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Prevalence, awareness, treatment and control of hypertension among older people in the Philippines

Jeofrey Abalos*, Yasuhiko Saito[1], Grace Cruz[2]

Abstract

This study examines the prevalence, awareness, treatment and control of hypertension and its correlates among older adults in the Philippines. We analyze the data of a nationally representative sample of adults 60 years and older (N=5,985, response rate=94%) from the baseline survey of the Longitudinal Study of Aging and Health in the Philippines conducted in 2018. Hypertension was defined as SBP ≥140 mm Hg or DBP ≥ 90 mm Hg or (self-reported) current use of anti-hypertension medication. Hypertensive respondents who responded 'No' to the question 'Have you been diagnosed by a doctor that you have high blood pressure?' were considered to be unaware and those who responded 'No' to the question 'At present do you take any medicine for high blood pressure?' were classified as untreated. Hence, untreated respondents included both those who are unaware of their hypertension and those who were aware but were not taking medications for high blood pressure. BP control was assessed among treated hypertensives, SBP <140 mm Hg and DBP <90 mm Hg was considered to be controlled BP. This study employed several socio-demographic and health variables, including age, sex, marital status, place of residence, education, living arrangement, wealth index, BMI, and daily exercise. Results show a high prevalence of hypertension (69.1%) and of suboptimal BP control among treated hypertensives (72.5%). Among those who are hypertensive, more than a third (38.4%) are unaware of their hypertension.

*: This study was completed while the first author was a research fellow at the University of the Philippines Population Institute

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Introduction

Hypertension is a global public health issue and is an important risk factor for deaths due to cardiovascular diseases, chronic kidney disease, and diabetes (The Global Burden of Metabolic Risk Factors for Chronic Diseases Collaboration, 2014; World Health Organization [WHO], 2013). An estimated 42% and 41% of hemorrhagic stroke and ischemic heart disease-related deaths, respectively, are associated with hypertension (Forouzanfar et al., 2017). The projected number of people with hypertension increased from 442 million in 1990 to 874 million in 2015, with an associated annual projected number of 7.8 million deaths, accounting for 14% of global mortality in 2015 (Forouzanfar et al., 2017). It is considered a "silent, invisible killer" because it rarely presents any symptoms during the early stage, and many individuals go undiagnosed (WHO, 2013).

The older people comprise an important segment in the epidemiology of hypertension (Malhotra, Chan, Malhotra, & Østbye, 2010). Compared with other age groups, the prevalence of hypertension is high among older people (Neutel & Gilderman, 2008; Ostchega, Dillon, Hughes, Carroll, & Yoon, 2007; Primatesta & Poulter, 2004; Sison et al., 2007).The Framingham Heart Study showed that men and women aged 55 years with normal blood pressure have 90% residual lifetime risks of developing hypertension over their remaining lifetime (Vasan et al., 2002). The increasing prevalence of hypertension at older ages is attributed to the increases in vascular resistance and large artery stiffness (Franklin et al., 1997), although the environment and culture may also have important contributions (Marmot, 1984).

Although the likelihood of developing hypertension is high among older people, the condition is treatable (Beckett et al., 2008; Rashidi & Wright Jr, 2009) and interventions are less expensive than addressing its subsequent health complications (Wagner, Valera, Graves, Laviña, & Ross-Degnan, 2008; World Health Organization [WHO], 2013). For example, a meta-analysis of randomized trials among hypertensive patients 80 years old and over showed antihypertensive treatment to be related with a reduced risk of stroke (35%), cardiovascular events (27%), and heart failure (50%) (Bejan-Angoulvant et al., 2010). However, despite the availability and effectiveness of treatment, the level of awareness, treatment, and control of hypertension among older persons is low, particularly in low and middle-income countries (Hypertension Study Group, 2001; Prince et al., 2012). Addressing hypertension among older people is very important not only because it is correlated with mortality (Mozaffarian, Kamineni, Prineas, & Siscovick, 2008), but it is also associated with life satisfaction (Mojon-Azzi & Sousa-Poza, 2011), cognitive performance (Obisesan et al., 2008), depression, (Boateng, Luginaah, & Taabazuing, 2015; Bosworth, Bartash, Olsen, & Steffens, 2003), and healthy ageing (Reed et al., 1998). Moreover, given the increasing share of the older population, the burden of hypertension is expected to rise substantially (Lloyd-Jones, Evans, & Levy, 2005). Hence, reliable information on the prevalence of hypertension is important in crafting policies and programs to prevent, control and facilitate early detection of this condition (Kearney et al., 2005). Similarly, information on the level of awareness, treatment and control of hypertension is also important in evaluating and monitoring the quality of care for individuals with hypertension (Porapakkham, Pattaraarchachai, & Aekplakorn, 2008).

The Philippines is not yet an aging country, but the absolute and relative size of its older population has been increasing over time (Abalos, 2018; Cruz & Camhol, 2014). In 2015 the number of older Filipinos aged 60 years and over reached 7.5 million, or 7.5% of the total population, and is projected to increase to 20 million in 2040. Despite the growing empirical evidence showing an elevated risk of developing hypertension at older ages, and its implication for older people's overall health and well-being, we know little about the current prevalence and management of hypertension among older people in the Philippines. Previous studies are mostly based on one locality in the Philippines (Reyes-Gibby & Aday, 2000), or do not focus exclusively on older people (Duante, Velandria, Orense, & Tangco, 2001; Lee, 2009; Philippine Heart Association-Council on Hypertension, 2013). While there are nationally representative surveys that document the prevalence of hypertension among older Filipinos (Capanzana, Duante, Abille-Goyena, Benavides-de Leon, & Cerdena, 2010; Tanchoco, Yee, Duante, & Orense, 1999), there is limited research that examines their hypertension awareness and treatment. This study aims to fill this gap by assessing the prevalence and correlates of hypertension, and of awareness, treatment, and control of hypertension among older people in the Philippines.

Data and Methods

Data for the analysis was drawn from the 2018 Longitudinal Study of Ageing and Health in the Philippines (LSAHP). LSAHP is the first nationally representative longitudinal study on ageing in the Philippines, implemented by the Demographic Research and Development Foundation, Inc., with funding support from the Economic Research Institute for ASEAN and East Asia (ERIA). The survey used a multistage sampling design with provinces as the primary sampling units (PSUs), barangays (villages) as the secondary sampling units (SSUs), and OPs as the ultimate sampling units. It covered 11 provinces, 167 barangays, and 5,985 individual respondents aged 60 years old and over. To ensure enough number of respondents in the succeeding rounds of the survey, the number of respondents in the age groups 70-79 and 80 and over were oversampled by a factor of 2 and 3, respectively. Sampling weights are applied to the data used in the analysis to nationally represent the older population in the Philippines. A more detailed discussion of the survey methodology can be found elsewhere (Barrios & Marquez, 2019). Of the 5,985 respondents, 5618 had their blood pressure taken. Excluding 76 respondents with missing information on key independent variables, such as education, awareness on their hypertension and diabetes status, the analytical sample was reduced to 5,542 cases.

BP Measurement

Before data collection, LSAHP interviewers were trained on the proper protocol for BP measurement using didactic instruction and role-plays. The interviewers were instructed to take the BP measurement of the older person respondent in a sitting position with the body erect and feet together, except for those who cannot sit and were bedridden whose BP was measured in a lying position. BP measurement was done three times at a one-minute interval using the digital BP apparatus. Almost all BP measurements were done in a sitting position (99%), using left arm (96.5%). Following previous studies, the definition of the systolic BP (SBP) and diastolic BP (DBP) values of the respondents was based on the average of the three readings (Malhotra et al., 2010).

Definition

Following previous studies and guidelines, hypertension was defined as SBP ≥140 mm Hg or DBP ≥ 90 mm Hg or (self-reported) current use of anti-hypertension medication (Malhotra et al., 2010; Saito, Davarian, Takahashi, Schneider, & Crimmins, 2015; Tareque & Saito, 2017). Hypertensive respondents who responded 'No' to the question 'Have you been told by a doctor that you have high blood pressure?' were considered to be unaware and those who responded 'No' to the question 'At present do you take any medicine for high blood pressure?' were classified as untreated. Hence, untreated respondents included both those who are unaware of their hypertension and those who were aware but were not taking medications for high blood pressure. BP control was assessed among treated hypertensives, taking into account their self-reported diabetes status. For respondents without diabetes, SBP <140 mm Hg and DBP <90 mm Hg was considered to be controlled BP, while the corresponding values for those with diabetes were SBP <130 mm Hg and DBP <80 mm Hg, based on JNC-7 guidelines and previous studies (Malhotra et al., 2010).

Correlates

The current study employed several socio-demographic and health variables that were used as potential correlates with hypertension, and/or awareness, treatment and control of hypertension in previous studies (Malhotra et al., 2010; Wu et al., 2015).

The socio-demographic variables included age, sex, marital status, place of residence, education, living arrangement, and wealth index. Age was grouped into three categories (60-69 years, 70-79 years, and 80 and over). Marital status was categorized into currently married (legally married and cohabiting) and unmarried (never married, widowed, divorced, and separated). Place of residence was dichotomized into urban and rural while education was categorized into, elementary and lower, high school/post-secondary and college and higher. Living arrangement was grouped into living alone, living with spouse only, living with children and other living arrangements. The wealth index was computed based on the household possessions and amenities of the older persons and was divided into quintiles.

The health variables included body mass index (BMI), smoking status, self-reported diabetes status, and daily exercise. BMI was calculated using the measured height and weight of the respondents, and was categorized based on Asian cutoffs (i.e. underweight (<18.5 kg/m^2), low risk (healthy range: 18.5-22 kg/m^2), moderate/increased risk (23.0-27.4 kg/m^2) and high risk (≥ 27.5 kg/m^2) (Capanzana et al., 2010; WHO Expert Consultation, 2004).

In order to assess the prevalence of hypertension and of awareness, treatment, and control across socio-demographic and health variables, weighted proportions for categorical variables and mean estimates for continuous variables were calculated. Sample t-test and analysis of variance were used to test significant differences in means across categories, while chi-square statistic was used to assess differences in proportions. In the multivariate analysis, binomial logistic regression was used to assess the relationship between socio-demographic and health correlates with the presence of hypertension, and respondents' awareness, treatment and control of hypertension.

Profile of respondents

The socio-demographic and health characteristics of the sample respondents are presented in Table 1. The majority (63.3%) of the respondents are in their 60s, and 6 in 10 are women. More than half (51.6%) are unmarried and living in urban areas (58.3%). The educational profile of the sample is generally low, with nearly 3 in 4 having elementary education or lower. Most older Filipinos in the sample are living with their children (60.7%), although a significant proportion is living alone (13.3%). More than a third (36.4%) of respondents have BMI that is within the healthy range, and nearly half have moderate (32.3%) to high risk (14.5%) BMI. Majority (52.7%) of respondents do daily exercise. More than half have never smoked cigarettes, while about 17% and 26% are current and former smokers, respectively. About 1 in 8 respondents reported that they have doctor-diagnosed diabetes.

Table 2 presents the mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) among older Filipinos by age and sex. SBP increases with age, while DBP declines with age. Older Filipino men have significantly higher DBP than women, while there was no significant sex difference in terms of SBP. Blood pressure classification based on the JNC-7 guidelines is also presented in Table 2. Only 10% of older Filipinos have normal blood pressure in 2018, and nearly a third (32%) are classified to have pre-hypertension blood pressure. About 28%

have stage 1 hypertension, and 30% have stage 2 hypertension. No significant age and sex differences exist in terms of the JNC-& BP classification.

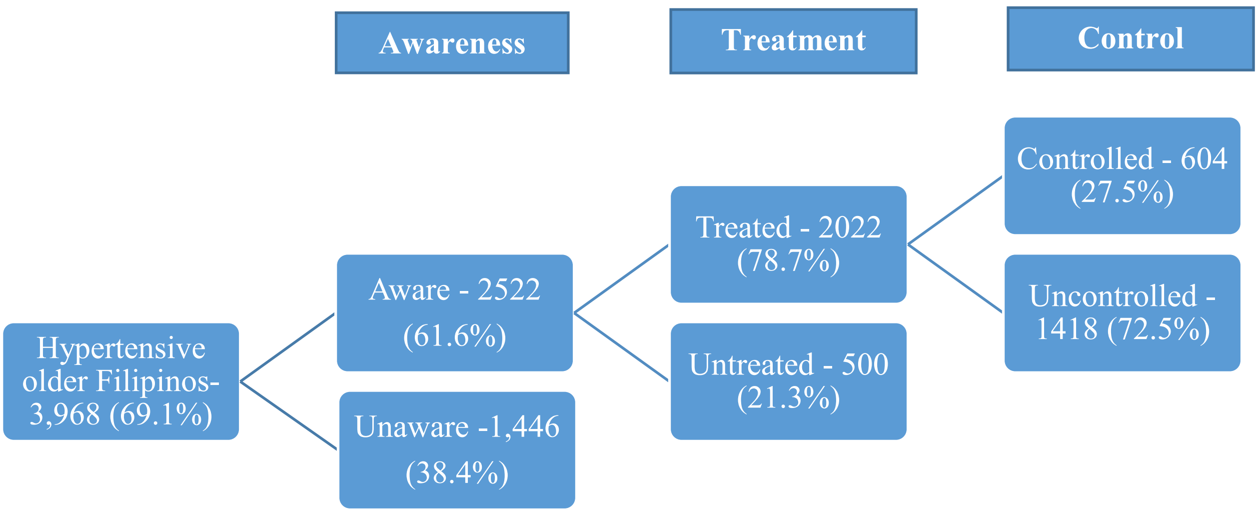
Table 1. Socio-demographic and health characteristics of the study population

Variables	%
Age group	
60-69	63.3
70-79	25.8
80+	10.8
Sex	
Male	40.2
Female	59.8
Marital status	
Married	48.4
Unmarried	51.6
Place of residence	
Urban	58.3
Rural	41.7
Level of education	
Elementary and below	73.2
High school/post-secondary	19
College and higher	7.8
Wealth index	
Lowest	24.9
Second	21.7
Middle	19.8
Fourth	16.9
Highest	16.7
Living arrangement	
Living alone	13.3
Living with spouse only	9.3
Living with children	60.7
Other types of arrangement	16.7
Physical activity	
Daily exercise	52.7
Otherwise	47.3
Smoking status	
Former smoker	25.8
Current smoker	17.3
Never smoker	56.9
BMI	
Underweight (<18.5 kg $m^{2)}$	13.5
Low risk (healthy range) (18.5-22.9 kg m^2)	36.4
Moderate risk (23.0-27.4 kg m2)	32.3
High risk (≥ 27.5 kg m2)	14.5
Missing information	3.3
Diabetes (self-reported)	
With diabetes	12.5
Without	87.5
Number of cases	**5624**

Table 2. Mean SBP and DBP, and JNC-7 blood pressure class, overall by age and sex

	Blood pressure (mm Hg, Mean ± s.d)						JNC-7 blood pressure class				
	SBP			DBP			Normal	Pre-HTN	Stage 1 HTN	Stage 2 HTN	
Age and sex	**Mean**	**SD**	**P values**	**Mean**	**SD**	**P values**					**P values**
All	146.4	24.4		84.8	12.4		10.1	32.0	28.3	29.6	
Age group											0.141
60-69	144.5	23.8	0.001	86.0	12.3	0.000	10.3	34.0	28.3	27.4	
70-79	149.1	24.8	0.249	83.6	12.0	0.001	9.1	30.5	28.2	32.2	
80+	150.7	25.8		80.5	12.7		11.5	23.2	28.8	36.5	
Sex											0.738
Male	145.2	24.1	0.225	86.0	12.6	0.016	11.0	32.4	26.2	30.4	
Female	147.2	24.6		84.0	12.2		9.6	31.7	29.7	29.1	

Figure 1. Hypertension and its awareness, treatment, and control among older Filipinos



Prevalence of hypertension, and of awareness, treatment, and control of hypertension

Figure 1 presents the overall prevalence of hypertension, and of awareness, treatment, and control of hypertension among older people in the Philippines. It shows that about 7 in 10 older Filipinos have hypertension. Among those with hypertension, more than a third (38.4%) are not aware that they have hypertension. Of those who are aware, a fifth are untreated, and nearly 3 in 4 (72.5%) of the treated hypertensives have suboptimal BP control. Including those who are unaware of their hypertension, and hence are not taking medication with those who are untreated, the total share of untreated hypertensive is 51.5%.

Table 3 shows that the prevalence of hypertension among older Filipinos is higher among women, those who are unmarried, those who have never smoked, and those who have moderate to high-risk BMI. Lack of awareness of their hypertension status also varies across demographic and health characteristics. The share of those with undiagnosed hypertension is higher among males, those with a low level of education, and those living in the poorest households. Similarly, lack of awareness is higher among those who are current smokers, those who are underweight and have no diabetes. The prevalence of untreated hypertensives is also higher among males, urban residents, those with low level of education, those who live in the poorest households, those who live alone, those who are current smokers, those who are underweight, and those who have no diabetes. Older Filipinos with diabetes have the highest prevalence of sub-optimal BP control.

Correlates of hypertension and of awareness, treatment and control of hypertension

Table 4 presents the results of the multivariate logistic regression predicting hypertension, unaware of hypertension, untreated hypertension, and uncontrolled hypertension. The table shows that the odds of having hypertension is 73% higher among older Filipinos aged 80 years and over compared to those in their 60s. Older Filipinos who are married have lower odds of developing hypertension compared to the unmarried. Older Filipinos who have quit smoking have lower odds of developing hypertension compared to those who have never smoked. Being underweight is associated with lower odds of having hypertension, whereas having moderate to high risk-BMI is associated with higher odds of experiencing hypertension.

Although older people aged 80 years and over are more likely to have hypertension compared to the younger age groups, their odds of having undiagnosed and untreated hypertension are lower than those in their 60s. Living in wealthy households is associated with lower odds of undetected and untreated hypertension. Current smokers are more likely to have undiagnosed and untreated hypertension compared to the never smokers. Compared to those who are in the healthy range- BMI, those who are underweight have higher odds of not taking medication for hypertension, whereas the reverse is true among those with high-risk BMI. Older people with diabetes are also less likely to be unaware and untreated hypertensives. The odds of having sub-optimal BP control is about seven times higher among those who have diabetes relative to those who are non-diabetic.

Table 3. Weighted prevalence of hypertension, unaware hypertensives, untreated hypertensives, and treated hypertensives with BP not under control by socio-demographic and health variables

Variables	Have hypertension	P value	Unaware hypertensives	P value	Untreated hypertensives	P value	Treated hypertensives with BP not under control	P value
Age group		0.099		0.609		0.410		0.220
60-69	67.0		39.3		53.1		69.9	
70-79	71.9		37.4		48.8		75.5	
80+	75.1		35.9		49.6		77.8	
Total	69.1		38.4		51.5		72.5	
Sex		0.005		0.037		0.027		0.541
Male	64.7		44.1		58.3		75.3	
Female	72.1		35.0		47.4		71.1	
Marital status		0.032		0.215		0.903		0.814
Married	65.6		36.3		51.7		73.1	
Unmarried	72.5		40.2		51.4		71.9	
Place of residence		0.068		0.268		0.003		0.279
Urban	66.5		40.6		58.0		69.4	
Rural	72.8		35.6		43.3		75.4	
Level of education		0.417		0.004		0.000		0.584
Elementary and below	68.0		42.3		56.6		71.6	
High school/post-secondary	74.1		29.0		41.6		76.3	
College and higher	68.0		25.9		29.9		69.1	
Wealth index		0.087		0.000		0.000		0.789
Lowest	60.3		49.2		73.3		71.4	
Second	69.8		47.7		59.8		73.5	
Middle	73.3		33.3		46.7		77.1	
Fourth	74.8		28.7		37.3		67.6	
Highest	70.9		29.4		34.4		72.6	
Living arrangement		0.083		0.159		0.015		0.091
Living alone	71.1		49.2		68.0		81.1	
Living with spouse only	76.3		32.7		51.7		83.2	
Living with children	65.8		38.4		49.2		70.9	
Other types of arrangement	75.7		33.5		46.5		67.9	
Physical activity		0.900		0.157		0.697		0.789
Daily exercise	69.3		40.8		52.3		72.0	
Otherwise	68.9		35.6		50.7		73.0	
Smoking status		0.005		0.001		0.000		0.115
Former smoker	62.7		37.6		51.8		80.2	
Current smoker	64.9		56.7		70.5		77.5	
Never smoker	73.3		33.8		46.3		69.0	
BMI		0.000		0.014		0.000		0.912
Underweight	51.6		50.6		71.7		68.6	
Low risk (healthy range)	65.4		41.0		59.8		73.1	
Moderate risk	72.8		38.7		47.7		74.2	
High risk	86.4		24.2		31.5		70.0	
Missing cases	70.6		48.9		54.0		73.3	
Diabetes (self-reported)		0.129		0.000		0.000		0.000
With diabetes	76.5		12.1		19.8		91.8	
Without	68.1		42.6		56.6		66.7	

Table 4. Adjusted odds ratios (OR) and 95% confidence intervals for association of socio-demographic and health variables among older Filipinos with hypertension; hypertension unawareness, untreated hypertension and lack of BP control among treated hypertensives

Variables	Have Hypertension OR	P value	Unaware of hypertension OR	P value	Untreated of hypertension OR	P value	Lack of BP control (among treated hypertensives) OR	P value
Age group								
60-69 (ref)	1.00		1.00		1.00		1.00	
70-79	1.23	0.196	0.92	0.635	0.79	0.170	1.17	0.475
80+	1.73	0.001	0.65	0.036	0.58	0.016	1.68	0.084
Sex								
Male	1.16	0.242	1.27	0.341	1.13	0.656	0.85	0.695
Female (ref)	1.00		1.00		1.00		1.00	
Marital status								
Married	0.74	0.039	0.87	0.341	1.15	0.453	0.89	0.672
Unmarried (ref)	1.00		1.00		1.00		1.00	
Place of residence								
Urban	0.91	0.599	0.89	0.571	1.14	0.544	0.64	0.073
Rural	1.00		1.00		1.00		1.00	
Level of education								
Elementary and below (ref)	1.00		1.00		1.00		1.00	
High school/post-secondary	1.16	0.426	0.69	0.121	0.74	0.169	1.16	0.642
College and higher	0.76	0.523	0.88	0.737	0.73	0.368	0.55	0.042
Wealth index								
Lowest	1.00		1.00		1.00		1.00	
Second	1.27	0.304	1.03	0.910	0.67	0.166	1.10	0.846
Middle	1.54	0.225	0.59	0.046	0.44	0.005	1.00	0.991
Fourth	1.61	0.22	0.45	0.005	0.30	0.000	0.63	0.304
Highest	1.26	0.569	0.59	0.104	0.36	0.001	0.80	0.631
Living arrangement								
Living alone	1.33	0.365	1.06	0.813	1.40	0.148	1.56	0.136
Living with spouse only	1.91	0.047	0.77	0.401	0.92	0.729	2.04	0.083
Living with children (ref)	1.00		1.00		1.00		1.00	
Other types of arrangement	1.49	0.054	0.77	0.228	0.86	0.385	0.85	0.529
Physical activity								
Daily exercise	1.04	0.817	1.20	0.229	1.09	0.530	1.10	0.636
Otherwise (ref)	1.00		1.00		1.00		1.00	
Smoking status								
Former smoker	0.64	0.023	1.01	0.972	1.04	0.860	1.86	0.077
Current smoker	0.84	0.394	1.86	0.034	1.93	0.022	1.93	0.194
Never smoker (ref)								
BMI								
Underweight	0.54	0.011	1.34	0.187	1.58	0.064	0.76	0.542
Low risk (healthy range) (ref)								
Moderate risk	1.45	0.013	1.14	0.482	0.78	0.113	1.03	0.926
High risk	3.21	0.000	0.55	0.044	0.35	0.000	0.94	0.858
Missing	1.13	0.737	2.43	0.012	1.42	0.319	0.83	0.664
Diabetes (self-reported)								
With diabetes	1.38	0.176	0.22	0.000	0.24	0.000	6.96	0.000
Without (ref)	1.00		1.00		1.00		1.00	

Discussion and Conclusion

The current study assessed the prevalence and correlates of hypertension and awareness, treatment, and control of hypertension among older Filipinos using the 2018 LSAHP data. Results show a high prevalence of hypertension (69.1%), particularly among older women (72.1%) compared to older men (64.7%). Among those who are hypertensive, more than a third (38.4%) are unaware of their hypertension. Of those who are aware, 78.7% are treated, of which only 27.5% are controlled. These prevalence do not completely conform to the classic 'rule of halves,' wherein 'only half of hypertensive are detected, half of which are treated, of which only half achieve adequate BP control' (Marques-Vidal & Tuomilehto, 1997; Wilber & Barrow, 1972).

Following the JNC-7 blood pressure classification guidelines, the prevalence of hypertension among older Filipinos in 2018 was 57.9 %, a slight decline from the 2007 prevalence of 64.5% based on the 2007 Philippine Study on Ageing. However, these figures are higher than the rates reported for 2015 (41.2%) and 2018 (35.0%) by the Department and Science and Technology-Food and Nutrition and Research Institute (DOST-FNRI) based on the National Nutrition Survey (NNS) (Patalen, 2019). Although both the NNS and LSAHP are nationally representative, differences in sampling design, response rate, BP measurement instrument (manual or electronic) number of readings (two or three) employed to define SBP and DBP, could explain the differences in the estimates from the two data sources.

The prevalence of hypertension among older Filipinos is comparable with that of their counterparts in Singapore (73.9%) and China (67.9%). However, the proportion who are unaware (30.3% in Singapore and 24.9% in China) and untreated (32% in Singapore and 32.9% in China) hypertensives are lower in these two countries (Malhotra et al., 2010; Wu et al., 2015). The relatively lower share of older Singaporeans who are unaware and untreated can be partly attributed to the country's health care services and its good awareness and screening programs (Malhotra et al., 2010). Previous research noted that the relatively low level of hypertension awareness in developing countries, which includes the Philippines, is a reflection of the population's low level of literacy and education, and poor access to medical care (Mittal & Singh, 2010).

One factor for the low levels of treatment among those who are aware of their hypertension could be the cost (Marques-Vidal & Tuomilehto, 1997). In 2009, one month treatment with beta-blocker (generic-atenolol) bought from the public pharmacy cost the equivalent of almost one-day wage of the lowest paid unskilled government worker (Php 320 in 2009); while a month treatment with angiotensin-converting enzyme inhibitor (captopril-generic) cost the equivalent of more than a day wages (Batangan & Juban, 2009). Another study in 2007 showed that Filipino hypertensives spent an average of Php 7,372 per year for medications, or around Php 614 per month (Gaspar-Trinidad et al., 2007). Not all older Filipinos may not have the resources to afford these hypertensive medicines, given their poor economic well-being. Based on the LSAHP data, 57% of older Filipinos reported that they had difficulty meeting their expenses considering their total household income and expenditures (Cruz, 2019). Although there are 20% discounts for senior citizens, these discounts are only availed by those who have the means to purchase the medicines in the first place (Cruz, Saito, & Natividad, 2007).

Similar with older people in low and middle-income countries (Porapakkham et al., 2008; Prince et al., 2012) the level of controlled hypertension among older Filipinos is low (27.5%). This is a cause for concern since uncontrolled hypertension has been shown to be strongly related to hemorrhagic strokes and that 57% of hemorrhagic strokes may be due to uncontrolled blood pressure (Klungel et al., 2000). Although older Filipinos are taking medications for hypertension, their compliance with blood pressure medication may be poor, hence the large proportion with uncontrolled hypertension. A study among adult Filipino patients with hypertensions identified several factors for poor compliance to BP medication, including lack of knowledge that BP medicines are to be taken daily, belief that medicine will make them feel bad, lack of physician's follow up after discharge, and absence of advice from health care providers in changing the dosage of medicine, among others (Laviña, Valera, Wagner, Ross-Degnan, & Banting, 2008). A more recent study among people with hypertension in Asian countries, including the Philippines, also identified several reasons for sub-optimal blood pressure control. These include patient's desire to maintain a sense of normalcy, reluctance to monitor their own BP at home, lack of understanding of the specific lifestyle changes needed and how to implement them, and patient's assessment of successful hypertension management based on their efforts to manage their condition rather than their actual blood pressure (Rahman et al., 2015).

This study shows that socio-demographic factors such as age, marital status, and wealth index to be significantly associated with hypertension prevalence, being aware of or untreated for hypertension, or of suboptimal BP control, which is in line with findings from previous studies (Hypertension Study Group, 2001; Joshi, Lim, & Nandkumar, 2007; Malhotra et al., 2010; Méndez-Chacón, Santamaría-Ulloa, & Rosero-Bixby, 2008; Palafox et al., 2016; Porapakkham et al., 2008; Wu et al., 2015). Older Filipinos aged 80 years and over are more likely to have hypertension, but they are also more likely to be aware and seek treatment for their condition compared to their younger counterparts. Married older Filipinos are less likely to have hypertension. Living in wealthier household is also associated with higher awareness and better treatment-seeking behaviour among older Filipinos. Filipinos who live in wealthier households may have frequent contact with healthcare professionals and have more access to medicines, thereby increasing their chances of having their hypertension detected and treated (Méndez-Chacón et al., 2008).

Consistent with findings from previous studies, health-related factors, such as smoking, BMI and presence of diabetes are also associated with hypertension prevalence, awareness, or management (Apidechkul, 2018; Hammami et al., 2011; Lee et al., 2010; Méndez-Chacón et al., 2008; The Decoda Study Group, 2008). Older Filipinos who have high BMI are more likely to develop hypertension, but they are also more likely to be aware and are taking medication for their condition compared to those with normal BMI. Similarly, those with diabetes are more likely to be aware of and being treated for their hypertension. The higher awareness among those with high-risk BMI and those with diabetes may be attributed to the joint hypertension screening efforts in this segment of the population (Banegas et al., 2002). Similarly, the higher level of treatment among this group can be due to selection in detection and treatment prompted by risk factor assessment of a health professional (Banegas et al., 2002). Although older Filipinos with diabetes are more likely to be aware and to be under medication for hypertension, they are also more likely to have uncontrolled hypertension. Comorbidity between diabetes and hypertension may make the treatment more complicated resulting to sub-optimal control. Curiously, those who quit smoking have lower odds of having hypertension compared to those who have never smoked. Quitting smoking is associated with increased concern about health (Curry, Grothaus, & McBride, 1997). It is possible that older people who have quit smoking have started to experience health problems and thus pursued a much healthier lifestyle or have started taking anti-hypertensive medicines, resulting to a lower blood pressure compared to the never smokers.

In response to the growing prevalence of non-communicable diseases (NCDs) in the country, particularly cardiovascular diseases and its risk factors, the Philippine government has initiated several policies and programs. In 2011, the Department of Health (DOH) came up with a national program to reduce the morbidity, mortality and disability rates caused by chronic lifestyle-related NCDs thorough an integrated and comprehensive program (Department of Health 2011). Some of the interventions under this program include lifestyle interventions and preventive strategies based on a life-course perspective and geared towards major risk factors, such as tobacco use, unhealthy diet, physical inactivity, alcohol use, and other related risk factors such as hypertension, and high blood sugar, among others (Department of Health 2011). In 2012 the Philippine government institutionalized the Philippine Package of Essential Non-communicable Disease Interventions (Phil PEN) Protocol on the Integrated Management of Hypertension and Diabetes (Department of Health, 2012). This protocol was adopted from the WHO Package of Essential Non-communicable Disease Interventions (WHO PEN) which is “a prioritized set of cost-effective interventions that can be delivered to an acceptable quality of care, even in resource-poor settings” (World Health Organization [WHO], 2010, p. 10). PhilPEN refers to the use of WHO/ISH risk prediction charts to ascertain the risk of having a cardiovascular disorder, i.e. heart attack or stroke over a ten-year period; and management protocols for risk-reduction, proper referral, regular follow-up, core set of technologies, and necessary medicines. (Department of Health, 2012). It shall be used in all primary health care facilities in the country, including barangay health stations, rural health centers, and community health centers, among others (Department of Health, 2012).

In addition, the DOH also issued a guideline in 2016 for the establishment of Hypertension-Diabetes Health Clubs to intensify the fight against NCDs in the country. These Health Clubs offer several services to its members, including lifestyle improvement activities, health education seminars, periodic measurement of blood pressure (BP) and fasting blood sugar (FBS), provision of free medications, and mental health activities (Department of Health, 2016). Furthermore, in 2017, the Philippine Health Insurance Corporation (PhilHealth) expanded its existing Primary Care Benefit (PCB), which was initially provided by rural health units

(RHUs)/ urban centers to the less privileged member of the population, to cover the formal economy, lifetime members and senior citizens. The expanded PCB shall include health screening and assessment, diagnostic services, follow up consultations and medicines for asthma, hypertension, and diabetes mellitus type II, among others. The benefit under PCB shall be at an average of Php 800.00 per family per year with fixed copayment (Philippine Health Insurance Corporation, 2019).

While there are many efforts by the Philippine government to address the increasing prevalence of hypertension, diabetes and lifestyle related diseases, there seems to be a low uptake of some of these programs among older Filipinos. For instance, the 2018 LSAHP data shows that barely half (48.8%) of older people in the Philippines availed of the free medical and dental services in government health facilities anywhere in the country. With the establishment of Hypertension-Diabetes Health Clubs in 2016, health centers are expected to give free medicines for hypertension and diabetes. However, only 3 in 10 hypertensive older Filipinos get their medicines from health centers (Natividad, 2019). Older Filipinos' low level of utilization of these government programs may have contributed to the significant proportion of them with undiagnosed and untreated hypertension. Previous studies in the Philippines identified lack of awareness as an important barrier in the underutilization of government programs such as Philhealth benefits, particularly among the poor (Quimbo et al.; Rivera, 2016). While lack of awareness certainly play a role why many older Filipinos do not avail of the health services offered by the government, accessibility of these health services and availability of caregiver also matter. For example, data from 2018 LSAHP reveal that among older Filipinos who felt ill in the past 12 months and thought of going to a doctor but didn't, cited 'too far' (12%), 'no transportation' (7%) and 'could not find someone to go with me' (5%) as some of their reasons for doing so.

The current study has several limitations. It is based on a cross-sectional survey, hence we cannot infer direct causation between the independent and the dependent variables used in the study. Due to logistical and financial constraints, BP measurements of the respondents were taken at a single visit. This procedure may lead to an overestimation of the prevalence of hypertension (Hammami et al., 2011; Hypertension Study Group, 2001; Kearney et al., 2005; Porapakkham et al., 2008) and an underestimation of the prevalence of awareness and BP control (Malhotra et al., 2010). Furthermore, hypertension treatment of the respondents was based on the self-reported use of antihypertension medicines. We did not collect specific information on the type, dosage, and frequency of use of the specified medication, hence, we are unable to further explore the reasons for the high prevalence of older Filipinos with uncontrolled hypertension.

The main strength of the study is the use of a recent nationally representative survey of older people in the Philippines that captures timely and reliable information on the current health situation of its older population. The definition of hypertension used in the present study is based on a classification that is in accordance with international guidelines and is widely used in previous studies, hence improving the comparability of our findings with that of other countries.

In conclusion, this study observed a high prevalence of hypertension and sub-optimal blood pressure control among older Filipinos. It also noted a relatively low level of awareness and treatment among those with hypertension, particularly those living in poor households and have high BMI. While there are government efforts to address the growing prevalence of hypertension in the country, it does not seem to reach the older people. Given the increasing share of older people in the country, and the attendant increase of those with hypertension, more efforts should be done to bring these government programs to the older Filipinos, in order to reduce the vulnerabilities they face, especially during this time when infectious diseases start to re-emerge.

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