ORIGINAL ARTICLE

Understanding knowledge of hypertension among affected individuals in low-Income (B40) communities in Malaysia: The RESPOND study

Farnaza Ariffin, FRCGP[Int][1], Mohamed Rodi Isa, DrPH (UM)[2], Nafiza Mat Nasir, MMed Fam Med (UM)[1], Mazapuspavina Md Yasin, MMed Fam Med (UM)[1], Fadhlina Abd Majid, BSc (Hons)(USM)[3], Benjamin Palafox, MSc[4], Martin McKee, FMedSci[4]

[1]Department of Primary Care Medicine, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Selangor, Malaysia, [2]Population Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Selangor, Malaysia, [3]Centre for Translation Research and Epidemiology (CenTre), Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Selangor, Malaysia, [4]Centre for Global Chronic Conditions, London School of Hygiene and Tropical Medicine, London, UK

ABSTRACT

Introduction: Achieving optimal control of blood pressure is easier when those affected understand the risks and consequences of hypertension and the principles of management. It is particularly important in disadvantaged groups among whom blood pressure control is often poor. However, effective responses require evidence of the knowledge and beliefs of those affected. This was undertaken as part of a larger study of the therapeutic journeys followed by individuals living in B40 (bottom 40% by income) households in Malaysia, the Responsive and Equitable Health Systems-Partnership on Non-Communicable Diseases (RESPOND).This paper describes their reported knowledge of hypertension, health, and measures that can improve hypertensive control.

Materials and Methods:The communities were selected from rural and urban populations in four peninsular states (Selangor, Kelantan, Perak, and Johor). Following a multistage sampling approach, communities in each stratum were selected according to probability proportional to the size and identified based on national census data by the community and administrative registers. Households were randomly selected. Eligible individuals were those aged between 35 and 70 years old, self-reported or identified as hypertensive at screening. Informed consent was taken. A survey using validated questionnaires was conducted.

Results: The total number of respondents was 579. The mean age was 59.0 (95%: 58.4, 59.7) and more were women (71.5%) than men (28.5%). Regarding respondents self-reported level of hypertension knowledge, 2.9% reported having no knowledge at all, 80.1% had little knowledge, and 17.9% were very familiar. Among all respondents, 56.2% (95% CI: 50.7, 61.6) correctly answered at least four out of five objective knowledge questions.Almost all (91.5%) were aware that hypertension could cause a stroke. However, one-fifth believed it could cause cancer. Almost three-quarters said that people with high blood pressure generally felt well (72.1%) and recognized that they should not stop taking their medication (70.7%). Most of the respondents knew that people should take their medication even if they feel well (73.6%). Although more than half (66.0%) of the respondents rated their health as poor. Interestingly, most did not perceive themselves as having a long-term illness (95.0%).

Conclusion: This study provides reassurance that individuals with hypertension in disadvantaged communities in Malaysia have a relatively good understanding of hypertension. Further research should explore the challenges they face on their therapeutic journeys.

KEYWORDS:
Knowledge; Hypertension; Low income; B40; Malaysia; RESPOND study

INTRODUCTION

Hypertension is easily treatable with safe and effective drugs yet, almost everywhere, achieving control remains a challenge. In Malaysia, the 2019 National Health and Morbidity Survey, with almost 15,000 subjects,found that 30.0% (95% CI: 28.57, 31.50) of adults aged 18 and over had been diagnosed with hypertension or were found to have elevated blood pressure.[1] Another study, with over 11,000 subjects but restricted to those aged 30 and above produced a figure of 42% (95%CI: 40.9, 43.2),[2] while an analysis of earlier waves of the national survey found that 37.4% (95% CI:35.3, 39.5) of those with hypertension had achieved control.[3]

Conveying an understanding of what high blood pressure means and why it is important to reduce is an important part of the therapeutic process and those with such an understanding are more likely to achieve control.[4-6] Yet we lack detailed insight into the knowledge of Malaysians with hypertension and how this impacts on their self-management, which is so important in achieving control. One exception is a small study (n=110) in an urban area near the capital that found a relatively high level of knowledge, with almost 90% of patients knowing something and almost 60% knowing the target blood pressure levels.[4] There was also

This article was accepted: 03 July 2022
Corresponding Author: Farnaza Ariffin
Email: farnaza@uitm.edu.my

a relatively good understanding of common risk factors and consequences of poor control, including cardiovascular disease, stroke, renal failure, and memory loss but over half also believed, incorrectly, that cancer is associated with hypertension.[4] We also know that traditional and complementary medicines are used widely by those with hypertension in Malaysia.[7,8]

Malaysia is not unusual in having socio-economic inequalities in treatment and control of hypertension,[9,10] although they are narrower than in several otherwise comparable middle-income countries.[11] Research elsewhere has pointed to the importance of characteristics such as lack of education and unemployment.[12,13] Inequalities have long been on the political agenda in Malaysia, with the New Economic Policy, in operation from 1970 to 1990, having an explicit goal to eradicate poverty. However, the 9th Malaysian plan (2006–2010) recognized that progress had stalled. Indeed, it found that the income share going to the group labelled B40 (the poorest 40% of the population) had fallen while the M40 middle (40%) were receiving higher incomes. Consequently, the 10th Malaysian plan (2011–2015) shifted from targeting poverty as such to improve the lot of the B40 group. The 11th Malaysia Plan (2016–2020), went further, seeking to bring the living standards of those in the B40 closer to those of the M40.[14]

This has been associated with a range of health initiatives, including 'Mysalam' and 'PekaB40'. MySalam is a health insurance scheme providing a cash payment to those with one of 45 diagnoses and a daily payment while in hospital, initially limited to the B40 but now including the M40, while Peka B40 offers free health screening.[15] A newspaper reported that 13.8% of those screened in the PekaB40 initiative were found to have previously undetected hypertension.[16]

If further progress is to be made in narrowing inequalities in hypertension control in Malaysia, it will be important to understand the knowledge and beliefs of the most disadvantaged in society. In this paper, we report findings from a study conducted among those with hypertension living in low-income (B40) households in Malaysia.

MATERIALS AND METHODS

Data were collected within the 'Responsive and Equitable Health Systems – Partnership on Non-communicable Diseases' (RESPOND) Project, being undertaken in Malaysia and the Philippines. Unlike the surveys described earlier that offer wide coverage of the country, RESPOND has been designed to gain in-depth knowledge of the lived experience of those with hypertension living in low-income communities using a mix of quantitative and qualitative methods, with a particular emphasis on their therapeutic journeys. The protocol and detailed methodology have been published elsewhere.[17]

Definitions

At the time when the study was planned, those in the B40 category had a household income of less than RM3,855 (€832; US$932) (level set in 2014). The cut-off point has changed over time. Those in the B40 category can be found in urban and rural areas and the study design included communities in both settings. Urban and rural areas were defined according to the Malaysian Population and Housing Census 2000.[18]

Conceptual framework

Our conceptual framework illustrated in Figure 1draws on research and theory in three main areas. First, individual health-seeking behaviour is shaped by individual, household, community, societal,[19-21] and 'environmental'19 factors such as distance to facilities and affordability, which may lead to inequalities in care.[22] We consider both 'potential' (opportunity to use care that is available) and 'realized' access (actual use of services) in understanding health-seeking behaviour and addressing barriers to access. Second, characteristics of health systems influence utilisation,[23] including availability of trained staff, essential medicines, and effective management and oversight,[24] while recognizing that a simplistic cause-and-effect model may be unhelpful[25] because of failure to consider complexity (path dependency and feedback loops).[19] Third, we draw on ideas of 'people-centred' health systems,[26] whereby individuals with their multifaceted beliefs, motivation, and behaviour, operating in informal and formal ways.[27,28] We seek to operationalize the barriers that exist at the level of individuals, families, communities, the health system, and the broader environment, and then understand the interrelations and synergies that exist between them. We draw on insights from anthropology, sociology, and social psychology to understand health experiences and health seeking behaviour of individuals, families, communities as circumscribed by the stated and implicit socio-cultural norms and values of the communities and social networks rather than by purely individual decisions.[29-31]

To demonstrate, knowledge of hypertension is an individual-level factor that influences decisions and behaviors related to treatment initiation, medication adherence, and adoption of lifestyle, which then determine the likelihood of achieving blood pressure control and ultimately the risk of cardiovascular and other non-communicable diseases. Such knowledge is, in turn, influenced by other factors operating at multiple levels, such as one's education, household income, interactions with the health system, exposure to media, among many other things—each of which present potential barriers and opportunities to intervene to improve knowledge, blood pressure control, and population health.

Sampling method

The urban and rural B40 communities were selected using a multistage sampling approach. The first stage was a purposive selection of four states in Peninsular Malaysia, Selangor, Perak, Kelantan, and Johor, all larger states with a mix of urban and rural communities. The second stage was selection of 24 communities, 3 urban and 3 ruralfrom each of the four states. Communities in each stratum were selected according to probability proportional to size using sampling frames based on national census data by community and administrative registers. The third stage involved recruitment of 25 households from each community, randomly selected

using a random online generator. Nearby communities were substituted where it was not feasible to ensure high levels of engagement with the chosen communities. This could arise from lack of community support, security risk for study personnel, inaccessibility by usual means of transportation, poor internet connection, or the existence of ongoing activities that may affect hypertension treatment seeking behavior.

Study population

The study population comprised adults aged 35–70 years old with hypertension, living within B40 households that were expected to remain at the current address for at least 18 months from the date of screening, with either a self-reported history of hypertension (previously diagnosed whether on or off treatment) or found to have elevated blood pressure at screening. B40 households were identified by contacting the municipal council and district council offices to identify low-income communities. The leader of the housing area or village from the randomly selected communities were then contacted for the researchers to approach the families. The families were asked regarding total household income or whether they received government financial aid for low-income households. Those who fulfil the B40 criteria were invited to participate. The exclusion criteria were those with self-reported history of major chronic co-morbidities that required regular contact with the health system such as cancer or HIV and those who were planning to move within the next 18 months. High blood pressure on screening was defined as when the average of two blood pressure measurements > 140/90 mmHg (using an OMRON blood pressure recorder from the non-dominant arm while in a sitting position after at least 5 minutes rest).

Sample size estimation were calculated based on detecting urban and rural differences in hypertension treatment in a middle-income country with α=0.05 and power of 0.8 (two-tailed), which we had previously found was as large as 14 percentage points (42% urban and 28% rural). This would require a minimum sample of 600 hypertensive individuals across 12 urban and 12 rural communities.[17]

Study procedure and data collection process

A maximum of three attempts was made to contact identified households, with substitution of another randomly selected household if contact could not be made. When a household responded but refused to participate in the full study, simple demographics, risk factors, and CVD history were recorded. When an eligible household was identified and agreed to participate, all adults in the household were enumerated and initial data were collected using a household census form. Screening for eligibility was conducted and if more than one hypertensive individual was identified one was selected at random using a probability-based method and invited to participate. If none were present another household was selected. Those who agreed, were provided with a written informed consent and enrolled. A brief non-responder form was completed for those participants who refused, and substitute participants were asked. In addition, a household census questionnaire was completed with demographic information (number of individuals in the household, sex ratio, number of children, and relatives living in the household), tobacco use, level of education, and morbidities in all inhabitants of the household. Participants who agreed were asked to complete a pre-tested questionnaire within the home, which included socio-demographic details of the participants. The variables of interest in this study were participants' perception of their knowledge level, specific knowledge, health and illness perception, and activities for blood pressure control.

Measuring knowledge

We measured both the subjective and objective knowledge of hypertension of the participants. One item in the questionnaire measured subjective knowledge, and asked participants to rate their own knowledge of blood pressure, as having no knowledge vs. little knowledge vs. being very familiar. This was followed by five true or false statements to measure objective knowledge. The statements included 'high blood pressure can cause stroke', 'high blood pressure can cause cancer', 'people with high blood pressure generally feel well and do not notice that they have high blood pressure', 'People with high blood pressure can stop taking their medications when their blood pressure value is normal', 'people with high blood pressure only have to take their medication when they feel unwell.' These items are those used for the Prospective Urban and Rural Epidemiology study, a large ongoing international cohort study of CVD incidence, mortality and risk factors among more than 250,000 individuals across 21 low-, middle-, and high-income countries, including Malaysia;[32] and their use ensures comparability of our findings to the wider Malaysian and global context. We derived an overall objective knowledge level indicator, where participants were assessed as having good knowledge if they correctly answered at least four out of five objective knowledge questions.

Data analysis

Data were managed and analyzed using the Statistical Package for Social Science (SPSS) Version 27.0 (SPSS, Inc, Chicago, IL, version 27.0) and Stata Statistical Software Release 17 (College Station, TX: StataCorp LLC).[33] Descriptive analyses were used to report socio-demographic characteristics based on the levels of knowledge, detailed knowledge responses, health perception, and activities to control blood pressure. Normally distributed data were presented with means and standard deviations. Categorical data were presented as frequencies (n) and percentages (%).

The comparison of the socio-demographic characteristics and the level of knowledge on hypertension was analyzed using the chi-square test. The 95% confidence intervals (CI) were calculated for the prevalence of knowledge of consequences and management of hypertension. The comparison between self-rated health, long-standing illness, and activities limitation of the respondents and respondents' effectives of various interventions to control hypertension, and subjectively- and objectively assessed levels of hypertension knowledge were analyzed using the chi-squared test or the chi-squared test for trend, depending on the nature of the variables being compared. To control for the potential confounding effects of respondent characteristics, includingage, gender, education level, state, urban–rural location, case status, and marital and employment status, we adjusted these crude associations using ordered logistic regression models.

All analyses account for the multi-stage sampling approach through the application of probability-based sampling weights, calculated by taking the inverse product of i) the unconditional probability of selecting the mukim within the state, ii) the conditional probability of selecting household within the community, and iii) the conditional probability of selecting participant from all eligible residents within household. The significance level was set at a p-value <0.05.

Ethical considerations

Ethical approval was provided by the National Medical Research Register ID NMRR-17-2599-38713, the Research Ethics Committees at LSHTM (Ref: 12214),and Universiti Teknologi MARA (600-IRMI(5/1/6) REC/313/18). We followed the Ethical Guidelines for good research practice of the Association of Social Anthropologists of the UK and the Commonwealth (ASA) (Association of Social Anthropologists, 2011). The research protocol addressed key principles set out in Wellcome Trust guidance notes on conducting ethical research involving people in low- and middle-income countries.[34]

RESULTS

The final sample comprised 585 respondents who completed the survey, 6 (1.0%) of whom did not report their age and were excluded, leaving 579 adults remaining in the sample for this analysis, with a mean age of 59.0 (95%: 58.4, 59.7) years. There were more women (71.5%) than men (28.5%). This imbalance was expected and reflected working patterns. The small number of excluded observations due to missing data was not expected to bias the results, as a comparison of basic characteristics (i.e. gender, urban–rural location, state, awareness of diagnosis, education, marital,and employment) between those retained versus excluded from the analysis found no statistically significant differences.

Subjective self-reported levels of hypertension knowledge

Regarding respondents self-reported level of hypertension knowledge, 2.9% (17) reported having no knowledge at all of hypertension, 80.1% (464) had little knowledge, and 17.9% (98) were very familiar with hypertension. Table I reports the distribution of self-reported knowledge by selected respondent characteristics.Unsurprisingly, those previously diagnosed with hypertension were more likely to be very familiar with the condition than those who were newly identified during the study (p<0.001). Old cases had a higher percentage of familiar knowledge on hypertension than new cases (20.0% versus 1.6%).

There were also significant differences by age group (p=0.048). More respondents older than 50 years tended to be very familiar with the knowledge of hypertension than their younger counterparts. The other sociodemographic characteristics were not statistically significant. Those in Johor, in urban areas, having vocational and university levels of education, and married were more likely to be very familiar but this did not reach statistical significance (p>0.05).

Objective levels of hypertension knowledge

Table II provides further detail on what it is that people with different levels of knowledge actuallyknow. Almost all (91.5%) were aware that hypertension can cause a stroke. However, one-fifth believed it could cause cancer and over half did not know that it could not. Almost three-quarters of respondents said that people with high blood pressure generally feel well (72.1%) and recognized that people with high BP should not stop taking their medication (70.7%). Most of the respondents knew that people should take their medication even if they feel well (73.6%).

Among all respondents, 56.2% (95% CI: 50.7, 61.6) correctly answered at least 4 out of 5 objective knowledge questions. Table III reports the distribution of objective knowledge by selected respondent characteristics. Younger respondents tended to have better levels of knowledge than their older counterparts (p=0.001); and separated and married respondents tended to be more knowledgeable than single or widowed respondents (p<0.001).The level of objective knowledge also increased with education level; however, this did not reach statistical significance (p>0.05).

Self-reported health and subjective vs. objective levels of hypertension knowledge

More than half (66.0%) of the respondents rated their health as poor. Interestingly, most did not perceive themselves as having a long-term illness (95.0%). Among those who did, most perceived that their long-term illness limits their ability to care for themselves (52.1%), to participate in social activities (82.1%), and limits activities in other ways (88.9%).

The self-reported health of respondents stratified by subjective and objective levels of hypertension knowledge is reported in Table IV. Those who considered themselves to have a long-standing illness, disability or infirmity tended to self-report as being more knowledgeable of hypertension than those without (p=0.002). Other characteristics were not significantly associated with their subjective or objective level of hypertension knowledge.

After adjusting for potential confounding from age, gender, education level, state, urban–rural location, case status, and marital and employment status, self-rated health was not strongly associated with either subjective (aOR: 1.05, 95% CI: 0.78, 1.41, p=0.769) or objective (aOR: 0.94, 95% CI: 0.69, 1.28, p=0.689) levels of hypertension knowledge.

Perceived effectiveness of hypertension interventions and subjective versus objective levels of hypertension knowledge

A large majority of respondents perceived taking western medications (75.7%), reducing body weight (80.5%), taking less salt (87.0%), increasing physical exercise (84.9%), and reducing stress (86.5%) to be effective atcontrolling hypertension. Conversely, respondents most reported not knowing about the effectiveness of traditional medicines for hypertension (34.4%).

Table V shows the crude associations betweenthese perceptions andrespondents' subjectively and objectively assessed levels of hypertension knowledge. There was strong evidence for an association between perceived effectiveness of taking traditional medications and taking less salt and

Table I: The distribution of levels of knowledge of hypertension among the respondents (N=579)

	Nothing (n=17), n(%)	Little (n=464), n(%)	Very familiar (n=98), n(%)	*p* value+
State:				
Selangor	3 (4.1%)	54 (84.2%)	7 (11.7%)	0.165
Johor	1 (0.6%)	129 (78.0%)	35 (21.4%)	
Penang	2 (1.9%)	75 (84.9%)	12 (13.2%)	
Kelantan	11 (4.4%)	206 (78.8%)	44 (16.8%)	
Location				
Urban	12 (3.8%)	236 (76.1%)	62 (20.1%)	0.091
Rural	5 (1.8%)	228 (84.7%)	36 (13.4%)	
Cases:				
Old	13 (2.7%)	374 (77.3%)	97 (20.0%)	<0.001
New	4 (4.2%)	89 (94.2%)	1 (1.6%)	
Gender:				
Male	4 (2.5%)	124 (75.0%)	37 (22.5%)	0.242
Female	13 (3.1%)	340 (82.1%)	61 (14.8%)	
Age group:				
less than 50 years	2 (2.5%)	69 (92.9%)	3 (4.6%)	0.048
50–59 years	4 (2.2%)	161 (79.4%)	37 (18.4%)	
60 years and above	10 (3.5%)	234 (77.4%)	58 (19.1%)	
Educational status				
None	2 (3.9%)	44 (83.6%)	6 (12.4%)	0.361
Primary	3 (1.6%)	196 (81.1%)	42 (17.4%)	
Secondary	11 (4.0%)	216 (78.7%)	48 (17.4%)	
Vocational and University	0 (0.0%)	6 (75.8%)	2 (24.2%)	
Marital status				
Single	0 (0.0%)	11 (96.7%)	1 (3.3%)	0.136
Currently married	14 (3.3%)	325 (76.4%)	86 (20.2%)	
Widowed	1 (2.1%)	108 (88.4%)	11 (9.5%)	
Separated and divorced	0 (0.0%)	19 (98.1%)	1 (2.0%)	
Currently employed				
Yes	4 (2.6%)	117 (82.7%)	117 (82.7%)	0.777
No	13 (3.0%)	347 (79.2%)	788 (17.8%)	

+*p* value from chi-squared test adjusted for sampling design

Table II: Knowledge of consequences and management of hypertension (N=579)

	Prevalence (95%CI)
High BP can cause stroke:	
Yes	91.5% (95% CI: 88.7-93.7)
No	1.8% (95% CI: 1.0-3.0)
Don't know	6.4% (95% CI: 4.5-9.0)
High BP can cause cancer:	
Yes	19.1% (95% CI: 14.9-24.2)
No	28.0% (95% CI: 22.8-33.8)
Don't know	52.6% (95% CI: 44.3-60.7)
People with high BP generally feel well:	
Yes	72.1% (95% CI: 67.5-76.3)
No	19.6% (95% CI: 14.8-25.5)
Don't know	7.9% (95% CI: 5.3-11.7)
People with high BP can stop taking their medication:	
Yes	18.0% (95% CI: 12.3-25.5)
No	70.7% (95% CI: 64.8-76.0)
Don't know	11.0% (95% CI: 8.2-14.6)
People with high BP only have to take medication when they feel unwell:	
Yes	17.2% (95% CI: 12.6-23.0)
No	73.6% (95% CI: 69.6-77.3)
Don't know	8.9% (95% CI: 6.6-11.9)

Table III: The distribution of respondents correctly answering at least four out of five objective knowledge questions (N=579)

	n(%)	*p* value+
State:		
Selangor	30 (47.0%)	0.103
Johor	90 (54.7%)	
Penang	51 (57.6%)	
Kelantan	154 (59.0%)	
Location		
Urban	165 (53.1%)	0.074
Rural	161 (59.9%)	
Cases:		
Old	280 (57.8%)	0.197
New	46 (48.1%)	
Gender:		
Male	82 (50.0%)	0.237
Female	243 (58.7%)	
Age group:		
less than 50 years	48 (65.6%)	0.001
50 -59 years	123 (60.5%)	
60 years and above	154 (51.1%)	
Educational status		
None	17 (32.7%)	0.092
Primary	127 (52.3%)	
Secondary	175 (63.5%)	
Vocational and University	7 (79.1%)	
Marital status		
Single	5 (40.9%)	<0.001
Currently married	253 (59.3%)	
Widowed	52 (42.7%)	
Separated and divorced	16 (82.0%)	
Currently employed		
Yes	75 (52.9%)	0.868
No	251 (57.3%)	

+*p* value from chi-squared test or chi-squared test for trend (for age group and educational status)adjusted for sampling design

Table IV: Crude associations between respondents' self-reported health and subjective and objective knowledge of hypertension (N=579)

	Subjective knowledge level				Objective knowledge level	
	Nothing (n=17), n (%)	Little (n=464), n (%)	Very familiar (n=98), n (%)	*p* value+	n (%)	*p* value*
Self-rated health:						
Poor	1 (2.3%)	26 (79.2%)	6 (18.5%)	0.180	14 (41.7%)	0.305
Neither good nor bad	10 (5.9%)	126 (76.9%)	28 (17.2%)		98 (60.1%)	
Good	6 (1.7%)	311 (81.5%)	64 (16.8%)		213 (55.8%)	
Long-standing illness, disability, and infirmity						
Yes	1 (4.2%)	16 (54.2%)	12 (41.6%)	0.002	22 (77.0%)	0.060
No	16 (2.8%)	448 (81.4%)	86 (15.7%)		303 (55.1%)	
Limit the ability to care for oneself (n=33)	(n=1)	(n=18)	(n=14)	0.171		0.670
Yes	0 (0.0%)	8 (48.5%)	9 (51.5%)		13 (74.2%)	
No	1 (8.7%)	10 (60.5%)	5 (30.9%)		13 (80.2%)	
Limit the participation in social activities (n=33)	(n=1)	(n=18)	(n=14)	0.797		0.968
Yes	1 (5.1%)	15 (54.4%)	11 (40.6%)		21 (76.9%)	
No	0 (0.0%)	3 (53.7%)	3 (46.3%)		5 (77.7%)	
Limit the activities in any other way (n=33)	(n=1)	(n=18)	(n=14)	0.350		0.909
Yes	1 (4.7%)	17 (57.3%)	11 (38.0%)		23 (78.4%)	
No	0 (0.0%)	1 (24.3%)	3 (75.7%)		3 (75.7%)	

+*p* value from chi-squared test for trend and*chi-squared test adjusted for sampling design

subjectively assessed level of hypertension knowledge. Conversely, there was strong evidence for positive associations between objectively assessed level of hypertension knowledgeand the perceived effectiveness of all the listed activities for controlling hypertension, apart from taking traditional medication.

After adjusting for potential confounding from age, gender, education level, state, urban-rural location, case status, and marital and employment status, strong evidence for a positive association between subjectively assessed level of hypertension knowledge and perceived effectiveness of taking traditional medicationsonly (aOR: 1.32, 95% CI: 1.13–1.55, *p*=0.001). Regarding objectively assessed level of

Table V: Crude associations between respondents' perceptions on the effectiveness of activities for controlling hypertension and subjective and objective knowledge of hypertension (N=579)

	Subjective knowledge level				Objective knowledge level	
	Nothing (N=17), n(%)	Little (N=464), n(%)	Very familiar (N=98), n(%)	*p* value+	n (%)	*p* value*
Taking western (prescribed) medications:						
Effective	13 (80.5%)	341 (73.6%)	83 (84.7%)	0.064	266 (81.7%)	0.001
Sometimes effective and ineffective	2 (12.4%)	74 (16.0%)	9 (9.6%)		42 (12.9%)	
Ineffective	0 (0.0%)	14 (3.0%)	5 (5.7%)		12 (3.6%)	
Don't know	1 (7.1%)	34 (7.4%)	0 (0.0%)		6 (1.8%)	
Taking traditional medications:						
Effective	2 (14.8%)	101 (21.8%)	23 (23.3%)	<0.001	75 (23.1%)	0.086
Sometimes effective and ineffective	3 (21.1%)	97 (21.0%)	22 (23.0%)		78 (23.9%)	
Ineffective	6 (34.8%)	91 (19.7%)	32 (33.0%)		79 (24.2%)	
Don't know	5 (29.4%)	174 (37.5%)	20 (20.7%)		93 (28.7%)	
Losing bodyweight:						
Effective	11(65.0%)	373(80.4%)	82 (83.5%)	0.057	287 (88.2%)	<0.001
Sometimes effective and ineffective	2(10.1%)	31(6.7%)	9(8.7%)		20 (6.2%)	
Ineffective	0 (0.0%)	9 (2.0%)	1 (1.1%)		4 (1.3%)	
Don't know	4 (24.9%)	50(10.9%)	6 (6.6%)		14 (4.3%)	
Taking less salt:						
Effective	14 (82.7%)	398 (85.9%)	91 (92.9%)	0.043	300 (92.1%)	<0.001
Sometimes effective and ineffective	1 (5.6%)	23 (5.0%)	6 (5.7%)		16 (4.9%)	
Ineffective	0 (0.0%)	5 (1.0%)	1 (0.4%)		2 (0.8%)	
Don't know	2 (11.7%)	37 (8.1%)	1 (1.0%)		7 (2.3%)	
Increase physical exercise:						
Effective	14 (85.3%)	390 (84.2%)	87 (87.9%)	0.490	298 (91.5%)	<0.001
Sometimes effective and ineffective	1 (7.5%)	29 (6.3%)	6 (6.1%)		14 (4.4%)	
Ineffective	0 (0.0%)	4 (1.0%)	1 (0.4%)		2 (0.8%)	
Don't know	2 (11.1%)	4 (1.0%)	4 (4.5%)		11 (3.3%)	
Reducing stress:						
Effective	14 (85.0%)	399 (86.0%)	88 (89.2%)	0.532	300 (92.1%)	<0.001
Sometimes effective and ineffective	1 (7.9%)	24 (5.2%)	6 (5.7%)		14 (4.5%)	
Ineffective	0 (0.0%)	4 (0.9%)	2 (2.3%)		2 (0.8%)	
Don't know	1 (7.1%)	36 (7.9%)	3 (2.8%)		9 (2.7%)	

+*p* value from chi-squared test for trend and *chi-squared test adjusted for sampling design

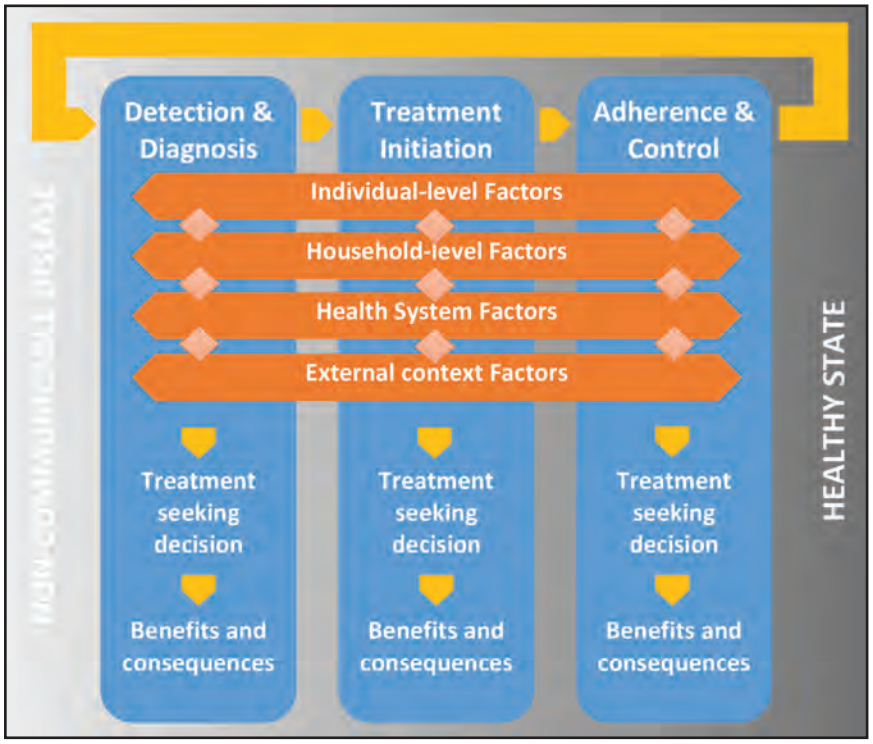

Fig. 1: Conceptual framework

hypertension knowledge, strong evidence remained for positive associations with the perceived effectiveness taking western medication (aOR: 2.28, 95% CI: 1.39–3.73, p=0.001), losing bodyweight (aOR: 2.82, 95% CI: 2.16–3.69, p<0.001), taking less salt (aOR: 2.56, 95% CI: 1.41-4.66, p=0.002),increasing physical exercise (aOR: 2.86, 95% CI: 1.63–5.00, p<0.001)and reducing stress (aOR: 2.62, 95% CI: 1.66–4.14, p<0.001), but not taking traditional medicine (aOR: 1.47, 95% CI: 0.91–2.39, p=0.118).

DISCUSSION

In these poor communities in Malaysia four out of five people with hypertension reported having little or no self-assessed knowledge of their condition. This was slightly better among those who had been hypertensive for longer and who were older, and therefore, more at risk from its consequences.

Yet, it is notable that, although self-assessed knowledge was low, their performance on the objective assessment of knowledge was better, withmore than half (56%) correctly answering at least four out of five of the related questions. This was consistent with other local studies that found hypertensive patients were relatively well informed of the risk factors and complications of hypertension,[4,35] but there is clear room for improvement. This study also reiterated that hypertensive patients were unsure about any link between hypertension and cancer, as most patients in our study responded that they did not know. In another study, patients believed that cancer was associated with hypertension, which is untrue.[4]

Most patients knew that people with high blood pressure cannot stop taking their medication (71%) and that they should take their medication despite feeling well (74%), However, there were still a quarter who were unsure or believed they did not need to take their medication if they felt well. The knowledge gap identified here is important because it could influence adherence to medication and blood pressure control. The overall rate of control among Malaysians on treatment is under 40% (30.7%[2] and 37.4%[3] in different studies). Inconsistencies in taking medication and doubting the role of medication are important factors in poor blood pressure control.[36]

Our study findings also highlight an important aspect of how hypertension is perceived:all respondents have high blood pressure and while 65.6% rate their health as poor, 94.4% do not describe themselves as having a long-term illness. Thus, hypertension appears not to be commonly viewed as a chronic condition, but rather as one that comes and goes – which is consistent with qualitative RESPOND study findings in the Philippines[37] – again, potentially affecting medication adherence. This could be due to the asymptomatic nature of those with high blood pressure, thus not equating it to feeling ill or having a long-term illness. This understanding is crucial when attempting to educate hypertensive patients on self-management and blood pressure control. It is important to acknowledge that hypertension may not cause symptoms and remain 'silent' for many years, while increasing the risk of devastating complications, such as heart disease or stroke. It is encouraging that hypertensive patients in these low-income communities identify western medications, losing weight, taking less salt, increase physical exercise, and reducing stress as effective means of controlling blood pressure. It is of particular interest that these positive perceptions of hypertension control measures appear to be supported by good levels of objective, and not subjective knowledge of hypertension, as suggested by the findings from our regression analyses. Consistent with findings from another study,[8] we also observed continued belief in traditional and complementary medication (TCM) as a means to treat high blood pressure. Again, our regression analyses provider further insight as a belief in the effectiveness of TCM for hypertension appears to be supported by high levels of subjective, and not objective knowledge of hypertension.

Malaysia has invested substantial resources in chronic disease management, with a Salt Reduction Strategy, a model of health care based on the Family Doctor Concept, Clinical practice guidelines for hypertension, and various community-based programs.[38] The 10-year National Strategic Plan for Non-Communicable Disease (NSP-NCD) introduced in 2016, explicitly seeks to improve health equity and to encourage people to adopt healthy lifestyles.[38] In light of our study's findings, the success of these policy outcomes could be enhanced by ensuring that related activities reach low-income groups, particularly those that aim to improve objective, rather than subjective knowledge of hypertension, and an understanding of the asymptomatic nature of this chronic condition.

An important consideration in interpreting our findings concerns their generalizability to other low-income communities in Malaysia, and in other LMICs more broadly. As mentioned previously, there were no notable differences in the characteristics of the 579 respondents included and 6 excluded in this analysis due to missing data; therefore, their exclusion is unlikely to bias our findings.Quality assurance measures conducted by the RESPOND study also show that the median household income, level of hypertension control, education, and employment observed in our sample are closely aligned with national data, which suggests that we have, indeed, sampled a suitable cross-section of hypertensive adults in low-income communities in Malaysia. However, several of the indicators presented that relate to respondents' hypertension knowledge and the perceived effectiveness health interventions may be affected by social desirability bias, where respondents may answer questions in ways that may be viewed favorably by others. We have taken steps to minimize this by interviewing respondents in their homes (rather than in clinical settings) and by interviewers trained in non-judgmental techniques. On the other hand, we accept that participants may have still considered the study as 'clinical' because it involved blood pressure measurement at enrolment.

CONCLUSION

This study provides some reassurance about knowledge of hypertension among some of the most disadvantaged communities in Malaysia. However, given that the rates of hypertension control across all populations nationally are low despite, further improvements in patient knowledge could support further and more equitable gains in

hypertension outcomes. It can be concluded that there is a gap between knowledge and action. The mere knowledge on activities that can control blood pressure does not necessarily lead to change for healthier lifestyle or compliance to medication. Recommendation can include better implementation of national policies that can reinforce the knowledge and stimulate lifestyle changes among individuals and communities. Yet, more research is needed, and other parts of this project will explore in more detail how the respondents conceptualize hypertension, for example, the role of the blood and other body systems[37] and the challenges they face on their therapeutic journeys,[39] issues already reported in the Philippines part of the project. Such insights, combined with the findings from this study, will help to inform strategies that aim to improve patient knowledge about hypertension, and ultimately, population levels of blood pressure control in ways that leave no one behind.

REFERENCES

1. National Institutes of Health. NCDs - Non-Communicable Diseases: Risk Factors and other Health Problems. In: National Institutes of Health, ed. National Health and Morbidity Survey 2019: Non-Communicable Diseases, Healthcare Demand and health Literacy (Vol I). Kuala Lumpur: Ministry of Health Malaysia; 2019.
2. Abdul-Razak S, Daher AM, Ramli AS, Ariffin F, Mazapuspavina MY, Ambigga KS, et al. Prevalence, awareness, treatment, control and socio demographic determinants of hypertension in Malaysian adults. BMC Public Health. 2016; 16: 1-10
3. Ab Majid NL, Omar MA, Khoo YY, Mahadir Naidu B, Ling Miaw Yn J, Rodzlan Hasani WS, et al. Prevalence, Awareness, Treatment and Control of hypertension in the Malaysian population: findings from the National Health and Morbidity Survey 2006-2015. J Hum Hypertens. 2018; 32(8-9): 617-24.
4. Buang NFB, Rahman NAA, Haque M. Knowledge, attitude and practice regarding hypertension among residents in a housing area in Selangor, Malaysia. Med Pharm Rep. 2019; 92(2): 145-52.
5. Jankowska-Polańska B, Uchmanowicz I, Dudek K, Mazur G. Relationship between patients' knowledge and medication adherence among patients with hypertension. Patient Prefer Adher. 2016; 10: 2437-47.
6. Teh XR, Lim MT, Tong SF, Husin M, Khamis N, Sivasampu S. Quality of hypertension management in public primary care clinics in Malaysia: an update. PLoS One 2020; 15(8): e0237083.
7. Risso-Gill I, Balabanova D, Majid F, et al. Understanding the modifiable health systems barriers to hypertension management in Malaysia: a multi-method health systems appraisal approach. BMC Health Serv Res. 2015; 15(1): 254.
8. Siew-Mooi C, Vasudevan R, Zacharia Z, Paimin F. Frequency of complementary and alternative medicine usage among Malaysian hypertensive subjects. Life Sci J. 2013; 10(4): 2526-31.
9. Abu Bakar AS, Rahman HA, Mohd Nazan AIH, Shahar HK, Idris K. Risk factors of chronic diseases among B40 workers in Malaysia: A review E-Proceeding International Webinar Community Development in Southeast Asia (IWCDSA) 2021.
10. Khoo KL, Liew YM, Tan H, Sambhi JS, Hatijah BA. Patients' knowledge and attitude towards treatment and control of hypertension: a nation-wide telephone survey conducted in Malaysia. Med J Malaysia 1999; 54(1): 37–46.
11. Palafox B, McKee M, Balabanova D, AlHabib KF, Avezum AJ, Bahonar A, et al. Wealth and cardiovascular health: a cross-sectional study of wealth-related inequalities in the awareness, treatment and control of hypertension in high-, middle- and low-income countries. Int J Equity Health. 2016; 15(1): 1-14
12. Eng JY, Moy FM, Bulgiba A. Impact of a workplace health promotion program on employees' blood pressure in a Public University. PLoS One 2016; 11(2): e0148307.
13. Fiidow OA, Huda B, Salmiah M. Socio-demographic Factors of Hypertension among Non-Academic Staff in Universiti Putra Malaysia. Int J Public Health Clin Sci. 2016; 3(4): 158-68.
14. Khazanah Research Institute. Demarcating households: an integrated income and consumption analysis. 2018. http://www.krinstitute.org/assets/contentMS/img/template/editor/Publication_Demarcating%20Households_Slides%20(1).pdf.Accessed 30th December 2021.
15. Protect Health. mySalam vs Peka B40. 2019. https://www.mysalam.com.my/b40/info/content/MYSALAM_INFOGRAPHIC_FINAL_15519.pdf.Accessed 30 December 2021.
16. The Edge Markets. 'Worrying' data shows about 33% of B40 group detected with non-communicable disease via PeKA B40 health screening — MOH. 2020. https://www.theedgemarkets.com/article/worrying-data-shows-about-33-b40-group-detected-noncommunicable-disease-peka-b40-health (accessed 30th December 2021).
17. Palafox B, Seguin ML, McKee M, Dans AL, Yusoff K, Candari CJ, et al. Responsive and Equitable Health Systems-Partnership on Non-Communicable Diseases (RESPOND) study: a mixed-methods, longitudinal, observational study on treatment seeking for hypertension in Malaysia and the Philippines. BMJ Open. 2018; 8(7): e024000.
18. Dept of Statistics Malaysia. Population distribution and basic demographic characteristics 2000. . 2000. https://www.mycensus.gov.my/index.php/census-product/publication/census-2000/650-population-distribution-and-basic-demographic-characteristics-2000.Accessed 30 December 2021.
19. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? J Health Soc Behav. 1995; 36(1): 1-10.
20. Aday LA, Andersen R. A framework for the study of access to medical care. Health Serv Res. 1974; 9(3): 208-20.
21. Aday LA, Andersen RM. Equity of access to medical care: a conceptual and empirical overview. Med Care 1981; 19(12): 4-27.
22. Davidson PL, Andersen RM, Wyn R, Brown ER. A framework for evaluating safety-net and other community-level factors on access for low-income populations. Inquiry 2004; 41(1): 21-38.
23. Ensor T, Cooper S. Overcoming barriers to health service access: influencing the demand side. Health Policy Plan 2004; 19(2): 69-79.
24. World Health Organization. Everybody's business--strengthening health systems to improve health outcomes: WHO's framework for action. Geneva: WHO; 2007.
25. George A. 'By papers and pens, you can only do so much': views about accountability and human resource management from Indian government health administrators and workers. Int J Health Plann Manag. 2009; 24(3): 205-24.
26. Sheikh K, Ranson MK, Gilson L. Explorations on people centredness in health systems. Health Policy Plan. 2014; 29(Suppl 2):ii1-5.
27. Fochsen G, Deshpande K, Ringsberg KC, Thorson A. Conflicting accountabilities: Doctor's dilemma in TB control in rural India. Health Policy 2009; 89(2): 160-7.
28. Kielmann K, Datye V, Pradhan A, Rangan S. Balancing authority, deference and trust across the public-private divide in health care: tuberculosis health visitors in western Maharashtra, India. Glob Public Health. 2014; 9(8): 975-92.
29. Mackian S, Bedri N, Lovel H. Up the garden path and over the edge: where might health-seeking behaviour take us? Health Policy Plan. 2004;19(3):137–146.
30. Greenhalgh T, Clinch M, Afsar N, Choudhury Y, Sudra R, Campbell-Richards D, et al. Socio-cultural influences on the behaviour of South Asian women with diabetes in pregnancy: qualitative study using a multi-level theoretical approach. BMC Med 2015; 13(1): 120.
31. Shoveller JA, Knight R, Johnson J, Oliffe JL, Goldenberg S. 'Not the swab!' Young men's experiences with STI testing. Sociol Health Illn. 2010; 32(1): 57-73.

32. Teo K, Chow CK, Vaz M, Rangarajan S, Yusuf S. The Prospective Urban Rural Epidemiology (PURE) study: examining the impact of societal influences on chronic noncommunicable diseases in low-, middle-, and high-income countries. AmHeart J. 2009; 158(1): 1-7. e1.
33. StataCorp. Stata Version 17 College Station, Texas, USA: StataCorp; 2022.
34. Wellcome Trust. Research involving people in low- and middle-income countries. 2017. https://wellcome.ac.uk/funding/managing-grant/guidance-notesresearch-involving-people-low-and-middle-income-countries (accessed 30th December 2021).
35. Mohammed AH, Hassan BAR, Suhaimi AM, Blebil A, Dujaili J. Factors associated with the level of knowledge about hypertension in Malaysia: A short communication. J Pharm Health ServRes. 2020; 11(4): 415-7.
36. Choudhry NK, Kronish IM, Vongpatanasin W, Ferdinand KC, Pavlik VN, Egan BM, et al. Medication adherence and blood pressure control: a scientific statement from the American Heart Association. Hypertension 2022; 79(1): e1–e14.
37. Lasco G, Mendoza J, Renedo A, Seguin ML, Palafox B, Palileo-Villanueva LM, et al. Nasa dugo ('It's in the blood'): lay conceptions of hypertension in the Philippines. BMJ Glob Health. 2020; 5(7): e002295.
38. Tan H, Ahmad A, Feisul I. Hypertension prevention and control in Malaysia: a review. Int J Public Health Clin Sci. 2020; 7(4): 19-31.
39. Mendoza JA, Lasco G, Renedo A, Palileo-Villanueva L, Seguin M, Palafox B, et al. (De) constructing 'therapeutic itineraries' of hypertension care: A qualitative study in the Philippines. Soc SciMed. 2022; 300: 114570.