



**UNIVERSITI PUTRA MALAYSIA**

***A MIXED-METHODS APPROACH TO DEVELOP AND VALIDATE THE  
MALAYSIA ANTI-HYPERTENSIVE AGENTS NON-ADHERENCE SCALE  
AMONG HYPERTENSIVE PATIENTS IN KUALA LUMPUR, MALAYSIA***

**YEW SHENG QIAN**

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**By**

**YEW SHENG QIAN**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in  
Fulfilment of the Requirement for the Degree of Doctor of Philosophy**

**September 2022**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

**A MIXED-METHOD APPROACH TO DEVELOP AND VALIDATE THE MALAYSIA ANTI-HYPERTENSIVE AGENTS NON-ADHERENCE SCALE AMONG HYPERTENSIVE PATIENTS IN KUALA LUMPUR, MALAYSIA**

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**September 2022**

**Chair: Ahmad Iqmer Nashriq Bin Mohd Nazan, PhD**  
**Faculty: Medicine and Health Sciences**

Existing scales used to measure non-adherence to anti-hypertensive medications are known to have various limitations—their psychometric properties were unsatisfactory and insufficiently assessed, they are lacking multi-dimensionality, lacking theoretical clarity, unable to comprehensively assess the themes of non-adherence to anti-hypertensive medications, and with uncertain cultural adaptation when administered in the local hypertensive populations. To address these limitations, the current study aimed to explore the themes of non-adherence to anti-hypertensive medications among hypertensive patients from health clinics in Kuala Lumpur, Malaysia. Such themes were used to develop a scale, named the Malaysia Anti-hypertensive Agent Non-Adherence Scale (MAANS). Also examined were the psychometric properties (factor structure, reliability, and predictive validity) of the MAANS. This was a two-phase exploratory mixed-methods study. In Study I (qualitative approach), hypertensive patients attending Kuala Lumpur Health Clinic and Cheras Baru Health Clinic were invited to participate in in-depth interviews. Themes of non-adherence reported by these patients were then used to generate initial items of the MAANS. An expert review was conducted to examine the content validity of the MAANS. In Study II (quantitative approach), data from 213 participants were subjected to exploratory factor analyses (EFA) to uncover the factor structure of the scale, thereby formed the modified version of the MAANS. Then, data from 205 participants were subjected to confirmatory factor analysis (CFA) to verify the factor structure of the modified version of the MAANS. Hence, the final version of the MAANS. Reliability of the final version of the MAANS was examined by Cronbach's alpha coefficient. Meanwhile, the predictive validity was established using the WHO Quality of Life (QOL) BREF Malay version, which consists of Physical QOL, Psychosocial QOL, Social QOL, and Environmental QOL. Ten qualitative interviews were conducted and generated 73 items. Seven items was removed from the expert review. Based on the EFA, 21 items were retained in the modified version of the MAANS, which encompassed of five themes, namely, Perceived Non-Susceptibility, Poor Doctor-Patient Relationship, Unhealthy Lifestyle, Perceived Barriers, and Limitations of Healthcare Facilities. The modified version of the MAANS was

subsequently subjected to CFA. When this was done, only three themes, namely, Perceived Non-Susceptibility, Poor Doctor-Patient Relationship, and Unhealthy Lifestyle were retained in the final version of the MAANS. The 14-item, 3-factor final version of the MAANS reported good model fit indices. Cronbach alpha was .64. Only Poor Doctor-Patient Relationship and Unhealthy Lifestyle themes of the final version of the MAANS were found to significantly predict Social QOL and Environment QOL. The final version of the MAANS has partial predictive validity as all of its themes were unable to predict Physical QOL and Psychosocial QOL. In conclusion, the MAANS is proven as a multidimensional, hypertension-specific, and locally derived scale. The scale was found to have moderate reliability and partial predictive validity. It is hoped that the MAANS can help to inform the future development of interventions to enhance patients' adherence, thereby reducing the prevalence of uncontrolled hypertension.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PEMBANGUNAN DAN PENGESAHAN SKALA KETIDAKPATUHAN  
TERHADAP UBAT ANTI-HIPERTENSI DALAM KALANGAN PESAKIT  
HIPERTENSI DI KUALA LUMPUR, MALAYSIA MENGGUNAKAN KAEDAH  
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Skala-skala yang sedia ada untuk mengukur kadar ketidakpatuhan kepada ubat anti-hipertensi terdapat beberapa kekurangan, di mana ciri-ciri psikometrik skala-skala tersebut adalah tidak memuaskan dan tidak dinilai secara menyeluruh, kurang kepelbagaian dimensi, kurang kejelasan teori, gagal menilai tema-tema ketidakpatuhan terhadap ubat anti-hipertensi secara menyeluruh, dan terdapat ketidakpastian penyesuaian budaya semasa digunapakai dalam kalangan populasi hipertensi tempatan. Untuk mengatasi kekurangan-kekurangan tersebut, kajian ini bertujuan untuk meneroka tema-tema ketidakpatuhan terhadap ubat anti-hipertensi dalam kalangan pesakit hipertensi di klinik kesihatan di Kuala Lumpur, Malaysia. Tema-tema ini akan digunakan untuk membentuk satu skala yang dinamakan sebagai Skala Ketidakpatuhan Ubat Anti-hipertensi Malaysia (MAANS). Ciri-ciri psikometrik MAANS dari segi struktur faktor, kebolehpercayaan, dan kesahan ramalan juga telah dikenalpasti. Kajian kaedah gabungan eksplorasi ini mempunyai dua fasa. Dalam kajian fasa pertama (kaedah kualitatif), pesakit hipertensi yang mengunjungi Klinik Kesihatan Kuala Lumpur dan Klinik Kesihatan Cheras Baru telah dijemput untuk menghadiri sesi temubual secara mendalam. Tema-tema ketidakpatuhan yang dikongsikan oleh pesakit-pesakit tersebut kemudiannya digunakan untuk menjana item bagi MAANS. Penilaian pakar dijalankan untuk menilai kesahan kandungan. Dalam kajian fasa kedua (kaedah kualitatif), data daripada 213 peserta digunakan dalam analisis faktor penerokaan (EFA) untuk mengenalpasti struktur faktor skala dan seterusnya menghasilkan MAANS versi ubahsuai. Kemudiannya, data daripada 205 peserta digunakan dalam analisis faktor kesahan (CFA) untuk mengesahkan struktur faktor MAANS versi ubahsuai. Ini menghasilkan MAANS versi terakhir. Kebolehpercayaan MAANS versi terakhir ini diperiksa melalui nilai Cronbach alpha. Manakala, kesahan ramalan dinilai menggunakan Skala Kualiti Hidup Singkatan WHO versi Melayu, yang mengandungi Kualiti Hidup Fizikal, Kualiti Hidup Psikososial, Kualiti Hidup Sosial, dan Kualiti Hidup Persekitaran. Sepuluh temubual kualitatif telah dijalankan dan ia berjaya menjana 73 item. Tujuh item disingkirkan hasil daripada penilaian pakar. Berdasarkan EFA, 21 item

telah dikekalkan dalam MAANS versi ubahsuai yang mengandungi lima tema, iaitu Rasa Tidak Rentan, Hubungan Buruk Antara Doktor Dan Pesakit, Gaya Hidup Yang Tidak Sihat, Rasa Penghalang, dan Kekurangan Dalam Sistem Kesihatan. MAANS versi ubahsuai ini kemudiannya melalui proses CFA. Ini memendekkan MAANS versi ubahsuai ini kepada tiga tema, iaitu Rasa Tidak Rentan, Hubungan Buruk Antara Doktor Dan Pesakit dan Gaya Hidup Yang Tidak Sihat. MAANS versi terakhir yang terdiri daripada 14 item dan tiga tema ini menunjukkan indeks kesepadanan model yang baik. Nilai Cronbach alpha adalah .64. Hanya tema Hubungan Buruk Antara Doktor Dan Pesakit dan Gaya Hidup Yang Tidak Sihat daripada MAANS versi terakhir ini berjaya meramalkan Kualiti Hidup Sosial dan Kualiti Hidup Persekitaran secara signifikan. MAANS versi terakhir ini mempunyai kesahan ramalan yang separa kerana ketiga-tiga tema tidak dapat meramalkan Kualiti Hidup Fizikal dan Kualiti Hidup Psikososial. Kesimpulannya, MAANS terbukti sebagai satu skala yang mempunyai pelbagai dimensi, spesifik kepada penyakit hipertensi, dan dicipta khas untuk populasi tempatan. MAANS mempunyai kebolehpercayaan yang sederhana dan kesahan ramalan yang separa. MAANS diharap dapat digunakan untuk merancang intervensi peningkatkan kepatuhan kepada ubat anti-hipertensi pada masa hadapan, dan seterusnya dapat mengurangkan kelaziman hipertensi yang tidak terkawal.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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## LIST OF ABBREVIATIONS

ACC	American College of Cardiology
ACEI	Angiotensin-converting enzyme inhibitors
AHA	American Heart Association
ARB	Angiotensin receptor blockers
BMI	Body Mass Index
BMQ	Brief Medication Questionnaire
BP	Blood pressure
CAD	Coronary heart disease
CCB	Calcium channel blocker
CFA	Confirmatory factor analysis
CFI	Comparative Fit Index
CKD	Chronic kidney disease
CPG	Clinical practice guideline
CVD	Cardiovascular disease
CVI	Content validity index
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic blood pressure
DOT	Direct observation technique
EFA	Exploratory factor analysis
EMS	Electronic management system
GFR	Glomerular filtration rate
GSES	General Self-Efficacy Scale
HBCS	Hill-Bone Compliance Scale
HBM	Health belief model

HCTZ	Hydrochlorothiazide
HIV	Human immunodeficiency virus
HPLC	High performance liquid chromatography
I-CVI	Item level content validity index
IGF	Insulin growth factor
IHD	Ischaemic heart disease
KMO	Kaiser–Meyer–Olkin
LGBTQ+	Lesbian, gay, bisexual, transgender, queer and others
LMIC	Low- and middle-income countries
LVH	Left ventricular hypertrophy
MAANS	Malaysia Anti-Hypertensive Agents Non-Adherence Scale
MAQ	Medication Adherence Questionnaire
MMAS-4	Four-item Morisky Medication Adherence Scale
MMAS-8	Eight-item Morisky Medication Adherence Scale
MOH	Ministry of Health
MUAH-16	Sixteen-item Maastricht Utrecht Adherence in Hypertension
MUAH-25	Twenty-five-item Maastricht Utrecht Adherence in Hypertension
NHMS	National Health and Morbidity Survey
PAD	Peripheral artery disease
PDS	Personalised dosage systems
QAM-Q	Questionnaire of Non-adherence to Medicines of the Qualiaids Team
QOL	Quality of life
RCT	Randomised controlled trial
RMSEA	Root mean square error of approximation
SBP	Systolic blood pressure

S-CVI	Subscale level content validity index
SEAMS	Self-efficacy for Appropriate Medication Adherence Scale
SPSS	Statistical Package for the Social Sciences
SRMR	Standardized root mean square residual
T2DM	Type 2 diabetes mellitus
TAQPH	Treatment Adherence Questionnaire for Patients with Hypertension
TEO	The Adherence Assessment test
UHC	Universal health coverage
UMMC	University of Malaya Medical Center
USD	United State Dollar
WHO	World Health Organization
WHO-QOL BREF	World Health Organization Quality of Life Brief questionnaire

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study

Hypertension, a medical condition characterised by an elevated blood pressure, is an increasingly important public health issue (WHO, 2021a). Till date, it is identified as the major risk factor of cardiovascular disease (CVD) and premature death worldwide (Roth et al., 2018; Stanaway et al., 2018). Hypertension is a worrying condition due to the fact that it is prevalent both globally and in Malaysia. In 2019, it was estimated that 33.1% (1.28 billion) of adults aged 30-79 years were diagnosed with hypertension globally. Specifically, 82% (1.05 billion) of all hypertension cases were living in low- and middle-income countries (WHO, 2021a). In a local context, the 2019 National Health and Morbidity Survey (NHMS) has shown that the prevalence of hypertension in Malaysia was 30.0% (Institute for Public Health, 2020).

According to World Health Organization (WHO), it was also known that an estimated 46% (580 million) of adults with hypertension are unaware that they have the condition due to its asymptomatic nature (WHO, 2021a). Even following a proper diagnosis, more than half of the hypertensive adults (720 million) were untreated. Not surprisingly, approximately 4 in 5 adults (79%) of hypertensive patients have their blood pressure not under control (WHO, 2021a). Numerous evidence has proven that uncontrolled blood pressure may lead to the development of hypertensive complications, such as myocardial infarction, cardiac failure, stroke, and renal disease (Schmieder, 2010). Hence, to reduce the risk of these complications, hypertensive patients must be treated appropriately, either through therapy involving lifestyle interventions and/or anti-hypertensive medications (*Prevention of cardiovascular disease: guidelines for assessment and management of cardiovascular risk*, 2007).

Having said the above, the burden of hypertension shall not only be valued in terms of its morbidities and mortalities but the severe economic implication due to the cost of treatment should be taken into consideration. In the United States, for instance, the mean annual cost of treatment for patients with hypertension was USD 9,089 (RM 39,782). When compared to non-hypertensive individuals, hypertensive patients had USD 1,920 (RM 8,403) higher annual expenditure, 2.5 times the inpatient cost, almost double the outpatient cost, and nearly triple the prescription medication expenditure. The estimated annual cost was USD 131 billion (RM 603 billion) per year higher for hypertensive patients compared to non-hypertensive individuals (Kirkland et al., 2018). In Malaysia, although the cost of hypertension treatment is mostly borne by the Malaysian government, the cost incurred to the country is nowhere close to being affordable. In fact, a study conducted by Alefan and colleagues in 2009 has shown that the total direct costs of treatment per patient per year ranged from RM 1,741.85 to RM 2,718.21. Meanwhile, the total indirect costs, including the value of productivity potentially lost due to absenteeism from work as a result of hypertension ranged from RM 6,654.52 to RM 7,511.41 (Alefan, Izham, Mohamed Ibrahim, Tariq, & Ayub, 2009).

Although hypertensive patients have been educated regarding the consequences of hypertension, including the possible development of hypertensive complications as well as its heavy economic implication as abovementioned, unfortunately there is still an insufficient blood pressure control among them (Annamalai, Govindaraja, & Chandramouli, 2011; Gee et al., 2012). Later, it was found that such uncontrolled blood pressure is mostly due to non-adherence to anti-hypertensive medications (Hamrahan, 2020). As such, the underlying causes of non-adherence among hypertensive patients should be explored in a timely manner via the current study. Interventions to improve medication adherence shall also be implemented. It is hoped that the final outcome of this study (i.e., the MAANS) can inform the designs of suitable interventions to improve medication adherence among hypertensive patients in Kuala Lumpur, Malaysia. The burden of uncontrolled hypertension on the individual and to the country as a whole can only be relieved if the issue of non-adherence is addressed appropriately.

## 1.2 Problem Statements

As reported by the WHO, adherence to medication in patients with chronic diseases averages only around 50% in developed countries. The situation is reported to be worse in developing countries due to poor accessibility to medications and health care services (*Adherence to long-term therapies: evidence for action*, 2003). In Malaysia, medication adherence studies are limited. In 2007, a study conducted in an outpatient clinic at Penang found that 51.3% of the patients had non-adherence to the prescribed hypertensive medications (Turki & Sulaiman, 2010). Five years later, Ramli and colleagues reported a prevalence of non-adherence to anti-hypertensive agents of 46.6% among patients who attended seven health clinics in Klang Valley (Ramli, Ahmad, & Paraidathathu, 2012). According to latest data, it was later found that 24.2% of the hypertensive patients in Malaysia had non-adherence to their hypertensive medications (Nur Hanani et al., 2020).

Although the prevalence of non-adherence to hypertensive treatment appears to decrease over the years, such “decreasing trend’ ought to be interpreted with caution for three main reasons. The first reason being that researchers in these studies utilised different tools (scales) of measuring medication adherence. Even though these scales were well validated, different scales may measure different domains of medication adherence, hence, resulted in different level of medication adherence. Secondly, these studies were conducted in different regions in Malaysia, mostly in urban regions. It was known that the medication adherence in urban regions may not represent those in rural regions and should never be representative of the entire nation. Thirdly, as reported by the author of one of the adherence studies in Malaysia (Nur Hanani, Joyce Leong, Soo, & Ching, 2020), their adherence study was conducted in a tertiary health care center, as opposed to previous adherence studies which were conducted in primary care clinics. One caveat is that the population in a tertiary health care center tend to overestimate the adherence level due to the availability of close supervision from health care providers and, hence, may not be representative of the community (Nur Hanani et al., 2020). With the above evidence, and with the lack of a nationwide survey, we were unable to ascertain the exact prevalence of non-adherence to anti-hypertensive medications of the entire country. However, one thing for sure is that the non-adherence is a serious issue that need immediate attention and there is an unmet need of interventions to improve adherence in

hypertension treatment (Vinay & P. Michael, 2018).

According to latest evidence, non-adherence to hypertensive treatment appeared not as high compared to dyslipidaemia and diabetic treatment (i.e., 24.2% of non-adherence to hypertensive medications versus 58.7% of non-adherence to lipid-lowering medications versus 65.8% of non-adherence to diabetic medications) (Akhir, Hadi, & Zainuddin, 2020; Nur Hanani et al., 2020; Teng, Chan, & Wong, 2022). Although these figures seem comforting and not sufficiently worrying, one should be reminded that hypertension is the most powerful, independent, and preventable risk factor for death and disability from cardiovascular diseases, when compared to other chronic illnesses (Mills, Stefanescu, & He, 2020). It is also a leading risk factor for all-cause mortality and the largest contributor to global disability-adjusted life years (DALYs). In 2015, exposure to high systolic blood pressure (SBP) accounted for 10.7 million deaths (33.2% of deaths attributed to all risk factors) and nearly 212 million DALYs or 20.9% of DALYs from all risk factors (Mensah, 2018). Given the low rate of adherence in hypertensive treatment and the huge burden of this condition, public health researchers, clinicians, policymakers, and other relevant stakeholders ought to put substantial effort to explore and understand all plausible causes of non-adherence in hypertensive treatment. To achieve this, a reliable, valid, culturally accepted, and hypertension-specific scale is crucially needed to capture all these underlying causes of non-adherence to anti-hypertensive medications before these causes can be subsequently addressed and resolved.

Over the past two decades, several adherence studies specific to hypertension have been conducted in Malaysia (Nur Hanani et al., 2020; Ramli et al., 2012; Turki & Sulaiman, 2010). In these studies, researchers utilised three commonly used scales to assess the adherence level among hypertensive patients, namely the four-item Morisky Medication Adherence Scale (MMAS-4), eight-item Morisky Medication Adherence Scale (MMAS-8), and Hill-Bone Compliance Scale (HBCS) (M. T. Kim, Hill, Bone, & Levine, 2000; Morisky, Ang, Krousel-Wood, & Ward, 2008; Morisky, Green, & Levine, 1986). Although these scales are commonly used in other countries, they are not without limitations, especially when adapted for use in a local hypertensive context.

Firstly, knowing that these scales were developed in different populations (M. T. Kim et al., 2000; Morisky et al., 2008), and that these scales were not originally developed for hypertensive patients, it was unclear to which extent these adherence scales accurately captured the real situation of adherence conduct among the local hypertensive community, who embrace a different culture compared to the original population from whom adherence scales were developed (M. Krousel-Wood et al., 2013). Besides this, previous literature has shown that a person's non-adherence to medication-taking, including anti-hypertensive agents is a multi-dimensional construct (Williamson et al., 2010). Specifically, WHO reported that such behaviour can be due to patient-related factors, condition-related factors, therapy-related factors, socioeconomic factors, and to a macro level – the healthcare system factors (WHO, 2003). Unfortunately, some of the currently used scales, such as the MMAS-4, the MMAS-8, and the HBCS are unidimensional in nature. In these scales, patients are simply classified as being adherent or non-adherent to medication. As such, the underlying causes for their non-adherence were poorly understood.



Thirdly, as far as scale's reliability is concerned, none of the abovementioned scales is able to demonstrate adequate reliability, as measured via internal consistency. Although some scales did demonstrate satisfactory reliability in the original scale development (overseas) studies, they did not perform well psychometrically when used in the local hypertensive community (Cheong, Tong, & Sazlina, 2015). In addition, when taking the validity of the scales into account, many of the currently used scales do not report content validity, criterion validity, and/or construct validity in their development process. Hence, the validity of these scales is in doubt.

The lack of adaptation of theoretical frameworks in scale development is another major limitation of the currently available adherence scales. The first step of designing a good scale is often to construct a theoretical framework, which can be adapted based on literature review or discussion with experts in that field (Jenn, 2006). The importance of a theoretical framework is to ensure the scale covers all relevant variables and any irrelevant variables can be excluded. Since the use of theoretical framework in the development of the above adherence scales was unclear, researchers and practitioners are unable to ascertain that the constructs in these adherence scales are comprehensive enough to describe a person's adherence behaviour. Last but not least, the themes of non-adherence in these scales were mainly reported from a quantitative point of view (Cabral, Castel-Branco, Caramona, Fernandez-Llimos, & Figueiredo, 2018; M. T. Kim et al., 2000; Ma, Chen, You, Luo, & Xing, 2012; Morisky et al., 2008; Morisky et al., 1986; Risser, Jacobson, & Kripalani, 2007; Svarstad, Chewning, Sleath, & Claesson, 1999; G. Wetzels et al., 2006). As such, there may be some missed themes as some themes can only be elicited or discovered via in-depth qualitative inquiries.

In a nutshell, it was noticed that no single adherence scale in current use can be appropriately administered in the context of Malaysian hypertensive patients. Some existing scales have uncertain cultural adaptation in the local context, while some scales are unidimensional in nature. Some others have low reliability and validity estimates. Most of the adherence scales are not built upon a solid theoretical framework and are not qualitatively derived. On top of these, only two hypertensive-related scales were validated in Malaysia, namely the MMAS-8 Malay version and HBCS Malay version. Even though they were successfully translated to Malay version, their psychometric properties were unsatisfactory and hence, not suitable for use among the local hypertensive population to identify the themes of non-adherence. There is still an absence of a gold standard scale that can accurately measure medication adherence in hypertension treatment.

With these gaps in the literature and clinical setting, there exists a timely need for a comprehensive understanding of patients' perspectives as well as their themes of non-adherence to anti-hypertensive medications. Subsequently, these themes of non-adherence shall be used to develop a local, hypertensive-specific, reliable, and valid scale that can accurately measure the adherence level of Malaysian hypertensive patients to their anti-hypertensive agents.

### **1.3 Research Questions**

- i. How to develop and validate the Malaysia Anti-hypertensive Agents Non-Adherence Scale (MAANS) that is suitable for use among hypertensive patients from health clinics in Kuala Lumpur, Malaysia?
- ii. What are the themes of non-adherence to anti-hypertensive agents among hypertensive patients from health clinics in Kuala Lumpur, Malaysia?
- iii. What is the dimensionality of the MAANS when tested among hypertensive patients from health clinics in Kuala Lumpur, Malaysia?
- iv. Is the MAANS reliable for use among hypertensive patients from health clinics in Kuala Lumpur, Malaysia?
- v. Is the MAANS valid for use among hypertensive patients from health clinics in Kuala Lumpur, Malaysia?

### **1.4 Research Objectives**

The research objectives of the current study were divided into general and specific objectives as described below.

#### **1.4.1 General Objective**

To develop and validate the MAANS that is suitable for use among hypertensive patients from health clinics in Kuala Lumpur, Malaysia.

#### **1.4.2 Specific Objectives**

- i. To explore the themes of non-adherence to anti-hypertensive agents among hypertensive patients from health clinics in Kuala Lumpur, Malaysia.
- ii. To examine the dimensionality of the MAANS among hypertensive patients from health clinics in Kuala Lumpur, Malaysia.
- iii. To examine the reliability of the MAANS among hypertensive patients from health clinics in Kuala Lumpur, Malaysia.
- iv. To examine the validity of the MAANS among hypertensive patients from health clinics in Kuala Lumpur, Malaysia.

### **1.5 Research Hypotheses**

No hypothesis can be generated from the general objective and specific research objective (i). However, with reference to the specific objectives (ii), (iii) and (iv), the following hypotheses were generated:

- i. The MAANS is a multidimensional scale.

- ii. The MAANS will demonstrate good internal reliability.
- iii. The MAANS will demonstrate good predictive validity when regressed on the WHOQOL-BREF Malay version.

## **1.6 Chapter Summary**

In summary, hypertension is well recognised as one of the major risk factors of morbidity and premature mortality. This highly prevalent medical condition is also causing severe economic implication globally. Although the treatment for hypertension is readily available, a majority of the hypertensive patients have their blood pressure not under control due to non-adherence to their treatment. Generally, one in two hypertensive patients are not adherent to their anti-hypertensive medications.

Given the low rate of adherence, there is an urgent need for public health researchers, clinicians, policymakers, and other relevant stakeholders to explore and understand all underlying causes that prevent adherence in hypertension therapy. To achieve this, a reliable, valid, culturally accepted, and hypertension-specific scale is crucially needed to capture all these underlying causes of non-adherence to anti-hypertensive medications before they can be subsequently addressed and resolved via suitable interventions. All these explain the rationale of the current study.

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