Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Overweight and Its Determinants Among Non-Academic Employees in a Higher Education Institution in Ras Al Khaimah, United Arab Emirates: A Cross-Sectional Study Using HBM and SEM Frameworks

Vimala Edwin
Ras al-Khaimah Medical and Health Sciences University
Ramya Kundayi Ravi
Ras al-Khaimah Medical and Health Sciences University
Priyalatha Muthu
priyalatha@rakmhsu.ac.ae

Ras al-Khaimah Medical and Health Sciences University
Sivan Padma Priya
Ras al-Khaimah Medical and Health Sciences University

Research Article

Keywords: Overweight, Obesity, Workplace Health, Lifestyle Behaviors, Health Belief Model, Structural Equation Modeling, Non-Academic Employees, UAE, Cardiovascular Risk

Posted Date: March 26th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9033581/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background:

Overweight and obesity remain major global health concerns and are particularly prevalent in Gulf countries undergoing rapid socioeconomic and lifestyle changes. In the United Arab Emirates (UAE), obesity rates exceed global averages. Despite this, limited research has focused on overweight among non-academic university employees, a group frequently engaged in sedentary administrative roles. Understanding the burden and determinants of overweight in this population is essential for developing effective workplace health promotion strategies.

Objectives:

To determine the prevalence of overweight and obesity and identify associated sociodemographic and lifestyle factors among non-academic employees in a higher education institution in Ras Al Khaimah, UAE, using the Health Belief Model (HBM) and Structural Equation Modeling (SEM).

Methods:

A cross-sectional study was conducted using total enumeration sampling. Data were collected through a structured questionnaire adapted from WHO STEPS [29] and the International Physical Activity Questionnaire (IPAQ) [30], incorporating validated HBM constructs. Standardized anthropometric measurements were obtained, and overweight was defined as BMI ≥ 25 kg/m². Descriptive statistics summarized participant characteristics, and chi-square/Fisher's exact tests assessed associations. SEM was used to examine direct and indirect pathways linking HBM constructs, lifestyle behaviors, and overweight.

Results:

A total of 104 employees participated (mean age 36.78 ± 8.9 years; 77.9% male). The prevalence of overweight and obesity was 56.8%. Only 29.6% met WHO physical activity recommendations, and 26% reported more than nine hours of sedentary time daily. Daily fruit and vegetable intake was low, and over half reported work-related stress. No significant associations were found between overweight and most sociodemographic or lifestyle variables, except passive smoking exposure. SEM indicated that perceived barriers (β = −0.42) and self-efficacy (β = 0.37) were the strongest predictors of lifestyle behaviors, although their indirect effects on overweight were not statistically significant.

Conclusion:

Overweight and obesity are highly prevalent among non-academic university employees in Ras Al Khaimah. Although SEM did not identify significant pathways to overweight, HBM constructs highlighted behavioral factors that can inform intervention design. Multi-level, theory-driven workplace health

promotion strategies are needed to address physical inactivity, unhealthy dietary patterns, stress, and organizational barriers.

BACKGROUND

Overweight and obesity have become major public health concerns worldwide, affecting more than 1.9 billion adults [1]. Countries in the Gulf region, including the United Arab Emirates (UAE), have experienced rapid economic development and lifestyle changes, contributing to rising obesity rates [4,5]. In the UAE, the prevalence of obesity is estimated at 31.7%, nearly twice the global average [1]. This growing burden highlights the need to better understand the factors that contribute to excess weight in different population groups.

The causes of overweight extend beyond individual choices and involve interactions between personal, social, environmental, and organizational influences. The Social Ecological Model (SEM) emphasizes that health behaviors are shaped by multiple levels of influence, including workplace environments, cultural expectations, and institutional policies [14]. The Health Belief Model (HBM) complements this perspective by focusing on how perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy influence behaviors such as physical activity and dietary practices [12]. Together, these frameworks offer a comprehensive approach for examining the determinants of overweight.

Non-academic employees in higher education institutions often work in administrative or support roles that involve prolonged sitting and limited opportunities for movement. Such sedentary work patterns have been associated with increased risk of weight gain and obesity in office-based occupations [17,23]. Despite this, limited research in the UAE has explored overweight and its associated factors among this occupational group. Understanding these patterns is essential for designing workplace health promotion initiatives that address both behavioral and organizational determinants of health.

This study, therefore, aimed to determine the prevalence of overweight and obesity among non-academic employees in a higher education institution in Ras Al Khaimah, UAE, and to identify associated sociodemographic and lifestyle factors. The study also applied the HBM and SEM to explore pathways influencing overweight in this population.

METHODS

Study Design and Setting

A quantitative cross-sectional study was conducted among non-academic employees working at a higher education institution in Ras Al Khaimah, United Arab Emirates. The study was guided by the Health Belief Model (HBM) and incorporated Structural Equation Modeling (SEM) to explore pathways linking HBM constructs, lifestyle behaviors, and overweight.

Participants and Sampling

Total enumeration sampling was used, with all eligible non-academic employees invited to participate. A total of 104 employees completed the study. Individuals with mobility limitations that prevented accurate anthropometric assessment and those employed on temporary or short-term contracts were excluded. Written informed consent was obtained from all participants before data collection.

Data Collection Tools

Data were collected between December 2023 and April 2024 using a structured, self-administered questionnaire adapted from two previously published instruments: the WHO STEPwise Approach to NCD Surveillance (STEPS) [29] and the International Physical Activity Questionnaire (IPAQ) [30]. Items from these tools were modified to suit the study context and to incorporate Health Belief Model (HBM) constructs, including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The adapted instrument demonstrated strong content validity (CVI = 0.94) and excellent internal consistency (Cronbach's alpha = 0.98). A full English version of the adapted questionnaire has been uploaded as Supplementary File 1.

Measurements

- **Anthropometry:** Height and weight were measured twice using standardized procedures, and the average of the two readings was used for analysis.
- **Body Mass Index (BMI):** Calculated as weight (kg)/height (m^2) and categorized according to WHO criteria [29]. Overweight was defined as BMI ≥25 kg/m^2.
- **Physical Activity:** Classified based on WHO recommendations and IPAQ scoring protocols [29,30].
- **Dietary Intake:** Adequate intake was defined as consuming at least five servings of fruits and vegetables per day, following WHO guidance [29].
- **Sedentary Behavior:** Categorized as low (<6 hours/day), moderate (6–9 hours/day), or high (>9 hours/day), consistent with IPAQ scoring recommendations [30].
- **Smoking Status:** Current smokers were defined as individuals who had smoked within the past 30 days.
- **HBM Constructs:** Assessed using Likert-scale items measuring perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy.
- **Categorization thresholds** for physical activity, sedentary behavior, and dietary intake followed WHO and IPAQ scoring protocols [29,30].

Statistical Analysis

Data were analyzed using SPSS version 26 and IBM SPSS AMOS version 29. Descriptive statistics (means, standard deviations, frequencies, and percentages) summarized participant characteristics. All analyses were conducted using complete-case data, as missing values were minimal and not systematically patterned. Associations between overweight and sociodemographic or lifestyle variables were examined using chi-square or Fisher's exact tests, as appropriate. Statistical significance was set

at $p < 0.05$. Multivariable regression was not performed because SEM was used as the primary multivariable analytical framework to examine relationships among constructs. Model assumptions, including multivariate normality and absence of multicollinearity, were assessed prior to SEM analysis. SEM was conducted using maximum likelihood estimation with robust standard errors to assess direct and indirect relationships between HBM constructs, lifestyle behaviors, and overweight. Model fit was evaluated using standard indices, including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Potential sources of bias, including recall bias from self-reported behaviors and selection bias due to non-participation, were considered during analysis

Ethical Considerations

Ethical approval was obtained from the Research and Ethics Committee of RAK Medical and Health Sciences University (Approval No: RAKMHSU REC 163 2021/22-F-N). The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participation was voluntary, and written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the study.

RESULTS

Participant Characteristics

All participants who consented and completed the questionnaire had complete anthropometric measurements and were included in the final analysis. Missing data were minimal (<5% across variables) and were handled using complete-case analysis. Of the 157 eligible employees, 104 participated in the study, yielding a response rate of 66.2%. No participants were excluded after enrollment. The mean age of participants was 36.78 ± 8.9 years. Most were male (77.9%), married (82.7%), and of Asian nationality (82.7%). Nearly two-thirds (68.3%) had completed college or university education, and more than half (52.9%) reported experiencing work-related stress. Detailed participant characteristics are presented in **Table 1**.

Prevalence of Overweight and Obesity

More than half of the participants (56.7%) had a BMI greater than 25 kg/m^2. Among them, 41.4% were classified as overweight and 15.4% as obese. The distribution of BMI categories is illustrated in **Figure 1**.

Lifestyle Behaviors

- **Smoking:** 13.5% were current smokers, and 26% reported exposure to passive smoking.
- **Physical Activity:** Only 29.6% met WHO recommendations for moderate-to-vigorous physical activity.
- **Sedentary Time:** 26% reported sitting for more than nine hours per day.

- **Dietary Habits:**
    - 92.3% did not consume fruits daily.
    - 97.1% did not consume vegetables daily.
    - 53.8% consumed junk food regularly.
    - 33.7% consumed carbonated drinks weekly or daily.

Lifestyle behaviors are summarized in **Tables 2 and 3**.

Associations with Overweight

No statistically significant associations were observed between overweight and sociodemographic characteristics, physical activity, dietary habits, or stress levels ($p > 0.05$). The only variable showing a significant association with overweight was passive smoking exposure. Associations with sociodemographic variables are presented in **Table 4**, and associations with lifestyle behaviors are shown in **Table 5**.

Structural Equation Modeling (SEM) Findings — SEM was conducted to examine direct and indirect pathways linking HBM constructs, lifestyle behaviors, and overweight. The final model demonstrated acceptable fit (CFI = 0.97, TLI = 0.93, RMSEA = 0.065, SRMR = 0.032). Perceived barriers showed a significant negative association with lifestyle behaviors ($\beta = -0.42$, $p < 0.01$), while self-efficacy demonstrated a significant positive association ($\beta = 0.37$, $p < 0.01$). Other HBM constructs—including perceived susceptibility, severity, benefits, and cues to action—were not significantly associated with lifestyle behaviors.

Lifestyle behaviors did not show a significant association with overweight ($\beta = 0.11$, $p > 0.05$), and none of the HBM constructs demonstrated a direct effect on overweight (β range: −0.05 to 0.09, all $p > 0.05$). Indirect effects of HBM constructs on overweight through lifestyle behaviors were also non-significant. These findings suggest that although perceived barriers and self-efficacy influence lifestyle behaviors, these behaviors did not translate into measurable differences in overweight status in this sample.

DISCUSSION

This study examined the prevalence of overweight and obesity and explored associated sociodemographic and lifestyle factors among non-academic employees at a university in Ras Al Khaimah, UAE. More than half of the participants were classified as overweight or obese, reflecting national and regional patterns that show a growing burden of excess weight in Gulf countries undergoing rapid lifestyle transitions [1,4,5]. Similar findings have been reported in workplace-based studies both within the region and internationally, particularly among administrative and office-based employees whose work environments promote prolonged sitting and limited physical activity [6,27].

Physical inactivity emerged as a notable concern in this study, with fewer than one-third of participants meeting WHO recommendations. This aligns with evidence indicating that modern occupational roles increasingly involve sedentary tasks that reduce daily energy expenditure and contribute to gradual weight gain [23]. Prolonged sitting has been linked to adverse cardiometabolic outcomes, even among individuals who engage in some physical activity [13]. The substantial proportion of participants reporting more than nine hours of sedentary time per day highlights the need for workplace strategies that encourage movement throughout the workday.

Dietary behaviors also reflected suboptimal patterns. Most participants reported low daily consumption of fruits and vegetables, alongside frequent intake of energy-dense foods. These findings are consistent with global and regional trends showing increased reliance on processed and convenience foods, which contribute to obesity and related chronic conditions [8,15]. Workplace food environments, time constraints, and stress may further influence unhealthy eating habits [18,19].

Stress and smoking were also prevalent among participants. Occupational stress has been associated with emotional eating, reduced physical activity, and long-term weight gain [20,21]. Although smoking is sometimes perceived as a weight-control behavior, evidence suggests that it contributes to cardiometabolic risk and may cluster with other unhealthy lifestyle patterns [7]. Interestingly, passive smoking exposure was the only variable significantly associated with overweight in this study. While the mechanism is not fully understood, passive smoking has been linked to metabolic disturbances and increased risk of obesity in previous research.

Most sociodemographic and lifestyle variables were not significantly associated with overweight. Similar findings have been reported in other workplace studies, where weight status appears to be shaped by a combination of environmental, behavioral, and organizational influences rather than individual characteristics alone [14,16,27]. This supports the use of multi-level frameworks such as the Social Ecological Model to guide workplace health promotion.

The SEM analysis provided additional insight into behavioral pathways. Perceived barriers and self-efficacy were the strongest predictors of lifestyle behaviors, consistent with previous research demonstrating that individuals who feel confident in their ability to adopt healthy behaviors and perceive fewer obstacles are more likely to engage in physical activity and healthy eating. However, these constructs did not show significant direct or indirect pathways to overweight. This suggests that individual health beliefs alone may not be sufficient to influence weight outcomes in this occupational group. Instead, broader environmental and organizational factors—such as workplace culture, job demands, and structural barriers to healthy behaviors—may play a more dominant role.

Overall, the findings underscore the need for comprehensive, multi-level interventions that address physical activity, diet, stress, and workplace environments. Evidence from international workplace health promotion programs shows that organizational support, policy changes, and environmental modifications can significantly improve employee health outcomes [14]. Tailored interventions that incorporate behavioral theories such as the HBM, while also addressing structural and environmental

barriers, may be particularly effective in this setting. Generalizability is limited to similar administrative and office-based employee populations in higher education settings.

CONCLUSIONS

This study identified a high prevalence of overweight and obesity among non-academic employees at a university in Ras Al Khaimah, reflecting broader national and regional trends in the UAE and Gulf countries. Low levels of physical activity, prolonged sedentary behavior, unhealthy dietary patterns, work-related stress, and smoking were common lifestyle risks in this population. Although most sociodemographic and behavioral variables were not significantly associated with overweight, the findings highlight the influence of workplace environments and daily routines on employee health.

The SEM analysis further indicated that individual health beliefs alone may not be sufficient to influence weight outcomes. While perceived barriers and self-efficacy were strongly associated with lifestyle behaviors, these constructs did not demonstrate significant direct or indirect pathways to overweight. This suggests that organizational and environmental factors may play a more substantial role in shaping weight-related outcomes among office-based employees. The lack of significant pathways may also reflect the modest sample size, which can limit statistical power in SEM models.

Addressing overweight in this occupational group, therefore, requires a comprehensive, multi-level approach that integrates behavioral, environmental, and policy-level strategies. Workplace health promotion programs that encourage physical activity, improve dietary environments, reduce sedentary time, and address stress may be particularly beneficial. Tailoring interventions to the unique needs of non-academic employees may help reduce the burden of overweight and support long-term health.

RECOMMENDATIONS

The findings of this study highlight the need for comprehensive workplace strategies to address overweight and obesity among non-academic university employees. Encouraging regular physical activity should be a central component of these efforts. This may include creating opportunities for movement during the workday, such as brief activity breaks, walking meetings, or the promotion of stair use. Providing access to fitness facilities or subsidized gym memberships may further support employees in increasing their activity levels.

Reducing sedentary time is equally important. Introducing sit-stand workstations, encouraging employees to stand or stretch periodically, and incorporating prompts to interrupt prolonged sitting may help mitigate the risks associated with sedentary behavior. Improving the dietary environment within the workplace is also essential. Ensuring that healthier food options are readily available in cafeterias and vending machines, alongside nutrition education initiatives, may support employees in making healthier choices. Programs that promote fruit and vegetable consumption could be particularly beneficial given the low intake observed in this study.

Addressing work-related stress should also be prioritized. Stress-management initiatives, such as mindfulness sessions, counseling services, or supportive management practices, may help reduce the impact of stress on lifestyle behaviors and overall health. These efforts should be embedded within broader workplace wellness policies that integrate behavioral, environmental, and organizational strategies. Tailoring interventions to the specific needs of non-academic employees and regularly evaluating their effectiveness may enhance long-term impact.

Future research should consider longitudinal designs to better understand causal pathways and explore organizational and environmental determinants in greater depth. Evaluating the effectiveness of targeted workplace interventions may also provide valuable insights for improving employee health outcomes.

STRENGTHS AND LIMITATIONS

This study offers several notable strengths. It is one of the few investigations in the UAE to focus specifically on overweight and obesity among non-academic university employees, a group that is often overlooked in workplace health research. The use of validated instruments, including WHO STEPS, the International Physical Activity Questionnaire, and established Health Belief Model constructs, enhances the reliability and credibility of the findings. In addition, the application of Structural Equation Modeling provided a more comprehensive understanding of the relationships between health beliefs, lifestyle behaviors, and overweight, offering insights that extend beyond traditional bivariate analyses.

Despite these strengths, the study has certain limitations that should be considered when interpreting the results. The cross-sectional design restricts the ability to draw causal inferences about the relationships between variables. Self-reported measures of lifestyle behaviors may also be subject to recall bias or social desirability bias, potentially affecting accuracy. Furthermore, the study was conducted within a single institution, which may limit the generalizability of the findings to other settings or occupational groups. Although the sample size was adequate for descriptive and basic inferential analyses, it may have reduced the statistical power needed to detect more subtle associations within the SEM framework. Residual confounding from unmeasured organizational or environmental factors may still be present.

Abbreviations

BMI: Body Mass Index

HBM: Health Belief Model

IPAQ: International Physical Activity Questionnaire

NCDs: Non-Communicable Diseases

PA: Physical Activity

RAK: Ras Al Khaimah

SEM: Structural Equation Modeling

SPSS: Statistical Package for the Social Sciences

UAE: United Arab Emirates

WHO: World Health Organization

Declarations

Ethics Approval and Consent to Participate

Ethical approval for this study was obtained from the Research and Ethics Committee of RAK Medical and Health Sciences University. All participants were informed about the purpose of the study and provided written informed consent before participation. Confidentiality and anonymity were maintained throughout the research process.

Consent to Participate

Written informed consent was obtained from all participants.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contributions

- **Conceptualization:**
  Vimala Edwin, Ramya Kundayi Ravi, Priyalatha Muthu, Sivan Padma Priya

- **Methodology:**
  Vimala Edwin, Ramya Kundayi Ravi, Priyalatha Muthu, Sivan Padma Priya
- **FormalAnalysis:**
  Vimala Edwin, Ramya Kundayi Ravi, Priyalatha Muthu,
- **Investigation:**
  Vimala Edwin, Ramya Kundayi Ravi, Sivan Padma Priya
- **Writing – Original Draft:**
  Vimala Edwin, Ramya Kundayi Ravi, Priyalatha Muthu, Sivan Padma Priya
- **Writing – Review & Editing:**
  Ramya Kundayi Ravi, Priyalatha Muthu
- **Supervision:**
  Vimala Edwin, Ramya Kundayi Ravi, Priyalatha Muthu, Sivan Padma Priya

Acknowledgements: The authors would like to thank the participating institution and all employees who took part in the study for their time and cooperation.

Ethics Approval

The study was approved by the Research and Ethics Committee of RAKMHSU (Approval No: RAKMHSU-REC-163-2021/22-F-N)

Availability of Data and Materials

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

References

1. World Health Organization. Obesity and overweight. 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
2. World Health Organization. Physical activity. 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/physical-activity
3. Central Intelligence Agency. The World Factbook—New Zealand. 2016. Available from: https://www.cia.gov/readingroom/document/cia-rdp90t01298r000200050001-7
4. Kalavathy R, Al Araj AS, Rabbani AS. Prevalence of obesity among adults in Ras Al Khaimah, United Arab Emirates. Int J Res Med Sci. 2019; 7:558. https://doi.org/10.18203/2320-6012.ijrms20190075.
5. Fox A, Feng W, Asal V. What is driving global obesity trends? Globalization or “modernization”? Glob Health. 2019; 15:32.10.1186/s12992-019-0457-y
6. Baye MY. Prevalence of overweight and obesity among urban civil servants in Southern Ethiopia. Ethiop Med J. 2019;57(2) https://emjema.org/index.php/EMJ/article/view/853

7. Powell-Wiley TM, Poirier P, Burke LE, Després JP, Gordon-Larsen P, Lavie CJ, et al. Obesity and cardiovascular disease: A scientific statement from the American Heart Association.Circulation.2021;143(21):e984 – e1010.https://doi..org/0.1161/CIR.0000000000000973
8. Grover SA, et al. Years of life lost and healthy life-years lost from diabetes and cardiovascular disease in overweight and obese people: A modelling study. Lancet Diabetes Endocrinol. 2015; 3:114–122.10.1016/S2213-8587(14)70229-3
9. Destri K, et al. Obesity-attributable costs of absenteeism among working adults in Portugal. BMC Public Health. 2022; 22:978. DOI: 10.1186/s12889-022-13337-z
10. Abdelaal M, Le Roux CW, Docherty NG. Morbidity and mortality associated with obesity. Ann Transl Med. 2017;5:161.DOI: 10.21037/atm.2017.03.107
11. Ren JY, et al. Validation of the simplified Chinese-character version of the International Physical Activity Questionnaire-long form. Biomed Environ Sci. 2017;30:255–263.DOI: 10.3967/bes2017.035
12. World Health Organization. A healthy lifestyle—WHO recommendations. 2010. https://www.who.int/europe/news-room/fact-sheets/item/everyday-actions-for-better-health-who-recommendations
13. Park JH, Moon JH, Kim HJ, Kong MH, Oh YH. Sedentary lifestyle: Overview of updated evidence of potential health risks. Korean J Fam Med. 2020;41(6):365–373.DOI: 10.4082/kjfm.20.0165
14. Cantonnet MLCJ, Aldasoro I. Well-being through workplace health promotion interventions by European enterprises. Saf Sci. 2022; 151:105736. DOI:10.1016/j.ssci.2022.105736
15. Costa AMP, Vasconcelos GGA, Fonseca MJM. Prevalence of obesity and its association with physical activity in a federal university. Rev Bras Epidemiol. 2014; *17*(2), 421–436. https://doi.org/10.1590/1809-4503201400020011eng.
16. Khademi N, Babanejad M, Asadmobini A, Karim H. The association of age and gender with risk factors of noncommunicable diseases among employees in West Iran. Int J Prev Med. 2017; 8: 9.doi: 10.4103/ijpvm.IJPVM_400_16
17. British Psychological Society. Office workers spend too much time at their desks. ScienceDaily. 2012. https://www.bbc.com/news/health-16535374
18. Leung, S L et al. “Factors associated with healthy and unhealthy workplace eating behaviours in individuals with overweight/obesity with and without binge eating disorder.” Obesity science & practice vol. 4,2 109-118. 14 Feb. 2018, doi:10.1002/osp4.151.
19. Hill D, et al. Stress and eating behaviours in healthy adults. Health Psychol Rev. 2022; 16:280–304.doi: 10.1080/17437199.2021.1923406.
20. Klingberg S, et al. Occupational stress and long-term weight gain. Int Arch Occup Environ Health. 2019; 92:569–576.doi: 10.1007/s00420-018-1392-6.
21. Valk ES van der, Savas M, Van Rossum CFE. Stress and obesity susceptibility. Curr Obes Rep. 2018; 7:193–203. doi: 10.1007/s13679-018-0306-y.

22. Arntz M, Gregory T, Zierahn U. The risk of automation for jobs in OECD countries. Paris: OECD Publishing; 2016.https://doi.org/10.1787/5jlz9h56dvq7-en.
23. Church TS, et al. Trends in occupation-related physical activity. PLoS One. 2011;6: e19657. https://doi.org/10.1371/journal.pone.0019657
24. Danielsen YS, et al. Physical activity in adolescents with severe obesity. Obes Sci Pract. 2022; 8:801–810. doi: 10.1002/osp4.624
25. Kari JT, et al. Education and physical activity: Mendelian randomization evidence. Scand J Med Sci Sports. 2020; 30:1194–1204. doi: 10.1111/sms.13653.
26. Newsom JT, et al. Physical activity as a mediator in multimorbidityJ Gerontol B Psychol Sci Soc Sci. 2022 Aug 11;77(8):1529-1538. doi: 10.1093/geronb/gbab148.
27. Meller DFO, et al. Overweight among university employees. Rev Bras Med Trab. 2020; 18:158–168. doi: 10.47626/1679-4435-2020-533.
28. Cook MA, Gazmararian J. Long work hours and obesity. Prev Med Rep. 2018; 10:271–277. doi: 10.1016/j.pmedr.2018.04.006.
29. World Health Organization. WHO STEPwise approach to surveillance (STEPS). Geneva: WHO; 2008.https://www.who.int/teams/noncommunicable- diseases/surveillance/systems
30. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35(8):1381–1395.doi: 10.1249/01.MSS.0000078924. 61453.FB.

Tables

Table 1. Sociodemographic Characteristics of Participants (N = 104)

Variables	Category	Frequency (n)	Percentage (%)
Age (years)	18–29	22	21.2
	30–44	63	60.6
	45–59	18	17.3
	≥60	1	1.0
Gender	Male	81	77.9
	Female	23	22.1
Education	Primary school	3	2.9
	Secondary	12	11.5
	High school	18	17.3
	College/University	71	68.3
Marital status	Married	86	82.7
	Unmarried	18	17.3
Nationality	Asian	86	82.7
	Others	18	17.3
Pre-existing illness	Heart disease	4	3.8
	Diabetes mellitus	5	4.8
	Hypertension	6	5.8
Family history of heart disease	Yes	24	23.1
	No	80	76.9
Sources of information	Social media	53	51.0
	Health worker	32	30.8
	Friends	5	4.8
	Workplace	14	13.5
Work-related stress	Yes	55	52.9
	No	49	47.1

This table summarizes the key demographic features of the study population, including age, gender, marital status, nationality, education level, and reported work-related stress.

Table 2. Lifestyle Behaviors of Participants (n = 104)

Variables	Category	Frequency (n)	Percentage (%)
Smoking status	Current smokers	14	13.5
	Never smokers	90	86.5
Frequency of smoking	Daily	9	8.7
	Weekly	2	1.9
	Rarely	2	1.9
Other tobacco use	Yes	3	2.9
	No	101	97.1
Cigarettes/day	Daily smokers	3.44	2.877
Duration of smoking (years)	Current smokers	2.69	1.032
Passive smoking exposure	Yes	27	26.0
	No	77	74.0
Vigorous activity ≥10 min	Yes	29	27.9
	No	75	72.1
Vigorous activity level	Adequate	6	5.8
	Inadequate	23	22.1
Moderate activity ≥10 min	Yes	26	25.0
	No	78	75.0
Walking ≥10 min	Yes	88	84.6
	No	16	15.4
Sedentary time		6	5.8
	6–9 hours	1	1.0
	>9 hours	27	26.0

This table presents participants' lifestyle patterns, including smoking status, exposure to passive smoking, physical activity levels, sedentary time, and dietary habits such as fruit, vegetable, junk food, and carbonated drink consumption.

Table 3. Health Belief Model (HBM) Constructs Among Participants (n = 104)

Variables	Category	Frequency (n)	Percentage (%)
Daily fruit intake	Yes	8	7.7
	No	96	92.3
Daily vegetable intake	Yes	3	2.9
	No	101	97.1
Daily fiber intake	Yes	17	16.3
	No	87	83.7
Adding extra salt	Yes	31	29.8
	No	73	70.2
Junk food consumption	Yes	56	53.8
	No	48	46.2
Eating at restaurants	Daily	3	2.9
	Weekly	21	20.2
	Monthly	42	40.4
	Occasionally	38	36.5
Carbonated drinks	Daily	13	12.5
	Weekly	32	30.8
	Monthly	25	24.0
	Occasionally	34	32.7
Adding salty sauces	Always	3	2.9
	Often	10	9.6
	Sometimes	28	26.9
	Rarely	32	30.8
	Never	31	29.8

This table displays the distribution of HBM constructs—perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy—based on participants' responses to the validated questionnaire.

Table 4. Association Between Sociodemographic Characteristics and Overweight (n = 104)

Variables	Category	Not overweight (n)	Overweight (n)	Test value	p-value
Age (years)	18–29	13	9	5.902	0.116
	30–44	22	41		
	45–59	10	8		
	≥60	0	1		
Gender	Male	35	46	0.001	0.982
	Female	10	13		
Education	Primary	2	1	5.903	0.116
	Secondary	2	10		
	High school	6	12		
	College/University	35	36		
Marital status	Married	36	50	0.402	0.526
	Unmarried	9	9		
Nationality	Asian	39	47	0.875	0.349
	Others	6	12		
Family history of heart disease	Yes	9	15	0.423	0.515
	No	36	44		

Note: $p < 0.05$ is considered statistically significant. This table examines the relationship between participants' sociodemographic variables and overweight status (BMI ≥ 25 kg/m^2). No statistically significant associations were observed.

Table 5. Association Between Lifestyle Behaviors and Overweight (n = 104)

Variables	Category	Not overweight (n)	Overweight (n)	Test value	p-value
Smoking status	Current smokers	6	8	0.001	0.973
	Never smokers	39	51		
Passive smoking	Yes	7	20	4.469	0.035*
	No	38	39		
Physical activity	Adequate	12	18	0.625	0.429
	Inadequate	16	16		
Walking ≥10 min	Yes	38	50	0.002	0.966
	No	7	9		
Sedentary time		30	38	0.261	0.878
	6–9 hours	12	18		
	>9 hours	3	3		
Adding extra salt	Yes	15	16	0.398	0.528
	No	30	42		
Junk food consumption	Yes	23	33	0.342	0.559
	No	22	25		
Soft drink intake	Yes	25	27	0.979	0.322
	No	20	32		
Eating out	Yes	35	47	0.054	0.816
	No	10	12		
Self-reported stress	Yes	26	29	0.762	0.383
	No	19	30		

Note: $p < 0.05$ is considered statistically significant. This table explores the association between lifestyle behaviors and overweight. Passive smoking was the only variable showing a statistically significant relationship with overweight status.

Figures

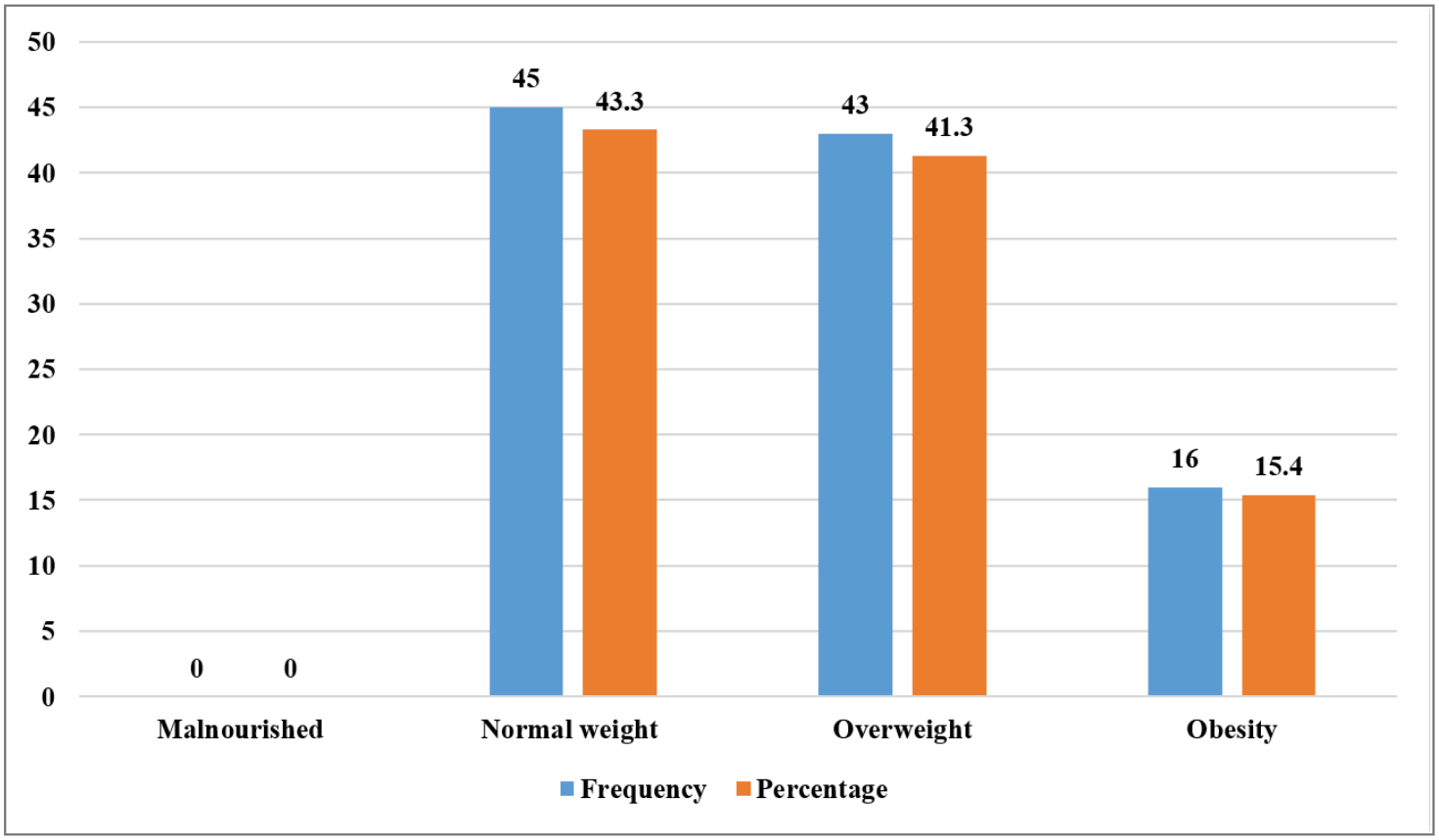


Figure 1

Distribution of BMI Categories Among Participants (n = 104)

This figure illustrates the proportion of participants classified as normal weight, overweight, and obese according to the WHO BMI categories.

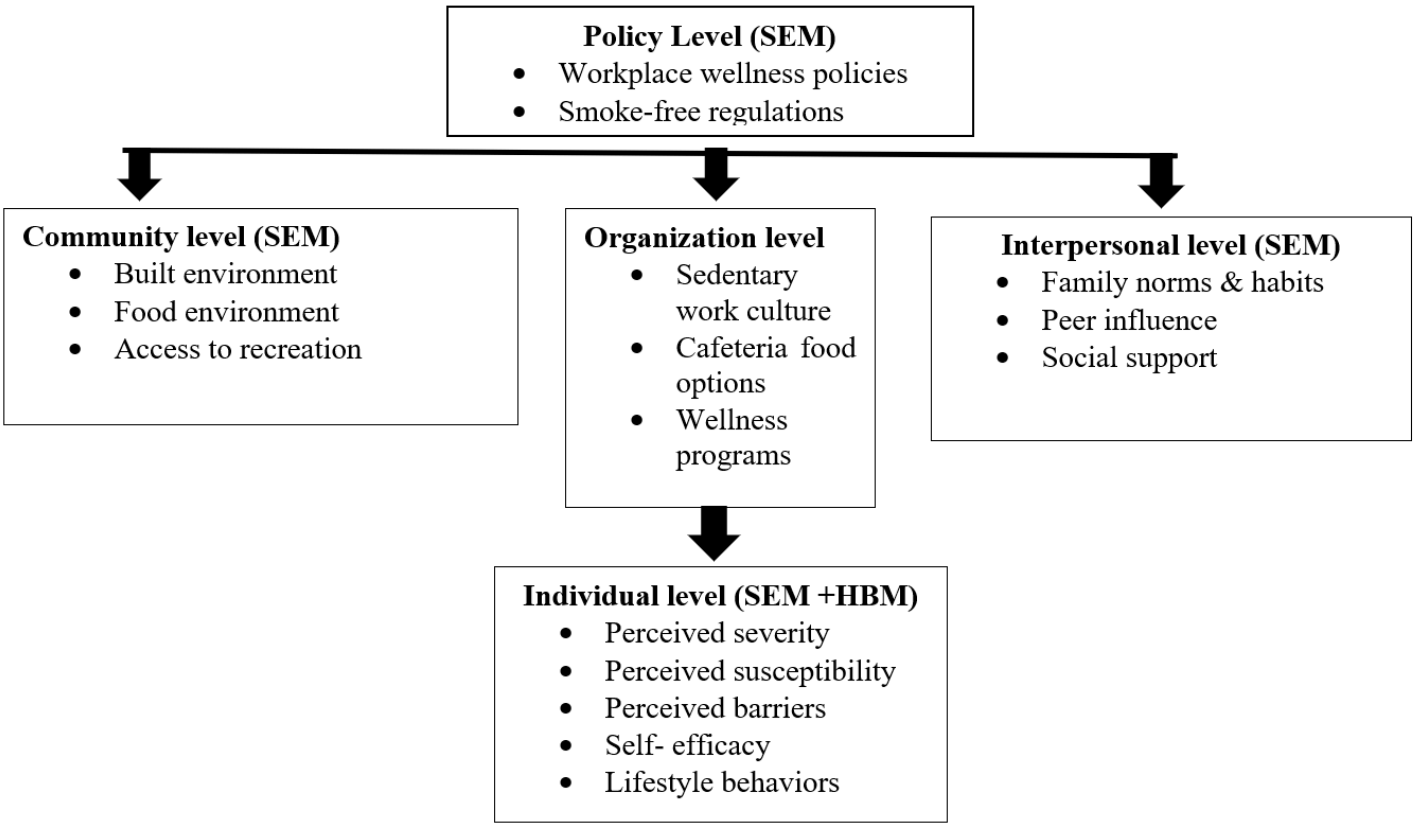


Figure 2

Structural Equation Model (SEM) of HBM Constructs, Lifestyle Behaviors, and Overweight

This figure presents the SEM pathways assessing direct and indirect relationships between HBM constructs, lifestyle behaviors, and overweight. Although perceived barriers and self-efficacy were strongly linked to lifestyle behaviors, no significant pathways to overweight were identified.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- supplementaryfile1Tool.docx