ORIGINAL ARTICLE

Journal of the ASEAN Federation of Endocrine Societies

Overweight and Obesity and Multimorbidity in Community-Living Older Persons in the Philippines

Maria Stella Giron[1] and Shelley Ann de la Vega[2]

[1]*Department of Pharmacology and Toxicology College of Medicine, University of the Philippines Manila*
[2]*National Institutes of Health Institute on Aging, University of the Philippines Manila*

Abstract

Background. Overweight and obesity, as well as the coexistence of multimorbidity, have been recognized as global health challenges. However, less is known about the prevalence of obesity and multimorbidity among older people in the Philippines. This study sought to determine the prevalence of obesity and multimorbidity among community-living older people.

Methodology. A cross-sectional analysis of older persons ≥60 years from the Focused Intervention for Frail Older Adults Research and Development Program (FITforFrail). Height and weight were measured by body mass index as underweight, <18.5 kg/m^2; normal, 18.5-22.9 kg/m^2; overweight, 23-27.5 kg/m^2; and obese, ≥27.5 kg/m^2. Multimorbidity was defined as the presence of two or more chronic diseases, assessed as a self-reported physician's diagnosis.

Results. The prevalence of obesity was 15.4%, which was significantly more common among women (p <0.013) and nonsmokers (p <0.006). Multimorbidity, including overweight/obesity, was reported by 77.9% of older persons, and among older persons with overweight and obesity, multimorbidity was present in 76.5%. A higher number of chronic diseases were reported by older persons who were overweight and obese (p <0.006). Significantly more overweight and obese older women reported having multimorbidity (p <0.049) compared to older men. Hypertension, hyperlipidemia, musculoskeletal disorders and hyperuricemia were the most commonly reported chronic diseases among older persons with overweight and obesity.

Conclusion. The results of this study highlight the importance of overweight/obesity as a determinant of multimorbidity. Future research should look into gender differences in risk factors and multimorbidity patterns.

Key words: obesity, multimorbidity, older persons

INTRODUCTION

The prevalence of overweight and obesity has increased globally, prompting the World Health Organization (WHO) to declare 'globesity' as an escalating global health epidemic.[1] Thirty-eight percent of the world's population was reported to be overweight and 14% obese in 2020, which is projected to increase to 46% and 20%, respectively, in 2030.[2] A Global Burden of Disease Study on death and disability due to obesity reported an increase in death from 2.2 million in 1990 to 4.7 million in 2017 and disability-adjusted life years from 65 million in 1990 to 147.7 million in 2017.[3] Obesity is significantly associated with premature death, increasing as the degree of obesity increases.[4] While differences exist, obesity arises in both high and low to middle-income countries across age, social class, sex, race and ethnicity.[2] Obesity speeds up the aging process, worsens the age-associated loss of lean body mass, impairs physical functioning and quality of life and increases the likelihood of hospitalization and length of hospital stay.[5-7]

Overweight and obesity are not merely defined as excessive gain in body weight against height. It is also related to excessive adiposity, leading to metabolic consequences such as hypertension, heart disease, diabetes, dyslipidemia, cardiovascular disease, nonalcoholic fatty liver disease, as well as osteoarthritis, respiratory disease, dementia, sleep apnea and some forms of cancer.[8] It is significantly associated with multimorbidity, the presence of two or more chronic health conditions in the same individual, and increases with each degree of severity of obesity.[8]

eISSN 2308-118x (Online)
Printed in the Philippines

Received: September 14, 2024. Accepted: November 15, 2024.
Published online first: October 1, 2025.
https://doi.org/10.15605/jafes.040.02.05

Corresponding author: Assoc. Prof. Maria Stella T. Giron, MD, PhD
Department of Pharmacology and Toxicology,
College of Medicine, University of the Philippines Manila
670 Pedro Gil St., Ermita, Manila 1000, Philippines
Tel. No: (632) 85284248
E-mail: mtgiron@up.edu.ph
ORCiD: https://orcid.org/0000-0001-8800-0782

As the prevalence of obesity is increasing, so does the proportion of older persons. In 2023, the 60 years and older comprised 14.2% of the total population worldwide.[9] This is projected to increase to 16.6% by 2030 and 22% by 2050, 80% of which will come from low to middle-income countries.[10,11] In the Philippines, this age group, which comprised 8.8% of the population in 2023, is projected to increase to 10.5% by 2030 and 15.4% by 2050.[9] Research on older persons in the Philippines is limited. Because of this looming public health crisis, an understanding of the epidemiology of overweight/obesity is critical for making informed healthcare policy planning for appropriate prevention and intervention. This study, therefore, aims to determine the prevalence of overweight and obesity among community-living older persons in the Philippines.

METHODOLOGY

The data for this study was obtained from the FITforFrail study, full details of which have been described previously.[12] Briefly, this was a cross-sectional study to determine community-living older adults' health and frailty status. Four communities from 4 provinces of 4 regions in the Philippines, namely, the National Capital Region, Cebu, Davao and Los Baños, were included in the study. Field listing was conducted, and records from the Office of Senior Citizens Affairs were obtained to ensure a wide coverage of older persons. The sample size was calculated based on the proportion of older persons in the four regions and oversampled to account for nonresponse. A random selection of participants from each community, 60 years and older, who could communicate and respond to questions were invited to participate in the study. All the participants were informed of the purpose and procedures of the study upon their recruitment. The total sample included 405 of the eligible 424 participants. Complete information was obtained from 357 participants. No difference was seen regarding age, sex, and marital status between those with and without complete information. The University of the Philippines Manila Research Ethics Board has approved this study.

Data collection

This study used the Comprehensive Geriatric Assessment (CGA), a multidisciplinary evaluation program that uncovers, describes, and explains multiple problems of older persons while identifying their needs, resources, and strengths.[13] The CGA was applied to create a coordinated care plan focusing on interventions for identified issues. Translation, pretesting, and pilot testing of the CGA were conducted in the language spoken by the participants in each identified community.

Study measures

Trained researchers collected data through face-to-face interviews and physical examinations in a designated health center and the participants' homes for those unable to travel. Sociodemographic information collected included age, sex, civil status, living arrangement, location, and education. Lifestyle factors consisted of smoking, categorized as nonsmoker and smoker (previous and current); alcohol consumption, non-drinker and drinker (previous and current) and physical activity. Physical activity was measured by asking the participants if they exercised or did household chores. This was defined as exercising or doing household chores for at least 150 minutes per week. Basic activities of daily living assessed the absence or presence of difficulty in feeding, bathing, dressing up, transferring, toileting, and incontinence. Participants were considered dependent when they reported difficulty performing one or more tasks. Consultation with a healthcare provider (doctor, dentist, nurse, community health worker, allied health professional, traditional healer) in the past year was also elicited.

Multimorbidity was defined as the presence of 2 or more chronic conditions or related health problems. The presence of a chronic condition was determined by self-report. Participants were asked if a doctor had ever diagnosed them with a chronic disease. This was then classified based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision published by the WHO. Body mass index (BMI) was calculated from weight and height measurements and classified following the proposed classification for Asian adults by the WHO as underweight, <18.5 kg/m^2; normal, 18.5-22.9 kg/m^2; overweight, 23-27.5 kg/m^2; and obese, ≥27.5kg/m^2.[14]

Statistical analyses

All analyses were performed using STATA (version 14). The distributional characteristic of continuous variables was examined using the P-P plot. Descriptive analyses were performed and expressed as means ± SD or median (IQR) and percentages with 95% sCI. Differences between continuous variables were examined using the Student's T-test for normally distributed variables or the Mann-Whitney test for non-normally distributed variables. Differences between proportions were assessed using the Chi-square test or Fischer exact test. BMI was analyzed as a dichotomous variable, obesity (overweight and obese) and without obesity (underweight and normal) after analyses showed no differences among the independent variables, except for sex and smoking history or using the four categories.

RESULTS

The participants' age ranged from 60 to 91 years, median (IQR), 68 (64,75); 64.1% were females, and 52.4% were married. According to the WHO BMI classification, 14% were underweight, 34.2% normal, 36.4% overweight, and 15.4% obese. Table 1 shows the demographic characteristics according to BMI categories (overweight was merged with obese; underweight with normal BMI). Obesity was the most common among the 60-69 age group, which decreased with increasing age group. There were no differences

Table 1. Sociodemographic and selected characteristics of the sample population and BMI

		Total % (95%CI)		With Obesity[a] N=185, % (95%CI)		Without Obesity[b] N=172, % (95%CI)	*p*-value
Age [Median (IQR)]							0.667
60-69	214	59.9 (54.7, 64.9)	115	62.2 (55.0, 68.9)	99	57.6 (50.1, 64.7)	
70-79	105	29.4 (24.9, 34.3)	51	27.6 (21.2, 34.0)	54	31.4 (24.9, 38.7)	
80+	38	10.6 (7.8, 14.2)	19	10.3 (6.7, 15.6)	19	11.0 (7.2, 16.6)	
Sex							0.013
Women	229	64.1 (59.0, 68.9)	130	70.3 (63.4, 76.4)	99	57.7 (502, 64.8)	
Men	128	35.9 (31.1, 41.0)	55	29.7 (23.6, 36.6)	73	42.3 (35.2, 49.8)	
Civil status							0.538
Single	170	47.6 (42.5, 52.8)	91	49.2 (42, 56.4)	79	45.9 (38.6, 53.4)	
Married	187	52.4 (47.2, 57.5)	94	50.8 (43.7, 57.9)	93	54.1 (46.6, 61.4)	
Education							0.762
Primary	128	35.9 (31.1, 41.0)	63	34.1 (29.3, 43.0)	65	37.8 (30.9, 45.2)	
High school	111	31.1 (26.5, 3.61)	59	31.9 (25.6, 38.9)	52	30.2 (23.8, 37.4)	
College	118	33.1 (28.4, 38.1)	63	34.1 (27.7, 41.2)	55	32.0 (25.5, 39.2)	
Living arrangement							0.162
Alone	17	4.8 (2.6, 7.0)	6	3.2 (1.5, 6.8)	11	6.4 (3.6, 11.1)	
With others		95.2 (92.5, 97.0)		96.8 (93.2, 98.5)		93.6 (88.9, 96.4)	
Smoking history							
Never smoker	207	58.0 (52.9,63.1)	120	64.9 (57.8, 71.4)	87	50.6 (43.2, 58.0)	0.006
Smoker	150	42.0 (36.9, 47.1)	65	35.1 (28.6, 42.2)	85	49.4 (42.0, 56.8)	
Alcohol consumption							
Non drinker	149	41.7 (36.6, 46.8)	78	42.2 (35.3, 49.4)	71	41.3 (34.2, 48.8)	0.866
Drinker	208	58.3 (53.2, 63.4)	107	57.8 (50.6, 64.7)	101	58.7 (51.2, 65.8)	
Physical activity							0.254
Yes	310	86.8 (83.3, 90.3)	157	84.6 (79.4, 89.8)	153	89.1 (83.6, 92.9)	
No	47	13.2 (9.7, 16.7)	28	15.4 (10.2, 20.6)	19	10.9 (7.1, 16.4)	
Self-rated health							0.800
Poor to fair	210	58.8 (53.7, 63.9)	110	59.5 (52.3, 66.3)	100	58.1 (50.6, 65.4)	
Good to excellent	147	41.2 (36.1, 46.3)	75	40.5 (33.7, 47.7)	72	41.9 (34.8, 49.4)	
Health consultation		0.110					0.082
Yes	299	83.8 (80.0, 87.6)	161	87.0 (81.4, 91.1)	138	80.2 (73.6, 85.5)	
No	58	16.2 (12.4, 20.0)	24	13.0 (8.9, 18.6)	34	19.8 (14.5, 26.4)	

[a] overweight and obese
[b] underweight and normal BMI

between older persons with and without obesity with regard to civil status, education, physical activity, ADL, alcohol consumption, self-rated health, and those seeking health consultation. Older persons with obesity were more commonly women, p <0.013, and never smokers, p <0.012.

Chronic diseases ranged from 0-12, median (IQR) of 3 (2,6). The prevalence of multimorbidity, including obesity, was 77.9%, while multimorbidity among older persons with obesity was 76.5%. There was no difference in multimorbidity between older persons with obesity (80.0%) and those without obesity (72.7%), with a p-value of 0.103. There were significantly more obese older women with multimorbidity compared to men (67.6% versus 32.4%, p = 0.049) (Table 2). Older persons with obesity reported a significantly higher number of chronic diseases than those without obesity (p = 0.006). No differences in multimorbidity were seen between older persons with and without obesity with regard to age, education, smoking, alcohol consumption, self-rated health, physical activity and health consultation.

Hypertension was the most commonly reported chronic disease by older persons with obesity (p = 0.003) (Table 3). Other chronic diseases more commonly reported were hyperlipidemia (p = 0.004), musculoskeletal disorders (p = 0.048) and hyperuricemia (p = 0.008 (Table 3). In 51.4% of the participants, the most common multimorbidity in dyads reported by older persons with obesity was hypertension and visual impairment (95%CI, 43.4, 59.3) (Table 4). This was followed by hypertension and hyperlipidemia, visual impairment and hyperlipidemia and visual impairment and musculoskeletal disorders (24.3) (95%CI, 18.1, 31.8). The most common triadic combination consisted of hypertension, hyperlipidemia and visual impairment, as seen in 17.2% of the participants (95%CI, 13.2, 22.1).

DISCUSSION

This study investigated the prevalence of obesity in a sample of community-living older persons. The literature is replete with reports on the prevalence of obesity in older persons. However, the results vary due to age cut-off, data collection methods, data sources and settings, ascertainment and cut-off levels of obesity. In this study, the prevalence of obesity based on the WHO BMI for Asian populations category for obesity (≥27.5 kg/m^2) was 15.4%. Using the same BMI threshold for obesity, other studies on older persons reveal a lower prevalence of 12.8% from the Singapore Chinese health study and an even lower 4.4% from Thailand's

Table 2. Multimorbidity of the sample population according to obesity

	Multimorbidity				*P* value
	n	With obesity[a] N=148, % (95%CI)	n	Without obesity[b] N=125, % (95%CI)	
Age [Median (IQR)]					0.873
60-69	90	60.8 (52.8, 68.3)	74	59.2 (50.4, 67.2)	
70-79	41	27.7 (21.1, 35.4)	38	30.4 (23.0, 38.9)	
80+	17	11.5 (7.3, 17.6)	13	10.4 (6.2, 17.0)	
Sex					0.049
Women	100	67.6 (59.7, 74.6)	70	56.0 (47.2, 64.4)	
Men	48	32.4 (25.4, 40.3)	55	44.0 (35.6, 52,8)	
Civil status					0.649
Single	68	45.9 (38.1, 53.9)	54	43.2 (34.8, 52.0)	
Married	80	54.1 (46.1, 61.9)	71	56.8 (48.0, 65.2)	
Education					0.785
Primary	43	29.1 (22.4, 36.9)	41	32.8 (25.2, 41.4)	
High school	51	34.5 (27.3, 42.5)	42	33.6 (25.9, 42.3)	
College	54	36.5 (29.2, 44.5)	42	33.6 (25.9, 42.3)	
Living arrangement					0.243
Alone	5	3.4 (1.5, 7.7)	8	6.4 (3.3, 12.1)	
With others	143	96.6 (94.7, 98.5)	117	93.6 (87.9, 97.9)	
Smoking history					0.071
No	93	62.8 (54.8, 70.2)	65	52.0 (43.1, 60.6)	
Yes	55	37.2 (29.4, 45.0)	60	48.0 (39.4, 56.7)	
Alcohol history					0.872
No	63	42.6 (34.9, 50.6)	52	41.6 (33.3, 50.4)	
Yes	85	57.4 (49.4, 65.1)	73	58.4 (49.5, 66.7)	
Physical activity					0.373
Yes	126	85.1 (78.5, 90.0	111	88.8 (82.1, 93.2)	
No	22	14.9 (10.0, 20.6)	14	11.2 (6.8, 17.9)	
Self-rated health					0.859
Poor to fair	88	59.5 (51.6, 67.4)	73	58.4 (49.6, 66.7)	
Good to excellent	60	40.5 (32.9, 48.6)	52	41.6 (33.3, 50.4)	
Health consultation					0.283
Yes	134	90.5 (84.7, 95.2)	108	86.4 (79.3, 91.3)	
No	14	9.5 (5.8, 15.3)	17	13.6 (8.7, 20.7)	
No. of chronic diseases [median (IQR)]		3 (1, 5)		4 (2, 6)	0.006

[a] overweight and obese
[b] underweight and normal BMI

Table 3. Most commonly reported chronic diseases by obesity status

	n	Obese[a], % (95%CI)	n	Non-obese[b], % (95%CI)	*p*-value
Hypertension	121	65.1 (58.3, 71.9)	86	50.0 (42.6, 57.4)	0.003
Visual impairment[c]	106	57.1 (50.1, 64.2)	81	47.2 (39.8, 54.5)	0.194
Hyperlipidemia	55	30.1 (23.6, 36.6)	32	19.3 (13.5, 25.1)	0.014
Diabetes	35	20.1 (14.4, 25.8)	33	19.9 (14.0, 25.7)	0.947
Musculoskeletal disorders[d]	42	22.7 (17.3, 29.3)	25	15.3 (10.0, 20.6)	0.048
Hyperuricemia[e]	37	20.6 (14.9, 26.3	17	10.8 (6.3, 15.3)	0.008
Chronic lung disease[f]	15	9.0 (5.0, 12.9)	14	9.0 (4.9, 13.2)	0.991
Cerebrovascular disease	11	6.8 (3.4, 10.3)	17	10.8 (6.3, 15.3)	0.167
Coronary heart disease	8	5.2 (2.2, 8.3)	13	8.5 (4.5, 12.5)	0.194
Tuberculosis	6	4.2 (1.5, 6.9)	12	7.9 (4.0, 11.8)	0.124

[a] overweight and obese
[b] underweight and normal BMI
[c] includes cataracts, error of refraction, presbyopia, and glaucoma
[d] osteoporosis, arthritis and low back pain
[e] includes gout
[f] chronic bronchitis and asthma

Table 4. Multimorbidity patterns among older persons with obesity

	n	% (95%CI)
Dyads		
Hypertension + visual impairment	76	41.3 (34.2, 48.3)
Hypertension + hyperlipidemia	42	23.3 (17.3, 29.3)
Hyperlipidemia + visual impairment	39	21.7 (15.8, 27.5)
Visual impairment + musculoskeletal disorders	31	17.4 (12.1, 22.8)
Hypertension + musculoskeletal disorders	31	17.4 (12.1, 22.8)
Hyperlipidemia + hyperuricemia	30	16.9 (11.6, 22.2)
Hypertension + hyperuricemia	29	16.4 (11.1, 21.6)
Hypertension + diabetes mellitus	27	15.3 (10.2, 20.4)
Visual impairment + hyperuricemia	27	15.3 (10.2, 20.4)
Visual impairment + diabetes mellitus	25	14.3 (9.3, 19.2)
Hyperlipidemia + musculoskeletal disorders	17	10.0 (5.8, 14.2)
Hypertension + chronic lung disease	15	9.0 (5.0, 12.9)
Hypertension + cerebrovascular disease	11	6.8 (3.4, 10.3)
Visual impairment + chronic lung disease	10	6.3 (3.0, 9.7)
Triads		
Hypertension + hyperlipidemia + visual impairment	29	16.4 (11.1, 21.6)
Hypertension + musculoskeletal disorder + visual impairment	25	14.3 (9.3, 19.2)
Hypertension + hyperlipidemia + hyperuricemia	21	12.1 (7.6, 16.7)
Hypertension + hyperuricemia + visual impairment	21	12.1 (7.6, 16.7)
Hyperlipidemia + hyperuricemia + visual impairment	21	12.1 (7.6, 16.7)
Hypertension + diabetes + visual impairment	20	10.6 (7.5, 14.9)
Hypertension + visual impairment + hyperuricemia	20	10.6 (7.5, 14.9)
Hypertension + hyperlipidemia + diabetes	17	10.0 (5.8, 14.2)
Hyperlipidemia + diabetes + visual impairment	16	9.5 (5.4, 13.6)

national health examination survey.[15,16] Meanwhile, the Malaysia Aging and Retirement Survey reported a higher prevalence of 30.8%.[17] A previous local study, the University of the Philippines Wellness Initiative for Seniors and Elders, reported a prevalence of 28.4%.[18] This study, however, included participants who were 55 years and older and classified obesity at a BMI of ≥25 kg/m^2.[18]

In this study, the prevalence of multimorbidity, including obesity, was 77.9%, and among older persons with obesity, 76.5%. These results are much higher than the 51% reported from a recent systematic review on the global and regional prevalence of older persons in community settings.[19] An earlier systematic review on the prevalence of multimorbidity among older persons ranged from 55% to 98%.[20] In another systematic review of multimorbidity among community-living older persons from high- and low-middle-income countries, the prevalence ranged from 35.7% to 100%.[21]

There was no difference in the prevalence of multimorbidity between older persons with and without obesity. However, significantly more chronic diseases were reported by older persons with obesity in this study. The comparable prevalence of multimorbidity between older persons with and without obesity supports previous research that age is a significant risk factor for multimorbidity.[20,22,23] Increasing age provides more room for chronic diseases to accumulate. Aging brings about a decline in organ and system functions, causing multiple hormonal dysregulation and proinflammatory states, increasing older persons' susceptibility to diseases and resulting in multimorbidity.[23,24] Moreover, in a study to determine the contribution of the hallmarks of aging, five of the nine hallmarks, namely, deregulated nutrient sensing, mitochondrial dysfunction, cellular senescence, stem cell exhaustion, and altered intercellular communication, contributed to the development of multimorbidity singly and jointly.[25] The higher number of chronic diseases among older persons with obesity is in line with previous research.[9,26] Obesity plays a vital role in the pathophysiology of multimorbidity through the release of inflammatory cytokines and lipid intermediates, increased activation of sympathetic nervous and renin-angiotensin-aldosterone systems, and mechanical stress.[27]

As with other reports, this study found obesity to be more common in older women.[17,28] Body composition changes with age; decreases in lean body mass and increases in height are greater in women than in men.[29] Estrogen deficiency following menopause results in increased visceral adiposity.[30] Other factors reported to contribute to greater adiposity in women include being single, divorced or separated, limited socialization, physical inactivity and sleep problems.[31-33]

This study also found more obese older women with multimorbidity, consistent with studies reporting a higher prevalence of multimorbidity among women with obesity than men.[19-21] Being female is an independent risk factor for multimorbidity.[21] Being a woman with obesity increases the risk of developing multimorbidity in older age, based on a study with a mean follow-up of 27.8 years compared to women without obesity.[34] Factors that are associated with obesity in women, such as physical inactivity, lifestyle and sleep problems, also increase the likelihood of multi-

morbidity.[28,31,35] Additionally, longer life expectancy, poor self-rated health, socioeconomic disparity and health-care utilization contribute to a higher multimorbidity among older women.[20,26,37] In the Philippines, older women have lower incomes and health care coverage and depend on their children for support.[38] An ADB study on gender differences in access to health care among older persons in the Philippines revealed that older women were more likely to report sickness or injury and seek consultation.[39] A study on aging and health in the Philippines reported that more older women are receiving outpatient care than men.[40]

Nonsmokers were found to be more commonly obese than smokers. There is an inverse relationship between smoking and obesity. Smokers are more likely to be underweight or normal. At the same time, nonsmokers are more commonly obese or overweight.[41] On the other hand, studies have reported that there was no association between obesity and increased amount of smoking.[42,43] Nicotine, the major component of tobacco, is reported to increase resting metabolic rate and decrease appetite, causing body weight.[44] Smoking induces lipolysis and increases the 24-hour energy expenditure mediated by the sympathetic nervous.[45]

Hypertension, hyperlipidemia, hyperuricemia and musculoskeletal disorders were the most commonly reported diseases by older persons with obesity, similar to previous research on the most common diseases in obesity, except hyperuricemia.[9,16,22,26] These diseases also comprised most of the dyads and triads of multimorbidity in obesity. Hypertension, hyperlipidemia and obesity are essential components of the metabolic syndrome, the prevalence of which increases with increasing severity of obesity.[46] Hyperuricemia has also been linked to hypertension, obesity, and metabolic syndrome.[47] It is interesting to note that diabetes, which is significantly associated with obesity, was not common among older persons with obesity in this study. This may be because the Asian diabetes phenotype is less commonly associated with obesity.[48]

Strengths and limitations

Chronic disease status was based on self-report, which is subject to response and recall bias. Older persons may have chronic conditions not listed in the questionnaire, which can lead to underreporting and underestimation of the prevalence of multimorbidity. However, self-reports have been considered a reliable measure of chronic disease.[49] The cross-sectional design of this study precludes causality. Whether obesity preceded multimorbidity or was preceded by multimorbidity cannot be determined. BMI, as a measure of obesity, has a limited ability to identify fat mass and lean body mass in older persons.

Despite these limitations, this study utilized information from a representative sample of community-living older persons with a high response rate. As far as the authors are aware, this is the first study to provide data on obesity and multimorbidity among community-living older persons in the Philippines. Older persons will soon comprise a more significant proportion of the population in the country, as will the proportion of older persons with obesity and multimorbidity. The approach to older persons with obesity and multimorbidity could be challenging to health professionals because medical education, training and research, as well as clinical practice guidelines (CPGs), have been focused on single diseases.[50] Clinical trials often exclude older persons and those with multimorbidity; therefore, CPGs offer limited guidance in the management of older persons with multiple chronic diseases. A review on the applicability of CPGs on older persons with multimorbidity reported that only 4 (diabetes, osteoarthritis, atrial fibrillation and angina) of 9 CPGs discussed older persons and comorbid diseases.[51] Multimorbidity in older persons with obesity is consequential because of its association with functional disability, poor quality of life, high healthcare utilization and cost, polypharmacy, higher rates of adverse events and increased risk of mortality.[20,52,53]

CONCLUSION

This study identified the prevalence of overweight and obesity among community-living older persons and called attention to the importance of recognizing obesity as a determinant of multimorbidity. It is recommended that drivers of obesity be identified and that obesity prevention be a part of the public health agenda. Future research should look into sex differences in risk factors and multimorbidity patterns. Multimorbidity is considered the norm in older persons; therefore, understanding the epidemiology is warranted to plan for future resources and delivery of healthcare services and assist policymakers and public health planners in developing effective interventions.

Acknowledgments
The authors express their appreciation to the research team and participants of the FITforFrail study.

Statement of Authorship
All authors certified fulfillment of ICMJE authorship criteria.

CRediT Author Statement
MSG: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing – original draft preparation, Writing – review and editing, Visualization, Project administration; **SADV:** Conceptualization, Methodology, Investigation, Resources, Writing – review and editing, Supervision, Project administration, Funding acquisition.

Data Availability Statement
The data supporting this study's findings are available on request from the corresponding author.

Author Disclosure
The authors declared no conflict of interest.

Funding Source
This study was funded by the Department of Health's Advancing Health through Evidence-Assisted Decisions (AHEAD) Program, with funds managed by the Philippine Council for Health Research and Development (PCHRD).

References

1. World Health Organization. Controlling the global obesity epidemic. World Health Organization. Accessed August 22, 2023. https://www.who.int/activities/controlling-the-global-obesity-epidemic.
2. World Obesity Federation. World Obesity Atlas 2022. World Obesity Federation. Accessed August 22, 2023. https://www.worldobesityday.org/assets/downloads/World_Obesity_Atlas_2022_WEB.pdf.
3. Dai H, Alsalhe TA, Chalghaf N, Riccò M, Bragazzi NL, Wu J. The global burden of disease attributable to high body mass index in 195 countries and territories, 1990–2017: An analysis of the global burden of disease study. PLoS Med. 2020;17(7): e1003198. PMID: 32722671 PMCID: PMC7386577 DOI: 10.1371/journal.pmed.1003198
4. Global BMI Mortality Collaboration, Di Angelantonio E, Bhupathiraju S, et al. Body-mass index and all-cause mortality: Individual-participant-data meta-analysis of 239 prospective studies in four continents. Lancet. 2016;388(10046):776-86. PMID: 27423262 PMCID: PMC4995441 DOI: 10.1016/S0140-6736(16)30175-1
5. Salvestrini V, Sell C, Lorenzini A. Obesity may accelerate the aging process. Front Endocrinol (Lausanne). 2019;10:266. PMID: 31130916 PMCID: PMC6509231 DOI: 10.3389/fendo.2019.00266
6. Malenfant JH, Batsis JA. Obesity in the geriatric population - A global health perspective. J Glob Health Rep. 2019;3:e2019045. PMID: 34027129 PMCID: PMC8136402 DOI: 10.29392/joghr.3.e2019045
7. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363(9403):157–63. PMID: 14726171 DOI: 10.1016/S0140-6736(03)15268-3
8. Schafer MH, Ferraro KF. Obesity and hospitalization over the adult life course: Does duration of exposure increase use? J Health Soc Behav. 2007;48(4):434-49. PMID: 18198689 PMCID: PMC2640491 DOI: 10.1177/002214650704800407
9. Calvin CM, Conroy MC, Moore SF, Kuzma E, Littlejohns TJ. Association of multimorbidity, disease clusters, and modification by genetic factors with risk of dementia. JAMA Netw Open. 2022;5(9):e2232124. PMID: 36125811 PMCID: PMC9490497 DOI: 10.1001/jamanetworkopen.2022.32124
10. Kivimäki M, Strandberg T, Pentti J, et al. Body-mass index and risk of obesity-related complex multimorbidity: An observational multicohort study. Lancet Diabetes Endocrinol. 2022;10(4):253-63. PMID: 35248171 PMCID: PMC8938400 DOI: 10.1016/S2213-8587(22)00033-X
11. United Nations Population Division. World Population Prospects 2022. 2022. Accessed August 17, 2023. https://www.un.org/development/desa/pd/sites/www.un.orzsg.development.desa.pd/files/wpp2022_summary_of_results.pdf
12. WHO ageing and health. Accessed January 2, 2024. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health
13. Ladia MAJ, dela Vega SF, Jacalan MTA, Torres RV, Cruda MAMCC, Gillera JMA. Mixed methods studies on health status of older adults with focus on frailty (quantitative component): Frailty among older persons: Cases of robust, pre-frail, and frail Filipinos. Fit for frail: Final report, vol 3; 2020. Accessed September 22, 2022. https://drive.google.com/file/d/1I4jhv0aoHHdPiS3rGdxPTx_3PVYYwgMd/view
14. National Institutes of Health. Geriatric assessment methods for clinical decision making. NIH Consens statement. 1987;6(13):1-21. Accessed March 20, 2022.
15. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004 ;363(9403):157-63. PMID: 14726171 DOI: 10.1016/S0140-6736(03)15268-3. Erratum in Lancet. 2004;363(9412):902.
16. Tan YH, Lim JP, Lim WS, et al. Obesity in older adults and associations with cardiovascular structure and function. Obes Facts. 2022;15(3): 336-43. PMID: 35249039 PMCID: PMC9209947 DOI: 10.1159/000521729
17. Vapattanawong P, Aekplakorn W, Rakchanyaban U, Prasartkul P, Porapakkham Y. Obesity and mortality among older Thais: A four year follow up study. BMC Public Health. 2010;10:604. PMID: 20942942 PMCID: PMC2964629 DOI: 10.1186/1471-2458-10-604
18. Apalasamy YD, Awang H, Mansor N, AbRashid N, Kamarulzaman ND, Lih Yoong T. Factors associated with obesity and abdominal obesity among Malaysian older adults. Asia Pac J Public Health. 202l;33(5):547-54. PMID: 34013778 DOI: 10.1177/10105395211014634
19. Chowdhury SR, Chandra Das D, Sunna TC, Beyene J, Hossain A. Global and regional prevalence of multimorbidity in the adult population in community settings: A systematic review and meta-analysis. EClinicalMedicine. 2023;57:101860. PMID: 36864977 PMCID: PMC9971315 DOI: 10.1016/j.eclinm.2023.101860
20. Laude TMP, Merca EE, Torres R, et al. A descriptive study of the nutritional and frailty status of working and retired employees within an academic community in the Philippines. Acta Med Philipp. 2021;55(7):728-37. DOI: 10.47895/amp.vi0.2830
21. Marengoni A, Angleman S, Melis R, et al. Aging with multimorbidity: A systematic review of the literature. Ageing Res Rev. 2011;10(4): 430-9. PMID: 21402176 DOI: 10.1016/j.arr.2011.03.003
22. Nguyen H, Manolova G, Daskalopoulou C, Vitoratou S, Prince M, Prina AM. Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies. J Comorb. 2019;9:2235042X19870934. PMID: 31489279 PMCID: PMC6710708 DOI: 10.1177/2235042X19870934
23. Violan C, Foguet-Boreu Q, Flores-Mateo G, et al. Prevalence, determinants and patterns of multimorbidity in primary care: A systematic review of observational studies. PLoS One. 2014;9(7):e102149. PMID: 25048354 PMCID: PMC4105594 DOI: 10.1371/journal.pone.0102149
24. Fabbri E, Zoli M, Gonzalez-Freire M, Salive ME, Studenski SA, Ferrucci L. Aging and multimorbidity: New tasks, priorities, and frontiers for integrated gerontological and clinical research. J Am Med Dir Assoc. 2015;16(8):640-7. PMID: 25958334 PMCID: PMC5125299 DOI: 10.1016/j.jamda.2015.03.013
25. Maggio M, Cattabiani C, Lauretani F, et al. The concept of multiple hormonal dysregulation. Acta Biomed. 2010;81 Suppl 1(Suppl 1):19-29. PMID: 20518188; PMCID: PMC5220583.
26. Fraser HC, Kuan V, Johnen R, et al. Biological mechanisms of aging predict age-related disease co-occurrence in patients. Aging Cell. 2022;21(4):e13524. PMID: 35259281 PMCID: PMC9009120 DOI: 10.1111/acel.13524
27. Peytremann-Bridevaux I, Santos-Eggimann B. Health correlates of overweight and obesity in adults aged 50 years and over: Results from the Survey of Health, Ageing and Retirement in Europe (SHARE). Obesity and health in Europeans aged >or = 50 years. Swiss Med Wkly. 2008;138(17-18):261-6. PMID: 18481232 DOI: 10.4414/smw.2008.12067
28. Heymsfield SB, Wadden TA. Mechanisms, pathophysiology, and management of obesity. N Engl J Med. 2017;376(3):254-66. PMID: 28099824 DOI: 10.1056/NEJMra1514009
29. Kanter R, Caballero B. Global gender disparities in obesity: A review. Adv Nutr. 2012;3(4):491-8. PMID: 22797984 PMCID: PMC3649717 DOI: 10.3945/an.112.002063
30. Enzi G, Gasparo M, Biondetti PR, Fiore D, Semisa M, Zurlo F. Subcutaneous and visceral fat distribution according to sex, age, and overweight, evaluated by computed tomography. Am J Clin Nutr. 1986;44(6):739-46. PMID: 3788827 DOI: 10.1093/ajcn/44.6.739
31. Davis SR, Castelo-Branco C, Chedraui P, et al; Writing Group of the International Menopause Society for World Menopause Day 2012. Understanding weight gain at menopause. Climacteric. 2012;15(5): 419-29. PMID: 22978257 DOI: 10.3109/13697137.2012.707385
32. Hosseini Z, Veenstra G, Khan NA, Conklin AI. Associations between social connections, their interactions, and obesity differ by gender: A population-based, cross-sectional analysis of the Canadian longitudinal study on aging. PLoS One. 2020;15(7):e0235977. PMID: 32730260 PMCID: PMC7392536 DOI: 10.1371/journal.pone.0235977
33. Maltagliati S, Saoudi I, Sarrazin P, et al. Women carry the weight of deprivation on physical inactivity: Moderated mediation analyses in a European sample of adults over 50 Years of age. SSM Popul Health. 2022;20:101272. PMID: 36387017 PMCID: PMC9641026 DOI: 10.1016/j.ssmph.2022.101272
34. Patel SR, Malhotra A, White DP, Gottlieb DJ, Hu FB. Association between reduced sleep and weight gain in women. Am J Epidemiol. 2006;164(10):947-54. PMID: 16914506 PMCID: PMC3496783 DOI: 10.1093/aje/kwj280
35. Blümel JE, Carrillo-Larco RM, Vallejo MS, Chedraui P. Multimorbidity in a cohort of middle-aged women: Risk factors and disease clustering. Maturitas. 2020;137:45-49. PMID: 32498936 PMCID: PMC7284304 DOI: 10.1016/j.maturitas.2020.04.016
36. Dhalwani NN, Zaccardi F, O'Donovan G, et al. Association between lifestyle factors and the incidence of multimorbidity in an older English population. J Gerontol A Biol Sci Med Sci. 2017;72(4):528-34. PMID: 27470302 DOI: 10.1093/gerona/glw146
37. de S Santos Machado V, Valadares AL, Costa-Paiva LH, Osis MJ, Sousa MH, Pinto-Neto AM. Aging, obesity, and multimorbidity in women 50 years or older: A population-based study. Menopause. 2013;20(8): 818-24. PMID: 23549445 DOI: 10.1097/GME.0b013e31827fdd8c
38. Lewis M. Older women and health: An Overview. Women Health. 1985;10(2–3):1–16. PMID: 3927595 DOI: 10.1300/j013v10n02_01
39. Castillo GPJ. Provision of care for Filipino older persons and responding to the needs of aging societies. 2019. Accessed August 22, 2023. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/unpd_egm_201902_s8_pleneegracejcastillo.pdf
40. van der Meulen Rodgers Y, Zveglich JE Jr. Gender differences in access to health care among the elderly: Evidence from Southeast Asia. Asian Dev Rev. 2021;38(2):59-92. https://www.adb.org/sites/default/files/publication/677981/ewp-633-gender-health-care-elderly-southeast-asia.pdf
41. Natividad JN. Healthcare and healthcare utilisation. In: Cruz GT, Cruz CJP, Saito Y, eds. Ageing and Health in the Philippines. Jakarta, Indonesia: Economic Research Institute for ASEAN and East Asia; 2019. https://www.eria.org/uploads/media/Books/2019-Dec-Ageing-and-Health-Philippines/12-Ageing-and-Health-Philippines-Chapter-6-0208.pdf

42. Watanabe T, Tsujino I, Konno S, et al. Association between smoking status and obesity in a nationwide survey of Japanese adults. PLoS One. 2016;11(3):e0148926. PMID: 27007232 PMCID: PMC4805304 DOI: 10.1371/journal.pone.0148926
43. Chiolero A, Jacot-Sadowski I, Faeh D, Paccaud F, Cornuz J. Association of cigarettes daily smoked with obesity in a general European adult population. Obesity (Silver Spring). 2007;15(5):1311-8. PMID: 17495208 DOI: 10.1038/oby.2007.153
44. John U, Hanke M, Rumpf HJ, Thyrian JR. Smoking status, cigarettes per day, and their relationship to overweight and obesity among former and current smokers in a national adult general population sample. Int J Obes (Lond). 2005;29(10):1289-94. PMID: 15997244 DOI: 10.1038/sj.ijo.0803028
45. Andersson K, Arner P. Systemic nicotine stimulates human adipose tissue lipolysis through local cholinergic and catecholaminergic receptors. Int J Obes Relat Metab Disord. 2001;25(8):1225-32. PMID: 11477508 DOI: 10.1038/sj.ijo.0801654
46. Hellerstein MK, Benowitz NL, Neese RA, et L. Effects of cigarette smoking and its cessation on lipid metabolism and energy expenditure in heavy smokers. J Clin Invest. 199;93(1):265-72. PMID: 8282797 PMCID: PMC293761 DOI: 10.1172/JCI116955
47. Marchesini G, Melchionda N, Apolone G, et al. The metabolic syndrome in treatment-seeking obese persons. Metabolism. 2004;53(4):435-40. PMID: 15045688 DOI: 10.1016/j.metabol.2003.10.026
48. George C, Leslie SW, Minter DA. Hyperuricemia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Accessed July 10, 2024.
49. Nakagami T, Qiao Q, Carstensen B, et al. Age, body mass index and type 2 diabetes-associations modified by ethnicity. Diabetologia. 2003;46(8):1063-70. PMID: 12827246. DOI: 10.1007/s00125-003-1158-9.
50. Van der Heyden J, De Bacquer D, Tafforeau J, et al. Reliability and validity of a global question on self-reported chronic morbidity. J Public Health. 2014;22:371–80. DOI: 10.1007/s10389-014-0624-9
51. Hwang K, Moore KJ, Chong TWH, Williams S, Batchelor F. Improving clinical practice guidelines for older people: Considerations and recommendations for more inclusive and ageing-relevant guidelines. Lancet Healthy Longev. 2022;3(5):e316-7. PMID: 36098306 DOI: 10.1016/S2666-7568(22)00074-5
52. Boyd CM, Darer J, Boult C, Fried LP, Boult L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: Implications for pay for performance. JAMA. 2005;294(6):716-24. PMID: 16091574 DOI: 10.1001/jama.294.6.716
53. Nunes BP, Flores TR, Mielke GI, Thumé E, Facchini LA. Multimorbidity and mortality in older adults: A systematic review and meta-analysis. Arch Gerontol Geriatr. 2016;67:130-8. PMID: 27500661 DOI: 10.1016/j.archger.2016.07.008
54. Makovski TT, Schmitz S, Zeegers MP, Stranges S, van den Akker M. Multimorbidity and quality of life: Systematic literature review and meta-analysis. Ageing Res Rev. 2019;53:100903. PMID: 31048032 DOI: 10.1016/j.arr.2019.04.005