RESEARCH NOTE

Lifestyle-related changes among Filipinos with comorbidities during the COVID-19 pandemic

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ABSTRACT

Background: The global impact of the COVID-19 pandemic has been significant, affecting individuals across all health spectrums. Many have adapted their lifestyles to navigate the challenges posed by the pandemic. Despite this, there remains a lack of understanding regarding the specific lifestyle changes made by Filipinos with comorbidities during this time.

Objectives: We aimed to ascertain the lifestyle changes among Filipinos with comorbidities and examine how their condition and various sociodemographic factors influenced these changes during the pandemic.

Methodology: We conducted a community-based cross-sectional study involving 402 Filipino adults with comorbidities residing in Metro Manila. Using descriptive statistics, we summarized sociodemographic profiles and considerations for lifestyle changes. We assessed lifestyle changes using principal component analysis. Multiple linear regression was used to identify factors associated with these changes.

Results: Lifestyle modifications include positive changes in a healthy diet, nutrition, and social support, as well as negative changes in restorative sleep, mental and physical states, and unhealthy eating habits. Monthly household income was positively associated with lifestyle changes. Specifically, individuals belonging to the middle to upper-income categories tend to adopt these modifications compared to those in the lower-income brackets (B [unstandardized beta] = 3.99; 95% CI [Confidence Interval]= 0.98, 6.99). The primary reason for embracing these changes was to delay or prevent the progression of diseases, followed by the desire to minimize health complications.

Conclusions: High-income Filipinos are more inclined to adopt lifestyle modifications compared to lower-income individuals. Prioritizing disease prevention and minimizing health complications are common considerations for these changes.

Introduction

Lifestyle plays a crucial role in health, shaping individuals' behavior and self-perception. However, understanding the association between comorbidities and lifestyle changes among Filipino adults remains limited. The emergence of recent communicable diseases like severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and its connection to SARS-CoV-2, the virus behind COVID-19, has brought unprecedented changes to daily life and health outcomes, mainly due to measures like physical distancing and quarantine [1].

The impact of the COVID-19 pandemic in the Philippines has been profound, with the country recording the highest cumulative number of cases and deaths in the Western-Pacific region [2]. By March 2020, the virus had spread locally in the National Capital Region (NCR), leading to a surge in cases and stretching hospitals' capacity to its limits [3,4]. By August 2022, the region had surpassed 1.2 million confirmed cases [5]. Priority vaccination categories were established, including Group A3, which comprises adults aged 18 to 59 with controlled comorbidities [6].

The pandemic has disproportionately affected individuals with chronic health issues, particularly those with conditions such as hypertension (HTN), diabetes, cardiovascular disease (CVD), and chronic obstructive pulmonary disease (COPD) [7,8,9,10]. Older adults face a higher risk of infection and severe illness, contrary to previous pandemics, where they had higher mortality rates [11,12]. Men and women over 50 are particularly susceptible to severe outcomes, often presenting with fever, cough, and dyspnea [13,14].

The World Health Organization (WHO) highlights lifestyle as a significant determinant of health, with factors such as diet, physical activity, and sleep playing key roles [15]. Unhealthy lifestyles contribute significantly to disease acquisition and progression. Socioeconomic factors also play a crucial role, with education level predicting future earnings and employment prospects and influencing individuals' access to healthcare information and resources [16,17].

Socioeconomic disparities exacerbate health inequalities, placing those with lower education and income levels at higher risk of contracting COVID-19 due to differences in living conditions and access to healthcare [18,19].

Social isolation during the pandemic has led to changes in eating habits and physical activity levels. Some have experienced increased food intake and weight gain, while others have taken the opportunity to improve their lifestyle through healthier meal preparation and increased physical activity [20].

Understanding lifestyle-related changes among Filipino adults with comorbidities is essential, particularly in the context of the COVID-19 pandemic. This study aimed to describe the lifestyle changes of Filipinos with comorbidities and examine the associated factors. Findings from this study may be used to create programs or policies that will address the needs of this vulnerable population.

Methodology

2.1 Data Gathering

We conducted a community-based cross-sectional study to evaluate the lifestyle changes adopted by Filipinos with comorbidities and to examine the factors influencing these lifestyle-related changes. The study was carried out across the 16 cities and one municipality of Metro Manila, namely Caloocan, Malabon, Navotas, Valenzuela, Quezon City, Marikina, Pasig, Taguig, Makati, Manila, Mandaluyong, San Juan, Pasay, Parañaque, Las Piñas, Muntinlupa, and Pateros.

We adapted the survey questionnaire (Supplementary Table 1) from a previous study conducted in India, which examined changes in lifestyle-related behavior during the COVID-19 pandemic [21]. The survey includes items regarding sociodemographic characteristics, a series of questions addressing the lifestyle-related modifications implemented during the pandemic, and the reasons behind them. Example questions include inquiries such as, "How has your habit of snacking between meals changed?" and "How has your daily intake of fruits and vegetables changed?" Responses ranged from 1 (significantly decreased) to 5 (significantly increased).

To ensure the validity of the survey questionnaire, we conducted content and face validity testing by consulting subject matter experts, as well as pre-testing and cognitive interviewing with 20 participants. The Cronbach's alpha coefficient for this study was 0.82, indicating good reliability [22, 23].

We utilized various social media platforms (e.g., Facebook and X/Twitter) to distribute the survey, making it available in the language of participants' choice (Filipino or English). The study was conducted between May and July 2022. The minimum sample size required was determined to be 400, calculated using OpenEpi with the following parameters: a population size of 468,151, a hypothesized frequency of the outcome factor at 50%, a 95% confidence interval, a design effect of 1, and a 5% dropout rate. In total, we collected responses from 402 Filipino individuals with comorbidities. The population size was based on data from the Department of Health (DOH) regarding the latest regional morbidities [24].

The inclusion criteria for participants were as follows: adults aged 18 to 59 years, residing in Metro Manila and diagnosed with two or more pre-existing comorbidities, including diabetes, chronic lung diseases (e.g., COPD, pneumonia), respiratory tract infections (e.g., asthma, allergic rhinitis), and heart conditions or other chronic diseases (e.g., hypertension). Additionally, participants must have experienced the local pandemic guidelines and restrictions from March 2020 until the introduction of Category A3 COVID-19 vaccines. Conversely, the exclusion criteria included individuals aged below 18 or above 59 years, those residing outside Metro Manila, individuals with pre-existing comorbidities other than those specified in the inclusion criteria, and those who did not experience the local pandemic guidelines and restrictions during the specified time frame from March 2020 until the introduction of Category A3 COVID-19 vaccines.

We obtained ethical approval from the University Ethics Review Committee of Adamson University (2022-02-PHA-03-029). Before participation, participants were given access to the study's objectives, data collection procedures, analysis methods, storage procedures, and privacy protection details on the survey's website landing page. Participants were required to click "agree" to indicate their understanding of the study's content and willingness to participate in the survey.

2.2 Data analysis

Using descriptive statistics, we summarized the participants' sociodemographic characteristics, including their age, sex, address, civil status, number of children, educational attainment, monthly household income, comorbidities, and considerations in employing lifestyle-related changes.

To assess the lifestyle changes among Filipinos with comorbidities, we utilized Principal Component Analysis (PCA). PCA helped us identify clusters of lifestyle-related changes. Before conducting PCA, we converted the ordinal scale into continuous variables by re-categorizing the response options as follows: 1 (grossly similar), 2 (significantly decreased), 3 (slightly decreased), 4 (slightly increased), and 5 (significantly increased). We also reversed scores on negatively constructed questions. We calculated the aggregated scores for each item and verified that they followed a normal distribution (Shapiro-Wilk Test > 0.05). This conversion from ordinal scales to continuous variables before PCA enhances the quality, sensitivity, and interpretability of the analysis while also ensuring that it adheres to the technique's statistical assumptions and requirements [25].

Following the PCA method (Rotation Method: Promax with Kaiser Normalization), we computed the covariance matrix of the standardized data to understand the covariation between variables [26]. By performing eigendecomposition on the covariance matrix, PCA identifies eigenvectors and eigenvalues, which are visualized through a scree plot (Supplementary Figure 1). Based on the criterion of eigenvalues greater than one, principal components one to four were selected, with eigenvalues of 2.6280, 2.6209,

1.4116, and 1.0435, respectively. These components above the red central line represent the final domains determined using PCA. After reversing the scores on negatively constructed questions and excluding items with missing values (e.g., N/A imputed as 0) and communalities of <0.20, the final rotated component matrix resulted in the identification of four domains: restorative sleep; healthy diet, nutrition, and social support; mental and physical states; and unhealthy eating habits. These domains comprise the relevant and correlated items or lifestyle-related changes employed.

Finally, multiple linear regression was employed to investigate the factors associated with lifestyle changes. A higher score indicates a greater extent of lifestyle changes adopted. We examined whether sociodemographic characteristics and the presence of comorbidities are associated with the adoption of lifestyle changes during the COVID-19 pandemic. Multicollinearity was not a concern as the variance inflation factor was below 5.

Results

Table 1 presents the sociodemographic characteristics of the 402 participants. Among them, 230 (57.2%) were classified as young adults, with the majority being female (214, 53.2%). Regarding residence, the largest proportion lived in the 4th District (39.8%), followed by the 3rd District (28.9%). Additionally, more than half of the participants were either married, separated, or widowed (53.5%) and had one or more children (60.7%). In terms of educational attainment, the majority had attained some college or postgraduate degree (78.4%). Furthermore, a significant proportion belonged to the middle to upper-middle class or rich income category (73.6%).

Table 2 presents the mean aggregated scores for assessing negative and positive lifestyle changes. Restorative sleep, mental and physical states, and unhealthy eating habits are scored on a scale of 0 to 10 per domain. An aggregated score of 7 to 10 indicates positive changes, while 0 to 6 indicates negative changes. An aggregated score of 13 to 20 reflects positive changes in a healthy diet, nutrition, and social support, while 0 to 12 indicates negative changes. These cut-off points were determined by summing the scores of all items within each domain. Items #2, #3, #5, and #10 obtained higher scores, indicating better outcomes from the participants' employed lifestyle changes.

Table 1. Participants' Characteristics (n=402)

Sociodemographic Profile		
Age, *n* (%)		
Young Adults (18 - 39 years)	230	(57.2)
Middle-aged Adults (40 - 59 years)	172	(42.8)
Sex, *n* (%)		
Male	179	(44.5)
Female	214	(53.2)
Address (City/Municipality), *n* (%)		
1st District[a]	35	(8.7)
2nd District[b]	91	(22.6)
3rd District[c]	116	(28.9)
4th District[d]	160	(39.8)
Civil status, *n* (%)		
Single	187	(46.5)
Married/Separated/Widowed	215	(53.5)
Number of children, *n* (%)		
0	158	(39.3)
1 & 2	150	(37.3)
3 and above	94	(23.4)
Educational attainment, *n* (%)		
Some Elementary to Vocational Degree	87	(21.6)
Some College to Post - Graduate Degree	315	(78.4)
Monthly household income, *n* (%)		
Poor to Lower - Middle Income	106	(26.4)
Middle - Middle Income to Rich	296	(73.6)

a 1st District: Manila City
b 2nd District: Cities of Mandaluyong, Marikina, Pasig, Quezon, and San Juan
c 3rd District: Cities of Caloocan, Malabon, Navotas, and Valenzuela
d 4th District: Cities of Las Piñas, Makati, Muntinlupa, Parañaque, Pasay, Taguig, and Municipality of Pateros

Table 2. Components determined using Principal Component Analysis

Domains	Items	Mean Aggregated Score (SD)	Interpretation
Restorative Sleep	7. How have your hours of sleep changed?	5.85 (2.88)	Negatively changed
	8. How has your quality of sleep changed?		
Healthy diet, Nutrition, and Social Support	2. How has your daily intake of fruits and vegetables changed?	13.95 (4.24)	Positively changed
	3. How has your intake of a balanced diet changed?		
	5. How has the support of your family and friends in eating healthy food changed?		
	10. How has your health-seeking behavior (e.g., medical check-ups) changed?		
Mental and Physical States	*9. How have your stress and anxiety levels changed?	4.84 (2.27)	Negatively changed
	11. How has your participation in physical activities changed?		
	*12. How has your weight changed?		
Unhealthy Eating Habits	*1. How has your habit of snacking between meals changed?	5.35 (2.07)	Negatively changed
	*4. How has your consumption of unhealthy food (e.g., salty chips, sodas/soft drinks, burgers, etc.) changed?		

SD, standard deviation

*, reverse-scored items

Note: Principal Component Analysis (Rotation Method: Promax with Kaiser Normalization: using 60% cut-off score and points per domain for interpretation

- 10 points for restorative sleep, mental and physical states, and unhealthy eating habits (Positively changed – Score 7-10; Negatively changed – Score 0-6)
- 20 points for healthy diet, nutrition, and social support (Positively changed – Score 13-20; Negatively changed – Score 0-6)

Table 3. Multivariable analysis showing the factors associated with lifestyle-related changes

Variables	B	95% CI Coefficient	p-value
Age (vs. Young adults)			
Middle - Aged adults	1.43	-1.64, 4.51	0.235
Sex (vs. Male)			
Female	0.58	-0.10, 1.26	0.072
Civil status (vs. Single)			
Married/Widowed/Separated	0.97	-3.76, 5.70	0.560
Number of children (vs. 0)			
1 – 2	-1.64	-4.90, 1.62	0.207
3 and above	-0.99	-4.00, 2.03	0.375
Educational attainment (vs. Some elementary to Vocational Degree)			
Some College to Post Graduate degree	-0.10	-2.36, 2.17	0.901
Monthly household income (vs. Poor to Lower - Middle income)			
Middle class to rich	3.99	0.98, 6.99	0.024
Comorbidity (vs. 2)			
3 or more	0.89	-1.53, 3.30	0.326

B, unstandardized beta; CI, confidence interval

Conversely, restorative sleep, mental and physical states, and unhealthy eating habits received lower scores, indicating negative lifestyle changes.

Table 3 shows the association between participants' sociodemographic characteristics, comorbidity, and lifestyle-related changes. Monthly household income showed a significant association with lifestyle-related changes. Specifically, individuals from the middle to upper-income bracket exhibited a 4-unit increase in their lifestyle-related changes score compared to those with poor to lower-middle income (B = 3.99; 95% Confidence Interval [CI] = 0.98, 6.99). This suggests that higher-income individuals may have the resources to implement positive lifestyle changes. However, the presence of comorbidities was not found to be associated with lifestyle-related changes.

Table 4 displays the participants' comorbidities and lifestyle considerations. Among the comorbidities, respiratory tract infections were the most prevalent (n=249), followed by hypertension (n=220), diabetes (n=171), diseases of the heart (n=129), and pneumonia (n=72). Regarding the considerations for employing lifestyle changes, the majority of participants indicated "to delay the progression of the disease" (n=340), followed by "for fewer health complications"

Table 4. Health condition of participants (n=402)

Comorbidities and Lifestyle Considerations		
Diseases, *n* (%)		
Respiratory tract infections	249	(61.9)
Hypertension	220	(54.7)
Diabetes	171	(42.5)
Diseases of the Heart	129	(32.1)
Pneumonia	72	(17.9)
Considerations in employing lifestyle changes, *n* (%)		
To delay progression of the disease	340	(84.6)
For fewer health complications	306	(76.1)
To save money (in treatment, medication, etc.)	269	(66.9)
To manage weight and have more energy	267	(66.4)
To feel better mentally	223	(55.5)

(n=306), "to save money (in treatment, medication, etc.)" (n=269), "to manage weight and have more energy" (n=267), and "to feel better mentally" (n=223).

Discussion

This study identified four domains as crucial for one's health: (1) restorative sleep, (2) a healthy diet, nutrition, and social support, (3) mental and physical states, and (4) unhealthy eating habits. This aligns with research conducted in Spain, highlighting the critical role of lifestyle behaviors in reducing all-cause mortality and morbidity and improving overall health and well-being during the pandemic [1]. Lifestyle-related changes, such as sleep quality, stress and anxiety levels, physical activity engagement, and unhealthy snacking, were found to be negatively impacted despite participants' health conditions. This finding is consistent with a study conducted in France, which indicated that social isolation is associated with increased unhealthy snacking and weight gain among individuals with overweight/obesity and diabetes [20]. Conversely, preparing healthier meals (e.g., fruits and vegetables) and receiving social support showed significant improvement. This suggests that individuals have capitalized on having more time for self-care. These findings highlight the varied effects of the pandemic on the lifestyle behaviors of individuals with comorbidities.

Monthly household income was the sole factor significantly associated with lifestyle-related changes among Filipinos with comorbidities. This finding implies that individuals with higher monthly household income may have the financial means to support their desired lifestyle changes, which could contribute to slowing disease progression. Previous studies suggest that lower-income individuals are four times more likely to be hospitalized and exhibit negative associations with food intake and exercise time during the pandemic [18,19,27].

Respiratory tract infections, hypertension, and diabetes rank as the top three prevalent comorbidities among Filipino adults in Metro Manila. This aligns with the Department of Health's 2018 data on regional morbidity, which identifies respiratory tract infections and hypertension as leading diseases [24]. Heart diseases and pneumonia follow closely behind. Notably, no association between comorbidities and lifestyle-related changes was observed in this study. This suggests that despite comorbidity during the pandemic, individuals may actively control their lifestyle choices and health outcomes. They may maintain their usual activities and confidently manage their comorbidities and lifestyle changes. However, further investigation is needed to understand the relationship between comorbidity and lifestyle changes fully [28].

The primary considerations for participants when implementing lifestyle changes are to delay or prevent disease progression and reduce health complications. This suggests that these changes were adopted to maintain their usual activities and prevent their condition from worsening. Managing weight and saving money received a similar number of responses, possibly because weight management can reduce the risk of developing additional diseases, and saving money allows for allocation to other expenses instead of medical treatment. Interestingly, mental well-being was considered the least, indicating that participants prioritize physical health over mental health. This could be due to a robust support system from their loved ones, leading them to focus less on the cognitive aspects of their condition for both themselves and their loved ones' well-being.

This study faces several limitations. First, online data collection may introduce selection bias, as respondents with internet access are more likely to participate. Second, recall bias is a concern, as respondents may inaccurately recall their pandemic-induced lifestyle modifications. Third, the study's geographic scope is limited to Metro Manila, limiting generalizability. To address these limitations, future studies should encompass rural and geographically isolated areas, employing in-person surveys and memory aids to enhance information recall. Additionally, the exclusion of adults aged 59 and older may overlook important insights into comorbidities. Therefore, widening the study's scope to include this demographic is recommended. Finally, employing more robust study designs, such as cohort studies, could establish temporal relationships between associated factors and lifestyle changes. Qualitative studies may offer further insights into the mechanisms behind these changes. Despite these limitations, the study sheds light on lifestyle changes among Filipinos with comorbidities during the COVID-19 pandemic, offering valuable insights for policymakers at local and national levels to develop targeted interventions.

Ethical approval

This study received ethical approval from the Adamson University Ethics Review Committee with the UERC code 2022-02-PHA-03-029.

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