Prevalence of Metabolic Syndrome and Specific Cardiovascular Risk Factors among Older Persons in the Philippines: Results from the 8th Philippine National Nutrition Survey

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ABSTRACT

Background. Cardiovascular diseases are the leading causes of deaths among adults in the Philippines, and this is true also among older persons aged 60 years and above. Identification of risk factors and diseases that lead to cardiovascular mortality among the elderly is important to have an impact on longevity.

Objective. This study aimed to determine the prevalence of metabolic syndrome and specific cardiovascular risk factors among older persons in the Philippines.

Methods. A cross sectional design was used, with data taken from the results of the 8th Philippine National Nutrition Survey (NNS) Clinical and Health Survey done in 2013. Although there is a more recent survey, only the 2013 data is complete and available for secondary analyses.

Results. There were 1,835 older persons who were participants in the 8th Philippine NNS who had complete clinical data. The prevalence of Metabolic Syndrome was 52.6% in this population with the distribution of the components as follows: 33.5% have elevated waist circumference; 59.25 had elevated BP >130/85 mm Hg; 30.1% had fasting blood glucose ≥100 mg/dL (includes prediabetes and diabetes); 63% have low HDL, and 39% have elevated triglycerides ≥150 mg/dL.

The results for other cardiovascular diseases and risk factors are as follows: 44% had hypertension using the criterion of the JNC VII report (BP ≥140/90 mm Hg); 85% had LDL cholesterol ≥100 mg/dL; 31% are current alcohol drinkers; 22% are current smokers; 53.7% have low physical activity; and 82% have an unhealthy diet.

Conclusions. Fifty-two percent (52%) of older Filipinos have metabolic syndrome and have a high prevalence of cardio-vascular risk factors, foremost of which are elevated LDL-cholesterol at 85%, hypertension at 44% based on JNC VII, approximately 10% with diabetes mellitus, but with a double burden of overweight/obesity and undernutrition. This data can help plan for public health approaches to improve quality of life and increase longevity of Filipinos.

Keywords: metabolic syndrome, cardiovascular risk, older persons

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INTRODUCTION

Aging has been identified as one of the major risk factors of disease and disability. Filipino older persons represent a significant portion of the growing population, with 7.5% of the total Philippine population in 2015 being comprised of older persons, which is remarkably higher than the proportion of the elderly in 2010 at less than 1%.[1] Common diseases diagnosed among the Filipino older persons are hypertension, diabetes, acute coronary syndrome, renal disease, arthritis, and cataracts.[2]

According to the World Bank 2020 data, Filipinos have a life expectancy at birth of 71 years which is comparable to those of our neighboring countries such as Myanmar (67 years), India and Cambodia (70 years), Bangladesh (73 years) Thailand and China (77 years), but lower relative to Hong Kong (85 years), Japan (84 years), and Singapore (83 years).[3] Providing interventions for the components of metabolic syndrome, and various cardiovascular diseases and risk factors can lead to longer life expectancy and better quality of life as chronic disabling conditions as a result of such diseases such as stroke, congestive heart failure or chronic kidney diseases, can be prevented.

Metabolic syndrome is a cluster of metabolic conditions that has been found to increase the risk for cardiovascular disease (CVD). Age was found to be an independent risk factor for CVD[4], as well as in the Philippines, higher socio-economic status[5]. Adults with metabolic syndrome have at least 50% higher cardiovascular risk than those without, but its absolute cardiovascular risk is not higher than each of its components.[6] The prevalence of metabolic syndrome among older persons ranges from 11-55% in a meta-analysis published in 2009. The prevalence was also found to increase with age, and was higher among older females. Among the components of metabolic syndrome, hypertension and central obesity were most common.[7]

In the Philippines, there is limited data on older persons. Characterizing the Filipino older population will help us better understand and anticipate health issues that commonly rise among them, and be more guided with clinical decisions for their care, and development of public health approaches to improve both quality of life and possibly longevity.

The objective of this study is to determine the prevalence of metabolic syndrome and specific cardiovascular (CV) risk factors including high LDL-cholesterol, smoking, alcohol intake, sedentary lifestyle, and unhealthy diet among older persons in the 8th National Nutrition Survey (NNS). Additionally, it aims to (1) compare the prevalence of metabolic syndrome and its components, as well as specific risk factors for CV diseases across the different categories of older adults: young old (60-69 years), middle old (70-79 years) and oldest old (≥80 years old); and (2) determine the association of the components of metabolic syndrome and specific CV risk factors with the categories of older adults or with age.

METHODS

This study used data collected by the FNRI for the NNS.[8] The protocol for the 8th NNS (2013) was approved by the Food and Nutrition Institute (FNRI) Institutional Ethics and Review Committee (FIERC) prior to its implementation. Specific data variables were requested through the Public Use Files (PUF) of the Food and Nutrition Research Institute. None of the data released to the investigators had subject identifiers and included only processed data. The protocol for this specific secondary study was submitted to the UPM Research Ethics Board and was exempted from review as there were no human participants in the study (2020-372-EX) and data that was analyzed had no identifiable personal information.

Study design

This study utilized a cross sectional design. Data was taken from the results of the 8th Philippine National Nutrition Survey (NNS) Clinical and Health Survey done in 2013 which were released through the PUF. Multi-Stage Stratified Sampling Design was used for the NNS and has been previously described in the executive summary of the 8th (NNS) done in 2013. The 2013 NNS adopted the 2003 master sample of the Philippine Statistics Authority (formerly the National Statistics Office), which utilized the 2009 Labor Force Survey list of households. The survey was conducted from June 2013 to April 2014, covering all 17 regions of the country and 80 provinces including the National Capital Region (NCR). The stratified random sampling involved 3 stages. The first stage or stratum was the Primary Sampling Unit which is one "barangay" (village) or contiguous "barangays" with at least 500 households. The second stage was the Enumeration area with 150-200 households, and the third stage was the households.

Variables analyzed included anthropometric data, history of smoking an alcohol use, level of physical activity, blood pressure and biochemical test results including fasting blood sugar (FBS), total cholesterol, triglycerides, high density lipoprotein (HDL-c), and low-density cholesterol (LDL-c) levels.

Sampling design

A total of 39,253 eligible households nationwide were identified from the list of the PSA, with almost an equal distribution between urban and rural at 18,125 and 21,128 households, respectively. From these eligible households, 91% responded to the survey for a final inclusion of 35,825 households with 15,866 households in the urban areas (87.5% response rate) and 19,959 households in the rural areas (94.5% response rate). From the total population in 2013 of 97.7 M people, 35,825 households responded out of 39,253 eligible households, with 172,323 individuals included in the main 8th NNS and finally, 19,566 adults were included in the Clinical and Health survey of the NNS. The 8th NNS

was the first ever NNS, since 1978, to cover almost 100% of the target households from one replicate to come up with estimates at the national and regional levels, specifically for elevated fasting blood glucose, dyslipidemia, and behavioral risk factors such as smoking, alcohol consumption, physical inactivity, and unhealthy diet. Provincial estimates were also generated for the prevalence of overweight and obesity, android obesity, and elevated blood pressure.[8]

The data of persons aged 60 years old and above, who were included in NNS 2013 was analyzed. Only those with complete demographic data and clinical data gathered by interview, anthropometric measurements and blood testing were included.

Operational Definitions of study outcomes and measurements enumerated below:

1. The Metabolic Syndrome is defined in this study using the NCEP/ ATP III-AHA/ NHBLI Harmonized criteria (2005) as fulfilling at least 3 out of 5 of the following criteria: waist circumference for (Southeast Asians, South Asians, Chinese) males: ≥90 cm, females: ≥80 cm; triglycerides ≥150 mg/dl; HDL cholesterol for males: <40 mg/dL, females: <50 mg/dL; fasting blood sugar ≥100 mg/dl or on treatment; blood pressure 130/85 mmHg or on treatment.[9]
2. The elderly is defined using the criteria as those adults aged 60 years and above. They can be categorized as young old (60-69), middle old (70-79), and old (≥80).[10]
3. Body-Mass Index (BMI) is classified using the original WHO cut-offs as follows: underweight (<18.5), normal weight (18.5-24.9), Pre-obese (25-29.9), Obese I (30-34.9), Obese II (35-39.9).[9] These categories are used so that these can be compared to previous NNS surveys and with international data. On the other hand, the Asia-Pacific classification was also used and entered into the components of MetS since this is the recommendation of the harmonized criteria to use country or region-specific cut-offs for obesity. The revised Asia Pacific classification is as follows: underweight (<18.5), normal weight (18.5-22.9), overweight (23-24.9), Obese I (25-29.9), Obese II (≥30). Both classifications are used in this study.
4. Waist circumference was classified as follows according to the WHO-Asia Pacific guidance: For males, normal (<90 cm), borderline (90-101 cm), and high (>101); for females, normal (<80 cm), borderline (80-87 cm), and high (>87).[9]
5. The cut-off values used for hypertension according to the JNC VIII in 2013 which did not revise the cut offs given in JNC VII in 2003, are as follows: normal (<120/<80 mmHg), pre-hypertension (systolic 120-139 and diastolic 80-89 mmHg), stage I hypertension (systolic 140-159 or diastolic 90-99 mmHg), stage II hypertension (systolic ≥160 or diastolic ≥100 mmHg).[9] This definition was used for comparability with previous NNS data.
6. Cut-off values for components of the lipid profile according to the NCEP-ATP III in 2001 are as follows: Total cholesterol (in mg/dl) desirable (<200), borderline high (200-239), high (≥240); LDL-cholesterol (in mg/dl) optimal (<100), near optimal/ above optimal (100-129), borderline high (130-159), high (160-189), very high (≥190); HDL-cholesterol (in mg/dl) low (<40), borderline (50-59), desirable (≥60); triglyceride (in mg/dl) desirable (<150), borderline (150-199), high (200-399), very high (<400).[9]
7. Fasting blood sugar cut-off values (in mg/dl) according to the Philippine UNITE for Diabetes Philippine clinical practice guidelines (CPG) adapted from the American Diabetes Association (ADA) are as follows: normal is <100mg/dL, impaired fasting glucose is 100-125 mg/dL, and diabetes ≥126 mg/dL.[11]
8. Cigarette smoking and alcohol consumption status, physical activity, and unhealthy diet were categorized using the definitions used in the 8th NNHeS.[8]

Statistical Analysis

The prevalence of Metabolic Syndrome and its component risk factors were analyzed using STATA v13 (June 2013, College Station, Texas, USA). Summary statistics were reported as count (percent) for qualitative data. Median, minimum, and maximum values were also reported for quantitative data. Shapiro-Wilk's test was used to check for normality of continuous data. Pearson's chi-square test or Yate's chi-square test was used to compare proportions using Bonferroni method to adjust p-value for pairwise comparisons. Missing data were estimated using multiple imputation by chained equation using all variables to support missing-at-random assumption. Ordinal regression analysis was performed to assess association of cardiovascular and metabolic diseases with aging. Crude odds ratio and 95% confidence interval were estimated for the association of Metabolic Syndrome and its components with socio-demographic factors. Statistical significance was primarily based on p-value ≤ 0.05. On exploring the factors associated with aging, those with p-value ≤ 0.10 were also considered significant.

RESULTS

There were 1,835 elderly participants in the 8th Philippine NNS with complete demographic and clinical data, blood samples, and 24-hour food recall. Average age was 68 years, ranging from 60 to 100. The young old (60-69 years) comprised 57.6% of the participants, followed by the middle old (70-79 years) at 32.4%, and the oldest old (≥80 years) constituted 10% of the sample. This is compatible with the average life expectancy of Filipinos of 71 years, hence, there are diminishing proportions with increasing age categories.

Metabolic Syndrome

The prevalence of metabolic syndrome among elderly Filipinos in this survey was 52.6%. Of the five criteria for

metabolic syndrome, HDL-cholesterol below 40 mg/dL in men and 50 mg/dL in women was most common (90.8%). This was followed by raised blood pressure based on systolic ≥130 mmHg or diastolic ≥85 mmHg (59.2%), triglycerides ≥150 mg/dL (39%), waist circumference ≥90 cm in men and ≥80 cm women (33.5%), and fasting blood glucose ≥100 mg/dL (30.1%). (Table 1)

Comparing categories of the elderly, a greater proportion of young old than oldest old had increased waist circumference (36.6% among males vs 23.5% among females) and fasting blood glucose ≥100 mg/dL (32.7% vs 23.0%). Higher proportion of young old than middle old had triglycerides ≥150 mg/dL (42.5% vs 34.1%). Proportions of young, middle, and oldest old with HDL cholesterol <40 mg/dL in men and <50 mg/dL in women and with systolic blood pressure ≥130 mmHg or diastolic ≥85 mmHg were comparable. Metabolic syndrome based on at least three of these five conditions were also comparable across young, middle, and oldest old.

The oldest old had lesser proportion of visceral obesity, diabetes, and high triglycerides. This could mean that those who had visceral obesity, diabetes or high triglycerides had died, or that the oldest old lived because they had lower proportions of obesity, diabetes, and high triglycerides despite the trend that they had higher proportions of Metabolic Syndrome compared to the younger elderly.

Overweight and Obesity

Table 2 summarizes the distribution of the older persons in the Philippines according to the WHO BMI Classification, while Table 3 classifies them using the Asia Pacific Modified BMI Classification.

Using the WHO classification, approximately a quarter are overweight or obese (22.9%), but this increases to 36.2% based on the Asia-Pacific classification. A significantly greater proportion of the young old than middle and oldest old were overweight and obese when either criterion was applied. It was very notable though that almost an equal proportion (21%) of the elderly were underweight (BMI less than 18.5 kg/m^2) as those who were overweight and obese, with one-third of persons in the oldest old category being underweight.

Hypertension

Based on the 2013 JNC VIII report which was the classification used for the NNS, 27.4% of the elderly had stage I hypertension (systolic 140-159 or diastolic 90-99), and 17% had stage II hypertension (systolic ≥160 or diastolic ≥100) or a total of 44.4% with hypertension. Only 21.5% were normotensive, and 34.1% had prehypertension (systolic 120-139 and diastolic 80-89). A greater proportion of the middle old than the young elderly had stage I hypertension (31.6% vs 25.9%). A higher proportion of the oldest old than the young and middle old had stage II hypertension (26.8% vs 16.4% and 15.1%).

Dyslipidemia

Using the 2001 NCEP-ATP III classification, only 44% of all the elderly had desirable total cholesterol levels. Proportions of young, middle, and oldest old with borderline high or high total cholesterol were comparable. For LDL-cholesterol, 84.7% of the elderly had levels ≥100 mg/dL, while 57.8% had levels ≥ 130 mg/dL, with no significant differences in levels of LDL-cholesterol across age groups. Finally, for HDL-cholesterol, a higher proportion of oldest old than young and middle old had low HDL-cholesterol levels (71.6% vs 62.2% and 61.8%). Thirty-nine percent (39%) of the elderly had elevated triglycerides ≥150 mg/dL. Table 4 includes the distribution of the elderly according to age categories and presence of various categories of dyslipidemia.

Impaired Fasting Glucose and Diabetes

Based on the Philippine CPG on diabetes, 20.2% of the elderly had impaired fasting blood glucose or pre-diabetes

Table 1. Distribution of Older Persons according to the Components of Metabolic Syndrome and Age Categories, N = 1,835, Philippines (2013)

	Total Elderly (n = 1,835)	Young Old (n = 1,057)	Middle Old (n = 595)	Oldest Old (n = 183)	p-value
Elevated Waist circumference [Males: ≥90 cm, Females: ≥80 cm]	615 (33.5%)	387 (36.6%)[a]	185 (31.1%)[a, b]	43 (23.5%)[b]	0.001*
Triglycerides ≥ 150 mg/dl	715 (39.0%)	449 (42.5%)[a]	203 (34.1%)[b]	63 (34.4%)[a, b]	0.002*
Low HDL cholesterol [Males: <40, Females: <50 mg/dl]	1,667 (90.8%)	960 (90.8%)	540 (90.8%)	167 (91.3%)	0.978
Fasting blood sugar ≥100 mg/dl	553 (30.1%)	346 (32.7%)[a]	165 (27.7%)[a, b]	42 (23.0%)[b]	0.009*
Elevated Blood pressure [Systolic BP ≥130 mmHg OR Diastolic BP ≥85 mmHg]	1,087 (59.2%)	603 (57.0%)	370 (62.2%)	114 (62.3%)	0.084
Metabolic syndrome (fulfilling at least 3 out of 5 criteria above)	965 (52.6%)	533 (50.4%)	327 (55.0%)	105 (57.4%)	0.082

Data presented as count (percent).
** Significant at 5% level*
[a, b] Significant pairwise comparisons

Table 2. Distribution of Older Adults Based on WHO BMI classification, N = 1,835, Philippines

BMI, WHO Classification	Cut-off (kg/m^2)	Total Elderly (n = 1,835)	Young Old 60-69 (n = 1,057)	Middle Old 70-79 (n = 595)	Oldest Old ≥80 (n = 183)	p-value
Underweight	<18.5	384 (20.9%)	179 (16.9%)[a]	148 (24.9%)[b]	57 (31.1%)[b]	<0.0001*
Normal weight	18.5-24.9	1,031 (56.2%)	593 (56.1%)[a]	332 (55.8%)[a]	106 (57.9%)[a]	
Pre-obese/Overweight	25-29.9	348 (19.0%)	230 (21.8%)[a]	100 (16.8%)[b]	18 (9.8%)[b]	
Obese I	30-34.9	64 (3.5%)	50 (4.7%)[a]	13 (2.2%)[b]	1 (0.5%)[b]	
Obese II	35-39.9	6 (0.3%)	4 (0.4%)[a]	1 (0.2%)[a]	1 (0.5%)[a]	
Obese III	≥40	2 (0.1%)	1 (0.1%)[a]	1 (0.2%)[a]	-[a]	

Data presented as count (percent).
** Significant at 5% level*
[1] BMI: body mass index
[a, b] Significant pairwise comparisons

Table 3. Distribution of Older Adults Based on the Asia-Pacific BMI classification, N = 1,835

BMI, Asia-Pacific Classification	Cut-off (kg/m^2)	Total Elderly (n = 1,835)	Young Old 60-69 (n = 1,057)	Middle Old 70-79 (n = 595)	Oldest Old ≥80 (n = 183)	p-value
Underweight	<18.5	384 (20.9%)	179 (16.9%)[a]	148 (24.9%)[b]	57 (31.1%)[b]	<0.0001*
Normal	18.5-22.9	787 (42.9%)	428 (40.5%)[a]	269 (45.2%)[a]	90 (49.2%)[a]	
Overweight	23-24.9	244 (13.3%)	165 (15.6%)[a]	63 (10.6%)[b]	16 (8.7%)[b]	
Obese I	25-29.9	348 (19.0%)	230 (21.8%)[a]	100 (16.8%)[b]	18 (9.8%)[b]	
Obese II	≥30	72 (3.9%)	55 (5.2%)[a]	15 (2.5%)[b]	2 (1.1%)[b]	

Data presented as count (percent).
** Significant at 5% level*
[1] BMI: body mass index
[a, b] Significant pairwise comparisons

(FBS 100-125 mg/dL) and 9.9% have values within the range of diabetes. Combining these 2 categories means that 30.1% of older individuals have dysglycemia. The proportions of young, middle, and oldest old with impaired fasting blood glucose were comparable. However, greater proportion of the young than oldest old had diabetes (11.4% vs 4.9%, p=0.012).

Other Lifestyle-related Cardiovascular Risk factors

Nearly one-third (31.3%) of the elderly are current drinkers. A greater proportion of the young old than middle and oldest old were current drinkers (34.8% vs 28.6% and 20.2%). Higher proportion of young old than oldest old were binge drinkers (49.6% vs 17.6%).

Approximately 22% of the elderly were current smokers, while more than half of all elderly claim to have never smoked cigarettes. There was insufficient evidence of association between smoking status and aging, i.e. across the elderly categories, approximately one-fifth were current smokers.

Low physical activity was found in 53.7% of the elderly claimed to have, while 82.1% reported to have an unhealthy diet. Higher proportion of oldest old than young or middle old had low physical activity (75.4% vs 48.2% vs 57.0%) and unhealthy diet (88.5% vs 80.3%).

Table 4 summarizes the distribution of the elderly according to various cardiovascular risk factors.

Association of Cardiovascular Diseases and Risk Factors with Aging

The oldest old were less obese (based on BMI and WC), had lower proportions of diabetes but also had lower physical activity and unhealthy diet. (Table 5)

The results of ordinal regression analysis showed that obesity at BMI ≥25 kg/m^2 cut-off, LDL-cholesterol ≥130 mg/dL, and low physical activity were independently associated with aging at 95% confidence level (Table 5). BMI ≥25 kg/m^2 and LDL-cholesterol ≥ 130 mg/dL were negatively associated with aging, while low physical activity was positively associated with aging. Diabetes based on FBS ≥126 mg/dL cut-off and hypertension (JNC VII) were also associated with aging at 90% confidence level. That is, younger elderly had higher risk of obesity and elevated LDL-cholesterol and diabetes, the oldest old had increased risk of low physical activity and hypertension.

DISCUSSION

Metabolic syndrome was found to be associated with an increased risk for CVD (1.24) and all-cause mortality (RR 1.23) among older persons.[12] The prevalence of metabolic syndrome among older Filipinos in this study is 52.6%. This was higher than the prevalence of Metabolic syndrome in

Table 4. Distribution of Older Adults Based on Cardiovascular (CV) Diseases and Risk Factors for CV Diseases, N = 1,835

Characteristic	Total Elderly (n = 1,835)	Young Old 60-69 (n = 1,057)	Middle Old 70-79 (n = 595)	Oldest Old ≥80 (n = 183)	p-value
BMI ≥25 kg/m^2 [Obese I]	420 (22.9%)	285 (27.0%)[a]	115 (19.3%)[b]	20 (10.9%)[c]	<0.0001*
BMI ≥30 kg/m^2 [Obese II]	72 (3.9%)	55 (5.2%)[a]	15 (2.5%)[b]	2 (1.1%)[b]	0.003*
Elevated waist circumference	258 (14.1%)	167 (15.8%)[a]	75 (12.6%)[a, b]	16 (8.7%)[b]	0.019*
Hypertension (JNC VIII)	815 (44.4%)	447 (42.3%)	278 (46.7%)	90 (49.2%)	0.086**
Low HDL <40	1,156 (63.0%)	657 (62.2%)[a]	368 (61.8%)[a]	131 (71.6%)[b]	0.040*
High Triglycerides >150	715 (39.0%)	449 (42.5%)[a]	203 (34.1%)[b]	63 (34.4%)[a, b]	0.002*
LDL[1]-Cholesterol ≥100 mg/dL	1,540 (84.0%)	895 (84.7%)	492 (82.7%)	153 (83.6%)	0.569
LDL[1]-Cholesterol ≥130 mg/dL	1,060 (57.8%)	636 (60.2%)	325 (54.6%)	99 (54.1%)	0.052**
Impaired fasting glucose	371 (20.2%)	225 (21.3%)[a]	113 (19.0%)[a]	33 (18.0%)[a]	0.015*
FBS[2] ≥126 mg/dL	182 (9.9%)	121 (11.4%)[a]	52 (8.7%)[a, b]	9 (4.9%)[b]	0.012*
Current drinkers	575 (31.3%)	368 (34.8%)[a]	170 (28.6%)[b]	37 (20.2%)[b]	<0.0001*
Current smokers	398 (21.7%)	239 (22.6%)	126 (21.2%)	33 (18%)	0.357
Former smokers	422 (23.0%)	237 (22.4%)	138 (23.2%)	47 (25.7%)	0.620
Low physical activity	986 (53.7%)	509 (48.2%)	339 (57.0%)	138 (75.4%)	<0.0001*
Unhealthy diet	1,507 (82.1%)	849 (80.3%)	496 (83.4%)	162 (88.5%)	0.018*

Data presented as count (percent).
** Significant at 5% level*
*** Significant at 10% level*
[1] LDL-cholesterol: low-density lipoprotein cholesterol
[2] FBS: fasting blood sugar
[a, b] Significant pairwise comparisons

Table 5. Factors Significantly Associated with Aging

Factor	®	Exp (®)	95% CI	p-value
BMI ≥25 kg/m^2	-0.393	0.675	(-0.642, -0.145)	0.002*
Hypertension (JNC VII)	0.171	1.186	(-0.024, 0.365)	0.086**
LDL-Cholesterol ≥130 mg/dL	-0.215	0.807	(-0.397, -0.032)	0.021*
FBS ≥126 mg/dL	-0.280	0.756	(-0.562, 0.003)	0.052**
Low physical activity	0.364	1.439	(0.206, 0.522)	<0.0001*

Data presented as count (percent).
** Significant at 5% level*
*** Significant at 10% level*
[a, b] Significant pairwise comparisons

India which was found to be 30%[13] and China at 33%[14]. Low HDL and hypertension were the most common conditions seen among older Filipinos, similar to the findings among the older population in India.

Hypertension is one of the most common cardiovascular diseases, and its prevalence has been found to increase with age. This study found that 44% of older Filipinos had hypertension. This is higher than the global prevalence of hypertension among adults at 31% in 2010 across 90 countries.[15]

There is limited data on hypertension prevalence among the elderly, and available studies may be difficult to compare due to differences in the definitions used in each. In the US National Health and Nutrition Survey, 70% of older persons had hypertension based on the ACC/AHA 2017 definition.[16] While in Germany, the prevalence was found to be 73.8% among older persons.[17]

The prevalence of impaired fasting glucose or pre-diabetes among Filipino older persons is 20.2%. This is comparable with the global prevalence of pre-diabetes among older persons at 26.4% in 2019.[18]

Elevated LDL and low HDL were found to be the most common dyslipidemia among older Filipinos. According to the Established Populations for Epidemiology Studies in the Elderly (EPESE), these are associated with an increased risk of cardiovascular mortality among older adults.

Thirty-one percent (31%) are current alcohol drinkers; 22% are current smokers; 53.7% have low physical activity; and 82% have an unhealthy diet. Studies among older persons in Myanmar, Vietnam, and Thailand found that the prevalence of smoking and drinking among men declines with age.[19]

This study revealed that Metabolic Syndrome and cardiovascular risk factors are still prevalent among older Filipinos. Attention should be given in treating these diseases and mitigating risk factors identified not only to prolong their lives, but to improve their quality of life. Considering that older persons are retired and most are dependent on their pension or families, the risk and complications of CVD could be a burden to their families or society.

Strengths and Limitations

This is one of the largest studies among older persons in the Philippines, representative of estimates of cardiovascular risk factors at the regional and national level. The data can be used by the national government, but the data is not granular enough for provincial government use.

CONCLUSION

Fifty-two percent (52%) of older Filipinos have metabolic syndrome and have a high prevalence of cardiovascular risk factors foremost of which are elevated LDL-cholesterol at 85%, hypertension at 44% based on JNC VII, approximately 10% with diabetes mellitus, but with a double burden of overweight/obesity and undernutrition. This data can help plan for public health approaches to improve quality of life and increase longevity of Filipinos.

Acknowledgments

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Declarations

The protocol for this specific study was submitted to the UPM Research Ethics Board and was exempted from review as there are no human participants in the study (2020-372-EX), and data that was analyzed had no identifiable personal information.

Availability of Data and Materials

The data tables and materials are available for perusal from authors on request.

Statement of Authorship

PML and CAJ conceptualized the study, and collected and analyzed the data. PML wrote the main manuscript text, and CAJ supervised and reviewed the manuscript.

Author Disclosure

Both authors declared that they have no competing interests.

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