are very costly. About 2,200 and 6,600 patients were on azathioprine and methotrexate respectively.

Table 17.1: Use of Systemic Corticosteroids and Immunosuppressive Agents by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
H02A A	Mineralocorticoids	0.0081
H02A B	Glucocorticoids	5.1062

Table 17.2: Use of Systemic Corticosteroids and Immunosuppressive Agents by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
H02A A	MINERALOCORTICOIDS		
H02A A02	Fludrocortisone	Total	0.0081
		Public	0.0004
		Private	0.0077
H02A B	GLUCOCORTICOIDS		
H02A B01	Betamethasone	Total	0.1239
		Public	0.0004
		Private	0.1236
H02A B02	Dexamethasone	Total	1.7270
		Public	0.2967
		Private	1.4303
H02A B04	Methylprednisolone	Total	0.2163
		Public	0.1007
		Private	0.1157
H02A B06	Prednisolone	Total	2.6472
		Public	1.0848
		Private	1.5624
H02A B08	Triamcinolone	Total	0.1399
		Public	0.0334
		Private	0.1065
H02A B09	Hydrocortisone	Total	0.2517
		Public	0.0610
		Private	0.1907

Table 17.3: Use of Systemic Corticosteroids and Immunosuppressive Agents by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
L02	ENDOCRINE THERAPY	0.3386
L03	IMMUNOSTIMULANTS	0.0151
L04	IMMUNOSUPPRESSIVE AGENTS	0.4507

Table 17.4: Use of Systemic Corticosteroids and Immunosuppressive Agents by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
L02A B	PROGESTOGENS		
L02A B01	Megestrol	Total	0.0107
		Public	-
		Private	0.0107
L02A B02	Medroxyprogesterone	Total	0.0009
		Public	0.0009
		Private	<0.0001
L02A E	GONADOTROPIN RELEASING HORMONE ANALOGUES		
L02A E01	Buserelin	Total	0.0014
		Public	-
		Private	0.0014
L02A E02	Leuprorelin	Total	0.0188
		Public	0.0026
		Private	0.0162
L02A E03	Goserelin	Total	0.0178
		Public	0.0040
		Private	0.0138
L02A E04	Triptorelin	Total	0.0011
		Public	0.0004
		Private	0.0006
L02B A	ANTI-ESTROGENS		
L02B A01	Tamoxifen	Total	0.2637
		Public	0.1415
		Private	0.1222
L02B B	ANTI-ANDROGENS		
L02B B01	Flutamide	Total	0.0031
		Public	0.0026
		Private	0.0005
L02B B03	Bicalutamide	Total	0.0068
		Public	0.0022
		Private	0.0046
L02B G	ENZYME INHIBITORS		
L02B G03	Anastrozole	Total	0.0072
		Public	0.0019
		Private	0.0053
L02B G04	Letrozole	Total	0.0055
		Public	0.0026
		Private	0.0030
L02B G06	Exemestane	Total	0.0015
		Public	0.0004
		Private	0.0011

ATC	Drug Class and Agents		2005
L03A A	COLONY STIMULATING FACTORS		
L03A A02	Filgrastim	Total	0.0032
		Public	0.0017
		Private	0.0015
L03A A03	Molgramostim	Total	-
		Public	-
		Private	-
L03A A10	Lenograstim	Total	0.0003
		Public	<0.0001
		Private	0.0002
L03A B	INTERFERONS		
L03A B04	Interferon alfa-2a	Total	0.0003
		Public	0.0003
		Private	<0.0001
L03A B05	Interferon alfa-2b	Total	0.0005
		Public	0.0004
		Private	0.0001
L03A B07	Interferon beta-1a	Total	0.0022
		Public	0.0020
		Private	0.0002
L03A B10	Peginterferon alfa-2b	Total	0.0032
		Public	0.0007
		Private	0.0025
L03A B11	Peginterferon alfa-2a	Total	0.0055
		Public	0.0014
		Private	0.0041
L04A A	SELECTIVE IMMUNOSUPPRESSIVE AGENTS		
L04A A01	Ciclosporin	Total	0.0483
		Public	0.0388
		Private	0.0095
L04A A05	Tacrolimus	Total	0.0051
		Public	0.0012
		Private	0.0039
L04A A06	Mycophenolic acid	Total	0.0238
		Public	0.0122
		Private	0.0116
L04A A08	Daclizumab	Total	<0.0001
		Public	-
		Private	<0.0001
L04A A09	Basiliximab	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
L04A A10	Sirolimus	Total	0.0002
		Public	0.0001
		Private	0.0001

ATC	Drug Class and Agents		2005
L04A A11	Etanercept	Total	0.0003
		Public	<0.0001
		Private	0.0002
L04A A12	Infliximab	Total	0.0028
		Public	-
		Private	0.0028
L04A A13	Leflunomide	Total	0.0184
		Public	0.0068
		Private	0.0116
L04A A21	Efalizumab	Total	<0.0001
		Public	-
		Private	<0.0001
L04A X	OTHER IMMUNOSUPPRESSIVE AGENTS		
L04A X01	Azathioprine	Total	0.0848
		Public	0.0633
		Private	0.0215
L04A X02	Thalidomide	Total	0.0118
		Public	0.0022
		Private	0.0096
L04A X03	Methotrexate	Total	0.2551
		Public	0.0853
		Private	0.1698

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The symptomatic treatment of pain in almost all rheumatological and bone disorders have resulted in huge usage of non-steroidal anti-inflammatory drugs (NSAIDs) globally and in Malaysia (1.2% of population). Among the NSAIDs, Acetic acid derivatives and related substances (4.26 DDD/1000 population/day), followed by Fenamates (3.07), Coxibs (1.6), Propionic acid derivatives (1.5) and Oxicams (1.2) in that sequence was the five most commonly prescribed drug classes. Being cheaper and easily available made diclofenac the most commonly prescribed NSAID in Malaysia (3.7). This was followed by mefenamic acid (3.07), ibuprofen (1.1), celecoxib (0.79) and meloxicam (0.72). The use of diclofenac was 1.5 times higher in the private institution whereas in the public institutions, mefenamic acid (1.36) and diclofenac (1.48) were almost equally prescribed. Ibuprofen was the top NSAID used in Australia [1] and Finland [2] but in Malaysia it was the 3rd most commonly used NSAID.

Among the Coxib group; celecoxib (0.79) was the most commonly used followed by etoricoxib (0.62). The private institutions used 1.4 times more celecoxib and 18 times more etoricoxib as compared to the public institutions. In comparing the use of all top NSAIDs in the country, diclofenac and mefenamic acid usage was 4 times more than the Coxibs. It is also interesting to note that rofecoxib that had been recalled from the market since the second half of 2004 and valdecoxib, which had been withdrawn from the market at the end of 2005, were still being used in the private institution. However, the injectable forms of NSAIDs like ketorolac and parecoxib were not widely used in both the public or private institutions.

There was no data available for the use of topical form of NSAIDs like salicylate liniment, ketoprofen gel, diclofenac gel and others and not to forget plaster or patch forms which are easily available in the dispensing facilities. The concentrated local effect with negligible systemic drug level makes them useful and safer even though they are less potent than the oral preparations.

Antigout medication use was dominated by allopurinol with the public institutions using twice as much compared to private institutions. Probenecid was hardly used by both the private and public institutions.

Baclofen was the commonly used muscle relaxant in public hospitals as compared to chlormezanone, which was more widely used in the private institutions. The use of baclofen may be more in the mental health cases to overcome the extra pyramidal side effect of the antipsychotic drugs. There is no data available on the use of other muscle relaxants such as myonal and botulinium toxin, which are effective for spastic muscle contracture. The indication of use of botulinium may be different in the private practice as compared to public hospitals. Its aesthetic use may be more dominant than the initial intended use for spastic muscle.

The use of drugs for osteoporosis is expected to increase significantly as osteoporosis awareness and health consciousness is more ingrained in our society. Among the Biphosphonates, alendronate was still the most used drug. The public hospitals used twice as frequent as the private institutions. The used of raloxifene is increasingly common. No data is available to make a comparison with other frequently used osteoporotic drugs such as activated Vitamin D analogue, hormone replacement therapy, parathyroid hormone and many more drugs available in the market now.

Table 18.1: Use of Drugs for Rheumatological and Bone disorders, in DDD/1000 population/ day 2005

ATC	Drug Class	2005
G03X C	SELECTIVE ESTROGEN RECEPTOR MODULATORS	0.1312
H05B A	CALCITONIN PREPARATIONS	0.0034
M01	ANTIINFLAMMATORY AND ANTIRHEUMATIC PRODUCTS	11.7583
M03	MUSCLE RELAXANTS	0.1895
M04	ANTIGOUT PREPARATIONS	1.7760
M05	DRUGS FOR TREATMENT OF BONE DISEASES	0.7851

Table 18.2.1: Use of Non-Steroidal Anti-Inflammatory drugs by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
M01A B	Acetic acid derivatives and related substances	4.2626
M01A C	Oxicams	1.1872
M01A E	Propionic acid derivatives	1.5238
M01A G	Fenamates	3.0741
M01A H	Coxibs	1.6163
M01A X	Other antiinflammatory and antirheumatic agents, non-steroids	0.0843
M01C C	Penicillamine and similar agents	0.0100

Table 18.2.2: Use of Non-Steroidal Anti-Inflammatory drugs by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
M01A B	Acetic acid derivatives and related substances		
M01A B01	Indometacin	Total	0.5084
		Public	0.4203
		Private	0.0882
M01A B02	Sulindac	Total	0.0001
		Public	-
		Private	0.0001
M01A B05	Diclofenac	Total	3.7183
		Public	1.4783
		Private	2.2399
M01A B15	Ketorolac	Total	0.0029
		Public	0.0005
		Private	0.0023
M01A B16	Aceclofenac	Total	0.0291
		Public	-
		Private	0.0291
M01A B55	Diclofenac, combinations	Total	0.0038
		Public	-
		Private	0.0038
M01A C	Oxicams		
M01A C01	Piroxicam	Total	0.421
		Public	0.06
		Private	0.361

ATC	Drug Class and Agents		2005
M01A C02	Tenoxicam	Total	0.0417
		Public	-
		Private	0.0417
M01A C06	Meloxicam	Total	0.7244
		Public	0.2805
		Private	0.4439
M01A E	Propionic acid derivatives		
M01A E01	Ibuprofen	Total	1.1127
		Public	0.1858
		Private	0.9269
M01A E02	Naproxen	Total	0.3893
		Public	0.0507
		Private	0.3387
M01A E03	Ketoprofen	Total	0.0217
		Public	0.0088
		Private	0.0129
M01A G	Fenamates		
M01A G01	Mefenamic acid	Total	3.0741
		Public	1.3606
		Private	1.7135
M01A H	Coxibs		
M01A H01	Celecoxib	Total	0.7902
		Public	0.3309
		Private	0.4593
M01A H02	Rofecoxib	Total	0.0037
		Public	-
		Private	0.0037
M01A H03	Valdecoxib	Total	0.1828
		Public	-
		Private	0.1828
M01A H04	Parecoxib	Total	0.0202
		Public	<0.0001
		Private	0.0202
M01A H05	Etoricoxib	Total	0.6194
		Public	0.0323
		Private	0.5871
M01A X	Other antiinflammatory and antirheumatic agents, non-steroids		
M01A X07	Benzylamine	Total	0.0072
		Public	0.0001
		Private	0.0071
M01A X17	Nimesulide	Total	0.0772
		Public	-
		Private	0.0772

ATC	Drug Class and Agents	2005	
M01C C	Penicillamine and similar agents		
M01C C01	Penicillamine	Total	0.01
		Public	0.0088
		Private	0.0012

Table 18.3.1: Use of Muscle relaxants by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
M03B	MUSCLE RELAXANTS, CENTRALLY ACTING AGENTS		
M03B B02	Chlormezanone	Total	0.0623
		Public	-
		Private	0.0623
M03B C01	Orphenadrine (citrate)	Total	0.0793
		Public	0.0331
		Private	0.0462
M03B X01	Baclofen	Total	0.0480
		Public	0.0401
		Private	0.0079
M03C	MUSCLE RELAXANTS, DIRECTLY ACTING AGENTS		
M03C A01	Dantrolene	Total	<0.0001
		Public	<0.0001
		Private	-

Table 18.4.1: Use of Anti-Gout preparations by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
M04A	ANTIGOUT PREPARATIONS		
M04A A01	Allopurinol	Total	1.4994
		Public	0.9639
		Private	0.5355
M04A B01	Probenecid	Total	0.0096
		Public	0.0008
		Private	0.0088
M04A C01	Colchicine	Total	0.2670
		Public	0.0683
		Private	0.1988

Table 18.5.1: Use of Bone diseases therapy by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
M05B A01	Etidronic acid	Total	0.0008
		Public	-
		Private	0.0008
M05B A02	Clodronic acid	Total	0.0066
		Public	0.0023
		Private	0.0043
M05B A03	Pamidronic acid	Total	0.0004
		Public	0.0003
		Private	0.0001
M05B A04	Alendronic acid	Total	0.7368
		Public	0.4781
		Private	0.2587
M05B A07	Risedronic acid	Total	0.0403
		Public	<0.0001
		Private	0.0403
M05B A08	Zoledronic acid	Total	0.0001
		Public	<0.0001
		Private	0.0001

Table 18.6.1: Use of Selective Estrogen Receptor Modulators by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
G03X C01	Raloxifene	Total	0.1312
		Public	0.0636
		Private	0.0677

Table 18.7.1: Use of Calcitonin preparations by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
H05B A01	Calcitonin (salmon synthetic)	Total	0.0034
		Public	0.0007
		Private	0.0028

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Drugs used for pain control belong to the following subgroups of the ATC classification: anti-inflammatory products, opioids, analgesics and antipyretics. In Malaysia, anti-inflammatory drugs are by far the most widely used group of drugs for pain control and the use of opioid analgesics is still comparatively low. In 2005, the most commonly used opioid was tramadol, followed by morphine, dihydrocodeine, pethidine, fentanyl and nalbuphine. Pentazocine, a benzomorphan derivative which is a partial opioid receptor agonist is not used any more. Among the strong opioids, morphine is the most commonly used, and this is in keeping with many other countries [1].

Opioid consumption data from the International Narcotics Control Bureau (INCB) show an increasing trend for morphine and fentanyl consumption in Malaysia from the early 1990s and early 21st century respectively [1]. Based on data from the Nordic countries and Australia, the usage of opioid analgesics in the world had also increased over the years [2,3].

The increase in the use of strong opioids is probably due to increased awareness regarding the use of strong opioids, especially morphine, to control cancer pain. This may be related to the increasing provision of palliative care services for patients with advanced cancer and the efforts of specialists in the field of pain and palliative medicine to educate healthcare providers. The availability of a more convenient pharmaceutical formulation for fentanyl in a form of a transdermal patch is most probably responsible for the increasing use of fentanyl. Prior to the release of this formulation in the late 1990s, fentanyl was only used in the injection form for intraoperative analgesia. The use of oxycodone is minimal because it is a relatively new drug in the Malaysian market, introduced only in the third quarter of 2005. In countries such as Finland, the greatest increase in opioid consumption was seen with oxycodone, where there was a 30% increase in its usage [3]. In the Nordic countries, the increase in the usage of opioids was mainly due to tramadol, paracetamol-codeine combination and fentanyl. However in Malaysia, codeine 30mg with paracetamol combination is not available at all, and the codeine 8 mg + paracetamol combination only available in private pharmacies and not in Ministry of Health hospitals; in addition, the paracetamol-tramadol combination has just been introduced into the country in 2005.

With regards to the usage of opioids in the private compared to public sector in Malaysia, it was found that more morphine was used in the public compared to private sectors, while pethidine and nalbuphine usage were similar for both private and public hospitals. This is possibly due to the fact that somehow pethidine has traditionally been the preferred injectable analgesic (compared to morphine); the switch from pethidine to morphine has occurred faster in the public sector most likely due to the growth of acute pain services which manage postoperative analgesia with morphine as the preferred analgesic due to toxicity of the metabolite of pethidine. The use of nalbuphine is possibly related to the fear of opioid related side effects, in particular respiratory depression, which is said to be less in nalbuphine. However it must be noted that nalbuphine being a partial agonist, has a ceiling effect in its analgesia and is suitable only when use is limited to a single dose or a very short period of time.

Codeine and tramadol are weak opioids that are most commonly prescribed in the oral form for moderate pain. In Malaysia in 2005, the DDD/1000 population/day for tramadol was much higher than that for codeine. This is possibly because tramadol causes less respiratory depression, has less addiction potential and is not controlled under the "Dangerous Drugs Act" (DDA). In addition, tramadol has also been shown to be efficacious in the treatment of some types of neuropathic pain whereas codeine has no role in neuropathic pain at all. Codeine, which used to be the only weak opioid available orally, is becoming less popular due to variable efficacy (it does not work in patients who do not have the enzyme to activate it) and because it can cause severe constipation. The usage of codeine was similar for both private and public hospitals, but tramadol use in the public sector was 2.5 times higher than in the private sector.

Table 19.1: Use of Analgesics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
N02A	OPIOIDS	0.4467

Table 19.2: Use of Analgesics by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
N02A A	Natural opium alkaloids		
N02A A01	Morphine	Total	0.1094
		Public	0.0867
		Private	0.0227
N02A A05	Oxycodone	Total	0.0002
		Public	<0.0001
		Private	0.0002
N02A A08	Dihydrocodeine	Total	0.0314
		Public	0.0162
		Private	0.0153
N02A B	Phenylpiperidine derivatives		
N02A B02	Pethidine	Total	0.0269
		Public	0.0075
		Private	0.0195
N02A B03	Fentanyl	Total	0.0065
		Public	0.0032
		Private	0.0034
N02A D	Benzomorphan derivatives		
N02A D01	Pentazocine	Total	-
		Public	-
		Private	-
N02A F	Morphinan derivatives		
N02A F02	Nalbuphine	Total	0.0024
		Public	0.0013
		Private	0.0010
N02A X	Other opioids		
N02A X02	Tramadol	Total	0.2698
		Public	0.1983
		Private	0.0715

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CHAPTER 20 : USE OF DRUGS FOR NEUROLOGICALS DISORDERS (RESERVE)

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The burden of mental illness on health and productivity throughout the world has long been underestimated. Data developed by the Global Burden of Disease study conducted by the World Health Organization, the World Bank, and Harvard University, revealed that mental illness, including suicide, accounts for over 15 percent of the burden of disease in established market economies such as the United States [1]. According to the WHO [2], mental illnesses accounts for 11.5% of the global burden of diseases, a figure which is projected to increase to 15% by 2020. WHO also found 35.5% to 50.3% of patients in developed countries and 76.3% to 85.4% in less-developed countries received no treatment in the 12 months prior to the survey [3].

Among the pharmacological treatment of psychiatric disorders, antipsychotics form 50.0% of consumption, followed by anxiolytics, sedatives and hypnotics 31.8%, antidepressants 17.9% and anti dementia medication 0.3%. In contrast, a national cross-sectional telephone survey in France, Germany, Italy and the UK found that anxiolytics was most commonly used followed by hypnotics, antidepressants, neuroleptics and other psychotropics [4].

Among antipsychotics, the consumption of conventional antipsychotics (86.7%) far exceeds that of atypical antipsychotics (13.3%), while the opposite was true for Australia [5]. The highest consumption of antipsychotics was phenothiazine (44.7%) and followed by butyrophenone derivatives (31.6%). Most of the consumption was at public facilities (87.0%), which are expected as the more disturbed/psychotic patients are referred to the public psychiatric healthcare centres.

The consumption of atypical antipsychotics in Malaysia was 13.3% as compared to Australia [6], which was 81%, in 2006. The low consumption of atypical antipsychotics could probably be due to its high cost. The most commonly used atypical antipsychotic was risperidone (45.3%) at both private and public facilities. Lithium was excluded from antipsychotic groups because this drug is not an antipsychotic.

Our survey showed 63.2% consumption of antidepressants was from public facilities and 36.8% private facilities. The consumption of Serotonin Selective Reuptake Inhibitors (SSRI) was 61.5% followed by Non-selective Monoamine Reuptake Inhibitors (30.7%). This figure complied with the recommendation in clinical practice guidelines for depressive disorders [7].

The use of antidepressants continues to lag behind antipsychotics. This may indicate that people with depressive and necrotic disorders are not coming forth for treatment, are under diagnosed and/or under treated.

The consumption of anxiolytics, sedative and hypnotics was higher in the private facilities (67.3%). This was expected, as most patients with anxiety and sleep disorders would seek treatment from primary healthcare givers rather than from public sector. Of the anxiolytics, the benzodiazepine derivatives were most commonly used (84.32%).

The consumption of anti-dementia medications from private facilities was about 51.5% whereas in the public facilities 49.5%. The slightly higher consumption of anti-dementia medication in private facilities was probably due to medical related symptoms rather than psychiatric symptoms.

Table 21.1.1: Use of Anti-Psychotics by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
N05A A	Phenothiazines with aliphatic side-chain	0.5431
N05A B	Phenothiazines with piperazine structure	1.0088
N05A C	Phenothiazines with piperidine structure	0.0085
N05A D	Butyrophenone derivatives	1.1032
N05A E	Indole derivatives	0.0053
N05A F	Thioxanthene derivatives	0.0881
N05A H	Diazepines, oxazepines and thiazepines	0.2484
N05A L	Benzamides	0.2752
N05A N	Lithium	0.0595
N05A X	Other antipsychotics	0.2100

Table 21.1.2: Use of Anti-Psychotics by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents	2005	
N05A A	Phenothiazines with aliphatic side-chain		
N05A A01	Chlorpromazine	Total	0.5431
		Public	0.4781
		Private	0.0651
N05A B	Phenothiazines with piperazine structure		
N05A B02	Fluphenazine	Total	0.5923
		Public	0.5569
		Private	0.0354
N05A B03	Perphenazine	Total	0.2191
		Public	0.0295
		Private	0.1896
N05A B04	Prochlorperazine	Total	0.0840
		Public	0.0488
		Private	0.0352
N05A B06	Trifluoperazine	Total	0.1133
		Public	0.1008
		Private	0.0125
N05A C	Phenothiazines with piperidine structure		
N05A C02	Thioridazine	Total	0.0085
		Public	0.0055
		Private	0.0030
N05A D	Butyrophenone derivatives		
N05A D01	Haloperidol	Total	1.1032
		Public	1.0898
		Private	0.0135
N05A E	Indole derivatives		
N05A E04	Ziprasidone	Total	0.0053
		Public	-
		Private	0.0053

ATC	Drug Class and Agents	2005	
N05A F	Thioxanthene derivatives		
N05A F01	Flupentixol	Total	0.0655
		Public	0.0346
		Private	0.0309
N05A F02	Clopenthixol	Total	0.0011
		Public	0.0011
		Private	-
N05A F05	Zuclopenthixol	Total	0.0215
		Public	0.0167
		Private	0.0048
N05A H	Diazepines, oxazepines and thiazepines		
N05A H02	Clozapine	Total	0.0686
		Public	0.0683
		Private	0.0003
N05A H03	Olanzapine	Total	0.1584
		Public	0.1411
		Private	0.0173
N05A H04	Quetiapine	Total	0.0215
		Public	0.0199
		Private	0.0016
N05A L	Benzamides		
N05A L01	Sulpiride	Total	0.2752
		Public	0.2687
		Private	0.0065
N05A N	Lithium		
N05A N01	Lithium	Total	0.0595
		Public	0.0480
		Private	0.0115
N05A X	Other antipsychotics		
N05A X08	Risperidone	Total	0.2100
		Public	0.1822
		Private	0.0278

Table 21.2.1: Use of Anti-Depressants by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
N06A A	Non-selective monoamine reuptake inhibitors	0.3905
N06A B	Selective serotonin reuptake inhibitors	0.7814
N06A G	Monoamine oxidase A inhibitors	0.0210
N06A X	Other antidepressants	0.0782

Table 21.2.2: Use of Anti-Depressants by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
N06A A	Non-selective monoamine reuptake inhibitors		
N06A A02	Imipramine	Total	0.0808
		Public	0.0251
		Private	0.0557
N06A A04	Clomipramine	Total	0.0282
		Public	0.0194
		Private	0.0088
N06A A09	Amitriptyline	Total	0.1630
		Public	0.1107
		Private	0.0523
N06A A16	Dosulepin	Total	0.1039
		Public	0.0694
		Private	0.0345
N06A A21	Maprotiline	Total	0.0147
		Public	0.0044
		Private	0.0103
N06A B	Selective serotonin reuptake inhibitors		
N06A B03	Fluoxetine	Total	0.1810
		Public	0.1358
		Private	0.0452
N06A B04	Citalopram	Total	0.0474
		Public	0.0105
		Private	0.0369
N06A B05	Paroxetine	Total	0.0088
		Public	0.0023
		Private	0.0065
N06A B06	Sertraline	Total	0.2918
		Public	0.2013
		Private	0.0905
N06A B08	Fluvoxamine	Total	0.2193
		Public	0.1617
		Private	0.0575
N06A B10	Escitalopram	Total	0.0332
		Public	0.0086
		Private	0.0246
N06A G	Monoamine oxidase A inhibitors		
N06A G02	Moclobemide	Total	0.0210
		Public	0.0151
		Private	0.0059

ATC	Drug Class and Agents		2005
N06A X	Other antidepressants		
N06A X03	Mianserin	Total	0.0133
		Public	0.0082
		Private	0.0052
N06A X06	Nefazodone	Total	<0.0001
		Public	-
		Private	<0.0001
N06A X11	Mirtazapine	Total	0.0408
		Public	0.0195
		Private	0.0213
N06A X16	Venlafaxine	Total	0.0241
		Public	0.0110
		Private	0.0131

Table 21.3.1: Use of Anxiolytics, Hypnotics and Sedatives by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
N05B A	Benzodiazepine derivatives	1.5623
N05B B	Diphenylmethane derivatives	0.1880
N05C C	Aldehydes and derivatives	<0.0001
N05C D	Benzodiazepine derivatives	0.3464
N05C F	Benzodiazepine related drugs	0.1669

Table 21.3.2: Use of Anxiolytics, Hypnotics and Sedatives by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
N05B A	Benzodiazepine derivatives		
N05B A01	Diazepam	Total	0.4811
		Public	0.0914
		Private	0.3897
N05B A02	Chlordiazepoxide	Total	0.0111
		Public	-
		Private	0.0111
N05B A05	Potassium clorazepate	Total	0.0345
		Public	-
		Private	0.0345
N05B A06	Lorazepam	Total	0.6090
		Public	0.2831
		Private	0.3259
N05B A08	Bromazepam	Total	0.0372
		Public	0.0031
		Private	0.0341
N05B A09	Clobazam	Total	0.0212
		Public	0.0003
		Private	0.0209

ATC	Drug Class and Agents		2005
N05B A12	Alprazolam	Total	0.3682
		Public	0.1120
		Private	0.2562
N05B B	Diphenylmethane derivatives		
N05B B01	Hydroxyzine	Total	0.1880
		Public	0.0613
		Private	0.1267
N05C C	Aldehydes and derivatives		
N05C C05	Paraldehyde	Total	<0.0001
		Public	<0.0001
		Private	<0.0001
N05C D	Benzodiazepine derivatives		
N05C D02	Nitrazepam	Total	0.0218
		Public	0.0018
		Private	0.0200
N05C D05	Triazolam	Total	0.0225
		Public	-
		Private	0.0225
N05C D08	Midazolam	Total	0.3020
		Public	0.1502
		Private	0.1518
N05C F	Benzodiazepine related drugs		
N05C F01	Zopiclone	Total	0.0301
		Public	-
		Private	0.0301
N05C F02	Zolpidem	Total	0.1367
		Public	0.0364
		Private	0.1004

Table 21.4.1: Use of Anti-Dementia by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
N06D	ANTI-DEMENTIA DRUGS	0.0236

Table 21.4.2: Use of Anti-Dementia by Drug Class and Agents, in DDD/1000 population/day2005

ATC	Drug Class and Agents		2005
N06D A	Anticholinesterases		
N06D A02	Donepezil	Total	0.0141
		Public	0.0076
		Private	0.0065
N06D A03	Rivastigmine	Total	0.0078
		Public	0.0044
		Private	0.0034
N06D A04	Galantamine	Total	0.0015
		Public	<0.0001
		Private	0.0015
N06D X	Other anti-dementia drugs		
N06D X01	Memantine	Total	0.0001
		Public	0.0001
		Private	-

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Asthma is a worldwide public health problem affecting about 300 million people [1]. The majority of persons living with asthma are in the developing countries where there is limited access to essential drugs. Management of asthma is still not up to the optimum level when use of guideline is considered. In the last AIRIAP study (Asthma Insight and Reality in Asia Pacific), the use of steroid was less than 12% overall [2]. Asthma affected many patients' quality of life as also shown by the Quality of Life in asthmatics study done by the Institute Kesihatan Umum [3]. The prevalence of asthma in children was 7.14%, while in adults 4.53%. The Third National Health and Morbidity Survey (NHMS) 2006 [4], showed that asthma was more common among the Indians (6.7%) and also in the lower socio-economic income group, lower education background and among unemployed. The NHMS 2006 also showed that more than two thirds of the adult asthmatics (67.8%) had poorly controlled asthma. This was reflected by the high number of emergency department visits and admissions. Childhood asthma was more prevalent amongst the Malays (8.8%) [4]. More than 80% had exacerbations, 32.2% visited emergency department and 14.29% were admitted in the past 12 months during the survey, for all races in Malaysia. In general, the NHMS showed that asthma is still poorly managed in both the adults and children.

Similarly, the other form of obstructive airway disease due to smoking is also increasing. Most of the cases of COPD are due to smoking and a small number due to environmental pollutants, infections and genetics. Recent figures have shown an increase in smokers among young adults, both male and female. The NHMS 2006 [4] reported 14.7% adolescents ever smoked with more adolescents in the rural (18.4%) compared to urban (12.3%). In the adults, 57.6% of males were ever smokers compared to 2.5% in the female. In both the adolescent and adults, Malays had the highest percentage. All these will lead to more cases of COPD in the near future. Management of COPD is also poor in Malaysia, as the disease is not detected early and majority of the patients only present at a later stage with an acute exacerbation.

Anti-asthma medications, mainly bronchodilators, anti-inflammatory medications and xanthines are used in the treatment of individuals with chronic bronchitis or emphysema (also referred to as chronic obstructive pulmonary disease or COPD) as well as those with asthma. The drugs used in asthma management have remained unchanged for the last 25 years although several new preparations and combination therapies had been introduced. A new class of drug for prophylaxis, called anti-leukotrienes was introduced about 8 years ago. These drugs and the combination therapy are only used in small groups of patients in the public hospitals due to their cost and prescriber restrictions.

The data collected for the Malaysian Statistics on Medicine (MSOM) 2005, showed some very interesting data reflecting worsening of the disease. The two common obstructive airway diseases are asthma and COPD. The data collected in the NMUS could not differentiate drugs used for these two conditions since some of the drugs can be used for both conditions, such as the inhaled beta-2 adrenoreceptor agonists and systemic beta-2 adrenoreceptor agonists. Although xanthines are commonly used in COPD patients, they can also be used in asthmatics at stage 3 and above. Newer studies also show that combination steroid and long acting beta agonists can be used for both asthma and COPD.

The use of inhaled selective beta-2 adrenoreceptor agonists for the treatment of obstructive airway disease showed a positive trend in the MSOM 2005 data. There was more use of glucocorticoids compared to the beta-2 agonists (4.17 DDD/1000 population/day vs. 3.88). This is a very good indication in the use of steroid for the treatment of asthma at least as in the 2004 data, use of beta-2 agonist doubled that of steroid (6.80 vs. 3.26). Budesonide was the most commonly prescribed steroid in the public sector while beclomethasone was the commonest in the private sector. This was because of the purchase of this drug and availability in the public hospitals. The most commonly used inhaled beta-2 agonist was salbutamol (3.68) followed by terbutaline (0.04). The use of oral beta-2 agonist was only 1.75 DDD/1000 population/day while in 2004 it was as high as 6.76. This again is a good indication of proper use of the asthma guideline [5], where inhalation therapy is preferred to oral beta-2 agonist. The high use of inhaled beta-2 agonist was only noted in the public hospitals and use of inhaled salbutamol was still low in the private sector (3.4 vs. 0.27). Leukotriene receptor antagonist, montelukast, is an expensive drug and its use in the public hospitals was limited to only specialists, while use in the private sector was higher due to affordability by the patients (0.035 vs 0.12). There is no data available on the new combination inhalers (steroid plus long acting beta agonist).

Overall, there is a positive indication in the management of asthma in Malaysia both in the public and private hospitals where less beta-2 agonists are used and more inhaled steroids being prescribed for asthma control. This increase in use of steroid therapy is in accordance to the new GINA guideline [6] in the management of asthma.

The anticholinergics and xanthines are commonly used in the treatment of COPD, though they are also used in a small group of poorly controlled asthma. The short acting ipratropium bromide was used more in the public hospitals (0.74 vs. 0.1) while the more expensive tiotropium was more used by the private sector (0.027 vs. 0.0059). The xanthines, theophylline and aminophylline were also commonly used in the public hospitals (1.8 vs. 0.4). The drugs used in the management of COPD did not show any dramatic changes as compared to those for the management of asthma.

The MSOM 2005 data suggested that there was slightly less use of beta-2 agonists as compared to inhaled steroids. The introduction of the asthma guideline and regular CMEs have made some positive changes in the trend of asthma management. These data though did not capture drugs used strictly for asthma, as the drugs used for COPD too may be the same. Future studies should be conducted so that drugs used for asthma and COPD can be identified separately so that a better reflection of their use can be obtained.

Table 22.1: Use of Medicines for Obstructive Airway Diseases by Drug Class, in DDD/1000 population/day 2005

ATC	Drug Class	2005
R03A C	Selective beta-2-adrenoreceptor agonists	3.8820
R03A K	Adrenergics and other drugs for obstructive airway diseases	0.8818
R03B A	Glucocorticoids	4.1764
R03B B	Anticholinergics	0.8709
R03B C	Antiallergic agents, excl. corticosteroids	0.0056
R03C A	Alpha- and beta-adrenoreceptor agonists	0.0153
R03C C	Selective beta-2-adrenoreceptor agonists	1.7541
R03D A	Xanthines	1.7851
R03D C	Leukotriene receptor antagonists	0.1576

Table 22.2: Use of Medicines for Obstructive Airway Diseases by Drug Class and Agents, in DDD/1000 population/day 2005

ATC	Drug Class and Agents		2005
R03A C	Selective beta-2-adrenoreceptor agonists		
R03A C02	Salbutamol	Total	3.6883
		Public	3.4157
		Private	0.2726
R03A C03	Terbutaline	Total	0.0371
		Public	0.0085
		Private	0.0286
R03A C04	Fenoterol	Total	0.0312
		Public	0.0283
		Private	0.0028
R03A C12	Salmeterol	Total	0.1023
		Public	0.0173
		Private	0.0850
R03A C13	Formoterol	Total	0.0232
		Public	0.0173
		Private	0.0059
R03A K	Adrenergics and other drugs for obstructive airway diseases		
R03A K03	Fenoterol and other drugs for obstructive airway diseases	Total	0.0325
		Public	-
		Private	0.0325
R03A K04	Salbutamol and other drugs for obstructive airway diseases	Total	0.4740
		Public	0.3536
		Private	0.1204
R03A K06	Salmeterol and other drugs for obstructive airway diseases	Total	0.2534
		Public	0.0431
		Private	0.2103
R03A K07	Formoterol and other drugs for obstructive airway diseases	Total	0.1219
		Public	0.0181
		Private	0.1039
R03B A	Glucocorticoids		
R03B A01	Beclometasone	Total	1.2446
		Public	0.5992
		Private	0.6454
R03B A02	Budesonide	Total	2.9235
		Public	1.1585
		Private	1.7650
R03B A05	Fluticasone	Total	0.0084
		Public	0.0033
		Private	0.0050
R03B A08	Ciclesonide	Total	-
		Public	-
		Private	-

ATC	Drug Class and Agents	2005	
R03B B	Anticholinergics		
R03B B01	Ipratropium bromide	Total	0.8378
		Public	0.7368
		Private	0.1010
R03B B04	Tiotropium bromide	Total	0.0331
		Public	0.0059
		Private	0.0272
R03B C	Antiallergic agents, excl. corticosteroids		
R03B C01	Cromoglicic acid	Total	0.0056
		Public	<0.0001
		Private	0.0056
R03C A	Alpha- and beta-adrenoreceptor agonists		
R03C A02	Ephedrine	Total	0.0153
		Public	0.0071
		Private	0.0082
R03C C	Selective beta-2-adrenoreceptor agonists		
R03C C02	Salbutamol	Total	1.3722
		Public	0.7096
		Private	0.6626
R03C C03	Terbutaline	Total	0.3541
		Public	0.2363
		Private	0.1178
R03C C04	Fenoterol	Total	0.0012
		Public	-
		Private	0.0012
R03C C08	Procaterol	Total	0.0161
		Public	-
		Private	0.0161
R03C C12	Bambuterol	Total	0.0104
		Public	-
		Private	0.0104
R03D A	Xanthines		
R03D A04	Theophylline	Total	1.7810
		Public	1.3809
		Private	0.4001
R03D A05	Aminophylline	Total	0.0041
		Public	0.0030
		Private	0.0011
R03D C	Leukotriene receptor antagonists		
R03D C03	Montelukast	Total	0.1576
		Public	0.0354
		Private	0.1221

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CHAPTER 23 : USE OF ANTIHISTAMINES & NASAL DECONGESTANTS (RESERVE)

CHAPTER 24 : USE OF OPHTHALMOLOGICALS (RESERVE)

CHAPTER 25 : USE OF OTOLOGICALS (RESERVE)

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Hospitals participating in NMUS survey*

#	<i>Ministry of Health Hospitals</i>		
1.	Hospital Alor Gajah	49.	Hospital Kuala Lumpur
2.	Hospital Ampang	50.	Hospital Kuala Nerang
3.	Hospital Bahagia Ulu Kinta	51.	Hospital Kudat
4.	Hospital Balik Pulau	52.	Hospital Kulim
5.	Hospital Baling	53.	Hospital Kunak
6.	Hospital Banting	54.	Hospital Labuan
7.	Hospital Batu Gajah	55.	Hospital Lahad Datu
8.	Hospital Batu Pahat	56.	Hospital Langkawi
9.	Hospital Bau	57.	Hospital Likas
10.	Hospital Beaufort	58.	Hospital Limbang
11.	Hospital Beluran	59.	Hospital Lundu
12.	Hospital Bentong	60.	Hospital Machang
13.	Hospital Besut	61.	Hospital Marudi
14.	Hospital Betong	62.	Hospital Melaka
15.	Hospital Bintulu	63.	Hospital Mersing
16.	Hospital Bukit Mertajam	64.	Hospital Mesra Bukit Padang
17.	Hospital Changkat Melintang	65.	Hospital Miri
18.	Hospital Daerah Lawas	66.	Hospital Muadzam Shah
19.	Hospital Daro	67.	Hospital Mukah
20.	Hospital Duchess of Kent, Sandakan	68.	Hospital Pakar Sultanah Fatimah, Muar
21.	Hospital Dungun	69.	Hospital Papar
22.	Hospital Gerik	70.	Hospital Parit Buntar
23.	Hospital Gua Musang	71.	Hospital Pasir Mas
24.	Hospital Hulu Terengganu	72.	Hospital Pekan
25.	Hospital Ipoh	73.	Hospital Permai
26.	Hospital Jasin	74.	Hospital Pontian
27.	Hospital Jelebu	75.	Hospital Port Dickson
28.	Hospital Jeli	76.	Hospital Pulau Pinang
29.	Hospital Jempol	77.	Hospital Putrajaya
30.	Hospital Jengka	78.	Hospital Queen Elizabeth
31.	Hospital Jerantut	79.	Hospital Raja Perempuan Zainab II, Kota Bharu
32.	Hospital Jitra	80.	Hospital Rajah Charles Brooke Memorial
33.	Hospital Kajang	81.	Hospital Ranau
34.	Hospital Kampar	82.	Hospital Raub
35.	Hospital Kanowit	83.	Hospital Sarikei
36.	Hospital Kapit	84.	Hospital Seberang Jaya
37.	Hospital Kemaman	85.	Hospital Segamat
38.	Hospital Keningau	86.	Hospital Selama
39.	Hospital Kepala Batas	87.	Hospital Selayang
40.	Hospital Kinabatangan	88.	Hospital Semporna
41.	Hospital Kluang	89.	Hospital Sentosa
42.	Hospital Kota Belud	90.	Hospital Serdang
43.	Hospital Kota Marudu	91.	Hospital Seri Manjung
44.	Hospital Kota Tinggi	92.	Hospital Serian
45.	Hospital Kuala Kangsar	93.	Hospital Setiu
46.	Hospital Kuala Krai	94.	Hospital Sibul
47.	Hospital Kuala Kubu Bharu	95.	Hospital Sik
48.	Hospital Kuala Lipis	96.	Hospital Simunjan

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Hospitals participating in NMUS survey*

#	<i>Ministry of Health Hospitals</i>	
97.	Hospital Sipitang	116. Hospital Tawau
98.	Hospital Slim River	117. Hospital Teluk Intan
99.	Hospital Sri Aman	118. Hospital Temenggung Seri Maharaja Tun Ibrahim, Kulai
100.	Hospital Sultan Abdul Halim, Sungai Petani	119. Hospital Tengku Ampuan Afzan, Kuantan
101.	Hospital Sultan Haji Ahmad Shah, Temerloh	120. Hospital Tengku Ampuan Jemaah, Sabak Bernam
102.	Hospital Sultan Ismail, Johor Bahru	121. Hospital Tengku Ampuan Rahimah, Klang
103.	Hospital Sultanah Aminah, Johor Bahru	122. Hospital Tengku Anis, Pasir Puteh
104.	Hospital Sultanah Bahiyah, Alor Setar	123. Hospital Tenom
105.	Hospital Sultanah Nur Zahirah, Kuala Terengganu	124. Hospital Tuanku Ampuan Najihah, Kuala Pilah
106.	Hospital Sungai Bakap	125. Hospital Tuanku Fauziah, Kangar
107.	Hospital Sungai Buloh	126. Hospital Tuanku Ja'afar, Seremban
108.	Hospital Sungai Siput	127. Hospital Tuaran
109.	Hospital Taiping	128. Hospital Tumpat
110.	Hospital Tambunan	129. Hospital Umum Sarawak
111.	Hospital Tampin	130. Hospital Yan
112.	Hospital Tanah Merah	131. Hospital Saratok
113.	Hospital Tangkak	132. Institut Perubatan Respiratori
114.	Hospital Tanjong Karang	
115.	Hospital Tapah	

#	<i>University Hospitals</i>
1.	Hospital Universiti Kebangsaan Malaysia
2.	University Malaya Medical Centre
3.	Hospital Universiti Sains Malaysia

#	<i>Armed Forces Hospitals</i>
1.	Lumut Armed Forces Hospital

#	<i>Private Hospitals</i>	
1.	Amanjaya Specialist Centre	16. Kuantan Medical Centre
2.	Ampang Puteri Specialist Hospital	17. Kuantan Specialist Hospital
3.	Bukit Mertajam Specialist Hospital	18. Lam Wah Ee Hospital
4.	Columbia Asia Medical Centre, Sarawak	19. Landmark Medical Centre Sdn. Bhd
5.	Columbia Asia Medical Centre, Seremban	20. Loh Guan Lye Specialist Centre
6.	Columbia Asia Nursing and Rehabilitation Centre	21. Mahkota Medical Centre
7.	Damai Service Hospital, Melawati	22. Medical Specialist Centre (JB) Sdn. Bhd
8.	Damansara Specialist Hospital	23. N. S. Chinese Maternity Hospital and Medical Centre
9.	Darul Ehsan Medical Centre	24. National Heart Institute
10.	Gleneagles Intan Medical Centre	25. NCI Cancer Hospital
11.	Gleneagles Medical Centre, Penang	26. Pantai Ayer Keroh Hospital Sdn. Bhd
12.	Ipoh Specialist Hospital	27. Pantai Cheras Medical Centre
13.	Island Hospital	28. Pantai Indah Hospital
14.	Johor Specialist Hospital	29. Pantai Klang Specialist Medical Centre Sdn. Bhd
15.	Kampung Baru Medical Centre	

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Hospitals participating in NMUS survey*

#	Private Hospitals
30.	Pantai Medical Centre
31.	Pantai Mutiara Hospital
32.	Pantai Putri Hospital
33.	Penang Adventist Hospital
34.	Perdana Specialist Hospital
35.	Pusat Pakar Tawakal
36.	PUSRAWI Hospital Sdn. Bhd
37.	Puteri Specialist Hospital
38.	Putra Medical Centre, Alor Setar
39.	Putra Specialist Hospital (Batu Pahat) Sdn. Bhd
40.	Putra Specialist Hospital (Melaka) Sdn. Bhd
41.	Rafflesia Medical Centre Sdn. Bhd
42.	Sabah Medical Centre
43.	Sentosa Medical Centre Sdn. Bhd, KL
44.	Sri Kota Specialist Medical Centre
45.	Sri Manjung Specialist Centre Sdn. Bhd
46.	Subang Jaya Medical Centre
47.	Sunway Medical Centre
48.	Taman Desa Medical Centre
49.	Tanjung Medical Centre
50.	Timberland Medical Centre
51.	Tung Shin Hospital

Primary Care Clinics participating in NMUS survey

#	Ministry of Health Clinics
1.	Jabatan Kesihatan Luar Marudi
2.	Jabatan Pesakit Luar Banting
3.	Jabatan Pesakit Luar Bau
4.	Jabatan Pesakit Luar Beaufort
5.	Jabatan Pesakit Luar Betong
6.	Jabatan Pesakit Luar Grik
7.	Jabatan Pesakit Luar Kanowit
8.	Jabatan Pesakit Luar Kuala Kangsar
9.	Jabatan Pesakit Luar Limbang
10.	Jabatan Pesakit Luar Lundu
11.	Jabatan Pesakit Luar Mukah
12.	Jabatan Pesakit Luar Papar
13.	Jabatan Pesakit Luar Parit Buntar
14.	Jabatan Pesakit Luar Ranau
15.	Jabatan Pesakit Luar RCBM
16.	Jabatan Pesakit Luar Sabak Bernam, Hospital Tengku Ampuan Jemaah
17.	Jabatan Pesakit Luar Saratok
18.	Jabatan Pesakit Luar Serian
19.	Jabatan Pesakit Luar Simunjan
20.	Jabatan Pesakit Luar Sungai Siput
21.	Jabatan Pesakit Luar Sungai Siput
22.	Jabatan Pesakit Luar Taiping
23.	Jabatan Pesakit Luar Tambunan
24.	Jabatan Pesakit Luar Tanjung Karang
25.	Jabatan Pesakit Luar Tenom
26.	Jabatan Pesakit Luar, Hospital Alor Gajah
27.	Jabatan Pesakit Luar, Hospital Balik Pulau
28.	Jabatan Pesakit Luar, Hospital Baling
29.	Jabatan Pesakit Luar, Hospital Bandar Machang
30.	Jabatan Pesakit Luar, Hospital Bukit Mertajam
31.	Jabatan Pesakit Luar, Hospital Changkat Melintang
32.	Jabatan Pesakit Luar, Hospital Jengka
33.	Jabatan Pesakit Luar, Hospital Kota Tinggi
34.	Jabatan Pesakit Luar, Hospital Kuala Kubu Bharu
35.	Jabatan Pesakit Luar, Hospital Mersing
36.	Jabatan Pesakit Luar, Hospital Pulau Pinang
37.	Jabatan Pesakit Luar, Hospital Sungai Bakap
38.	Jabatan Pesakit Luar, Hospital Tuaran
39.	Jabatan Pesakit Luar, Klinik Kesihatan Kudat
40.	Jabatan Pesakit Luar, Klinik Kesihatan Lahad Datu
41.	Jabatan Pesakit Luar, Poliklinik Komuniti Beluran
42.	Jabatan Pesakit Luar, Poliklinik Komuniti Bentong
43.	Jabatan Pesakit Luar, Poliklinik Komuniti Kinabatangan
44.	Jabatan Pesakit Luar, Poliklinik Komuniti Kluang
45.	Jabatan Pesakit Luar, Poliklinik Komuniti Kota Belud
46.	Jabatan Pesakit Luar, Poliklinik Komuniti Kota Marudu
47.	Jabatan Pesakit Luar, Poliklinik Komuniti Mentakab
48.	Jabatan Pesakit Luar, Poliklinik Komuniti Sandakan
49.	Jabatan Pesakit Luar, Poliklinik Komuniti Semporna
50.	Jabatan Pesakit Luar, Poliklinik Komuniti Sipitang
51.	Jabatan Pesakit Luar, Poliklinik Komuniti Tawau

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Ministry of Health Clinics
52.	Jabatan Pesakit Luar, Klinik Kesihatan Jasin
53.	Klinik Kesihatan Air Hangat
54.	Klinik Kesihatan Air Itam Pulau Pinang
55.	Klinik Kesihatan Air Kuning
56.	Klinik Kesihatan Air Tawar
57.	Klinik Kesihatan Alor Gajah
58.	Klinik Kesihatan Alor Pongsu
59.	Klinik Kesihatan Ampangan
60.	Klinik Kesihatan Apin-Apin
61.	Klinik Kesihatan Arau
62.	Klinik Kesihatan Aring
63.	Klinik Kesihatan Asajaya
64.	Klinik Kesihatan Astana Raja
65.	Klinik Kesihatan Ayer Keroh
66.	Klinik Kesihatan Ayer Lanas
67.	Klinik Kesihatan Ayer Molek
68.	Klinik Kesihatan Ba Kelalan
69.	Klinik Kesihatan Badang
70.	Klinik Kesihatan Bagan
71.	Klinik Kesihatan Bagan Datoh
72.	Klinik Kesihatan Bagan Serai
73.	Klinik Kesihatan Bahau
74.	Klinik Kesihatan Bakar Arang
75.	Klinik Kesihatan Bako
76.	Klinik Kesihatan Bakri
77.	Klinik Kesihatan Balai
78.	Klinik Kesihatan Balai
79.	Klinik Kesihatan Balai Ringin
80.	Klinik Kesihatan Balingian
81.	Klinik Kesihatan Balok
82.	Klinik Kesihatan Bandar 32 Bera
83.	Klinik Kesihatan Bandar Alor Setar
84.	Klinik Kesihatan Bandar Bachok
85.	Klinik Kesihatan Bandar Baharu
86.	Klinik Kesihatan Bandar Gua Musang
87.	Klinik Kesihatan Bandar Jengka
88.	Klinik Kesihatan Bandar Kota Bharu
89.	Klinik Kesihatan Bandar Kuala Krai
90.	Klinik Kesihatan Bandar Kuala Nerang
91.	Klinik Kesihatan Bandar Kuantan
92.	Klinik Kesihatan Bandar Mentakab
93.	Klinik Kesihatan Bandar Miri
94.	Klinik Kesihatan Bandar Pasir Mas
95.	Klinik Kesihatan Bandar Pasir Puteh
96.	Klinik Kesihatan Bandar Sungai Petani
97.	Klinik Kesihatan Bandar Tanah Merah
98.	Klinik Kesihatan Bandar Tun Razak, Pahang
99.	Klinik Kesihatan Bandar Tun Razak
100.	Klinik Kesihatan Bareo
101.	Klinik Kesihatan Batang Ai
102.	Klinik Kesihatan Batu
103.	Klinik Kesihatan Batu 30
104.	Klinik Kesihatan Batu Danau
105.	Klinik Kesihatan Batu Gajah
106.	Klinik Kesihatan Batu Kawa
107.	Klinik Kesihatan Batu Kurau
108.	Klinik Kesihatan Batu Lintang
109.	Klinik Kesihatan Batu Niah
110.	Klinik Kesihatan Batu Pahat
111.	Klinik Kesihatan Bawang Assan
112.	Klinik Kesihatan Bedong
113.	Klinik Kesihatan Bekenu
114.	Klinik Kesihatan Beladin
115.	Klinik Kesihatan Belaga
116.	Klinik Kesihatan Belawai
117.	Klinik Kesihatan Beluru
118.	Klinik Kesihatan Benta
119.	Klinik Kesihatan Beris Kubor Besar
120.	Klinik Kesihatan Beris Panchor
121.	Klinik Kesihatan Bertam Baru
122.	Klinik Kesihatan Beserah
123.	Klinik Kesihatan Beseri
124.	Klinik Kesihatan Betanak
125.	Klinik Kesihatan Biawak
126.	Klinik Kesihatan Bidor
127.	Klinik Kesihatan Bingkor
128.	Klinik Kesihatan Bintangor
129.	Klinik Kesihatan Bintulu
130.	Klinik Kesihatan Bongawan
131.	Klinik Kesihatan Bota Kiri
132.	Klinik Kesihatan Bruas
133.	Klinik Kesihatan Bruit
134.	Klinik Kesihatan Bukit Betong
135.	Klinik Kesihatan Bukit Gambir, Muar
136.	Klinik Kesihatan Bukit Goh (Felda)
137.	Klinik Kesihatan Bukit Ibam
138.	Klinik Kesihatan Bukit Mendi
139.	Klinik Kesihatan Bukit Pasir, Muar
140.	Klinik Kesihatan Bukit Pelanduk
141.	Klinik Kesihatan Bukit Rambai
142.	Klinik Kesihatan Bukit Selambau
143.	Klinik Kesihatan Bukit Tunggul
144.	Klinik Kesihatan Bunan Gega
145.	Klinik Kesihatan Bunohan
146.	Klinik Kesihatan Buntal
147.	Klinik Kesihatan Bunuk

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Ministry of Health Clinics
148.	Klinik Kesihatan Cameron Highlands
149.	Klinik Kesihatan Changkat Jering
150.	Klinik Kesihatan Changkat Keruing
151.	Klinik Kesihatan Changkat Melintang
152.	Klinik Kesihatan Chanis
153.	Klinik Kesihatan Chekok
154.	Klinik Kesihatan Chemenong
155.	Klinik Kesihatan Chemor
156.	Klinik Kesihatan Chenderong Balai
157.	Klinik Kesihatan Cheneh
158.	Klinik Kesihatan Cheng
159.	Klinik Kesihatan Chenor
160.	Klinik Kesihatan Cherang Ruku
161.	Klinik Kesihatan Cheras
162.	Klinik Kesihatan Cheras Baru
163.	Klinik Kesihatan Cheroh
164.	Klinik Kesihatan Chiku 3
165.	Klinik Kesihatan Chini
166.	Klinik Kesihatan Chukai
167.	Klinik Kesihatan Dabong
168.	Klinik Kesihatan Dalat
169.	Klinik Kesihatan Damak
170.	Klinik Kesihatan Daro
171.	Klinik Kesihatan Dato' Keramat
172.	Klinik Kesihatan Debak
173.	Klinik Kesihatan Dong
174.	Klinik Kesihatan Durian Tunggal
175.	Klinik Kesihatan Durin
176.	Klinik Kesihatan Engkelili
177.	Klinik Kesihatan Ensengei
178.	Klinik Kesihatan Gaal
179.	Klinik Kesihatan Gambang
180.	Klinik Kesihatan Gedong
181.	Klinik Kesihatan Gemas
182.	Klinik Kesihatan Gemencheh
183.	Klinik Kesihatan Gopeng
184.	Klinik Kesihatan Greentown
185.	Klinik Kesihatan Gua Musang
186.	Klinik Kesihatan Gual Ipoh
187.	Klinik Kesihatan Guar Chempedak
188.	Klinik Kesihatan Gulau
189.	Klinik Kesihatan Gunong
190.	Klinik Kesihatan Gunung Besaut
191.	Klinik Kesihatan Gunung Pasir
192.	Klinik Kesihatan Gunung Rapat
193.	Klinik Kesihatan Gunung Semanggol
194.	Klinik Kesihatan Hiliran
195.	Klinik Kesihatan Hutan Melintang
196.	Klinik Kesihatan Hutan Percha
197.	Klinik Kesihatan Ibu Dan Anak (Pejabat Kesihatan Daerah Dungun)
198.	Klinik Kesihatan Ibu Dan Anak (Pejabat Kesihatan Daerah Jerantut)
199.	Klinik Kesihatan Ibu Dan Anak (Pejabat Kesihatan Kawasan Beaufort)
200.	Klinik Kesihatan Ibu Dan Anak Air Jernih
201.	Klinik Kesihatan Ibu Dan Anak Ayer Puteh
202.	Klinik Kesihatan Ibu Dan Anak Bakar Bata
203.	Klinik Kesihatan Ibu Dan Anak Baling
204.	Klinik Kesihatan Ibu Dan Anak Bandar Miri
205.	Klinik Kesihatan Ibu Dan Anak Batu Gajah
206.	Klinik Kesihatan Ibu Dan Anak Batu Pahat
207.	Klinik Kesihatan Ibu Dan Anak Bau
208.	Klinik Kesihatan Ibu Dan Anak Beluran
209.	Klinik Kesihatan Ibu Dan Anak Bentong Klinik
210.	Kesihatan Ibu Dan Anak Betong
211.	Klinik Kesihatan Ibu Dan Anak Bukit Mertajam
212.	Klinik Kesihatan Ibu dan Anak Dalat
213.	Klinik Kesihatan Ibu Dan Anak Gelugor
214.	Klinik Kesihatan Ibu Dan Anak Gombak
215.	Klinik Kesihatan Ibu Dan Anak Gombak Setia
216.	Klinik Kesihatan Ibu Dan Anak Grik
217.	Klinik Kesihatan Ibu Dan Anak Herrington, Kota Kinabalu
218.	Klinik Kesihatan Ibu Dan Anak Jalan Jawa
219.	Klinik Kesihatan Ibu Dan Anak Jalan Kebajikan
220.	Klinik Kesihatan Ibu Dan Anak Jalan Putra
221.	Klinik Kesihatan Ibu Dan Anak Jalan Sekama
222.	Klinik Kesihatan Ibu Dan Anak Jengka
223.	Klinik Kesihatan Ibu Dan Anak Jinjang Klinik
224.	Kesihatan Ibu Dan Anak Jitra
225.	Klinik Kesihatan Ibu Dan Anak Johor Bharu
226.	Klinik Kesihatan Ibu Dan Anak Kampung Malaysia Jaya
227.	Klinik Kesihatan Ibu Dan Anak Kampung Pandan
228.	Klinik Kesihatan Ibu Dan Anak Kanowit
229.	Klinik Kesihatan Ibu Dan Anak Karamunting
230.	Klinik Kesihatan Ibu Dan Anak Keningau
231.	Klinik Kesihatan Ibu Dan Anak Kidurong
232.	Klinik Kesihatan Ibu Dan Anak Kluang Klinik
233.	Kesihatan Ibu Dan Anak Kota Belud
234.	Klinik Kesihatan Ibu Dan Anak Kota Bharu
235.	Klinik Kesihatan Ibu Dan Anak Kota Kinabalu
236.	Klinik Kesihatan Ibu Dan Anak Kota Kinabatangan

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Ministry of Health Clinics
237.	Klinik Kesihatan Ibu Dan Anak Kota Marudu
238.	Klinik Kesihatan Ibu Dan Anak Kota Padawan
239.	Klinik Kesihatan Ibu Dan Anak Kota Tinggi
240.	Klinik Kesihatan Ibu Dan Anak Kpg Gita
241.	Klinik Kesihatan Ibu Dan Anak Kuala Krai
242.	Klinik Kesihatan Ibu Dan Anak Kuala Lipis
243.	Klinik Kesihatan Ibu Dan Anak Kuala Nerang
244.	Klinik Kesihatan Ibu Dan Anak Kuala Pilah
245.	Klinik Kesihatan Ibu dan Anak Kuantan
246.	Klinik Kesihatan Ibu Dan Anak Kudat
247.	Klinik Kesihatan Ibu Dan Anak Labuan
248.	Klinik Kesihatan Ibu Dan Anak Lahad Datu
249.	Klinik Kesihatan Ibu Dan Anak Lambir
250.	Klinik Kesihatan Ibu Dan Anak Limbang
251.	Klinik Kesihatan Ibu Dan Anak Lundu
252.	Klinik Kesihatan Ibu Dan Anak Machang
253.	Klinik Kesihatan Ibu Dan Anak Marudi
254.	Klinik Kesihatan Ibu Dan Anak Medan Maju Jaya (Bgn. Sewa)
255.	Klinik Kesihatan Ibu Dan Anak Mentakab
256.	Klinik Kesihatan Ibu Dan Anak Muadzam Shah
257.	Klinik Kesihatan Ibu Dan Anak Mukah
258.	Klinik Kesihatan Ibu Dan Anak Papar
259.	Klinik Kesihatan Ibu Dan Anak Parit Buntar
260.	Klinik Kesihatan Ibu Dan Anak Pasir Mas
261.	Klinik Kesihatan Ibu Dan Anak Pasir Puteh
262.	Klinik Kesihatan Ibu Dan Anak Pekan
263.	Klinik Kesihatan Ibu Dan Anak Pekan, Kota Kinabalu
264.	Klinik Kesihatan Ibu Dan Anak Port Dickson
265.	Klinik Kesihatan Ibu Dan Anak Ranau
266.	Klinik Kesihatan Ibu Dan Anak Raub
267.	Klinik Kesihatan Ibu Dan Anak RCBM
268.	Klinik Kesihatan Ibu Dan Anak Rifles Range
269.	Klinik Kesihatan Ibu Dan Anak Sandakan
270.	Klinik Kesihatan Ibu Dan Anak Saratok
271.	Klinik Kesihatan Ibu Dan Anak Semporna
272.	Klinik Kesihatan Ibu Dan Anak Seremban
273.	Klinik Kesihatan Ibu Dan Anak Serian
274.	Klinik Kesihatan Ibu Dan Anak Simunjan
275.	Klinik Kesihatan Ibu Dan Anak Sungai Bakap
276.	Klinik Kesihatan Ibu Dan Anak Sungai Petani
277.	Klinik Kesihatan Ibu Dan Anak Taiping
278.	Klinik Kesihatan Ibu Dan Anak Taman Bandar Baru
279.	Klinik Kesihatan Ibu Dan Anak Taman Tun Sardon
280.	Klinik Kesihatan Ibu Dan Anak Tambunan
281.	Klinik Kesihatan Ibu Dan Anak Tampin
282.	Klinik Kesihatan Ibu Dan Anak Tanah Merah
283.	Klinik Kesihatan Ibu Dan Anak Tanjong Tokong
284.	Klinik Kesihatan Ibu Dan Anak Tawau
285.	Klinik Kesihatan Ibu Dan Anak Tenom
286.	Klinik Kesihatan Ibu Dan Anak Tuaran
287.	Klinik Kesihatan Jagau
288.	Klinik Kesihatan Jalan Baru
289.	Klinik Kesihatan Jalan Gereja
290.	Klinik Kesihatan Jalan Macalister, Pulau Pinang
291.	Klinik Kesihatan Jalan Masjid Kuching
292.	Klinik Kesihatan Jalan Oya
293.	Klinik Kesihatan Jalan Perak Pulau Pinang
294.	Klinik Kesihatan Jasin (KKIA)
295.	Klinik Kesihatan Jawi-Jawi
296.	Klinik Kesihatan Jaya Gading
297.	Klinik Kesihatan Jelai
298.	Klinik Kesihatan Jelapang
299.	Klinik Kesihatan Jelebu
300.	Klinik Kesihatan Jeli
301.	Klinik Kesihatan Jempol
302.	Klinik Kesihatan Jemukan
303.	Klinik Kesihatan Jengka 2
304.	Klinik Kesihatan Jengka 22
305.	Klinik Kesihatan Jengka 8
306.	Klinik Kesihatan Jeniang
307.	Klinik Kesihatan Jeram
308.	Klinik Kesihatan Jeram Tekoh
309.	Klinik Kesihatan Jerantut
310.	Klinik Kesihatan Jeruas
311.	Klinik Kesihatan Jinjang
312.	Klinik Kesihatan Johol
313.	Klinik Kesihatan Juasseh
314.	Klinik Kesihatan Julau
315.	Klinik Kesihatan Kabong
316.	Klinik Kesihatan Kaki Bukit
317.	Klinik Kesihatan Kakus
318.	Klinik Kesihatan Kampar
319.	Klinik Kesihatan Kampung Awah
320.	Klinik Kesihatan Kampung Gajah
321.	Klinik Kesihatan Kampung Gial
322.	Klinik Kesihatan Kampung Pandan
323.	Klinik Kesihatan Kampung Simee
324.	Klinik Kesihatan Kamunting
325.	Klinik Kesihatan Kangar
326.	Klinik Kesihatan Kangkong
327.	Klinik Kesihatan Kapit
328.	Klinik Kesihatan Karai

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Ministry of Health Clinics
329.	Klinik Kesihatan Karak
330.	Klinik Kesihatan Karangan
331.	Klinik Kesihatan Kedai Empat
332.	Klinik Kesihatan Kedai Lalat
333.	Klinik Kesihatan Kemabong
334.	Klinik Kesihatan Kemahang
335.	Klinik Kesihatan Kemasik
336.	Klinik Kesihatan Kemayan
337.	Klinik Kesihatan Kemendor
338.	Klinik Kesihatan Kempas
339.	Klinik Kesihatan Keningau
340.	Klinik Kesihatan Kepala Batas
341.	Klinik Kesihatan Kesindu
342.	Klinik Kesihatan Ketereh
343.	Klinik Kesihatan Kinarut
344.	Klinik Kesihatan Klebang Besar
345.	Klinik Kesihatan Kota Baru
346.	Klinik Kesihatan Kota Klias
347.	Klinik Kesihatan Kota Kuala Muda
348.	Klinik Kesihatan Kota Samarahan
349.	Klinik Kesihatan Kota Sentosa
350.	Klinik Kesihatan Kuah
351.	Klinik Kesihatan Kuala Balah
352.	Klinik Kesihatan Kuala Balingian
353.	Klinik Kesihatan Kuala Gula
354.	Klinik Kesihatan Kuala Igan
355.	Klinik Kesihatan Kuala Kangsar
356.	Klinik Kesihatan Kuala Kemaman
357.	Klinik Kesihatan Kuala Krau
358.	Klinik Kesihatan Kuala Kurau
359.	Klinik Kesihatan Kuala Lawas
360.	Klinik Kesihatan Kuala Lumpur
361.	Klinik Kesihatan Kuala Matu
362.	Klinik Kesihatan Kuala Medalam
363.	Klinik Kesihatan Kuala Oya
364.	Klinik Kesihatan Kuala Penyu
365.	Klinik Kesihatan Kuala Perlis
366.	Klinik Kesihatan Kuala Pilah
367.	Klinik Kesihatan Kuala Rompin
368.	Klinik Kesihatan Kuala Sanglang
369.	Klinik Kesihatan Kuala Sepetang
370.	Klinik Kesihatan Kuala Sungai Baru
371.	Klinik Kesihatan Kuala Tahan
372.	Klinik Kesihatan Kuala Tatau
373.	Klinik Kesihatan Kuala Tembeling
374.	Klinik Kesihatan Kuala Tomani
375.	Klinik Kesihatan Kuarters KLIA
376.	Klinik Kesihatan Kubang Kerian
377.	Klinik Kesihatan Kubur Panjang
378.	Klinik Kesihatan Kulai Besar
379.	Klinik Kesihatan Kulim
380.	Klinik Kesihatan Labok
381.	Klinik Kesihatan Ladang Sawit
382.	Klinik Kesihatan Ladang Tiga
383.	Klinik Kesihatan Lambor Kiri
384.	Klinik Kesihatan Lanang
385.	Klinik Kesihatan Lanchang
386.	Klinik Kesihatan Langkap
387.	Klinik Kesihatan Langkon
388.	Klinik Kesihatan Lassi
389.	Klinik Kesihatan Lau King Howe
390.	Klinik Kesihatan Lawas
391.	Klinik Kesihatan Lawin
392.	Klinik Kesihatan Lekir
393.	Klinik Kesihatan Lembah Klau
394.	Klinik Kesihatan Lenga, Muar
395.	Klinik Kesihatan Lenggeng
396.	Klinik Kesihatan Lenggong
397.	Klinik Kesihatan Lepar Utara 4
398.	Klinik Kesihatan Lingga
399.	Klinik Kesihatan Linggi
400.	Klinik Kesihatan Lintang
401.	Klinik Kesihatan Lio Mato
402.	Klinik Kesihatan Long Banga
403.	Klinik Kesihatan Long Bedian
404.	Klinik Kesihatan Long Bemang
405.	Klinik Kesihatan Long Jeeh
406.	Klinik Kesihatan Long Jegan
407.	Klinik Kesihatan Long Kevok
408.	Klinik Kesihatan Long Lama
409.	Klinik Kesihatan Long Lellang
410.	Klinik Kesihatan Long Loyang
411.	Klinik Kesihatan Long Miri
412.	Klinik Kesihatan Long Naah
413.	Klinik Kesihatan Long Panai
414.	Klinik Kesihatan Long Pillah
415.	Klinik Kesihatan Long San
416.	Klinik Kesihatan Long Semadoh
417.	Klinik Kesihatan Long Sukang
418.	Klinik Kesihatan Long Teran
419.	Klinik Kesihatan Long Teru
420.	Klinik Kesihatan Lubok Antu
421.	Klinik Kesihatan Lubok China
422.	Klinik Kesihatan Lubok Tapang
423.	Klinik Kesihatan Lubuk Buntar
424.	Klinik Kesihatan Lubuk Merbau

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#	Ministry of Health Clinics
425.	Klinik Kesihatan Lui Muda
426.	Klinik Kesihatan Lunas
427.	Klinik Kesihatan Lundang Paku
428.	Klinik Kesihatan Lurah Bilut (Felda)
429.	Klinik Kesihatan Lusong Laku
430.	Klinik Kesihatan Luyang
431.	Klinik Kesihatan Macap Baru
432.	Klinik Kesihatan Machan
433.	Klinik Kesihatan Mahang
434.	Klinik Kesihatan Mahligai
435.	Klinik Kesihatan Malim Nawar
436.	Klinik Kesihatan Maludam
437.	Klinik Kesihatan Manik Urai
438.	Klinik Kesihatan Manjoi
439.	Klinik Kesihatan Manong
440.	Klinik Kesihatan Mantin
441.	Klinik Kesihatan Maran
442.	Klinik Kesihatan Masiat
443.	Klinik Kesihatan Masjid Tanah
444.	Klinik Kesihatan Matu
445.	Klinik Kesihatan Mela Lipis
446.	Klinik Kesihatan Melalap
447.	Klinik Kesihatan Mempaga (Felda PK Fasa 1)
448.	Klinik Kesihatan Menglembu
449.	Klinik Kesihatan Mentu
450.	Klinik Kesihatan Merapoh (Fasa 1)
451.	Klinik Kesihatan Merapok
452.	Klinik Kesihatan Merbau Pulas
453.	Klinik Kesihatan Merbok
454.	Klinik Kesihatan Merindun
455.	Klinik Kesihatan Merlimau
456.	Klinik Kesihatan Munggu Lallang
457.	Klinik Kesihatan Muntri Street Pulau Pinang
458.	Klinik Kesihatan Nabawan
459.	Klinik Kesihatan Naga Baoh
460.	Klinik Kesihatan Naga Taroh
461.	Klinik Kesihatan Naka
462.	Klinik Kesihatan Nanga Atoi
463.	Klinik Kesihatan Nanga Bangkit
464.	Klinik Kesihatan Nanga Bena
465.	Klinik Kesihatan Nanga Budu
466.	Klinik Kesihatan Nanga Ensiring
467.	Klinik Kesihatan Nanga Entabai
468.	Klinik Kesihatan Nanga Entaih
469.	Klinik Kesihatan Nanga Entalau
470.	Klinik Kesihatan Nanga Entawau
471.	Klinik Kesihatan Nanga Gaat
472.	Klinik Kesihatan Nanga Ibau
473.	Klinik Kesihatan Nanga Kara
474.	Klinik Kesihatan Nanga Kesit
475.	Klinik Kesihatan Nanga Lawih
476.	Klinik Kesihatan Nanga Maong
477.	Klinik Kesihatan Nanga Medamit
478.	Klinik Kesihatan Nanga Melinau
479.	Klinik Kesihatan Nanga Merirai
480.	Klinik Kesihatan Nanga Merit
481.	Klinik Kesihatan Nanga Mujong
482.	Klinik Kesihatan Nanga Passin
483.	Klinik Kesihatan Nanga Patoh
484.	Klinik Kesihatan Nanga Semah
485.	Klinik Kesihatan Nanga Tau
486.	Klinik Kesihatan Nanga Tekalit
487.	Klinik Kesihatan Nanga Tiga
488.	Klinik Kesihatan Nanga Wak
489.	Klinik Kesihatan Nenasi
490.	Klinik Kesihatan Ngungun
491.	Klinik Kesihatan Nibong Tebal
492.	Klinik Kesihatan Nilai
493.	Klinik Kesihatan Nyabor
494.	Klinik Kesihatan Nyalau
495.	Klinik Kesihatan Padang Besar
496.	Klinik Kesihatan Padang Lebar
497.	Klinik Kesihatan Padang Luas
498.	Klinik Kesihatan Padang Matsirat
499.	Klinik Kesihatan Padang Rengas
500.	Klinik Kesihatan Padang Rumbia
501.	Klinik Kesihatan Padang Sebang
502.	Klinik Kesihatan Padang Serai
503.	Klinik Kesihatan Padang Tengku
504.	Klinik Kesihatan Padawan
505.	Klinik Kesihatan Pagalungan
506.	Klinik Kesihatan Pahi
507.	Klinik Kesihatan Paka
508.	Klinik Kesihatan Pakan
509.	Klinik Kesihatan Paloh
510.	Klinik Kesihatan Palong 4,5,6
511.	Klinik Kesihatan Palong 7&8 (Felda)
512.	Klinik Kesihatan Palong 9,10,11
513.	Klinik Kesihatan Pangkalan Amo
514.	Klinik Kesihatan Pantai
515.	Klinik Kesihatan Pantai Remis
516.	Klinik Kesihatan Pantu
517.	Klinik Kesihatan Parit
518.	Klinik Kesihatan Parit Raja
519.	Klinik Kesihatan Parit Sulong
520.	Klinik Kesihatan Parit Yaani

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#	Ministry of Health Clinics
521.	Klinik Kesihatan Parit Yusof, Muar
522.	Klinik Kesihatan Pasir Panjang
523.	Klinik Kesihatan Pasir Pinji
524.	Klinik Kesihatan Passai Siong
525.	Klinik Kesihatan Payamas, Tangkak
526.	Klinik Kesihatan Pedas
527.	Klinik Kesihatan Pekan Tajau
528.	Klinik Kesihatan Pendang
529.	Klinik Kesihatan Penerok
530.	Klinik Kesihatan Penganan
531.	Klinik Kesihatan Pengkalan Chepa
532.	Klinik Kesihatan Pengkalan Hulu
533.	Klinik Kesihatan Pengkalan Kubor
534.	Klinik Kesihatan Pensiangan
535.	Klinik Kesihatan Peramu Jaya
536.	Klinik Kesihatan Perantau Damai
537.	Klinik Kesihatan Peringat
538.	Klinik Kesihatan Peringgiti
539.	Klinik Kesihatan Perol
540.	Klinik Kesihatan Pertang
541.	Klinik Kesihatan Perwira Jaya
542.	Klinik Kesihatan Petaling Bahagia
543.	Klinik Kesihatan Plang
544.	Klinik Kesihatan Poi/Menalun
545.	Klinik Kesihatan Pokok Assam
546.	Klinik Kesihatan Police Field Force
547.	Klinik Kesihatan Port Dickson
548.	Klinik Kesihatan Primer
549.	Klinik Kesihatan Pulau Chondong
550.	Klinik Kesihatan Pulau Pangkor
551.	Klinik Kesihatan Punan Bah
552.	Klinik Kesihatan Purun
553.	Klinik Kesihatan Pusa
554.	Klinik Kesihatan Pusing
555.	Klinik Kesihatan Putatan
556.	Klinik Kesihatan Putrajaya
557.	Klinik Kesihatan Rantau
558.	Klinik Kesihatan Rantau Panjang
559.	Klinik Kesihatan Rassau
560.	Klinik Kesihatan Redang Panjang
561.	Klinik Kesihatan Rejang
562.	Klinik Kesihatan Rembau
563.	Klinik Kesihatan Roban
564.	Klinik Kesihatan Sadong Jaya
565.	Klinik Kesihatan Sambir
566.	Klinik Kesihatan Sampadi
567.	Klinik Kesihatan Sangau
568.	Klinik Kesihatan Sanggang
569.	Klinik Kesihatan Santubong
570.	Klinik Kesihatan Sarikei
571.	Klinik Kesihatan Sauk
572.	Klinik Kesihatan Sebangau
573.	Klinik Kesihatan Sebauh
574.	Klinik Kesihatan Seberang Perak
575.	Klinik Kesihatan Sebuyau
576.	Klinik Kesihatan Sekalong
577.	Klinik Kesihatan Sekeroh
578.	Klinik Kesihatan Sekuau
579.	Klinik Kesihatan Selama
580.	Klinik Kesihatan Selandar
581.	Klinik Kesihatan Selangau
582.	Klinik Kesihatan Selekoh
583.	Klinik Kesihatan Selising
584.	Klinik Kesihatan Semarang
585.	Klinik Kesihatan Sematan
586.	Klinik Kesihatan Semera
587.	Klinik Kesihatan Semerah
588.	Klinik Kesihatan Sendayan (Felda)
589.	Klinik Kesihatan Sentul
590.	Klinik Kesihatan Sepulut
591.	Klinik Kesihatan Serasot
592.	Klinik Kesihatan Serdang
593.	Klinik Kesihatan Seremban
594.	Klinik Kesihatan Serting Hilir
595.	Klinik Kesihatan Setapak
596.	Klinik Kesihatan Siburan
597.	Klinik Kesihatan Sik (KKIA)
598.	Klinik Kesihatan Simpang Ampat
599.	Klinik Kesihatan Simpang Bekoh
600.	Klinik Kesihatan Simpang Durian
601.	Klinik Kesihatan Simpang Empat
602.	Klinik Kesihatan Simpang Pelangai
603.	Klinik Kesihatan Singai
604.	Klinik Kesihatan Sitiawan
605.	Klinik Kesihatan Skim Tunoh
606.	Klinik Kesihatan Skrang
607.	Klinik Kesihatan Slim River
608.	Klinik Kesihatan Song
609.	Klinik Kesihatan Sook
610.	Klinik Kesihatan Spaoh
611.	Klinik Kesihatan Sri Aman
612.	Klinik Kesihatan Sri Gading
613.	Klinik Kesihatan Sri Medan
614.	Klinik Kesihatan Sri Menanti
615.	Klinik Kesihatan Stoh Rambungan
616.	Klinik Kesihatan Suai LKTS

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#	Ministry of Health Clinics
617.	Klinik Kesihatan Suai Tegaging
618.	Klinik Kesihatan Sukau
619.	Klinik Kesihatan Sundar
620.	Klinik Kesihatan Sungai Arip
621.	Klinik Kesihatan Sungai Bayor
622.	Klinik Kesihatan Sungai Besi
623.	Klinik Kesihatan Sungai Dua, Pulau Pinang
624.	Klinik Kesihatan Sungai Kerang
625.	Klinik Kesihatan Sungai Koyan
626.	Klinik Kesihatan Sungai Koyan
627.	Klinik Kesihatan Sungai Lembing
628.	Klinik Kesihatan Sungai Limau Dalam
629.	Klinik Kesihatan Sungai Mati
630.	Klinik Kesihatan Sungai Pinang
631.	Klinik Kesihatan Sungai Rambai
632.	Klinik Kesihatan Sungai Sumun
633.	Klinik Kesihatan Sungai Tekam Utara
634.	Klinik Kesihatan Sungai Tiang
635.	Klinik Kesihatan Sungai Tong
636.	Klinik Kesihatan Sungai Udang
637.	Klinik Kesihatan Sungkai
638.	Klinik Kesihatan Sunsuron
639.	Klinik Kesihatan Taginambur
640.	Klinik Kesihatan Taman Bandar Baru
641.	Klinik Kesihatan Taman Negara Mulu
642.	Klinik Kesihatan Taman Selasih
643.	Klinik Kesihatan Tanah Puteh
644.	Klinik Kesihatan Tanah Rata
645.	Klinik Kesihatan Tang Lapadan
646.	Klinik Kesihatan Tanjung Bijat
647.	Klinik Kesihatan Tanjung Bungah, Pulau Pinang
648.	Klinik Kesihatan Tanjung Embang
649.	Klinik Kesihatan Tanjung Gemok
650.	Klinik Kesihatan Tanjung Kling
651.	Klinik Kesihatan Tanjung Malim
652.	Klinik Kesihatan Tanjung Manis
653.	Klinik Kesihatan Tanjung Piandang
654.	Klinik Kesihatan Tanjung Rambutan
655.	Klinik Kesihatan Tanjung Tualang
656.	Klinik Kesihatan Tapah
657.	Klinik Kesihatan Tarat
658.	Klinik Kesihatan Tatau
659.	Klinik Kesihatan Tebakang
660.	Klinik Kesihatan Tebedu
661.	Klinik Kesihatan Tebrau
662.	Klinik Kesihatan Tekajong
663.	Klinik Kesihatan Tekek, Pulau Tioman
664.	Klinik Kesihatan Telaga Air
665.	Klinik Kesihatan Teluk Medan
666.	Klinik Kesihatan Temangan
667.	Klinik Kesihatan Temerloh
668.	Klinik Kesihatan Tendong
669.	Klinik Kesihatan Teng Bukap
670.	Klinik Kesihatan Tengkeru
671.	Klinik Kesihatan Terachi
672.	Klinik Kesihatan Tersang
673.	Klinik Kesihatan Tian
674.	Klinik Kesihatan Titi
675.	Klinik Kesihatan Tok Uban
676.	Klinik Kesihatan Tongkang Pecah
677.	Klinik Kesihatan Triang
678.	Klinik Kesihatan Triboh
679.	Klinik Kesihatan Trolak Selatan
680.	Klinik Kesihatan Trong
681.	Klinik Kesihatan Tronoh
682.	Klinik Kesihatan Trusan
683.	Klinik Kesihatan Tubau
684.	Klinik Kesihatan Tudan
685.	Klinik Kesihatan Tuie
686.	Klinik Kesihatan Tulid
687.	Klinik Kesihatan Tumpat
688.	Klinik Kesihatan Tun Openg
689.	Klinik Kesihatan Ujong Pasir
690.	Klinik Kesihatan Ulu Dedap
691.	Klinik Kesihatan Ulu Gali
692.	Klinik Kesihatan Ulu Teru
693.	Klinik Kesihatan Uma Sambop
694.	Klinik Kesihatan Umbai
695.	Klinik Kesihatan Wakaf Bharu
696.	Klinik Kesihatan Wakaf Che Yeh
697.	Klinik Kesihatan Yan
698.	Klinik Kesihatan Yong Peng
699.	Klinik Pesakit Luar Johor Bahru, Jln Mahmoodiah
700.	Pejabat Kesihatan Pelabuhan Batu Maung
701.	Pejabat Kesihatan Pelabuhan Butterworth
702.	Poliklinik Komuniti Air Puteh
703.	Poliklinik Komuniti Air Tawar 2
704.	Poliklinik Komuniti Ajil
705.	Poliklinik Komuniti Al-Muktafi Billah Shah
706.	Poliklinik Komuniti Alor Janggus
707.	Poliklinik Komuniti Ampang
708.	Poliklinik Komuniti Apas Balung
709.	Poliklinik Komuniti Ayer Baloi
710.	Poliklinik Komuniti Ayer Hitam, Kubang Pasu
711.	Poliklinik Komuniti Bagan Terap

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#	Ministry of Health Clinics
712.	Poliklinik Komuniti Banai
713.	Poliklinik Komuniti Bandar
714.	Poliklinik Komuniti Bandar Baru Bangi
715.	Poliklinik Komuniti Bandar Jitra
716.	Poliklinik Komuniti Bandar Maharani
717.	Poliklinik Komuniti Bandar Mas
718.	Poliklinik Komuniti Bandar Penawar
719.	Poliklinik Komuniti Bandar Permaisuri
720.	Poliklinik Komuniti Bandar Putra
721.	Poliklinik Komuniti Bandar Tenggara
722.	Poliklinik Komuniti Batang Berjuntai
723.	Poliklinik Komuniti Batu 15
724.	Poliklinik Komuniti Batu 9
725.	Poliklinik Komuniti Batu Anam
726.	Poliklinik Komuniti Batu Arang
727.	Poliklinik Komuniti Batu Rakit
728.	Poliklinik Komuniti Bayan Baru
729.	Poliklinik Komuniti Bayan Lepas
730.	Poliklinik Komuniti Bekok
731.	Poliklinik Komuniti Benut
732.	Poliklinik Komuniti Beranang
733.	Poliklinik Komuniti Berapit
734.	Poliklinik Komuniti Bongkol
735.	Poliklinik Komuniti Bukit Bendera
736.	Poliklinik Komuniti Bukit Besar
737.	Poliklinik Komuniti Bukit Besi
738.	Poliklinik Komuniti Bukit Changgang
739.	Poliklinik Komuniti Bukit Garam
740.	Poliklinik Komuniti Bukit Jambul
741.	Poliklinik Komuniti Bukit Kuda
742.	Poliklinik Komuniti Bukit Minyak
743.	Poliklinik Komuniti Bukit Panchor
744.	Poliklinik Komuniti Bukit Payong
745.	Poliklinik Komuniti Bukit Waha
746.	Poliklinik Komuniti Buloh Kasap
747.	Poliklinik Komuniti Bundu Tuhan
748.	Poliklinik Komuniti Butterworth
749.	Poliklinik Komuniti Chaah
750.	Poliklinik Komuniti Changlun
751.	Poliklinik Komuniti Dandun
752.	Poliklinik Komuniti Dengkil
753.	Poliklinik Komuniti Endau
754.	Poliklinik Komuniti Felda Sahabat
755.	Poliklinik Komuniti Felda Umas-Umas
756.	Poliklinik Komuniti Gelang Patah
757.	Poliklinik Komuniti Gersik
758.	Poliklinik Komuniti Hospital Daro
759.	Poliklinik Komuniti Hospital Sri Aman
760.	Poliklinik Komuniti Hulu Langat (Klinik Kesihatan Batu 13 1/4)
761.	Poliklinik Komuniti Ijok
762.	Poliklinik Komuniti Inanam
763.	Poliklinik Komuniti Jabi
764.	Poliklinik Komuniti Jalan Mengkibol (Poliklinik Komuniti Kluang)
765.	Poliklinik Komuniti Jalan Putra
766.	Poliklinik Komuniti Jemaluang
767.	Poliklinik Komuniti Jementah
768.	Poliklinik Komuniti Jenjarom
769.	Poliklinik Komuniti Jeram
770.	Poliklinik Komuniti Jerangau
771.	Poliklinik Komuniti Jerteh
772.	Poliklinik Komuniti Kahang Batu 22
773.	Poliklinik Komuniti Kahang Timur
774.	Poliklinik Komuniti Kaingaran
775.	Poliklinik Komuniti Kajang
776.	Poliklinik Komuniti Kalumpang, Hulu Selangor
777.	Poliklinik Komuniti Kalumpang, Pitas
778.	Poliklinik Komuniti Kampung Kenangan Tun Dr. Ismail
779.	Poliklinik Komuniti Kampung Lalang
780.	Poliklinik Komuniti Kampung Majidee
781.	Poliklinik Komuniti Kampung Rahmat
782.	Poliklinik Komuniti Kampung Raja Besut
783.	Poliklinik Komuniti Kampung Soeharto
784.	Poliklinik Komuniti Kanchong Darat
785.	Poliklinik Komuniti Kapar
786.	Poliklinik Komuniti Karakit
787.	Poliklinik Komuniti Kayu Ara Pasong
788.	Poliklinik Komuniti Kelana Jaya
789.	Poliklinik Komuniti Kepala Batas
790.	Poliklinik Komuniti Kerteh
791.	Poliklinik Komuniti Ketengah Jaya
792.	Poliklinik Komuniti Kijal
793.	Poliklinik Komuniti Kiulu
794.	Poliklinik Komuniti Klang
795.	Poliklinik Komuniti Kodiang
796.	Poliklinik Komuniti Kota Beaufort
797.	Poliklinik Komuniti Kota Sarang Semut
798.	Poliklinik Komuniti Kuala Abang
799.	Poliklinik Komuniti Kuala Berang
800.	Poliklinik Komuniti Kuala Besut
801.	Poliklinik Komuniti Kuala Kedah
802.	Poliklinik Komuniti Kuala Ketil
803.	Poliklinik Komuniti Kuala Kubu Bharu
804.	Poliklinik Komuniti Kuala Sapi

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#	Ministry of Health Clinics
805.	Poliklinik Komuniti Kuala Sedili Besar
806.	Poliklinik Komuniti Kuala Selangor
807.	Poliklinik Komuniti Kuala Telemong
808.	Poliklinik Komuniti Kuala Terengganu
809.	Poliklinik Komuniti Kuamut
810.	Poliklinik Komuniti Kuang
811.	Poliklinik Komuniti Kubang Semang
812.	Poliklinik Komuniti Kunak
813.	Poliklinik Komuniti Kundasang
814.	Poliklinik Komuniti Kupang
815.	Poliklinik Komuniti Labis
816.	Poliklinik Komuniti Laka Temin
817.	Poliklinik Komuniti Langgar
818.	Poliklinik Komuniti Larkin
819.	Poliklinik Komuniti Layang-Layang Poliklinik
820.	Komuniti Lok Heng
821.	Poliklinik Komuniti Mak Mandin
822.	Poliklinik Komuniti Malau
823.	Poliklinik Komuniti Manir
824.	Poliklinik Komuniti Marang
825.	Poliklinik Komuniti Masai
826.	Poliklinik Komuniti Matunggung
827.	Poliklinik Komuniti Meligan
828.	Poliklinik Komuniti Membakut
829.	Poliklinik Komuniti Mendulong
830.	Poliklinik Komuniti Menggatal
831.	Poliklinik Komuniti Menumbuk
832.	Poliklinik Komuniti Merchang
833.	Poliklinik Komuniti Merotai Besar Poliklinik
834.	Komuniti Mersing
835.	Poliklinik Komuniti Mersing Kanan
836.	Poliklinik Komuniti Meru
837.	Poliklinik Komuniti Nanga Engkuah
838.	Poliklinik Komuniti Nangka Lotong
839.	Poliklinik Komuniti Nangoh / Rumidi
840.	Poliklinik Komuniti OPD Hospital Kuala Lipis
841.	Poliklinik Komuniti OPD Hospital Kuala Terengganu
842.	Poliklinik Komuniti OPD Hospital Muadzam Shah
843.	Poliklinik Komuniti OPD Hospital Raub
844.	Poliklinik Komuniti Padas Damit
845.	Poliklinik Komuniti Paginatan
846.	Poliklinik Komuniti Pagoh
847.	Poliklinik Komuniti Paitan
848.	Poliklinik Komuniti Paloh, Kluang
849.	Poliklinik Komuniti Pandamaran
850.	Poliklinik Komuniti Pantai
851.	Poliklinik Komuniti Parit Bakar
852.	Poliklinik Komuniti Parit Baru
853.	Poliklinik Komuniti Parit Ismail
854.	Poliklinik Komuniti Parit Jawa
855.	Poliklinik Komuniti Parit Panjang
856.	Poliklinik Komuniti Parit Sri Merlong
857.	Poliklinik Komuniti Pasir Akar
858.	Poliklinik Komuniti Pasir Gudang
859.	Poliklinik Komuniti Pekan Air Panas
860.	Poliklinik Komuniti Pekan Nanas
861.	Poliklinik Komuniti Pelabuhan Klang
862.	Poliklinik Komuniti Pemanis (Felda) Poliklinik
863.	Komuniti Penaga
864.	Poliklinik Komuniti Penampang
865.	Poliklinik Komuniti Penangah
866.	Poliklinik Komuniti Pengerang
867.	Poliklinik Komuniti Pengkalan Berangan
868.	Poliklinik Komuniti Perancangan
869.	Poliklinik Komuniti Pokok Sena
870.	Poliklinik Komuniti Pontian
871.	Poliklinik Komuniti Prai
872.	Poliklinik Komuniti Puchong
873.	Poliklinik Komuniti Pulau Bum-Bum
874.	Poliklinik Komuniti Pulau Indah
875.	Poliklinik Komuniti Pulau Ketam
876.	Poliklinik Komuniti Pulau Tambisan
877.	Poliklinik Komuniti Rasa
878.	Poliklinik Komuniti Rawang
879.	Poliklinik Komuniti Renggam
880.	Poliklinik Komuniti Rengit
881.	Poliklinik Komuniti Sabak Bernam
882.	Poliklinik Komuniti Sagil
883.	Poliklinik Komuniti Salak
884.	Poliklinik Komuniti Seberang Jaya
885.	Poliklinik Komuniti Seberang Takir
886.	Poliklinik Komuniti Segamat
887.	Poliklinik Komuniti Sekinchan
888.	Poliklinik Komuniti Selayang Baru
889.	Poliklinik Komuniti Semenyih
890.	Poliklinik Komuniti Senggarang
891.	Poliklinik Komuniti Sening
892.	Poliklinik Komuniti Serendah
893.	Poliklinik Komuniti Seri Bandi
894.	Poliklinik Komuniti Seri Kembangan
895.	Poliklinik Komuniti Seri Langkap
896.	Poliklinik Komuniti Serkat
897.	Poliklinik Komuniti Shah Alam
898.	Poliklinik Komuniti Sijangkang

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY***Primary Care Clinics participating in NMUS survey***

#	<i>Ministry of Health Clinics</i>	
899	Poliklinik Komuniti Sikuati	928. Poliklinik Komuniti Tanglin
900.	Poliklinik Komuniti Silabukan Scheme	929. Poliklinik Komuniti Tanjung Sedili
901.	Poliklinik Komuniti Simpang Ampat Poliklinik	930. Poliklinik Komuniti Tanjung Karang
902.	Komuniti Simpang Empat Poliklinik Komuniti	931. Poliklinik Komuniti Tanjung Sepat
903.	Simpang Kuala	932. Poliklinik Komuniti Tasek Gelugor
904.	Poliklinik Komuniti Simpang Renggam	933. Poliklinik Komuniti Tawar
905.	Poliklinik Komuniti Sindumin	934. Poliklinik Komuniti Telaga
906.	Poliklinik Komuniti Sri Medang/Gong Tok Pek	935. Poliklinik Komuniti Telipok
907.	Poliklinik Komuniti Sri Menanti, Muar Poliklinik	936. Poliklinik Komuniti Telok Datok
908.	Komuniti Suan Lamba	937. Poliklinik Komuniti Telok Panglima Garang
909.	Poliklinik Komuniti Sungai Aceh	938. Poliklinik Komuniti Teluk Bahang
910.	Poliklinik Komuniti Sungai Air Tawar Poliklinik	939. Poliklinik Komuniti Telupid
911.	Komuniti Sungai Asap	940. Poliklinik Komuniti Tenggaroh II (Felda)
912.	Poliklinik Komuniti Sungai Besar	941. Poliklinik Komuniti Tenghilan
913.	Poliklinik Komuniti Sungai Buloh	942. Poliklinik Komuniti Tengawang
914.	Poliklinik Komuniti Sungai Dua Butterworth	943. Poliklinik Komuniti Tenglu
915.	Poliklinik Komuniti Sungai Manila	944. Poliklinik Komuniti Timbua
916.	Poliklinik Komuniti Sungai Pelek	945. Poliklinik Komuniti Tinangol
917.	Poliklinik Komuniti Sungai Rengit	946. Poliklinik Komuniti Tongod
918.	Poliklinik Komuniti Sungai Selisek	947. Poliklinik Komuniti Tungku
919.	Poliklinik Komuniti Sungai Tamang	948. Poliklinik Komuniti Tunjang
920.	Poliklinik Komuniti Sungai-Sungai	949. Poliklinik Komuniti Ulu Belitong
921.	Poliklinik Komuniti Taman Ehsan	950. Poliklinik Komuniti Ulu Dusun
922.	Poliklinik Komuniti Taman Kenangan	951. Poliklinik Komuniti Ulu Tiram
923.	Poliklinik Komuniti Taman Tun Aminah	952. Poliklinik Komuniti Ulu Yam Bharu
924.	Poliklinik Komuniti Tamparuli	953. Poliklinik Komuniti Wakaf Tapai
925.	Poliklinik Komuniti Tampoi	954. Poliklinik Komuniti Weston
926.	Poliklinik Komuniti Tandek	955. Poliklinik Penambang
927.	Poliklinik Komuniti Tangkarason	

#	<i>Private Clinics</i>	
1.	24 Jam Poliklinik Yap	17. City Medical Centre
2.	Ali Klinik	18. City Poliklinik
3.	Aman Putri Dispensary	19. Clinic Ho
4.	Asia Clinic	20. Clinic Joseph
5.	ASP Medical Clinic	21. Clinic Wellness Lab, Cheras
6.	B. Kong's Clinic	22. Dindings Poliklinik
7.	Bakti Healthcare - NSTP	23. Ding Polyklinik Dan Surgeri
8.	Bina Kelinik	24. Dispensary Martin dan Lalita
9.	Care Clinic Pudu	25. Dispensary Sharil
10.	Chan Clinic, Kuching	26. Dora Medical Clinic
11.	Chan Clinic, Miri	27. Dr Amir Abbas-KMA Sdn Bhd
12.	Cheah & Lim Medical Associates	28. Dr Jaafar Dan Rakan-Rakan
13.	Chen Dispensary	29. Dr John Yeo's Clinic, Batu Niah
14.	Chong's Clinic	30. Dr Kueh's Clinic
15.	Chu Hwa Dispensary	31. Dr Leela Ratos dan Rakan-Rakan Sdn Bhd, Jln Pudu
16.	Chye Clinic	

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#	Private Clinics
32.	Dr Mohamed Mydin & Rakan-Rakan Sdn Bhd, Jln Ampang
33.	Dr Mohamed Mydin & Rakan-Rakan Sdn Bhd, Jln Tun Razak
34.	Dr Oorloff, Rajakumar & Partners
35.	Dr S. Vijayakumar
36.	Dr Yap's Clinic
37.	Dr. Leela Ratos dan Rakan-Rakan
38.	Drs Abraham George & Partners
39.	Drs Fateh, Mydin dan Rakan-Rakan Poliklinik & Surgeri
40.	Drs Young Newton & Partners
41.	Drs Young Newton & Rakan-Rakan, Brickfields
42.	Drs Young Newton & Rakan-Rakan, Damansara
43.	Drs Young Newton & Rakan-Rakan, Jln Ampang
44.	Elizabeth Medical Centre Sdn Bhd
45.	Gill Medical Centre
46.	Global Doctors (Malaysia) Sdn Bhd
47.	Goay Klinik
48.	Goh Clinic
49.	GP Klinik
50.	Gul Medical Centre
51.	Healthcare Clinic
52.	Healthcare Medical Centre
53.	Horeb Sdn Bhd, Jln Ampang
54.	Horeb Sdn Bhd, Jln P. Ramlee
55.	Horeb Sdn Bhd, Leboh Ampang
56.	ING Insurance Berhad In-House Clinic Intan
57.	Poliklinik & Surgeri, Tmn Arowana
58.	Island Klinik, Esplanade
59.	Island Klinik, Island Glades
60.	Jaya Clinic
61.	Jose Clinic & Surgery
62.	Klinik & Surgeri Templar
63.	Klinik Ganesan Sdn. Bhd
64.	Klinik Gopi, Jln Market
65.	Klinik Gopi, Tmn Desa Permai
66.	Klinik Liu
67.	Klinik Ng
68.	Klinik Poh Soon Sim Sdn. Bhd
69.	Klinik Ratna
70.	Klinik S Suren
71.	Klinik Selvam
72.	Klinik Thurai
73.	Klinik Woo & Hong
74.	Khong Klinik
75.	Kiara Medical Clinic
76.	Klinik Australia
77.	Klinik & Surgeri Bakti
78.	Klinik & Surgeri Delima
79.	Klinik & Surgeri Dorai
80.	Klinik & Surgeri Dr Harvinder
81.	Klinik & Surgeri Gill
82.	Klinik & Surgeri Lee, Seri Kembangan
83.	Klinik & Surgeri Lee, Tmn Ros
84.	Klinik & Surgeri Ong
85.	Klinik & Surgeri Sipitang
86.	Klinik & Surgeri Stanley Chong
87.	Klinik & Surgeri Uni-Sentul
88.	Klinik & Surgery Guna
89.	Klinik & Wisma Bersalin Bhajan
90.	Klinik Ahmad Nizam & Surgeri
91.	Klinik Aishah
92.	Klinik Akashah
93.	Klinik Al' Azhim, Klebang
94.	Klinik Al Farabi Jaya Gading
95.	Klinik Al Ikhwan
96.	Klinik Alam Medic, Tmn OUG
97.	Klinik Al-Azhim Tampin
98.	Klinik Ali
99.	Klinik Al-Insaan
100.	Klinik Alor Setar
101.	Klinik Amal
102.	Klinik Aman, Shah Alam
103.	Klinik Amardeev & Surgery
104.	Klinik Aminah, Hulu Kelang
105.	Klinik Aminah, Pelabuhan Klang
106.	Klinik Amirtham
107.	Klinik Anis, Shah Alam
108.	Klinik Anita
109.	Klinik Anthony
110.	Klinik Ariffin
111.	Klinik Arun, Sentul
112.	Klinik Asean
113.	Klinik Asia, Bukit Bintang
114.	Klinik Asniza, Tmn Pandan Permai
115.	Klinik Awana Kijal
116.	Klinik Baba
117.	Klinik Bakti, Bangsar
118.	Klinik Bakti, Cheras
119.	Klinik Bala, Georgetown
120.	Klinik Bala, Paya Terubong
121.	Klinik Baling
122.	Klinik Ban
123.	Klinik Bandar Baru
124.	Klinik Bandar Raya

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Private Clinics
125.	Klinik Bandaran Sdn. Bhd, Jalan Bunga Melor
126.	Klinik Bandaran Sdn. Bhd, Section 15
127.	Klinik Bandaran Sdn. Bhd, Section 25
128.	Klinik Bandaran Sdn. Bhd, SS 15/4D
129.	Klinik Baru Jerneh
130.	Klinik Berkat
131.	Klinik Bersatu 16 Jam, Tmn Chai Leng
132.	Klinik Bersatu Kulim
133.	Klinik Bersatu, Jln Raja Uda
134.	Klinik Bersatu, Tikam Batu
135.	Klinik Bersatu, Tmn Ipoh Timur
136.	Klinik Bersatu, Tmn Seruling
137.	Klinik Bintulu
138.	Klinik Boon
138.	Klinik Bukit Beruang
140.	Klinik Bukit Jambul
141.	Klinik Bukit Maluri & Surgeri
142.	Klinik C F Chong
143.	Klinik C. S. Ooi
144.	Klinik Care Poliklinik dan Surgeri
145.	Klinik Catterall, Khoo and Raja Malek, Bangunan Ming
146.	Klinik Catterall, Khoo and Raja Malek, Plaza Sentral
147.	Klinik Cempaka
148.	Klinik Ceria
149.	Klinik Chai
150.	Klinik Chan, Ipoh Garden
151.	Klinik Chang
152.	Klinik Chen
153.	Klinik Cheryan
154.	Klinik Chew
155.	Klinik Chiew
156.	Klinik Chin, Jln Sultan Idris Shah
157.	Klinik Chon
158.	Klinik Chong, Kota Bharu
159.	Klinik Chong, Seremban
160.	Klinik Choo
161.	Klinik Chua, Ayer Tawar
162.	Klinik Chua, Sitiawan
163.	Klinik Cinta Sayang, Jln Ibrahim
164.	Klinik City
165.	Klinik Dan Surgeri Dr Gan
166.	Klinik dan Surgeri Ng
167.	Klinik Dan Surgeri Putra
168.	Klinik Dan Surgeri Raju
169.	Klinik Dan Surgeri Soo
170.	Klinik dan Surgeri Sri Damansara
171.	Klinik Dedap
172.	Klinik Deepa
173.	Klinik Desa Jaya
174.	Klinik Desa, Desa Petaling
175.	Klinik Doktor Wong - Dr Wong Hua Seh
176.	Klinik Dorai
177.	Klinik Doshi
178.	Klinik Dr (Mrs) Law
179.	Klinik Dr Bazlan
180.	Klinik Dr C H Kong
181.	Klinik Dr Che Ku
182.	Klinik Dr Cheu Sdn Bhd
183.	Klinik Dr Chew
184.	Klinik Dr Chin Kon Yoon
185.	Klinik Dr Elvin Chong & Surgery
186.	Klinik Dr Hamid
187.	Klinik Dr Husna, Tmn Ria
188.	Klinik Dr Kamaludin
189.	Klinik Dr Karim
190.	Klinik Dr Lilian Hong
191.	Klinik Dr Mohamad
192.	Klinik Dr Najiha
193.	Klinik Dr Rahim Omar & Rakan-Rakan
194.	Klinik Dr Ramzi
195.	Klinik Dr Roslan, Baling
196.	Klinik Dr Roziah
197.	Klinik Dr Shashikala Sdn Bhd
198.	Klinik Dr Syed
199.	Klinik Dr Ting
200.	Klinik Dr Tuan Yusof
201.	Klinik Dr Umi
202.	Klinik Dr Wong & Dr Lau
203.	Klinik Dr Yong
204.	Klinik Dr. Aishah Dan Dr. Fisol
205.	Klinik Dr. S. Kumar
206.	Klinik Dr. Zakaria
207.	Klinik Eastern
208.	Klinik Efendi
209.	Klinik Ehsan
210.	Klinik Eirena
211.	Klinik Elizabeth, Tmn Makmor
212.	Klinik Elopura Sdn Bhd - Jln Tmn Mawar
213.	Klinik Elopura Sdn Bhd - Sedco Complex
214.	Klinik Endau
215.	Klinik Everlasting Sdn Bhd
216.	Klinik Faiza Woon
217.	Klinik Famili, Wangsa Melawati
218.	Klinik Family TTDI

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#	Private Clinics
219.	Klinik Fateh Mohd & Rakan-Rakan
220.	Klinik Fauzi
221.	Klinik Fauziah dan Rakan-Rakan
222.	Klinik Fettes Park
223.	Klinik G.S
224.	Klinik Ganesha Vijayam
225.	Klinik Genting Uni-Med
226.	Klinik George Jinivon
227.	Klinik Glugor
228.	Klinik Gopeng
229.	Klinik Grace
230.	Klinik Gunn
231.	Klinik Gurdip
232.	Klinik Hafiz
233.	Klinik Halizah
234.	Klinik Hamidah
235.	Klinik Harun
236.	Klinik Healthcare
237.	Klinik Hee Annandan Sdn Bhd
238.	Klinik Hemavathy
239.	Klinik Hidayah
240.	Klinik Hikmah
241.	Klinik Hisham
242.	Klinik Hj. Ayaz
243.	Klinik Ho, Senai
244.	Klinik Hock-San
245.	Klinik Hon
246.	Klinik Hossana
247.	Klinik Hsu dan Ng
248.	Klinik Husin
249.	Klinik Ian Ong
250.	Klinik Ibu Kota, Satok
251.	Klinik Idaman
252.	Klinik Idzham Sdn. Bhd, Danau Kota
253.	Klinik Idzham Sdn. Bhd, Gombak
254.	Klinik Idzham Sdn. Bhd, Tmn Melawati
255.	Klinik IHM
256.	Klinik Ikhwan & Surgeri
257.	Klinik Iman
258.	Klinik Imbi
259.	Klinik Indah
260.	Klinik Inter-Med, Jln Bangsar
261.	Klinik Ishak Dan Surgeri
262.	Klinik J.D.
263.	Klinik Jaafar & Partners
264.	Klinik Jalan Templer Sdn. Bhd.
265.	Klinik Jauhar
266.	Klinik Jaya
267.	Klinik Jaya, Subang Jaya
268.	Klinik Jayaraman, Jln Raja Laut
269.	Klinik Jelebu
270.	Klinik Jo
271.	Klinik Johor, Johor Jaya
272.	Klinik Joseph & Surgeri
273.	Klinik K G Mah
274.	Klinik K I P Sdn Bhd
275.	Klinik K J Lim, Medan Idaman
276.	Klinik K J Lim, Prima Setapak
277.	Klinik K S Tan
278.	Klinik K V Tan
279.	Klinik K. H. Ong
280.	Klinik Kalai
281.	Klinik Kanta
282.	Klinik Kapar, Tmn Kapar
283.	Klinik Karak
284.	Klinik Kaulsay
285.	Klinik Kayu Ara
286.	Klinik Keluarga
287.	Klinik Keluarga Aishah
288.	Klinik Keluarga Dan Surgeri
289.	Klinik Keluarga Dr. Hj. Mohd. Khadzali
290.	Klinik Keluarga, Danau Kota
291.	Klinik Khairat
292.	Klinik Khizan
293.	Klinik Koidupan
294.	Klinik Kok
295.	Klinik Kok Dan Surgeri
296.	Klinik Kok Dan Wendy, Klang
297.	Klinik Kok Dan Wendy, Subang Jaya
298.	Klinik Kok Wah
299.	Klinik Kok, Jln 17/1A
300.	Klinik Kok, Jln USJ 4/1
301.	Klinik Kong
302.	Klinik Kuantan
303.	Klinik Kucai
304.	Klinik Kumpulan Muslimah
305.	Klinik Kwok
306.	Klinik Lahad Datu (Cawangan)
307.	Klinik Langkawi, Pusat Bandar Kuah
308.	Klinik Lau
309.	Klinik Lee dan Chia
310.	Klinik Lee, Petaling Jaya
311.	Klinik Leela
312.	Klinik Leong, Puchong
313.	Klinik Leong, Kuala Terengganu
314.	Klinik Leong, Tmn Maluri

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#	Private Clinics
315.	Klinik Leong, Tmn Midah
316.	Klinik Leow
317.	Klinik Liew & Surgeri
318.	Klinik Lim, Seremban
319.	Klinik Lim, Kuching
320.	Klinik Lim & Lau
321.	Klinik Lim Chin Chong Sdn Bhd
322.	Klinik Lim, Jln Amarasegara
323.	Klinik Lin & Chandran
324.	Klinik Ling & Thoo
325.	Klinik Lo
326.	Klinik Low, Setapak
327.	Klinik Ludher, Jln Kelang Lama
328.	Klinik M Ghana
329.	Klinik Maamor
330.	Klinik Maharani
331.	Klinik Majid
332.	Klinik Makbul
333.	Klinik Malaysia, Sibul
334.	Klinik Malaysia, Tampoi
335.	Klinik Maniraj
336.	Klinik Mansor
337.	Klinik Maranatha
338.	Klinik Maria, Keningau
339.	Klinik Maria, Seremban
340.	Klinik Mariam
341.	Klinik Masjid Tanah
342.	Klinik Medan Jaya
343.	Klinik Medi Al-Hilmi
344.	Klinik Medi Pembangunan
345.	Klinik Medi Pesona
346.	Klinik Medic Bestari
347.	Klinik Medic City, Brickfields
348.	Klinik Medical Subang HI TEC
349.	Klinik Medicare, Jln Bangsar
350.	Klinik Medijaya, Century Garden
351.	Klinik Medijaya, Jln SS 25/2, Tmn Bkt Emas
352.	Klinik Medik 24-7, Bandar Country Homes
353.	Klinik Medimetro
354.	Klinik Medi-Pro, Jln Tun Razak
355.	Klinik Medi-Pro, Tmn Miharja
356.	Klinik Medisquare
357.	Klinik Mediviron, Bdr Sri Damansara
358.	Klinik Mediviron, Brickfields
359.	Klinik Mediviron, Sentul Raya
360.	Klinik Mediviron, Sri Hartamas
361.	Klinik Mediviron, Tmn Sentosa
362.	Klinik Meena
363.	Klinik Melaka
364.	Klinik Melawati
365.	Klinik Mersing
366.	Klinik Mesra
367.	Klinik Mesra, Shah Alam
368.	Klinik Metro Medics, HICOM Industrial Estate
369.	Klinik Metro, Puchong
370.	Klinik Michael Wong
371.	Klinik Ming
372.	Klinik Mitter dan Rakan-Rakan
373.	Klinik Mogan
374.	Klinik Moorthy
375.	Klinik Muhibbah
376.	Klinik Muhibbah, Alor Setar
377.	Klinik Murugasu
378.	Klinik Mutiara Inanam
379.	Klinik Naga
380.	Klinik Nagiah
381.	Klinik Najihah
382.	Klinik Nanda
383.	Klinik Nasha
384.	Klinik Nathan, Bgn Mas
385.	Klinik Neoh
386.	Klinik Ng & Ng
387.	Klinik Ng, Jln Kangsar
288.	Klinik Noh
389.	Klinik Noorleza
390.	Klinik Nur Aqila
391.	Klinik Nuraina Poliklinik & Surgeri
392.	Klinik Nuraini
393.	Klinik Ong & Surgeri
394.	Klinik Oziar Darus
395.	Klinik Pakatan Medik, Kuala Lumpur
396.	Klinik Pakatan Medik, Banting
397.	Klinik Panicker
398.	Klinik Pantai, Batu Ferringhi
399.	Klinik Pantai, Rantau
400.	Klinik Pantai, Tmn Kota Lukut
401.	Klinik Papar Medical Group
402.	Klinik Perdana, Kuantan
403.	Klinik Perdana - Bgn PKINK
404.	Klinik Perdana - Wisma Suara Muda
405.	Klinik Perdana, Islah
406.	Klinik Perdana, Jln Lubok Stol
407.	Klinik Perdana, Lumut
408.	Klinik Perdana, Pusing
409.	Klinik Perkasa
410.	Klinik Permata

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Private Clinics
411.	Klinik Pertama, Johor Bahru
412.	Klinik Pertama, Georgetown
413.	Klinik Pertama, Sg Besi
414.	Klinik Perubatan & Surgeri Dr. Ahmad
415.	Klinik Perubatan Chong
416.	Klinik Perubatan Lita Alis
417.	Klinik Perubatan Ong
418.	Klinik Petaling Jaya
419.	Klinik Poorni
420.	Klinik Prihatin
421.	Klinik Primecare, Lucky Garden
422.	Klinik Primecare, Phileo Corporate Park
423.	Klinik Public
424.	Klinik Pushpa
425.	Klinik Rabiah
426.	Klinik Radha, Bentong
427.	Klinik Radha Ampang
428.	Klinik Rahim
429.	Klinik Rahimah
430.	Klinik Rahman
431.	Klinik Rahmat
432.	Klinik Raj
433.	Klinik Raj (Jasin) Sdn Bhd
434.	Klinik Raj dan Rakan-Rakan, Segambut
435.	Klinik Raj dan Rakan-Rakan, Sentul
436.	Klinik Raja, Kepong
437.	Klinik Raja, Ipoh
438.	Klinik Raju
439.	Klinik Rakyat, Gopeng
440.	Klinik Rakyat, Jln Besar Kepong
441.	Klinik Rakyat, Jln Telok Wanjah
442.	Klinik Rakyat, Taiping
443.	Klinik Rama
444.	Klinik Ramabai & Surgeri Sdn Bhd
445.	Klinik Ratnam
446.	Klinik Rawatan Keluarga
447.	Klinik Rawatan Utama
448.	Klinik Razak
449.	Klinik Razana
450.	Klinik Reddy, Puchong
451.	Klinik Reddy PJ
452.	Klinik Reddy Pudu
453.	Klinik Reddy Setapak
454.	Klinik Rembau
455.	Klinik Ria
456.	Klinik Roberts
457.	Klinik Rohana & Seripah Sdn Bhd, Tmn Seri Intan
458.	Klinik Roslina
459.	Klinik S K Leong
460.	Klinik S K Lo Sdn. Bhd
461.	Klinik S. L. Ma
462.	Klinik Sabrina
463.	Klinik Sada
464.	Klinik Sanan
465.	Klinik Sandhu Senai
466.	Klinik Sannasees
467.	Klinik Saujana, Melaka Tengah
468.	Klinik Saujana, Selayang
469.	Klinik Saujana, Sungai Buloh
470.	Klinik Segamat
471.	Klinik Segara, Jln Bangsar
472.	Klinik Sekeluarga Ipoh, Fair Park
473.	Klinik Sekeluarga Ipoh, Tmn Bukit Merah
474.	Klinik Senan
475.	Klinik Sentosa, Johor Bahru
476.	Klinik Sentosa, Kuala Berang
477.	Klinik Sentosa Sdn. Bhd, Lengkok Dumbar
478.	Klinik Sentosa, Penang Street
479.	Klinik Seremban, Bdr Seremban Selatan
480.	Klinik Seremban, Senawang Jaya
481.	Klinik Seri Pulau, Jln P. Ramlee
482.	Klinik Serijasa
483.	Klinik Setapak & Surgeri, Sri Rampai
484.	Klinik Setapak dan Surgeri, Desa Setapak
485.	Klinik Setia
486.	Klinik Setiajaya
487.	Klinik Shafi, Jinjang Utara
488.	Klinik Shankar Sdn Bhd
489.	Klinik Shanraj
490.	Klinik Sharani
491.	Klinik Shatin
492.	Klinik Sibul
493.	Klinik Sidhu
494.	Klinik Sihat Putrajaya
495.	Klinik Sihat, Menggatal Oldtownship
496.	Klinik Simee
497.	Klinik Sinar
498.	Klinik Siti Zariah
499.	Klinik Siva & Surgeri
500.	Klinik Soo, Chemor
501.	Klinik Soon, Sibul
502.	Klinik Soon, Puchong
503.	Klinik Soong
504.	Klinik Sri Permaisuri
505.	Klinik Sri Puteri

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Private Clinics
506.	Klinik Sri Sulong
507.	Klinik Subang Perdana
508.	Klinik Subra Sdn Bhd
509.	Klinik Subramaniam
510.	Klinik Suhaini
511.	Klinik Sukimi
512.	Klinik Sulaiman, Jengka
513.	Klinik Sulaiman, Jln Tahan
514.	Klinik Sulaiman, Kompleks Teruntum
515.	Klinik Sulaiman, Maran
516.	Klinik Sundram
517.	Klinik Sungai Besar
518.	Klinik Syed Salleh & Rakan-Rakan, K. Terengganu
519.	Klinik T.A.R.
520.	Klinik TA
521.	Klinik Taipan
522.	Klinik Tampin
523.	Klinik Tan, Melaka
524.	Klinik Tan, Kuala Lumpur
525.	Klinik Tan & Appaduray
526.	Klinik Tan Cheng Leng
527.	Klinik Tan See Kin
528.	Klinik Tan, Bidor
529.	Klinik Tan, Sg Petani
530.	Klinik Tawakal, Parit Sulong
531.	Klinik Teck Hoe
532.	Klinik Teh, Petaling Jaya
533.	Klinik Teh, Port Dickson
534.	Klinik Templer
535.	Klinik Tenaga Baru
536.	Klinik Tengku Amir
537.	Klinik Teo, Kota Kinabalu
538.	Klinik Teoh & Chan Sdn Bhd
539.	Klinik Thean
540.	Klinik Ting
541.	Klinik Toh & Lim
542.	Klinik Tujuan
543.	Klinik Ummu Roihan
544.	Klinik Union 16 Jam, Tmn Tangling
545.	Klinik Union 24 Jam
546.	Klinik Union, Hunza Complex
547.	Klinik Utama, Kepong
548.	Klinik Utama, Petaling Jaya
549.	Klinik Venka
550.	Klinik Vignesh
551.	Klinik Vigneshwer
552.	Klinik Voon
553.	Klinik Wan Suhaimi
554.	Klinik Wang
555.	Klinik Wawasan 14 Jam
556.	Klinik Wawasan, Tmn Sentosa
557.	Klinik Wee
558.	Klinik West Jelutong
559.	Klinik Wira
560.	Klinik Wong, Kuala Lumpur
561.	Klinik Wong, Tawau
562.	Klinik Wong, Petaling Jaya
563.	Klinik Wong Ching Seh
564.	Klinik Y M Lo
565.	Klinik Yeoh
566.	Klinik Yii
567.	Klinik Yusof
568.	Klinik Zahar
569.	Klinik Zain & Zakaria, Kuala Lumpur
570.	Klinik Zain & Zakaria, Batu Caves
571.	Klinik Zainab
572.	Klinik Zainiati
573.	Klinik Zaleha
574.	Klinikah Sdn Bhd
575.	Kumpulan Medic, Menara Boustead
576.	Kumpulan Medic, Shah Alam
577.	Kumpulan Medic, Subang Jaya
578.	Kumpulan Medi-Systems Sdn Bhd
579.	Kumpulan Perubatan SMP Sdn. Bhd (Klinik Pertama)
580.	LKB Clinic
581.	Loh & Lim Sdn. Bhd
582.	MAA In House Clinic
583.	Maha Klinik
584.	Medi - Klinik Shahrol
585.	Medic-Klinik Lim
586.	Mediklinik Keluarga, Tmn Ipoh Jaya Timur
587.	Medi-Klinik Lee, Goh & Rakan-Rakan, Klang Lama
588.	Medi-Klinik Lee, Goh & Rakan-Rakan, Bangsar
589.	Mediklinik TTDI Jaya
590.	Medi-Klinik Wong Zul & Rakan-Rakan
591.	Merican Dispensary
592.	Ooi Kwee Lim Polyclinic
593.	Ophir Clinic
594.	Perak Medical Centre Sdn. Bhd, Kampar
595.	Perdana Polyclinics, Selayang
596.	Perdana Polyclinics Wilayah
597.	Poli Klinik, Jln P. Ramlee
598.	Poliklinik & Surgeri Batu Gajah

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Primary Care Clinics participating in NMUS survey*

#	Private Clinics
599.	Poliklinik & Surgeri Chew
600.	Poliklinik & Surgeri Di-G
601.	Poliklinik & Surgeri Gul
602.	Poliklinik & Surgeri Seapark
603.	Poliklinik & Surgeri Sentosa
604.	Poliklinik Al-Bukhari
605.	Poliklinik Al-Haj
606.	Poliklinik Aman
607.	Poliklinik An-Nisa
608.	Poliklinik Bahagia
609.	Poliklinik Bukit Mayang Emas
610.	Poliklinik Central
611.	Poliklinik Central & Surgeri, Jln Genting Klang
612.	Poliklinik Central & Surgeri, Jln Gombak
613.	Poliklinik Chew & Rakan-Rakan
614.	Poliklinik Damai & Surgeri, Tmn Desa Jaya
615.	Poliklinik dan Surgeri Ren-Ai
616.	Poliklinik Dinamik, Beranang
617.	Poliklinik Dinamik, Kajang
618.	Poliklinik Dinamik, Semenyih
619.	Poliklinik Dr Azhar, Jeniang
620.	Poliklinik Dr Norliza
621.	Poliklinik East Asia
622.	Poliklinik Family
623.	Poliklinik Fitrah, Bgn PKNK
624.	Poliklinik Harmoni
625.	Poliklinik Healthsense
626.	Poliklinik Hidayah, Bagan Serai
627.	Poliklinik Hidayah, Jln Kuala Pilah
628.	Poliklinik Ihsan
629.	Poliklinik Jaya
630.	Poliklinik Kong
631.	Poliklinik Kumpulan City - Capital Square
632.	Poliklinik Kumpulan City - Dataran Templer
633.	Poliklinik Kumpulan City - Jln Inai
634.	Poliklinik Kumpulan City - Jln Pahang
635.	Poliklinik Kumpulan City - Tmn Connaught
636.	Poliklinik Kumpulan City - Tmn Muda
637.	Poliklinik Kumpulan City - Tmn OUG
638.	Poliklinik Lai
639.	Poliklinik Liew
940.	Poliklinik Lim & Leong
641.	Poliklinik Lim & Pusat Rawatan Intan
642.	Poliklinik Ludher
643.	Poliklinik Mat Top
644.	Poliklinik Medic, Melaka Tengah
645.	Poliklinik Medics, Kuala Lumpur
646.	Poliklinik Meranti
647.	Poliklinik Mindaku
648.	Poliklinik Murni
649.	Poliklinik Mutiara, Shah Alam
650.	Poliklinik Mutiara, Tmn Desa Aman
651.	Poliklinik Ng
652.	Poliklinik Ong, Bt Gajah
653.	Poliklinik Pan-Medic, Farlim
654.	Poliklinik Penawar
655.	Poliklinik Perdana
656.	Poliklinik Pertama
657.	Poliklinik Perubatan Kubang Pasu
658.	Poliklinik Putra, Kulim
659.	Poliklinik Raj
660.	Poliklinik Rajen
661.	Poliklinik Rakyat, Masjid Tanah
662.	Poliklinik Rakyat, Bahau
663.	Poliklinik Rakyat, Jln Tuanku Munawir
664.	Poliklinik Rakyat, Putatan
665.	Poliklinik Rakyat, Tmn Tasik Jaya
666.	Poliklinik Rama
667.	Poliklinik Rani
668.	Poliklinik Raub & Surgeri
669.	Poliklinik Ravi
670.	Poliklinik S M Lee & Rakan-Rakan
671.	Poliklinik S. Naga, Tmn Kluang Jaya
672.	Poliklinik Salehudin
673.	Poliklinik Samudera, Sitiawan
674.	Poliklinik Sandhu
675.	Poliklinik Sentosa
676.	Poliklinik Seri Mas
677.	Poliklinik Seri Mutiara
678.	Poliklinik Sg. Besi
679.	Poliklinik Simpang Pulai, Tmn Bersatu
680.	Poliklinik Siti Fatimah
681.	Poliklinik SM Lee & Rakan-Rakan
682.	Poliklinik Soo & Tan
683.	Poliklinik Sri Permai
684.	Poliklinik Star Puchong
685.	Poliklinik Subasari Dan Gan
686.	Poliklinik Sungai Long
687.	Poliklinik Tan, Lee & Cheong
688.	Poliklinik Tang
689.	Poliklinik Teoh & Ding
690.	Poliklinik Yazmeen & Mahanum
691.	Poliklinik Zakariya
692.	Poliklinik Zul Dan Rakan-Rakan Sdn. Bhd
693.	Poly Klinik dan Surgery Kampung Pandan

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY***Primary Care Clinics participating in NMUS survey***

#	<i>Private Clinics</i>
694.	Polyclinic Muru
695.	Polyklinik Rajoo
696.	Pusat Rawatan Desa Pandan
697.	Pusat Rawatan Islam - Mais
698.	Reddy Clinic, Jln Ipoh
699.	S. P. Klinik Bersatu Sdn Bhd
700.	Sham Poliklinik Sdn. Bhd
701.	Shri Senthil Clinic
702.	Sim's Medical Clinic, Miri
703.	Siva Clinic
704.	Somu Kelinik
705.	Sundaram Dispensary
706.	Sushila Clinic
707.	Tejani Medical Centre
708.	Teow & Teo Medicare Sdn Bhd
709.	The Key Clinic
710.	The KL Clinic
711.	The People's Dispensary Sdn Bhd, Johor Bahru
712.	Tiram Medical Centre
713.	Uma Klinik
714.	Union Clinic, Bau
715.	Vaithyanathan Clinic
716.	Victor Medical Practice
717.	WCL Medical Associates Sdn Bhd
718.	Woo Dispensary
719.	Yoong Clinic Sdn. Bhd
720.	Yuli Poliklinik & Surgeri Sdn Bhd

Pharmacies participating in NMUS survey

#	<i>Private Pharmacies</i>
1.	Advanced & Leading Pharmacy Alliance Sdn. Bhd. (ALPHA)
2.	Alpro Pharmacy Holdings Sdn Bhd - Damansara
3.	Apo's Pharmacy
4.	Bahau Pharmacy Sdn. Bhd.
5.	Balik Pulau Health-Care
6.	Baling Pharmacy Sdn. Bhd.
7.	C S Lo Pharmacy
8.	Carene Pharmacy
9.	CL SU Pharmacy Sdn Bhd
10.	Daya Pharma Sdn Bhd
11.	Delima Farmasi Sdn Bhd
12.	Excelcare Pharmacy
13.	Far East Pharmacy Sdn Bhd
14.	Farmasi ABC Sdn Bhd - Jln Mahkota, Tmn Maluri
15.	Farmasi ABC Sdn Bhd - Pandan Indah
16.	Farmasi Al-Nabilah
17.	Farmasi Alychem Sdn. Bhd - Bdr. Baru Sg. Buloh
18.	Farmasi Alychem Sdn. Bhd - Payar Jaras, Sg. Buloh
19.	Farmasi Alychem Sdn. Bhd - Selayang, Batu Caves
20.	Farmasi Alychem Sdn. Bhd - Sg. Long, Kajang
21.	Farmasi Apollo
22.	Farmasi Bakti Sdn. Bhd.
23.	Farmasi Bintang
24.	Farmasi Carrie
25.	Farmasi Chia
26.	Farmasi Gamma
27.	Farmasi Goh - Bdr Puchong Jaya
28.	Farmasi Kemuning
29.	Farmasi Kepong - Desa Jaya, Kepong
30.	Farmasi Komuniti UKM
31.	Farmasi Lim
32.	Farmasi Materia Medica
33.	Farmasi Maxheal Sdn. Bhd.
34.	Farmasi Mira
35.	Farmasi Nazifa
36.	Farmasi Pendang
37.	Farmasi Rantau
38.	Farmasi Ruby
39.	Farmasi S J Sdn Bhd
40.	Farmasi Teck Hong
41.	Farmasi USJ Sdn Bhd
42.	Farmasi Utara Sdn Bhd
43.	Farmasi Vitacare Sdn. Bhd - Tmn Melawati
44.	Farmasi Voon
45.	Gaya Pharmacy Supplies
46.	GP Pharmacy
47.	Guardian Pharmacy (M) Sdn Bhd - Alpha Angle
48.	Guardian Pharmacy (M) Sdn Bhd - Ampang Park
49.	Guardian Pharmacy (M) Sdn Bhd - Bangsar Baru
50.	Guardian Pharmacy (M) Sdn Bhd - Bdr Sri Damansara

PARTICIPANTS OF THE NATIONAL MEDICINES USE SURVEY*Pharmacies participating in NMUS survey*

#	Private Pharmacies
51.	Guardian Pharmacy (M) Sdn Bhd - Bukit Bintang Plaza
52.	Guardian Pharmacy (M) Sdn Bhd - Carrefour Wangsa Maju
53.	Guardian Pharmacy (M) Sdn Bhd - Desa Jaya
54.	Guardian Pharmacy (M) Sdn Bhd - Desa Sri Hartamas
55.	Guardian Pharmacy (M) Sdn Bhd - Endah Parade
56.	Guardian Pharmacy (M) Sdn Bhd - Giant Hypermarket Ulu Kelang
57.	Guardian Pharmacy (M) Sdn Bhd - Great Eastern Mall
58.	Guardian Pharmacy (M) Sdn Bhd - Jalan Tun Perak
59.	Guardian Pharmacy (M) Sdn Bhd - Jusco Metro Prima Kepong
60.	Guardian Pharmacy (M) Sdn Bhd - Lot 10 Shopping Centre
61.	Guardian Pharmacy (M) Sdn Bhd - Lucky Garden
62.	Guardian Pharmacy (M) Sdn Bhd - Maju Junction Shopping Centre
63.	Guardian Pharmacy (M) Sdn Bhd - Mid Point
64.	Guardian Pharmacy (M) Sdn Bhd - OUG Plaza
65.	Guardian Pharmacy (M) Sdn Bhd - Pearl Point Shopping Mall
66.	Guardian Pharmacy (M) Sdn Bhd - Suria KLCC Guardian Pharmacy (M) Sdn Bhd - Taman
67.	Danau Desa
68.	Guardian Pharmacy (M) Sdn Bhd - Taman Tun Dr Ismail
69.	Guardian Pharmacy (M) Sdn Bhd - The Weld
70.	Guardian Pharmacy (M) Sdn Bhd - University Hospital
71.	Health-Care Pharmacy
72.	Jitra Pharmacy Sdn Bhd
73.	Joy Pharmacy
74.	K H Hoe Pharmacal Sdn Bhd
75.	Karamunsing Pharmacy Sdn. Bhd.
76.	KNL Medicare
77.	Kumpulan Farmasi Vitacare Sdn Bhd
78.	Mico Farmasi Sdn Bhd
79.	Nori Care Pharmacy
80.	Pahang Pharmacy Sdn. Bhd - Karak
81.	Pharmachem Labuan Sdn Bhd
82.	Pharmway Sdn Bhd
83.	Plaza Pharmacy Sdn Bhd
84.	Pusat Farmasi USM (Kedai Koop)
85.	Remedy Pharmacy
86.	Rheco Pharmacy
87.	Sentosa Pharmacy
88.	Sungai Siput Pharmacy
89.	Watson's Personal Care Stores Sdn. Bhd - Banting, Klang
90.	Yin Woh Tong Medical Supply Sdn Bhd
91.	YW Cheah Farmasi Sdn Bhd
92.	Zuffa Pharmacy Sdn Bhd - Jln Petani

NATIONAL MEDICINES USE SURVEY

Promoting the Quality use of Medicines

“ THANK YOU ”

Your data is
contributing
to improving the
use of medicines
in MALAYSIA

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CRC
Research that matters to patients

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