



## Demographic correlates of weight-loss strategies in US adults: Cross-sectional analysis of NHANES data 2017–2020

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### ABSTRACT

**Objective:** To investigate the frequency of various weight loss strategies among adults in the United States and to explore which weight-loss strategies are associated with several demographic factors.

**Methods:** The study utilized 2017–2020 data from the National Health and Nutrition Examination Survey. Adult participants (N = 3,130) who had tried to lose weight during the past year were included. Pregnant women and individuals under age 20y were excluded. Weight-loss strategies were categorized into 6 groups: consuming more healthy options (e.g., more fruits); consuming less un-healthy options (e.g., junk food); quality of diet changes (e.g., changed eating habits); assisted weight-loss method (e.g., special diet); exercising; and un-healthy strategies (e.g., vomiting). Adjusted odds ratios (aORs) and 95% CIs were calculated using weighted logistic regression models.

**Results:** The most frequently employed strategies to achieve weight loss were exercising (60.6%), consuming less un-healthy options (60.4%), and drinking a lot of water (55.3%). Un-healthy strategies were less prevalent among older individuals (aOR:0.46 [95% CI:0.37–0.58]) and those with higher incomes (aOR:0.69 [95% CI:0.54–0.89]). Conversely, individuals with obesity class I (aOR:1.85 [95% CI:1.38–2.48]) and obesity class II/III (aOR:1.69 [95% CI:1.27–2.25]) showed an increased likelihood of adopting unhealthy strategies. Similarly, widowed individuals (aOR:1.31 [95% CI:1.03–1.66]) and those who have never been married (aOR:1.36 [95% CI:1.09–1.69]) exhibited a higher tendency for such behaviors compared to married individuals.

**Conclusion:** The likelihood of using various weight-loss methods differs based on demographic characteristics. Recognizing these tendencies can guide public health initiatives and customized strategies for weight control.

### 1. Introduction

Obesity is a significant public health concern that has been on the rise globally (Alfaris et al., 2023). Overweight and obesity result from the excessive accumulation of body weight and body fat, characterized by a BMI of 25 or higher for overweight and 30 or higher for obesity (Ogden et al., 2007). A recent report from the World Health Organization (WHO) revealed that in 2022, 43% of adults were overweight and 16% were obese. The global prevalence of obesity has more than doubled between 1990 and 2022 (WHO, 2024). Likewise, the Centers for Disease Control and Prevention (CDC) have reported a similar pattern in the United States (US), with obesity rates rising from 30.5% in 1999 to 41.9% in 2020. Moreover, severe obesity (BMI  $\geq 40$  kg/m<sup>2</sup>) prevalence in the US also rose from 4.7% to 9.2% during this timeframe (Stierman et al., 2021).

An increasing number of public health organizations, health care systems and individuals have been seeking ways to promote weight loss for better well-being and enhanced quality of life (Molarius et al., 2020, Yumuk et al., 2015). Numerous studies have evaluated the effectiveness of various weight-loss strategies, including calorie reduction (Benton and Young, 2017), engaging in physical activity (Oppert et al., 2023), enrolling in weight loss programs (Martin et al., 2010), utilization of weight-loss medications (Holmbäck et al., 2022), and adoption of popular diets (Kunduraci and Ozbek, 2020). Nicklas et al. (Nicklas et al., 2012) conducted a study comparing the success rates of various weight-loss strategies and found that reducing fat intake, increasing exercise, taking prescription weight-loss medications, and joining commercial weight loss programs were associated with achieving a weight loss of  $\geq 10\%$ . Conversely, non-prescription diet pills and liquid diets did not show any significant connection to successful weight loss (Nicklas et al.,

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2012), although some anti-obesity medications like Orlistat/Alli are obtainable over the counter (OTC) and may yield different results from other non-prescription options. Some studies have also examined the characteristics of individuals who tried to lose weight (Kakinami et al., 2014, Latimer et al., 2013, Zhong et al., 2022). An analysis of data from the National Health and Nutrition Examination Survey (NHANES) 1999–2018 conducted by Zhong et al. (Zhong et al., 2022) revealed a rise in the overall prevalence of weight loss efforts among US adults. Furthermore, the prevalence of weight loss attempts was found to be positively correlated with BMI across all ethnicities and gender groups. Additionally, weight loss strategies can vary from healthy practices like balanced eating and physical activity to risky behaviors such as skipping meals, using diet pills, and inducing vomiting (Rahman and Berenson, 2010). Various subgroups of populations are known to have differing likelihoods of engaging in various weight-loss strategies (Raffoul and Hammond, 2018).

Currently, there is limited research on the association of obesity status and demographic variables on the utilization of weight-loss strategies (Kakinami et al., 2014, Boutelle et al., 2002). The Boutelle study indicated that overweight adolescents engaged less in vigorous physical activities and were more likely to adopt unhealthy weight control methods than normal weight individuals (Boutelle et al., 2002). Kakinami et al.'s cross-sectional study in the US population revealed that both youth and adults with lower incomes are less inclined to adopt weight-loss strategies aligned with healthy recommendations (Kakinami et al., 2014). However, the study did not assess other sociodemographic variables. It is important to enhance our understanding of how the methods used to try to lose weight differ among various demographic groups. Recognizing the demographic factors associated with weight-loss strategies in American adults is essential for creating targeted interventions and policies to combat the obesity epidemic. Using a national population survey, this study aimed to investigate how sex, age, race/ethnicity, and socioeconomic status influence the methods of weight loss strategies among adults in the US.

## 2. Material and methods

Our study conducted a secondary analysis utilizing the NHANES dataset from 2017 to 2020, which was gathered prior to the COVID-19 pandemic (official NHANES website: <https://www.cdc.gov/nchs/nhanes/index.htm>). NHANES is an ongoing cross-sectional survey program designed to evaluate the health and nutritional status of both adults and children in the US. The surveys utilize a comprehensive multistage probability sampling method to ensure diverse representation from the non-institutionalized U.S. population. It is important to note that the NHANES program suspended field operations in March 2020 due to the pandemic. As a result, data collected from 2019 through March 2020 were merged with data from the NHANES 2017–2018 cycle to form a nationally representative sample of pre-pandemic data from NHANES 2017 to March 2020, which constitutes the last published dataset from the NHANES group. The analysis sample included non-pregnant adults aged 20 years and older who had attempted weight loss in the past 12 months. To determine this, all participants were asked, "During the past 12 months, have you tried to lose weight?" Those who responded "yes" were included in this study. Participants with missing data (including "missing" or "refused" or "don't know" responses) were excluded. Due to limited data availability regarding marital and pregnancy status for individuals under the age of 20, as well as different educational categories for those under 20 years old, they were excluded from our final sample. Additionally, individuals classified as underweight were excluded from the study due to a low sample size for analysis. A total of 15,560 individuals from the dataset were evaluated for inclusion in the current study. Before participating in the NHANES, all participants completed written informed consent forms approved by the National Center for Health Statistics (NCHS) Ethics Review Committee. This secondary analysis of NHANES data did not

require additional institutional review board approval.

### 2.1. Sociodemographic variables

In our analysis, we considered various demographic characteristics, including age, sex, race/ethnicity, and three indicators of socioeconomic status: family income to poverty guidelines ratio (FIPR), education level, and marital status. Three marital status categories were used: married/living with partner, widowed/divorced/separated and never married. Participants' educational levels were classified into four groups: less than high school, high school, some college, college graduate and above. FIPR was categorized into three groups according to income: low income (0 to 1.3) (equivalent to eligibility for participation in the Supplemental Nutrition Assistance Program (USDA, 2024)), middle income (1.3 to 3.5), and high income ( $\geq 3.5$ ). Body Mass Index (BMI) of participants was determined by dividing their weight in kilograms by the square of their height in meters. The BMI values were then classified into four categories: underweight ( $< 18.5$ ), normal weight (18.5–24.9), overweight (25.0–29.9), obesity class I (30.0–34.9) and obesity class II/III ( $\geq 35$ ) based on the criteria set by the Centers for Disease Control and Prevention (CDC). In this study, the underweight category was excluded as it consisted of only one person.

### 2.2. Weight-loss strategies

Participants who had tried to lose weight (34.35% of total NHANES eligible participants) were asked 20 follow-up questions about the methods they used to try to lose weight in the past year. They were given the freedom to select any number of weight-loss methods that they had used,

as outlined in the Weight History section (P\_WHQ) of the NHANES dataset. Weight-loss strategies were categorized into 6 groups including: (1) consuming more healthy options ( $n = 2193$ ): Ate more fruits, vegetables, salads, or drank a lot of water; (2) consuming less un-healthy options ( $n = 2776$ ): Ate less, less junk food or fast food, less sugar, candy, sweets, fewer carbohydrates, less fat; (3) quality of diet changes ( $n = 1783$ ): Changed eating habits, switched to foods with lower calories, ate diet foods or products; (4) assisted weight-loss method ( $n = 2776$ ): Followed a special diet, joined a weight-loss program, used a liquid diet formula (5) exercising ( $n = 1896$ ) and (6) un-healthy strategies ( $n = 913$ ): Skipped meals, started to smoke, took laxatives or vomited, or took prescription or non-prescription diet pills.

### 2.3. Statistical analysis

This study employed weighted methods (full sample interview weights) based on the NHANES analysis guidelines (Akinbami et al., 2022). The frequency of participants within different demographic variables such as sex, age, ethnicity, household income, and the education and marital status of the participants and weight status were calculated. Weighted multiple logistic regressions were utilized to determine the relationship between demographic factors and the likelihood of individuals using specific weight-loss methods. Each weight-loss strategy was analyzed separately for the variables. Each weight-loss strategy was analyzed separately for the variables. Demographic characteristics were adjusted as potential confounding variables. Multicollinearity among covariates was carefully assessed using the variance inflation factor (VIF) test, following the acceptable criterion of  $VIF < 5$  (O'Brien, 2007). The results were reported as crude odds ratios (OR) and adjusted odds ratio (AOR) with 95% CIs and  $P < 0.05$  was used to indicate statistical significance. All statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) software (V 22; SPSS Inc., Chicago, IL).

### 3. Results

A total of 3,130 adults (above 20 years old) were eligible for inclusion in the study. Of the participants, 40% were identified as male. Most of the participants in the sample, specifically 58.9%, had obesity. Additionally, the study included individuals from diverse ethnic backgrounds: 25.6% identified as Hispanic, 33.4% as non-Hispanic white, 26.5% as non-Hispanic black, and 14.5% as non-Hispanic Asian (Table 1).

The most frequently employed methods to achieve weight loss were exercising (60.6%), consuming less un-healthy options (60.4%), and drinking a lot of water (55.3%). In contrast, the rates of less commonly practiced strategies like enrolling in weight-loss programs, taking prescription diet pills, resorting to extreme measures like laxatives or vomiting, smoking, and undergoing weight loss surgery were all fewer than 5% (Fig. 1).

Separate crude and adjusted weighted logistic regression analysis results for each weight-loss strategy categories are shown in Tables 2 and 3, respectively. Female individuals were 1.48 (adjusted Odds Ratio (aOR)) [95% CI: 1.26–1.74], (aOR:1.21 [95% CI: 1.04–1.4]), and (aOR: 1.81 [95% CI: 1.5–2.19]), times more likely than male to utilize consuming more healthy options, quality of diet changes and assisted weight-loss strategies to lose weight, respectively. Individuals over 60 years old had lower odds of using all the strategies except consuming less

unhealthy options strategy. Non-Hispanic white individuals had lower likelihood of exercising for weight-loss (aOR: 0.79 [95% CI: 0.64–0.99]) compared to Hispanic individuals. Conversely, non-Hispanic black individuals demonstrated a higher propensity for engaging in exercise for weight-loss (aOR: 1.7 [95% CI: 1.24–2.34]). Furthermore, unhealthy weight-loss strategies were less likely to be adopted by non-Hispanic Asian adults (aOR: 0.71 [95% CI: 0.49–0.98]) compared to Hispanic individuals.

Compared to individuals with less than a high school education, those with a high school education (aOR: 1.74 [95% CI: 1.28–2.37]), some college education (aOR: 2.13 [95% CI: 1.56–2.92]), and college graduates (aOR: 2.81 [95% CI: 2.03–3.91]) were more likely to adopt consuming more healthy options strategy to lose weight. A similar pattern was also observed for the consuming less un-healthy options and quality of diet changes strategies.

Individuals who were widowed/divorced (aOR: 1.31 [95% CI: 1.03–1.66]) and those who had never been married (aOR: 1.36 [95% CI: 1.09–1.69]) were found to have notably increased likelihood of adopting un-healthy strategies. Conversely, participants with high income (350% or more of the poverty line) demonstrated lower odds of engaging in un-healthy strategies compared to those with low incomes (aOR: 0.69 [95% CI: 0.54–0.89]). Additionally, high-income individuals were more likely to adopt strategies such as consuming more healthy options (aOR: 1.58 [95% CI: 1.22–2.04]), using assisted weight-loss methods (aOR: 2.02 [95% CI: 1.43–2.84]), and exercising (aOR: 1.59 [95% CI: 1.25–2.04]).

Compared to individuals with normal weight, those classified as obesity class I exhibited significantly greater odds of utilizing various strategies, including consuming more healthy options (aOR: 1.35 [95% CI: 1.02–1.79]), quality of diet changes (aOR: 1.56 [95% CI: 1.21–2.01]), assisted weight-loss methods (aOR: 1.69 [95% CI: 1.21–2.36]), and un-healthy strategies (aOR: 1.85 [95% CI: 1.38–2.48]). Similarly, individuals with obesity class II and III showed markedly higher odds of adopting strategies such as consuming more healthy options (aOR: 1.55 [95% CI: 1.17–2.06]), quality of diet changes (aOR: 1.96 [95% CI: 1.53–2.52]), assisted weight-loss methods (aOR: 2.06 [95% CI: 1.49–2.84]), and un-healthy methods (aOR: 1.69 [95% CI: 1.27–2.25]). Additionally, being overweight increased the odds of adhering to quality of diet changes (aOR: 1.37 [95% CI: 1.08–1.74]) and assisted weight-loss methods (aOR: 1.78 [95% CI: 1.3–2.44]) to lose weight.

### 4. Discussion

This study analyzed data from NHANES collected between 2017 and 2020 to explore the demographic factors associated with weight-loss strategies among US adults. The results of the study showed various demographic factors that were associated with different weight-loss strategies among adults. First, sex was found to be a significant factor in weight-loss strategies. Female were more likely than male to utilize strategies such as consuming more healthy options, making quality diet changes, and using assisted weight-loss methods. This finding suggests that women may be more conscious and proactive about their weight and may try a variety of approaches to achieve their weight loss goals. In line with our findings, the study by Tsai et al. (Tsai et al., 2016) indicated that men were less inclined to pursue weight loss efforts. Furthermore, strategies such as enrolling in weight loss programs, using prescription diet pills, adhering to specialized diets, and increasing consumption of fruits, vegetables, and salads were more frequently selected by female compared to male individuals. This finding was similarly identified in a research study conducted on young adults in Canada by Raffoul and colleagues (Raffoul and Hammond, 2018). Understanding these gender differences in weight-loss strategies can inform targeted health interventions and marketing strategies. Public health campaigns could be tailored to engage men more effectively in weight management efforts by addressing potential barriers that may discourage them from participating. Additionally, programs aimed at

**Table 1**

Weighted demographic characteristics of study participants, US adults in NHANES 2017–2020 (N=3130).

Characteristics	N (%)
<b>Sex</b>	
Male	1318 (42.1)
Female	1812 (57.9)
<b>Age</b>	
20–40y	1199 (38.3)
40–60y	1164 (37.2)
≥60y	767 (24.5)
<b>Education level</b>	
<High school	254 (8.1)
High school	786 (25.9)
Some college	899 (28.7)
≥College graduate	1189 (38)
<b>Income (%FIPR)</b>	
<130%	427 (15.5)
130%–349%	872 (31.7)
≥350%	1453 (52.8)
<b>Race/ethnicity</b>	
Hispanic	535 (17.7)
Non-Hispanic white	1953 (64.8)
Non-Hispanic Black	320 (10.6)
Non-Hispanic Asian	207 (6.9)
<b>Marital status</b>	
Married/Living with partner	2057 (65.7)
Widowed/Divorced/Separated	526 (18.8)
Never married	546 (17.5)
<b>Weight status</b>	
Normal weight	379 (13.1)
Overweight	933 (32.2)
Obesity class I	770 (26.5)
Obesity class II/III	818 (28.2)

Abbreviations: NHANES, National Health and Nutrition Examination Survey; FIPR, family income to poverty level ratio. All percentages were weighted.

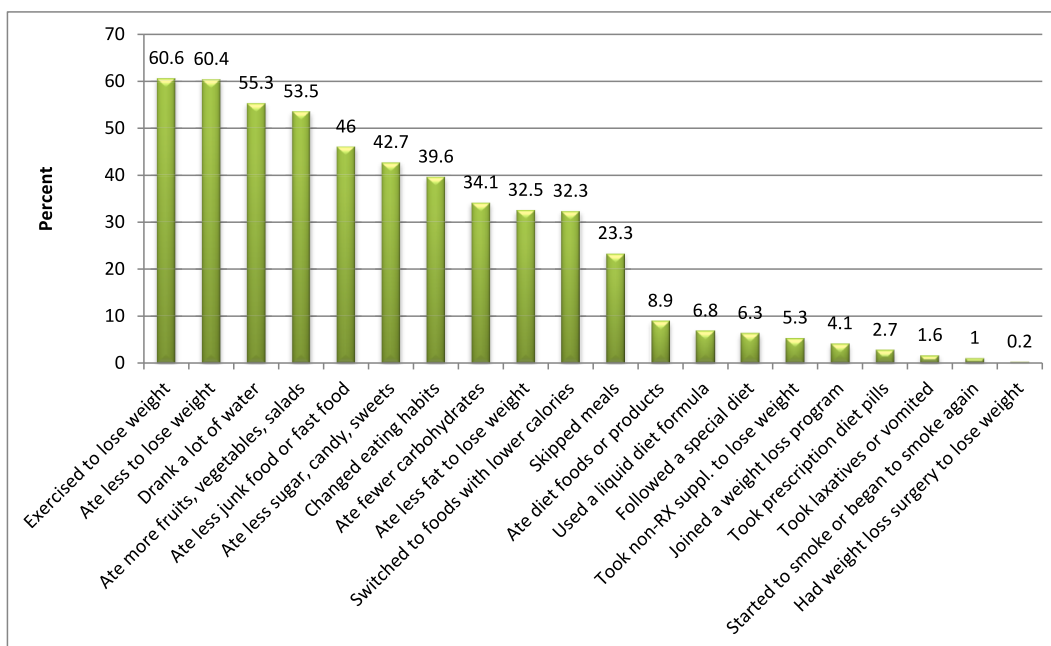


Fig. 1. Weight loss strategies utilized by US adults attempting to lose weight in the previous 12 months: Findings from the National Health and Nutrition Examination Survey (NHANES), 2017–2020.

women might benefit from emphasizing a range of healthy approaches, as females appear to be more open to adopting various methods. Age was also found to influence weight loss strategies. Individuals over 60 years old were less likely to use most weight loss strategies compared to younger age groups. This may be due to the fact that older individuals may have different health concerns or may have more difficulty engaging in physical activity as supported by the findings of the study conducted by LaRose and colleagues (LaRose et al., 2013). Moreover, (Jackson et al., 2019) discovered that older individuals unanimously agreed that implementing weight loss strategies becomes progressively more challenging with age. Therefore, it is important to consider these factors when designing weight loss programs targeted at older adults. Therefore, it is important to consider these factors when designing weight loss programs targeted at older adults.

Different ethnic backgrounds played a significant role in determining weight loss strategies, with Non-Hispanic Asian adults showing lower engagement in un-healthy behaviors compared to Hispanics, while Non-Hispanic Black adults demonstrated higher odds of engaging in such behaviors. Cultural factors and social norms may contribute to this variation, as Asian cultures often prioritize self-control and a commitment to healthy living, which has been observed in research by Lopez-Neyman et al. (Lopez-Neyman et al., 2022). Specifically, non-Hispanic Asians were found to have higher rates of ideal cardiovascular health metrics and a greater prevalence of higher Healthy Eating Index-2015 (HEI-2015) scores when compared to other racial and ethnic groups. These cultural norms may contribute to a decreased likelihood of participating in un-healthy weight loss behaviors among Asian adults. Recognizing these ethnic differences can enhance the development of culturally sensitive weight-loss programs. Public health initiatives should consider cultural contexts when designing interventions to improve acceptance and effectiveness.

Research has shown that marital status can influence the weight loss methods people choose. Individuals who are widowed, divorced, or have never been married are more likely to use un-healthy weight loss strategies. A study by Schoeppe and colleagues (Schoeppe et al., 2018), which spanned from 2005 to 2014 and involved 15,001 Australian adults, found that married individuals were more likely to follow recommendations for limited fast food consumption, increased fruit and vegetable intake, and overall healthier lifestyles compared to single

people. Furthermore, research conducted by Watt et al. (Watt et al., 2014) indicated that receiving support from a partner can act as a protective factor against the negative effects of stress, thereby decreasing the likelihood of engaging in un-healthy behaviors. Interventions aimed at building supportive social networks may improve the healthy weight loss efforts. Community-based programs that encourage group participation or partner engagements could be particularly beneficial for those at risk of unhealthy weight loss practices due to lack of support.

Individuals with high income levels were less likely to engage in un-healthy strategies and more likely to adopt beneficial strategies such as consuming more healthy options, using assisted weight-loss methods, and exercising. This suggests that financial resources may play a role in individuals' ability to access healthier weight loss options. Higher income often provides better access to fresh and high-quality produce, as well as the ability to afford healthier food options such as fruits and vegetables (Houghtaling et al., 2022). According to Chaitoff et al.'s study (Chaitoff et al., 2019), those who employed un-healthy weight loss strategies were more likely unmarried and had lower family incomes. Also other similar findings have been reported by previous investigations (VanKim and Laska, 2012, Tsai et al., 2009, Kakinami et al., 2014). Additionally, Kakinami et al. (Kakinami et al., 2014) found that both young people and adults with lower household incomes were less likely to follow recommended weight-loss strategies, such as exercising, reducing fat or sweets intake, and drinking a lot of water.

Participants showed a greater preference for using exercise as a weight-loss strategy, but previous literature suggests that weight loss programs focusing solely on physical activity (OR=5.2) are less effective than those emphasizing dietary changes (OR=7.2) or a combination of both physical activity and diet modifications (OR=17.5) (Elliot and Hamlin, 2018). This recommendation is also supported by a systematic review and meta-analysis carried out by Johns et al (Johns et al., 2014).

Finally, weight status was strongly associated with weight loss strategies. Individuals with obesity were more likely to engage in various weight loss strategies, including consuming more healthy options, making quality diet changes, using assisted weight-loss methods, and un-healthy ways. This finding aligns with the understanding that individuals with higher body weights are more motivated to lose weight and may be more willing to try different strategies to achieve their goals (Lee, 2024). This finding is concordant with other studies that suggest

**Table 2**  
Associations between weight-loss strategies and demographic characteristics among US adults, NHANES 2017–2020.

Descriptive Characteristic	Consuming more healthy <sup>1</sup>	Consuming less un-healthy <sup>2</sup>	Quality of diet changes <sup>3</sup>	Assisted weight-loss method <sup>4</sup>	Exercising	Un-healthy strategies <sup>5</sup>
<b>Sex</b>						
Male <sup>#</sup>	1	1	1	1	1	1
Female	1.33 (1.15–1.53)	0.84 (0.68–1.04)	1.15 (1.01–1.31)	1.47 (1.24–1.74)	0.82 (0.72–0.93)	0.85 (0.74–0.98)
<b>Age group, y</b>						
20–40y <sup>#</sup>	1	1	1	1	1	1
40–60y	0.58 (0.49–0.69)	1.05 (0.83–1.33)	0.7 (0.61–0.82)	1.02 (0.85–1.22)	0.5 (0.43–0.58)	0.86 (0.73–1.01)
≥60y	0.57 (0.47–0.68)	1.09 (0.84–1.43)	0.68 (0.57–0.8)	0.7 (0.56–0.87)	0.28 (0.24–0.34)	0.51 (0.42–0.62)
<b>Race/ethnicity</b>						
Hispanic <sup>#</sup>	1	1	1	1	1	1
Non- Hispanic white	1.2 (1–1.45)	1.11 (0.84–1.47)	1.12 (0.94–1.33)	1.31 (1.04–1.64)	0.9 (0.75–1.01)	0.7 (0.58–0.85)
Non- Hispanic Black	1.56 (1.17–2.08)	0.72 (0.5–1.05)	1.31 (1.02–1.68)	1.02 (0.73–1.43)	1.33 (1.03–1.73)	1.33 (1.03–1.72)
Non-Hispanic Asian	0.72 (0.53–0.97)	0.77 (0.5–1.19)	0.78 (0.59–1.04)	0.64 (0.41–0.99)	1.8 (1.31–2.47)	0.56 (0.39–0.78)
<b>Education level</b>						
<High school <sup>#</sup>	1	1	1	1	1	1
High school	1.86 (1.44–2.4)	1.77 (1.26–2.47)	1.56 (1.22–2.01)	1.28 (0.86–1.91)	1.28 (1–1.65)	1.15 (0.87–1.53)
Some college	2.48 (1.92–3.2)	2.07 (1.48–2.9)	1.82 (1.42–2.34)	2.07 (1.41–3.04)	1.64 (1.28–2.11)	1.28 (0.97–1.69)
≥College graduate	2.84 (2.22–3.65)	2.9 (2.08–4.06)	2.25 (1.76–2.86)	2.46 (1.69–3.57)	2.89 (2.26–3.69)	0.91 (0.69–1.2)
<b>Marital status</b>						
Married/Living with Partner <sup>#</sup>	1	1	1	1	1	1
Widowed/Divorced/ Separated	0.91 (0.76–1.1)	1.1 (0.76–1.46)	1.05 (0.88–1.26)	1.08 (0.91–1.28)	0.49 (0.41–0.58)	1.26 (1.04–1.52)
Never married	1.55 (1.26–1.89)	1.01 (0.76–1.31)	1.24 (1.03–1.5)	1.19 (1.01–1.42)	1.58 (1.31–1.9)	1.58 (1.32–1.89)
<b>Income (%FIPR)</b>						
<130% <sup>#</sup>	1	1	1	1	1	1
130%–349%	1.56 (1.25–1.95)	1.32 (0.97–1.78)	1.64 (1.33–2.02)	1.61 (1.19–2.18)	1.21 (0.98–1.48)	0.72 (0.58–0.89)
≥350%	1.71 (1.39–2.09)	1.73 (1.29–2.31)	1.42 (1.17–1.72)	2.06 (1.55–2.73)	1.94 (1.59–2.35)	0.56 (0.46–0.69)
<b>Obesity status</b>						
Normal weight <sup>#</sup>	1	1	1	1	1	1
Overweight	0.84 (0.67–1.07)	0.91 (0.64–1.27)	1.13 (0.91–1.4)	1.56 (1.17–2.08)	0.92 (0.73–1.16)	0.92 (0.71–1.18)
Obesity class I	0.96 (0.75–1.23)	1.1 (0.77–1.58)	1.25 (1–1.56)	1.15 (0.85–1.56)	0.59 (0.47–0.75)	1.67 (1.3–2.15)
Obesity class II/III	1.12 (0.88–1.43)	1.06 (0.74–1.51)	1.49 (1.19–1.85)	1.55 (1.15–2.08)	0.46 (0.37–0.58)	1.68 (1.31–2.16)

Notes: Values represent weighted un-adjusted odds ratios with 95%CI. Values in bold are statistically significant ( $p < 0.05$ ).

Abbreviations: FIPR, family income to poverty level ratio; NHANES, National Health and Nutrition Examination Survey.

<sup>#</sup> Reference category.

<sup>1</sup> Ate more fruits, vegetables, salads, or Drank a lot of water.

<sup>2</sup> Ate less, Less junk food or fast food, Less sugar, candy, sweets, Fewer carbohydrates, Less fat,

<sup>3</sup> Changed eating habits, Switched to foods with lower calories, Ate diet foods or products.

<sup>4</sup> Followed a special diet, Joined a weight loss program, Used a liquid diet formula.

<sup>5</sup> Skipped meals, started to smoke, Took laxatives or vomited, or Took prescription or non-prescription diet pills.

individuals with obesity are more likely to engage in greater number of weight loss strategies especially un-healthy practices (Raffoul and Hammond, 2018, Chaitoff et al., 2019, Malinauskas et al., 2006). These results highlight the motivation among individuals with obesity to pursue various weight loss strategies, which can include both healthy and unhealthy methods. This reinforces the need of focusing on this group, as they are at a higher risk of adopting potentially harmful weight

loss methods.

The main strengths of this study include a nationally representative US population, a large sample size, the exploration of a diverse range of demographic factors associated with different weight loss strategies, and objective measures collected by trained personnel. However, the study does have several limitations. Firstly, the reliance on self-reported data for weight loss strategies over the past year introduces the potential for

**Table 3**  
Adjusted associations between weight-loss strategies and demographic characteristics of US adults, NHANES 2017–2020.

Descriptive Characteristic	Consuming more healthy <sup>1</sup>	Consuming less un-healthy <sup>2</sup>	Quality of diet changes <sup>3</sup>	Assisted weight-loss method <sup>4</sup>	Exercising	Un-healthy strategies <sup>5</sup>
<b>Sex</b>						
Male <sup>#</sup>	1	1	1	1	1	1
Female	1.48 (1.26–1.74)	0.91 (0.72–1.15)	1.21 (1.04–1.4)	1.81 (1.5–2.19)	0.91 (0.78–1.06)	0.83 (0.7–1)
<b>Age group, y</b>						
20–40y <sup>#</sup>	1	1	1	1	1	1
40–60y	0.61 (0.5–0.74)	1.12 (0.86–1.47)	0.72 (0.61–0.85)	0.87 (0.71–1.07)	0.51 (0.42–0.61)	0.96 (0.8–1.15)
≥ 60y	0.63 (0.51–0.77)	1.11 (0.82–1.49)	0.67 (0.55–0.81)	0.66 (0.51–0.84)	0.29 (0.24–0.36)	0.46 (0.37–0.58)
<b>Race/ethnicity</b>						
Hispanic <sup>#</sup>	1	1	1	1	1	1
Non- Hispanic white	1.07 (0.85–1.34)	0.7 (0.49–0.99)	0.99 (0.81–1.23)	1.02 (0.78–1.33)	0.79 (0.62–0.99)	0.87 (0.7–1.1)
Non- Hispanic Black	1.3 (0.93–1.82)	0.47 (0.3–0.74)	0.99 (0.74–1.33)	0.84 (0.57–1.23)	1.7 (1.24–2.34)	1.29 (0.95–1.74)
Non-Hispanic Asian	0.54 (0.34–0.78)	0.56 (0.33–0.95)	0.69 (0.49–0.97)	0.47 (0.28–0.78)	1.13 (0.77–1.66)	0.71 (0.49–0.98)
<b>Education level</b>						
< high school <sup>#</sup>	1	1	1	1	1	1
High school	1.74 (1.28–2.37)	2.15 (1.44–3.19)	1.69 (1.24–2.3)	1.2 (0.75–1.94)	1.1 (0.81–1.5)	1.21 (0.86–1.7)
Some college	2.13 (1.56–2.92)	2.53 (1.68–3.81)	1.84 (1.35–2.5)	1.75 (1.1–2.79)	1.24 (0.9–1.69)	1.35 (0.95–1.91)
≥ College graduate	2.81 (2.03–3.91)	3.56 (2.31–5.48)	2.63 (1.91–3.61)	2.02 (1.26–3.25)	1.87 (1.35–2.59)	1.22 (0.85–1.75)
<b>Marital status</b>						
Married/Living with Partner <sup>#</sup>	1	1	1	1	1	1
Widowed/Divorced/Separated	0.91 (0.73–1.14)	1.29 (0.91–1.83)	1.34 (1.08–1.66)	0.84 (0.63–1.1)	0.79 (0.64–0.98)	1.31 (1.03–1.66)
Never married	1.27 (0.98–1.63)	0.98 (0.70–1.36)	1.15 (0.92–1.43)	0.66 (0.49–0.87)	1.13 (0.89–1.43)	1.36 (1.09–1.69)
<b>Income (%FIPR)</b>						
<130% <sup>#</sup>	1	1	1	1	1	1
130%–349%	1.74 (1.36–2.24)	1.29 (0.92–1.8)	1.81 (1.43–2.29)	1.71 (1.21–2.41)	1.27 (1.01–1.61)	0.75 (0.59–0.96)
≥350%	1.58 (1.22–2.04)	1.32 (0.93–1.86)	1.46 (1.15–1.86)	2.02 (1.43–2.84)	1.59 (1.25–2.04)	0.69 (0.54–0.89)
<b>Obesity status</b>						
Normal weight <sup>#</sup>	1	1	1	1	1	1
Overweight	1.03 (0.79–1.35)	0.91 (0.63–1.31)	1.37 (1.08–1.74)	1.78 (1.3–2.44)	0.99 (0.76–1.29)	1.09 (0.81–1.45)
Obesity class I	1.35 (1.02–1.79)	1.3 (0.87–1.94)	1.56 (1.21–2.01)	1.69 (1.21–2.36)	0.71 (0.54–0.94)	1.85 (1.38–2.48)
Obesity class II, III	1.55 (1.17–2.06)	1.39 (0.94–2.07)	1.96 (1.53–2.52)	2.06 (1.49–2.84)	0.56 (0.43–0.73)	1.69 (1.27–2.25)

Notes: Values represent weighted adjusted odds ratios with 95%CI. Each odds ratio is adjusted for all other demographic variables shown. Values in bold are statistically significant ( $p < 0.05$ ).

Abbreviations: FIPR, family income to poverty level ratio; NHANES, National Health and Nutrition Examination Survey.

<sup>#</sup>Reference category

<sup>1</sup> Ate more fruits, vegetables, salads, or Drank a lot of water

<sup>2</sup> Ate less, Less junk food or fast food, Less sugar, candy, sweets, Fewer carbohydrates, Less fat,

<sup>3</sup> Changed eating habits, Switched to foods with lower calories, Ate diet foods or products

<sup>4</sup> Followed a special diet, Joined a weight loss program, Used a liquid diet formula

<sup>5</sup>Skipped meals, started to smoke, Took laxatives or vomited, or Took prescription or non-prescription diet pills.

recall bias. Furthermore, differential social desirability could lead to some individuals being less honest about their weight loss behaviors compared to others. While the categorization of weight loss strategies was based on existing norms in the literature, it is crucial to recognize that certain methods, such as using diet pills, which are generally considered un-healthy, may not always have detrimental effects in every

situation. Additionally, we acknowledge the importance of measurement uniformity across different weight loss strategies. Inconsistencies in how these strategies are reported could potentially introduce misclassification bias, impacting the accuracy of our findings. Conducting longitudinal studies to track rigorously measured weight loss strategies and outcomes over time could provide valuable insights into

the adopting process of different strategies and also effectiveness of various methods could be insightful.

In conclusion, this study highlights the diverse factors that are associated with different weight-loss strategies among adults. Understanding these factors can help inform public health interventions and personalized approaches for weight management, taking into account factors such as age, sex, ethnicity, family income, education level, marital status, and weight status. Future research should continue to explore these factors and their impact on weight loss strategies to develop targeted interventions that can effectively promote healthy weight loss behaviors.

### Informed consent statement

The NHANES protocol has undergone a thorough review and approval by the research ethics review board at the National Center for Health Statistics. All participants involved in the study provided written informed consent.

### CRedit authorship contribution statement

**Amin Mokari-Yamchi:** Writing – original draft, Formal analysis.  
**Richard R. Rosenkranz:** Writing – review & editing, Methodology, Conceptualization.

### Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Richard R. Rosenkranz and Amin Mokari report no conflicts of interest related to this research study. This work was conducted without any financial assistance or support from external organizations. They received no funding, grants, or honorariums that could have influenced the research findings or biased the interpretation of the data.

### Data availability

Data for this study can be accessed from the “NHANES” database, available at: <https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/default.aspx?Cycle=2017-2020>, (accessed on 17 March 2024).

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