**Supplemental Materials**

**Measurements of plasma trans-fatty acids**

Four TFAs (elaidic acid [18:1n-9t] OD9, vaccenic acid [18:1n-7t] OD1, linoelaidic acid [18:2n-6t,9t] OTT, and palmitelaidic acid [16:1n-7t] HDT) were analyzed in plasma using gas chromatography coupled with mass spectrometry. In brief, 100 µL plasma with 100 µL of internal standard (IS) solution containing stable isotope-labeled TFAs (10 µM of HDT, 30 µM of OD1, 30 µM of OD9, 2.0 µM of OTT) were successively hydrolyzed with 2 mL of 10% (v/v) 6N HCl in acetonitrile and 2 mL of 10% (v/v) 10N NaOH in methanol at 104oC for 45 min. Free fatty acids were extracted from the hydrolysis solution with hexane. The hexanes extract was evaporated to dryness under vacuum and derivatized as described by Lagerstedt et al [1]. The derivatized fatty acids were analyzed by gas chromatography coupled with mass spectrometry (GC/MSD, Agilent Technologies, Santa Clara, CA). The mass spectrometer was operated in negative chemical ionization (NCI) mode (reagent gas: methane).  Chromatographic separation was carried out with an Agilent Select FAME column (200 m x 250 µm x 0.25 µm) and with hydrogen as the carrier gas at 3 ml/min. A sample volume of 1 µL was injected (injector spilt mode: 20:1 split ratio). The fatty acids were separated using a temperature program starting at 130oC and ending at 260oC. The within-day and among-day precision expressed as percent coefficient of variation (%CV) ranged from 2-9 %CV and 8-9 %CV for HDT, 3-8 %CV and 7-9 %CV for OD1, 1-7 %CV and 6-10 %CV for OD9, and 2-11 %CV and 9-15 %CV for OTT, respectively. The limits of detection determined using Taylor’s method were 0.07 µM for HDT, 0.43 µM for OD1, 0.29 µM for OD9, and 0.02 µM for OTT, respectively [2].  The accuracy for all 4 TFAs was in average 102% (95% CI: 97-107%) compared to 2 commercial standards.

**REFERENCES**

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2. J.K. Taylor. Quality assurance of chemical measurements. Chelsea, Mich.: Lewis Publishers; 1987.

**Supplemental Table S1. Adjusted Prevalence Ratios of Metabolic Syndrome Among Participants Aged ≥20 Years by Quintiles of Plasma TFA Concentrations and Selected Covariates—NHANES 1999-2000 and 2009-2010a**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Quintiles of Plasma TFA Concentrations, Prevalence Ratios (95% CI)** | | | | |  |
|  | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | ***P* Value for trendb** |
| **NHANES 1999-2000** |  |  |  |  |  |  |
| **Range** | 10.96-55.35 | 55.36-72.28 | 72.29-89.29 | 89.30-115.28 | 115.29-478.34 |  |
| **Number of participants** | 304 | 310 | 274 | 266 | 288 |  |
| **Age <60 years** |  |  |  |  |  |  |
| **Number of participants** | 203 | 181 | 173 | 167 | 161 |  |
| M1**c** | 1.00 | 1.50 (0.88-2.54) | 2.50 (1.44-4.33) | 3.10 (1.69-5.68) | 5.19 (3.16-8.51) | <.001 |
| M2**d** | 1.00 | 1.58 (0.89-2.82) | 2.56 (1.47-4.47) | 2.94 (1.57-5.49) | 5.07 (2.84-9.03) | <.001 |
| M3**e** | 1.00 | 1.54 (0.89-2.73) | 2.53 (1.48-4.39) | 2.94 (1.64-5.25) | 5.02 (2.89-8.92) | <.001 |
| **≥60 years** |  |  |  |  |  |  |
| Number of participants | 101 | 129 | 101 | 99 | 127 |  |
| M1**c** | 1.00 | 1.32 (0.87-2.01) | 1.40 (0.78-2.50) | 1.64 (1.07-2.52) | 1.90 (1.32-2.72) | .002 |
| M2**d** | 1.00 | 1.20 (0.84-1.70) | 1.36 (0.79-2.36) | 1.32 (0.86-2.00) | 1.65 (1.13-2.41) | .018 |
| M3**e** | 1.00 | 1.20 (0.84-1.70) | 1.38 (0.79-2.43) | 1.38 (0.89-2.13) | 1.70 (1.14-2.53) | .014 |
| **Male** |  |  |  |  |  |  |
| Number of participants | 189 | 159 | 126 | 104 | 154 |  |
| M1**c** | 1.00 | 1.26 (0.87-1.82) | 1.69 (0.99-2.88) | 2.38 (1.41-4.01) | 3.55 (2.70-4.67) | <.001 |
| M2**d** | 1.00 | 1.26 (0.88-1.80) | 1.84 (1.19-2.85) | 2.17 (1.32-3.54) | 3.42 (2.29-5.11) | <.001 |
| M3**e** | 1.00 | 1.27 (0.88-1.82) | 1.82 (1.19-2.80) | 2.14 (1.34-3.41) | 3.38 (2.28-5.01) | <.001 |
| **Female** |  |  |  |  |  |  |
| Number of participants | 115 | 151 | 148 | 162 | 134 |  |
| M1**c** | 1.00 | 1.75 (0.93-3.32) | 2.43 (1.23-4.80) | 2.73 (1.48-5.04) | 4.10 (2.09-8.04) | <.001 |
| M2**d** | 1.00 | 1.61 (0.94-2.78) | 2.12 (1.21-3.69) | 2.15 (1.27-3.61) | 3.41 (1.95-5.96) | <.001 |
| M3**e** | 1.00 | 1.58 (0.92-2.60) | 2.02 (1.20-3.41) | 2.06 (1.26-3.37) | 3.15 (1.82-5.44) | <.001 |
| **Non-Hispanic white** |  |  |  |  |  |  |
| Number of participants | 110 | 133 | 148 | 138 | 164 |  |
| M1**c** | 1.00 | 1.31 (0.86-1.98) | 1.84 (1.17-2.89) | 2.36 (1.43-3.89) | 3.47 (2.62-4.58) | <.001 |
| M2**d** | 1.00 | 1.21 (0.74-1.98) | 1.81 (1.10-2.98) | 1.98 (1.14-3.44) | 3.10 (2.11-4.54) | <.001 |
| M3**e** | 1.00 | 1.21 (0.75-1.95) | 1.81 (1.11-2.93) | 2.02 (1.19-3.44) | 3.09 (2.12-4.51) | <.001 |
| **Non-Hispanic black** |  |  |  |  |  |  |
| Number of participants | 67 | 57 | 40 | 39 | 23 |  |
| M1**c** | 1.00 | 1.59 (1.00-2.52) | 1.79 (0.76-4.19) | 2.26 (1.23-4.15) | 5.16 (2.95-9.01) | <.001 |
| M2**d** | 1.00 | 1.62 (1.02-2.58) | 1.90 (0.97-3.72) | 1.74 (0.93-3.28) | 3.66 (2.12-6.32) | <.001 |
| M3**e** | 1.00 | 1.66 (0.99-2.80) | 2.08 (1.04-4.15) | 1.72 (0.91-3.26) | 3.83 (2.21-6.62) | <.001 |
| **Mexican-American** |  |  |  |  |  |  |
| Number of participants | 88 | 91 | 74 | 71 | 89 |  |
| M1**c** | 1.00 | 1.90 (0.80-4.49) | 1.84 (0.79-4.27) | 2.02 (1.15-3.57) | 4.24 (1.77-10.16) | <.001 |
| M2**d** | 1.00 | 1.83 (0.81-4.13) | 1.80 (0.74-4.38) | 1.81 (0.97-3.40) | 3.87 (1.53-9.82) | <.001 |
| M3**e** | 1.00 | 1.81 (0.78-4.19) | 1.82 (0.74-4.49) | 1.77 (0.91-3.47) | 3.86 (1.47-10.11) | <.001 |
| **Education <12 years** |  |  |  |  |  |  |
| Number of participants | 130 | 126 | 92 | 93 | 107 |  |
| M1**c** | 1.00 | 1.28 (0.76-2.14) | 1.87 (0.99-3.51) | 1.67 (0.86-3.27) | 2.54 (1.33-4.88) | .023 |
| M2**d** | 1.00 | 1.16 (0.76-1.75) | 1.59 (0.92-2.77) | 1.40 (0.73-2.69) | 2.09 (1.23-3.55) | .006 |
| M3**e** | 1.00 | 1.16 (0.77-1.75) | 1.66 (0.96-2.84) | 1.49 (0.78-2.82) | 2.22 (1.33-3.70) | .002 |
| **Education ≥12 years** |  |  |  |  |  |  |
| Number of participants | 174 | 184 | 182 | 173 | 181 |  |
| M1**c** | 1.00 | 1.47 (0.94-2.30) | 2.08 (1.29-3.36) | 2.83 (1.70-4.73) | 4.20 (2.88-6.11) | <.001 |
| M2**d** | 1.00 | 1.54 (0.90-2.63) | 2.22 (1.29-3.81) | 2.66 (1.55-4.56) | 4.11 (2.55-6.64) | <.001 |
| M3**e** | 1.00 | 1.52 (0.90-2.55) | 2.19 (1.28-3.74) | 2.69 (1.62-4.48) | 4.07 (2.53-6.57) | <.001 |
| **HEI-2010 ≥top 50% (score ≥44.27)** |  |  |  |  |  |  |
| Number of participants | 191 | 181 | 145 | 126 | 136 |  |
| M1**c** | 1.00 | 1.52 (0.92-2.51) | 1.95 (1.12-3.40) | 2.60 (1.61-4.19) | 3.59 (2.27-5.66) | <.001 |
| M2**d** | 1.00 | 1.46 (0.95-2.26) | 1.90 (1.23-2.94) | 2.24 (1.45-3.47) | 3.18 (2.07-4.89) | <.001 |
| M3**e** | 1.00 | 1.44 (0.96-2.15) | 1.86 (1.23-2.82) | 2.22 (1.49-3.32) | 3.15 (2.07-4.78) | <.001 |
| **HEI-2010 <top 50% (score <44.27)** |  |  |  |  |  |  |
| Number of participants | 113 | 129 | 129 | 140 | 152 |  |
| M1**c** | 1.00 | 1.32 (0.79-2.20) | 2.00 (0.93-4.33) | 2.24 (1.20-4.19) | 3.65 (2.07-6.41) | <.001 |
| M2**d** | 1.00 | 1.37 (0.81-2.32) | 2.07 (1.00-4.29) | 2.13 (1.09-4.17) | 3.63 (1.96-6.74) | <.001 |
| M3**e** | 1.00 | 1.33 (0.78-2.25) | 2.07 (1.01-4.21) | 2.13 (1.10-4.12) | 3.61 (1.97-6.61) | <.001 |
| **Physical activity - High** |  |  |  |  |  |  |
| Number of participants | 165 | 161 | 141 | 141 | 137 |  |
| M1**c** | 1.00 | 1.23 (0.88-1.72) | 2.04 (1.29-3.24) | 2.73 (1.75-4.28) | 4.16 (3.06-5.67) | <.001 |
| M2**d** | 1.00 | 1.28 (0.86-1.90) | 1.95 (1.29-2.93) | 2.44 (1.47-4.04) | 3.87 (2.53-5.94) | <.001 |
| M3**e** | 1.00 | 1.27 (0.86-1.88) | 1.94 (1.29-2.91) | 2.44 (1.51-3.95) | 3.86 (2.54-5.87) | <.001 |
| **Physical activity - Low** |  |  |  |  |  |  |
| Number of participants | 131 | 141 | 123 | 121 | 147 |  |
| M1**c** | 1.00 | 1.62 (0.99-2.64) | 1.90 (1.04-3.48) | 1.95 (1.18-3.20) | 2.99 (1.80-4.97) | <.001 |
| M2**d** | 1.00 | 1.65 (0.98-2.76) | 1.96 (1.01-3.82) | 1.81 (0.99-3.32) | 2.87 (1.53-5.39) | .001 |
| M3**e** | 1.00 | 1.61 (1.02-2.56) | 1.96 (1.07-3.59) | 1.82 (1.04-3.21) | 2.86 (1.58-5.17) | <.001 |
| **Normal weight (BMI <25)** |  |  |  |  |  |  |
| Number of participants | 117 | 118 | 99 | 64 | 78 |  |
| M1**c** | 1.00 | 1.06 (0.14-8.21) | 3.42 (0.41-28.48) | 3.92 (0.77-20.07) | 6.01 (1.22-29.50) | .010 |
| M2**d** | 1.00 | 1.58 (0.15-16.50) | 3.91 (0.29-53.04) | 4.00 (0.42-38.61) | 6.36 (0.72-56.38) | .058 |
| M3**e** | 1.00 | 1.67 (0.15-18.90) | 4.10 (0.29-58.34) | 4.04 (0.42-39.26) | 6.64 (0.72-60.87) | .060 |
| **Overweight/obese (BMI ≥25)** |  |  |  |  |  |  |
| Number of participants | 187 | 192 | 175 | 202 | 210 |  |
| M1**c** | 1.00 | 1.49 (1.17-1.88) | 1.79 (1.25-2.54) | 1.85 (1.29-2.64) | 2.77 (2.27-3.40) | <.001 |
| M2**d** | 1.00 | 1.37 (1.13-1.65) | 1.69 (1.29-2.22) | 1.61 (1.22-2.11) | 2.47 (2.11-2.89) | <.001 |
| M3**e** | 1.00 | 1.35 (1.13-1.62) | 1.68 (1.30-2.17) | 1.60 (1.25-2.06) | 2.46 (2.12-2.85) | <.001 |
| **Statin use - Users** |  |  |  |  |  |  |
| Number of participants | 17 | 24 | 21 | 24 | 24 |  |
| M1**c** | 1.00 | 1.42 (0.58-3.49) | 1.99 (0.73-5.43) | 1.79 (0.58-5.55) | 2.04 (0.78-5.37) | .147 |
| M2**d** | 1.00 | 1.35 (0.74-2.44) | 2.37 (0.89-6.32) | 1.69 (0.69-4.10) | 2.30 (0.81-6.53) | .041 |
| M3**e** | 1.00 | 1.32 (0.69-2.51) | 2.28 (0.86-6.02) | 1.77 (0.71-4.43) | 2.33 (0.81-6.74) | .050 |
| **Statin use - Non-users** |  |  |  |  |  |  |
| Number of participants | 287 | 286 | 253 | 242 | 264 |  |
| M1**c** | 1.00 | 1.42 (1.04-1.94) | 1.99 (1.27-3.11) | 2.52 (1.62-3.94) | 3.89 (2.76-5.49) | <.001 |
| M2**d** | 1.00 | 1.45 (1.03-2.06) | 1.99 (1.28-3.10) | 2.30 (1.47-3.62) | 3.66 (2.48-5.39) | <.001 |
| M3**e** | 1.00 | 1.44 (1.03-2.01) | 1.98 (1.28-3.05) | 2.31 (1.50-3.54) | 3.64 (2.46-5.37) | <.001 |
| **NHANES 2009-2010** |  |  |  |  |  |  |
| **Range** | 7.33-25.46 | 25.47-33.30 | 33.31-41.14 | 41.15-54.14 | 54.15-303.20 |  |
| **Age <60 years** |  |  |  |  |  |  |
| Number of participants | 313 | 310 | 294 | 295 | 283 |  |
| M1**c** | 1.00 | 1.37 (0.83-2.26) | 1.94 (1.27-2.98) | 2.18 (1.44-3.31) | 4.15 (2.72-6.33) | <.001 |
| M2**d** | 1.00 | 1.37 (0.88-2.11) | 2.00 (1.41-2.84) | 2.12 (1.49-3.01) | 3.90 (2.89-5.26) | <.001 |
| M3**e** | 1.00 | 1.43 (0.98-2.09) | 2.08 (1.51-2.88) | 2.21 (1.59-3.06) | 4.01 (3.05-5.28) | <.001 |
| **≥60 years** |  |  |  |  |  |  |
| Number of participants | 110 | 133 | 140 | 160 | 195 |  |
| M1**c** | 1.00 | 1.02 (0.75-1.38) | 1.07 (0.78-1.47) | 1.33 (0.97-1.82) | 1.89 (1.47-2.42) | <.001 |
| M2**d** | 1.00 | 0.97 (0.77-1.21) | 0.97 (0.72-1.32) | 1.18 (0.81-1.72) | 1.57 (1.15-2.15) | .007 |
| M3**e** | 1.00 | 0.96 (0.74-1.25) | 0.97 (0.71-1.32) | 1.15 (0.77-1.72) | 1.57 (1.15-2.14) | .007 |
| **Male** |  |  |  |  |  |  |
| Number of participants | 223 | 199 | 209 | 206 | 226 |  |
| M1**c** | 1.00 | 1.17 (0.85-1.62) | 1.64 (1.25-2.15) | 1.57 (1.16-2.11) | 3.00 (2.38-3.78) | <.001 |
| M2**d** | 1.00 | 1.22 (0.87-1.70) | 1.74 (1.35-2.24) | 1.60 (1.18-2.16) | 2.88 (2.26-3.68) | <.001 |
| M3**e** | 1.00 | 1.28 (0.93-1.77) | 1.82 (1.39-2.37) | 1.67 (1.22-2.28) | 2.96 (2.29-3.83) | <.001 |
| **Female** |  |  |  |  |  |  |
| Number of participants | 200 | 244 | 225 | 249 | 252 |  |
| M1**c** | 1.00 | 1.27 (0.83-1.95) | 1.40 (0.90-2.16) | 2.03 (1.34-3.07) | 3.18 (2.10-4.81) | <.001 |
| M2**d** | 1.00 | 1.18 (0.84-1.67) | 1.27 (0.89-1.79) | 1.70 (1.22-2.37) | 2.59 (1.81-3.71) | <.001 |
| M3**e** | 1.00 | 1.19 (0.84-1.68) | 1.26 (0.91-1.74) | 1.72 (1.25-2.37) | 2.62 (1.84-3.72) | <.001 |
| **Non-Hispanic white** |  |  |  |  |  |  |
| Number of participants | 167 | 197 | 219 | 229 | 264 |  |
| M1**c** | 1.00 | 1.14 (0.74-1.77) | 1.49 (1.01-2.19) | 1.74 (1.15-2.63) | 3.13 (2.14-4.56) | <.001 |
| M2**d** | 1.00 | 1.17 (0.77-1.77) | 1.54 (1.08-2.19) | 1.76 (1.20-2.60) | 2.96 (2.14-4.10) | <.001 |
| M3**e** | 1.00 | 1.20 (0.85-1.69) | 1.58 (1.12-2.22) | 1.84 (1.25-2.71) | 3.05 (2.21-4.21) | <.001 |
| **Non-Hispanic black** |  |  |  |  |  |  |
| Number of participants | 92 | 82 | 78 | 59 | 41 |  |
| M1**c** | 1.00 | 1.23 (0.94-1.62) | 1.16 (0.77-1.74) | 1.60 (1.13-2.25) | 2.05 (1.13-3.18) | .004 |
| M2**d** | 1.00 | 1.33 (1.10-1.60) | 1.23 (0.88-1.71) | 1.68 (1.18-2.38) | 2.13 (1.43-3.19) | .003 |
| M3**e** | 1.00 | 1.35 (1.12-1.63) | 1.26 (0.85-1.86) | 1.69 (1.17-2.43) | 2.16 (1.42-3.27) | .003 |
| **Mexican-American** |  |  |  |  |  |  |
| Number of participants | 60 | 87 | 78 | 107 | 122 |  |
| M1**c** | 1.00 | 1.50 (0.74-3.03) | 1.67 (0.81-3.42) | 1.73 (0.91-3.30) | 2.83 (1.58-5.06) | <.001 |
| M2**d** | 1.00 | 1.26 (0.71-2.24) | 1.73 (0.96-3.12) | 1.61 (0.98-2.63) | 2.69 (1.80-4.02) | <.001 |
| M3**e** | 1.00 | 1.25 (0.67-2.32) | 1.71 (0.92-3.18) | 1.58 (0.94-2.66) | 2.65 (1.71-4.09) | <.001 |
| **Education <12 years** |  |  |  |  |  |  |
| Number of participants | 100 | 114 | 111 | 144 | 170 |  |
| M1**c** | 1.00 | 1.02 (0.75-1.38) | 1.31 (0.92-1.87) | 1.33 (1.01-1.75) | 1.72 (1.29-2.30) | <.001 |
| M2**d** | 1.00 | 1.04 (0.74-1.46) | 1.38 (0.97-1.96) | 1.36 (0.98-1.88) | 1.73 (1.25-2.39) | <.001 |
| M3**e** | 1.00 | 1.06 (0.76-1.48) | 1.41 (1.02-1.96) | 1.36 (1.00-1.86) | 1.75 (1.28-2.40) | <.001 |
| **Education ≥12 years** |  |  |  |  |  |  |
| Number of participants | 323 | 329 | 323 | 311 | 308 |  |
| M1**c** | 1.00 | 1.28 (0.86-1.91) | 1.60 (1.14-2.25) | 1.90 (1.34-2.71) | 3.64 (2.59-5.13) | <.001 |
| M2**d** | 1.00 | 1.27 (0.89-1.80) | 1.60 (1.21-2.11) | 1.83 (1.39-2.40) | 3.32 (2.49-4.44) | <.001 |
| M3**e** | 1.00 | 1.29 (0.96-1.72) | 1.63 (1.24-2.13) | 1.88 (1.45-2.44) | 3.38 (2.58-4.44) | <.001 |
| **HEI-2010 ≥top 50% (score≥47.84)** |  |  |  |  |  |  |
| Number of participants | 266 | 234 | 184 | 206 | 205 |  |
| M1**c** | 1.00 | 1.25 (0.80-1.95) | 1.19 (0.70-2.02) | 1.54 (0.88-2.72) | 3.11 (2.04-4.75) | <.001 |
| M2**d** | 1.00 | 1.17 (0.79-1.73) | 1.24 (0.86-1.78) | 1.48 (0.92-2.37) | 2.76 (1.97-3.87) | <.001 |
| M3**e** | 1.00 | 1.17 (0.79-1.72) | 1.23 (0.85-1.78) | 1.48 (0.91-2.42) | 2.75 (1.95-3.88) | <.001 |
| **HEI-2010 <top 50% (score <47.84)** |  |  |  |  |  |  |
| **Number of participants** | 157 | 209 | 250 | 249 | 273 |  |
| M1**c** | 1.00 | 1.11 (0.79-1.57) | 1.73 (1.16-2.57) | 1.90 (1.35-2.67) | 2.90 (2.06-4.10) | <.001 |
| M2**d** | 1.00 | 1.23 (0.91-1.66) | 1.82 (1.25-2.64) | 1.93 (1.41-2.66) | 2.89 (2.11-3.97) | <.001 |
| M3**e** | 1.00 | 1.28 (0.95-1.72) | 1.90 (1.34-2.70) | 2.03 (1.50-2.74) | 2.99 (2.20-4.07) | <.001 |
| **Physical activity - High** c |  |  |  |  |  |  |
| Number of participants | 228 | 232 | 199 | 193 | 183 |  |
| M1**c** | 1.00 | 1.07 (0.68-1.69) | 1.91 (1.21-3.03) | 1.95 (1.22-3.11) | 3.82 (2.78-5.25) | <.001 |
| M2**d** | 1.00 | 1.10 (0.70-1.72) | 2.00 (1.35-2.97) | 2.07 (1.47-2.93) | 3.69 (2.80-4.85) | <.001 |
| M3**e** | 1.00 | 1.09 (0.68-1.74) | 2.01 (1.35-3.01) | 2.08 (1.45-2.97) | 3.69 (2.82-4.84) | <.001 |
| **Physical activity - Low** |  |  |  |  |  |  |
| Number of participants | 195 | 211 | 235 | 262 | 295 |  |
| M1**c** | 1.00 | 1.27 (0.86-1.88) | 1.24 (0.88-1.74) | 1.57 (1.18-2.10) | 2.42 (1.83-3.20) | <.001 |
| M2**d** | 1.00 | 1.29 (0.91-1.82) | 1.26 (0.90-1.77) | 1.48 (1.10-1.99) | 2.32 (1.81-2.96) | <.001 |
| M3**e** | 1.00 | 1.34 (0.98-1.82) | 1.31 (0.95-1.78) | 1.55 (1.18-2.01) | 2.36 (1.87-2.97) | <.001 |
| **Normal weight (BMI<25)** |  |  |  |  |  |  |
| Number of participants | 163 | 153 | 125 | 92 | 79 |  |
| M1**c** | 1.00 | 1.26 (0.63-2.52) | 2.01 (0.82-4.93) | 2.44 (1.31-4.55) | 6.07 (3.06-12.02) | <.001 |
| M2**d** | 1.00 | 1.24 (0.53-2.89) | 1.81 (0.79-4.14) | 2.56 (1.01-6.52) | 5.10 (2.35-11.06) | <.001 |
| M3**e** | 1.00 | 1.06 (0.44-2.52) | 1.83 (0.76-4.37) | 2.30 (0.92-5.78) | 4.80 (2.31-10.00) | <.001 |
| **Overweight/obese (BMI≥25)** |  |  |  |  |  |  |
| Number of participants | 260 | 290 | 309 | 363 | 399 |  |
| M1**c** | 1.00 | 1.15 (0.90-1.48) | 1.32 (1.05-1.66) | 1.41 (1.07-1.86) | 2.30 (1.81-2.93) | <.001 |
| M2**d** | 1.00 | 1.17 (0.92-1.49) | 1.33 (1.09-1.62) | 1.37 (1.08-1.74) | 2.16 (1.76-2.62) | <.001 |
| M3**e** | 1.00 | 1.20 (0.97-1.49) | 1.36 (1.12-1.64) | 1.40 (1.11-1.77) | 2.19 (1.81-2.65) | <.001 |
| **Statin use - Users** |  |  |  |  |  |  |
| Number of participants | 79 | 81 | 71 | 70 | 109 |  |
| M1**c** | 1.00 | 1.14 (0.82-1.60) | 1.38 (1.07-1.79) | 1.50 (1.18-1.91) | 2.03 (1.58-2.59) | <.001 |
| M2**d** | 1.00 | 1.15 (0.77-1.71) | 1.45 (1.10-1.91) | 1.44 (1.11-1.88) | 1.96 (1.52-2.53) | <.001 |
| M3**e** | 1.00 | 1.23 (0.80-1.88) | 1.52 (1.09-2.12) | 1.54 (1.13-2.08) | 2.05 (1.56-2.70) | <.001 |
| **Statin use - Non-users** |  |  |  |  |  |  |
| Number of participants | 344 | 362 | 363 | 385 | 369 |  |
| M1**c** | 1.00 | 1.39 (0.93-2.07) | 1.82 (1.36-2.44) | 2.24 (1.61-3.12) | 4.05 (3.06-5.35) | <.001 |
| M2**d** | 1.00 | 1.28 (0.90-1.82) | 1.60 (1.27-2.02) | 1.82 (1.39-2.38) | 3.24 (2.58-4.06) | <.001 |
| M3**e** | 1.00 | 1.30 (0.93-1.81) | 1.62 (1.29-2.04) | 1.86 (1.41-2.45) | 3.28 (2.60-4.12) | <.001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. BMI: Body Mass Index; HEI-2010: Healthy Eating Index-2010; NHANES-National Health and Nutrition Examination Survey; TFA, trans-fatty acid
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = Adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S2. Adjusted Prevalence Ratio of Metabolic Syndrome and Its Components Among Adult Participants Aged ≥20 Years by Quintiles of Plasma TFA Concentrations Excluding Participants with Missing Physical Activity and Alcohol Intake—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma TFA Concentrations, Prevalence Ratio (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 10.96-55.71 | 55.72-72.70 | 72.71-89.92 | 89.93-116.62 | 116.63-478.34 |  |
| **Number of participants** | | 281 | 289 | 257 | 258 | 278 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.47 (1.09-1.98) | 1.98 (1.29-3.05) | 2.42 (1.56-3.73) | 3.62 (2.65-4.94) | <.001 |
| M2**d** | | 1.00 | 1.48 (1.06-2.08) | 1.99 (1.30-3.04) | 2.20 (1.43-3.38) | 3.40 (2.39-4.85) | <.001 |
| M3**e** | | 1.00 | 1.47 (1.06-2.03) | 1.97 (1.30-2.99) | 2.20 (1.46-3.31) | 3.38 (2.39-4.80) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.15 (0.89-1.50) | 1.33 (0.98-1.80) | 1.56 (1.18-2.06) | 1.77 (1.41-2.23) | <.001 |
| M2**d** | | 1.00 | 1.12 (0.87-1.46) | 1.34 (1.00-1.79) | 1.49 (1.18-1.89) | 1.71 (1.40-2.08) | <.001 |
| M3**e** | | 1.00 | 1.13 (0.89-1.45) | 1.34 (1.01-1.79) | 1.51 (1.20-1.90) | 1.71 (1.41-2.08) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.13 (0.72-1.76) | 2.69 (1.99-3.63) | 3.15 (2.44-4.07) | 6.56 (5.39-7.98) | <.001 |
| M2**d** | | 1.00 | 1.32 (0.73-2.38) | 3.34 (2.43-4.57) | 3.80 (3.04-4.76) | 7.89 (6.11-10.20) | <.001 |
| M3**e** | | 1.00 | 1.30 (0.72-2.32) | 3.32 (2.42-4.55) | 3.81 (3.10-4.69) | 7.85 (6.07-10.15) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.20 (0.87-1.65) | 1.39 (0.94-2.06) | 1.73 (1.24-2.42) | 2.19 (1.71-2.80) | <.001 |
| M2**d** | | 1.00 | 1.12 (0.79-1.58) | 1.25 (0.83-1.88) | 1.45 (1.04-2.01) | 1.85 (1.38-2.49) | <.001 |
| M3**e** | | 1.00 | 1.13 (0.80-1.59) | 1.27 (0.85-1.90) | 1.46 (1.07-2.01) | 1.88 (1.41-2.50) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.18 (0.88-1.58) | 1.05 (0.75-1.46) | 0.98 (0.64-1.50) | 1.15 (0.87-1.52) | .805 |
| M2**d** | | 1.00 | 1.19 (0.90-1.57) | 1.05 (0.77-1.43) | 0.96 (0.63-1.47) | 1.13 (0.84-1.53) | .924 |
| M3**e** | | 1.00 | 1.20 (0.90-1.61) | 1.06 (0.76-1.47) | 0.97 (0.64-1.48) | 1.14 (0.85-1.54) | .895 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.37 (1.03-1.83) | 1.10 (0.69-1.76) | 1.57 (1.11-2.22) | 1.61 (1.12-2.29) | .009 |
| M2**d** | | 1.00 | 1.33 (1.12-1.58) | 1.13 (0.74-1.71) | 1.37 (1.00-1.87) | 1.49 (1.17-1.90) | .018 |
| M3**e** | | 1.00 | 1.32 (1.12-1.55) | 1.11 (0.74-1.68) | 1.34 (1.01-1.78) | 1.47 (1.17-1.86) | .017 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S3. Adjusted Prevalence Ratio of Metabolic Syndrome and Its Components Among Adult Participants Aged ≥20 Years by Quintiles of Plasma TFA Concentrations Excluding Participants with Missing Alcohol Intake—NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma TFA Concentrations, Prevalence Ratio (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 7.33-25.55 | 25.56-33.53 | 33.54-41.34 | 41.35-55.14 | 55.15-303.20 |  |
| **Number of participants** | | 390 | 409 | 410 | 428 | 459 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.17 (0.84-1.63) | 1.54 (1.18-2.00) | 1.82 (1.34-2.47) | 3.06 (2.35-3.99) | <.001 |
| M2**d** | | 1.00 | 1.19 (0.86-1.63) | 1.55 (1.23-1.97) | 1.76 (1.37-2.25) | 2.85 (2.33-3.49) | <.001 |
| M3**e** | | 1.00 | 1.22 (0.92-1.62) | 1.60 (1.27-2.00) | 1.81 (1.42-2.31) | 2.91 (2.39-3.54) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.18 (1.02-1.36) | 1.43 (1.20-1.69) | 1.45 (1.20-1.74) | 1.70 (1.45-2.00) | <.001 |
| M2**d** | | 1.00 | 1.16 (0.99-1.36) | 1.41 (1.18-1.70) | 1.41 (1.15-1.72) | 1.61 (1.38-1.89) | <.001 |
| M3**e** | | 1.00 | 1.15 (1.00-1.33) | 1.41 (1.17-1.71) | 1.41 (1.15-1.73) | 1.62 (1.39-1.89) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.23 (0.67-2.24) | 3.82 (2.08-7.00) | 6.49 (3.75-11.25) | 12.54 (7.41-21.21) | <.001 |
| M2**d** | | 1.00 | 1.41 (0.78-2.57) | 4.78 (2.51-9.07) | 7.95 (4.60-13.72) | 15.11 (8.90-25.66) | <.001 |
| M3**e** | | 1.00 | 1.58 (0.87-2.88) | 5.14 (2.70-9.76) | 8.37 (4.82-14.51) | 15.59 (9.14-26.58) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.21 (0.80-1.82) | 2.03 (1.48-2.79) | 1.94 (1.40-2.70) | 3.67 (2.65-5.06) | <.001 |
| M2**d** | | 1.00 | 1.17 (0.79-1.74) | 1.80 (1.27-2.56) | 1.68 (1.19-2.37) | 3.06 (2.18-4.28) | <.001 |
| M3**e** | | 1.00 | 1.23 (0.84-1.79) | 1.88 (1.33-2.66) | 1.73 (1.24-2.43) | 3.11 (2.21-4.38) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.92 (0.76-1.11) | 1.08 (0.91-1.28) | 1.07 (0.89-1.28) | 1.26 (1.10-1.45) | .006 |
| M2**d** | | 1.00 | 0.92 (0.76-1.11) | 1.11 (0.97-1.27) | 1.09 (0.93-1.28) | 1.26 (1.11-1.43) | .002 |
| M3**e** | | 1.00 | 0.93 (0.78-1.12) | 1.13 (0.98-1.30) | 1.11 (0.96-1.29) | 1.27 (1.12-1.44) | .001 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.02 (0.81-1.30) | 1.09 (0.87-1.36) | 1.25 (0.98-1.61) | 1.32 (1.07-1.64) | .002 |
| M2**d** | | 1.00 | 1.03 (0.85-1.24) | 1.09 (0.92-1.30) | 1.21 (1.00-1.45) | 1.22 (1.03-1.43) | .001 |
| M3**e** | | 1.00 | 1.05 (0.87-1.26) | 1.11 (0.94-1.31) | 1.22 (1.02-1.47) | 1.22 (1.04-1.44) | <.001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S4. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma TFA Concentrations Excluding Vaccenic Acid—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma TFA Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Median (range) of plasma TFA (µmmol/L)** | | 6.51-28.61 | 28.62-37.22 | 37.23-47.09 | 47.10-60.92 | 60.93-212.35 |  |
| **Number of participants** | | 301 | 286 | 294 | 261 | 300 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.49 (0.94-2.36) | 1.89 (1.21-2.97) | 2.70 (1.77-4.10) | 4.07 (2.72-6.08) | <.001 |
| M2**d** | | 1.00 | 1.55 (1.09-2.22) | 1.92 (1.29-2.84) | 2.40 (1.67-3.44) | 3.78 (2.65-5.40) | <.001 |
| M3**e** | | 1.00 | 1.53 (1.08-2.16) | 1.92 (1.31-2.80) | 2.41 (1.71-3.38) | 3.77 (2.66-5.36) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.20 (0.88-1.65) | 1.66 (1.12-2.45) | 1.83 (1.43-2.35) | 2.09 (1.64-2.66) | <.001 |
| M2**d** | | 1.00 | 1.24 (0.91-1.69) | 1.68 (1.16-2.44) | 1.75 (1.43-2.14) | 2.03 (1.65-2.50) | <.001 |
| M3**e** | | 1.00 | 1.25 (0.93-1.69) | 1.69 (1.17-2.44) | 1.77 (1.45-2.16) | 2.04 (1.65-2.51) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.49 (1.09-5.67) | 4.69 (2.21-9.94) | 6.89 (3.26-14.53) | 13.05 (6.75-25.24) | <.001 |
| M2**d** | | 1.00 | 2.86 (1.29-6.33) | 5.56 (2.77-11.15) | 7.87 (3.88-15.95) | 15.09 (8.07-28.22) | <.001 |
| M3**e** | | 1.00 | 2.78 (1.23-6.28) | 5.58 (2.77-11.25) | 7.86 (3.82-16.18) | 15.03 (7.89-28.66) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.28 (0.99-1.65) | 1.51 (1.15-2.00) | 1.75 (1.34-2.26) | 2.35 (1.86-2.97) | <.001 |
| M2**d** | | 1.00 | 1.19 (0.92-1.56) | 1.42 (1.06-1.91) | 1.48 (1.16-1.87) | 2.03 (1.58-2.60) | <.001 |
| M3**e** | | 1.00 | 1.21 (0.92-1.57) | 1.44 (1.07-1.92) | 1.48 (1.16-1.89) | 2.04 (1.60-2.61) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.97 (0.77-1.22) | 1.08 (0.82-1.43) | 0.99 (0.76-1.30) | 1.14 (0.84-1.55) | .415 |
| M2**d** | | 1.00 | 0.98 (0.78-1.22) | 1.07 (0.81-1.42) | 0.97 (0.75-1.25) | 1.12 (0.82-1.51) | .554 |
| M3**e** | | 1.00 | 0.99 (0.79-1.24) | 1.07 (0.80-1.44) | 0.97 (0.75-1.26) | 1.12 (0.83-1.51) | .551 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.10 (0.89-1.35) | 0.92 (0.58-1.46) | 1.46 (1.02-2.11) | 1.46 (1.10-1.94) | .007 |
| M2**d** | | 1.00 | 1.17 (1.01-1.35) | 0.96 (0.65-1.41) | 1.29 (0.95-1.73) | 1.39 (1.11-1.73) | .020 |
| M3**e** | | 1.00 | 1.16 (1.01-1.32) | 0.95 (0.65-1.39) | 1.28 (0.96-1.70) | 1.39 (1.12-1.72) | .020 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S5. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma TFA Concentrations Excluding Vaccenic Acid —NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma TFA Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Median (range) of plasma TFA (µmmol/L)** | | 4.41-12.77 | 12.78-16.54 | 16.55-20.97 | 20.98-27.83 | 27.84-174.20 |  |
| **Number of participants** | | 409 | 424 | 454 | 447 | 499 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.56 (1.05-2.31) | 1.63 (1.24-2.16) | 2.24 (1.48-3.39) | 3.76 (2.70-5.24) | <.001 |
| M2**d** | | 1.00 | 1.54 (1.09-2.16) | 1.58 (1.24-2.02) | 2.07 (1.45-2.96) | 3.33 (2.52-4.40) | <.001 |
| M3**e** | | 1.00 | 1.58 (1.12-2.22) | 1.62 (1.26-2.09) | 2.17 (1.50-3.14) | 3.44 (2.56-4.63) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.58 (1.28-1.95) | 1.52 (1.27-1.81) | 1.74 (1.45-2.10) | 2.02 (1.70-2.40) | <.001 |
| M2**d** | | 1.00 | 1.54 (1.23-1.93) | 1.47 (1.21-1.78) | 1.68 (1.39-2.03) | 1.88 (1.63-2.17) | <.001 |
| M3**e** | | 1.00 | 1.55 (1.24-1.93) | 1.50 (1.23-1.84) | 1.72 (1.43-2.07) | 1.93 (1.68-2.21) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.91 (1.27-6.64) | 5.83 (4.29-7.94) | 13.88 (8.92-21.59) | 24.18 (15.53-37.66) | <.001 |
| M2**d** | | 1.00 | 3.36 (1.46-7.71) | 7.18 (5.27-9.78) | 16.72 (10.68-26.16) | 29.09 (18.72-45.19) | <.001 |
| M3**e** | | 1.00 | 3.41 (1.62-7.19) | 6.84 (5.01-9.32) | 15.87 (10.42-24.17) | 27.30 (18.08-41.22) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.87 (1.20-2.93) | 2.16 (1.47-3.19) | 2.78 (1.84-4.21) | 4.63 (3.24-6.62) | <.001 |
| M2**d** | | 1.00 | 1.81 (1.20-2.74) | 1.92 (1.31-2.82) | 2.45 (1.60-3.74) | 3.84 (2.69-5.50) | <.001 |
| M3**e** | | 1.00 | 1.84 (1.22-2.77) | 1.93 (1.28-2.91) | 2.45 (1.58-3.81) | 3.82 (2.61-5.60) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.21 (0.99-1.48) | 1.16 (0.99-1.35) | 1.20 (0.94-1.54) | 1.48 (1.24-1.77) | .002 |
| M2**d** | | 1.00 | 1.21 (0.99-1.48) | 1.19 (1.04-1.35) | 1.21 (0.97-1.52) | 1.46 (1.25-1.70) | .001 |
| M3**e** | | 1.00 | 1.23 (1.02-1.49) | 1.20 (1.04-1.39) | 1.24 (1.00-1.55) | 1.48 (1.27-1.73) | <.001 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.16 (0.91-1.48) | 1.20 (0.98-1.48) | 1.28 (0.97-1.69) | 1.46 (1.18-1.82) | <.001 |
| M2**d** | | 1.00 | 1.11 (0.94-1.33) | 1.16 (0.99-1.36) | 1.19 (0.98-1.44) | 1.27 (1.09-1.48) | <.001 |
| M3**e** | | 1.00 | 1.13 (0.95-1.35) | 1.17 (1.00-1.36) | 1.22 (1.00-1.48) | 1.29 (1.09-1.53) | <.001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S6. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Vaccenic Acid Concentrations—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Vaccenic Acid (18:1n-7t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 4.45-25.81 | 25.82-33.98 | 33.99-41.85 | 41.86-53.33 | 51.34-298.20 |  |
| **Number of participants** | | 317 | 298 | 277 | 255 | 295 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.52 (1.08-2.15) | 2.03 (1.54-2.67) | 2.07 (1.45-2.94) | 3.30 (2.66-4.10) | <.001 |
| M2**d** | | 1.00 | 1.38 (0.95-1.99) | 1.90 (1.38-2.61) | 1.81 (1.25-2.63) | 2.92 (2.09-4.07) | <.001 |
| M3**e** | | 1.00 | 1.37 (0.95-1.95) | 1.88 (1.37-2.60) | 1.82 (1.28-2.58) | 2.90 (2.07-4.07) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.15 (0.93-1.43) | 1.29 (0.96-1.74) | 1.44 (1.14-1.82) | 1.60 (1.29-1.99) | <.001 |
| M2**d** | | 1.00 | 1.08 (0.89-1.31) | 1.24 (0.90-1.70) | 1.33 (1.08-1.63) | 1.48 (1.18-1.86) | <.001 |
| M3**e** | | 1.00 | 1.09 (0.91-1.31) | 1.25 (0.91-1.70) | 1.35 (1.11-1.64) | 1.48 (1.19-1.84) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.15 (0.73-1.79) | 2.06 (1.48-2.89) | 2.58 (1.76-3.77) | 4.97 (3.69-6.70) | <.001 |
| M2**d** | | 1.00 | 1.16 (0.76-1.78) | 2.45 (1.77-3.38) | 2.97 (2.06-4.27) | 5.64 (4.26-7.47) | <.001 |
| M3**e** | | 1.00 | 1.15 (0.75-1.76) | 2.40 (1.68-3.43) | 2.99 (2.10-4.27) | 5.66 (4.23-7.56) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.14 (0.78-1.67) | 1.35 (0.97-1.88) | 1.55 (1.17-2.07) | 2.13 (1.61-2.80) | <.001 |
| M2**d** | | 1.00 | 1.07 (0.73-1.57) | 1.21 (0.85-1.72) | 1.36 (1.02-1.82) | 1.81 (1.30-2.52) | <.001 |
| M3**e** | | 1.00 | 1.09 (0.75-1.59) | 1.23 (0.87-1.74) | 1.39 (1.06-1.81) | 1.87 (1.35-2.59) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.07 (0.86-1.32) | 1.02 (0.78-1.33) | 0.94 (0.66-1.33) | 1.04 (0.82-1.32) | .857 |
| M2**d** | | 1.00 | 1.06 (0.85-1.32) | 1.01 (0.77-1.32) | 0.89 (0.63-1.27) | 1.00 (0.76-1.31) | .620 |
| M3**e** | | 1.00 | 1.07 (0.86-1.35) | 1.02 (0.77-1.35) | 0.90 (0.64-1.28) | 1.01 (0.77-1.32) | .636 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.27 (0.96-1.70) | 1.34 (1.09-1.63) | 1.30 (0.94-1.81) | 1.65 (1.23-2.21) | .004 |
| M2**d** | | 1.00 | 1.17 (0.93-1.48) | 1.29 (1.06-1.57) | 1.13 (0.87-1.47) | 1.50 (1.13-1.99) | .014 |
| M3**e** | | 1.00 | 1.16 (0.92-1.45) | 1.28 (1.06-1.55) | 1.11 (0.88-1.41) | 1.47 (1.12-1.92) | .014 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S7. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Vaccenic Acid Concentrations—NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Vaccenic Acid (18:1n-7t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 2.92-12.19 | 12.20-16.14 | 16.15-20.11 | 20.12-26.41 | 26.42-161.00 |  |
| **Number of participants** | | 422 | 464 | 431 | 453 | 463 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.17 (0.89-1.53) | 1.31 (1.03-1.67) | 1.85 (1.58-2.16) | 2.38 (1.93-2.93) | <.001 |
| M2**d** | | 1.00 | 1.14 (0.91-1.43) | 1.29 (1.07-1.55) | 1.67 (1.47-1.89) | 2.15 (1.86-2.50) | <.001 |
| M3**e** | | 1.00 | 1.21 (0.97-1.51) | 1.37 (1.16-1.62) | 1.77 (1.56-2.01) | 2.31 (1.98-2.68) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.07 (0.93-1.23) | 1.41 (1.21-1.64) | 1.33 (1.14-1.55) | 1.43 (1.20-1.70) | <.001 |
| M2**d** | | 1.00 | 1.05 (0.91-1.21) | 1.38 (1.15-1.65) | 1.25 (1.04-1.50) | 1.35 (1.13-1.62) | <.001 |
| M3**e** | | 1.00 | 1.05 (0.91-1.21) | 1.39 (1.16-1.65) | 1.26 (1.05-1.52) | 1.37 (1.14-1.63) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.22 (1.24-3.95) | 3.63 (2.22-5.93) | 6.33 (3.73-10.76) | 10.35 (6.56-16.32) | <.001 |
| M2**d** | | 1.00 | 2.31 (1.29-4.12) | 4.04 (2.46-6.63) | 6.93 (4.15-11.58) | 11.28 (7.19-17.70) | <.001 |
| M3**e** | | 1.00 | 2.62 (1.41-4.84) | 4.67 (2.82-7.71) | 7.54 (4.51-12.60) | 12.29 (7.79-19.39) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.98 (0.70-1.39) | 1.43 (1.07-1.93) | 1.89 (1.46-2.45) | 2.66 (2.01-3.53) | <.001 |
| M2**d** | | 1.00 | 0.92 (0.68-1.25) | 1.31 (0.95-1.79) | 1.55 (1.18-2.04) | 2.21 (1.70-2.88) | <.001 |
| M3**e** | | 1.00 | 0.95 (0.70-1.30) | 1.37 (1.00-1.88) | 1.61 (1.22-2.13) | 2.29 (1.74-3.02) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.85 (0.71-1.01) | 0.89 (0.76-1.03) | 1.13 (1.03-1.25) | 1.00 (0.88-1.13) | .048 |
| M2**d** | | 1.00 | 0.84 (0.71-0.99) | 0.89 (0.79-1.02) | 1.13 (1.01-1.25) | 0.99 (0.87-1.11) | .087 |
| M3**e** | | 1.00 | 0.86 (0.71-1.04) | 0.92 (0.81-1.05) | 1.16 (1.04-1.29) | 1.02 (0.90-1.16) | .021 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.94 (0.73-1.22) | 1.02 (0.83-1.26) | 1.26 (1.05-1.51) | 1.16 (0.95-1.41) | .005 |
| M2**d** | | 1.00 | 0.94 (0.77-1.15) | 1.02 (0.87-1.19) | 1.20 (1.05-1.36) | 1.08 (0.94-1.24) | .003 |
| M3**e** | | 1.00 | 0.98 (0.80-1.18) | 1.05 (0.90-1.23) | 1.24 (1.09-1.41) | 1.12 (0.98-1.29) | <.001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S8. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Elaidic Acid Concentrations—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Elaidic Acid (18:1n-9t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Number of participants** | | 304 | 274 | 301 | 266 | 297 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.58 (0.95-2.64) | 1.91 (1.18-3.09) | 2.47 (1.60-3.83) | 4.14 (2.66-6.46) | <.001 |
| M2**d** | | 1.00 | 1.63 (1.11-2.41) | 1.86 (1.25-2.77) | 2.19 (1.58-3.03) | 3.75 (2.58-5.46) | <.001 |
| M3**e** | | 1.00 | 1.61 (1.10-2.37) | 1.86 (1.27-2.73) | 2.20 (1.62-2.99) | 3.75 (2.60-5.40) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.20 (0.84-1.72) | 1.68 (1.14-2.49) | 1.75 (1.33-2.30) | 2.10 (1.61-2.74) | <.001 |
| M2**d** | | 1.00 | 1.24 (0.89-1.73) | 1.70 (1.18-2.45) | 1.68 (1.38-2.05) | 2.03 (1.60-2.58) | <.001 |
| M3**e** | | 1.00 | 1.24 (0.90-1.73) | 1.71 (1.19-2.46) | 1.71 (1.40-2.08) | 2.04 (1.62-2.59) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.32 (1.15-4.68) | 3.53 (1.89-6.59) | 5.57 (3.25-9.57) | 10.90 (6.85-17.36) | <.001 |
| M2**d** | | 1.00 | 2.66 (1.36-5.22) | 3.95 (2.08-7.52) | 6.28 (3.71-10.64) | 12.10 (7.61-19.26) | <.001 |
| M3**e** | | 1.00 | 2.60 (1.32-5.12) | 3.98 (2.12-7.50) | 6.30 (3.68-10.80) | 12.08 (7.53-19.37) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.29 (0.99-1.68) | 1.51 (1.11-2.04) | 1.79 (1.31-2.45) | 2.43 (1.92-3.08) | <.001 |
| M2**d** | | 1.00 | 1.22 (0.89-1.69) | 1.40 (0.99-1.98) | 1.52 (1.11-2.07) | 2.10 (1.59-2.77) | <.001 |
| M3**e** | | 1.00 | 1.24 (0.91-1.70) | 1.41 (1.00-1.98) | 1.52 (1.10-2.08) | 2.11 (1.60-2.77) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.96 (0.69-1.34) | 1.09 (0.82-1.44) | 0.97 (0.68-1.38) | 1.13 (0.82-1.56) | .488 |
| M2**d** | | 1.00 | 0.96 (0.70-1.32) | 1.06 (0.80-1.39) | 0.94 (0.66-1.35) | 1.09 (0.80-1.49) | .680 |
| M3**e** | | 1.00 | 0.97 (0.70-1.34) | 1.07 (0.81-1.42) | 0.95 (0.67-1.35) | 1.10 (0.80-1.49) | .666 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.11 (0.86-1.42) | 0.97 (0.63-1.50) | 1.35 (0.93-1.96) | 1.53 (1.15-2.05) | .006 |
| M2**d** | | 1.00 | 1.18 (1.01-1.38) | 1.00 (0.70-1.42) | 1.21 (0.92-1.58) | 1.41 (1.11-1.79) | .030 |
| M3**e** | | 1.00 | 1.17 (1.01-1.35) | 0.99 (0.71-1.38) | 1.20 (0.93-1.55) | 1.40 (1.11-1.78) | .030 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S9. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Elaidic Acid Concentrations—NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Elaidic Acid (18:1n-9t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 2.66-8.60 | 8.61-11.51 | 11.52-15.01 | 15.02-20.46 | 20.47-126.00 |  |
| **Number of participants** | | 407 | 419 | 451 | 457 | 499 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.43 (0.92-2.24) | 1.67 (1.19-2.35) | 2.15 (1.49-3.11) | 3.59 (2.48-5.21) | <.001 |
| M2**d** | | 1.00 | 1.33 (0.93-1.91) | 1.54 (1.12-2.12) | 1.92 (1.43-2.58) | 3.05 (2.18-4.28) | <.001 |
| M3**e** | | 1.00 | 1.35 (0.93-1.97) | 1.57 (1.12-2.20) | 1.99 (1.44-2.76) | 3.13 (2.19-4.49) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.54 (1.27-1.85) | 1.48 (1.23-1.79) | 1.67 (1.43-1.95) | 1.96 (1.64-2.35) | <.001 |
| M2**d** | | 1.00 | 1.45 (1.20-1.75) | 1.40 (1.15-1.70) | 1.59 (1.37-1.84) | 1.79 (1.54-2.07) | <.001 |
| M3**e** | | 1.00 | 1.47 (1.22-1.77) | 1.42 (1.16-1.74) | 1.63 (1.40-1.90) | 1.84 (1.59-2.13) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 3.13 (1.44-6.17) | 5.61 (2.96-10.62) | 11.70 (6.33-21.62) | 20.71 (10.82-39.65) | <.001 |
| M2**d** | | 1.00 | 3.51 (1.57-7.84) | 6.66 (3.52-12.57) | 13.95 (7.27-26.76) | 24.30 (12.40-47.63) | <.001 |
| M3**e** | | 1.00 | 3.35 (1.55-7.24) | 6.28 (3.30-11.98) | 12.69 (6.70-24.02) | 22.18 (11.49-42.80) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.64 (1.15-2.34) | 2.31 (1.64-3.27) | 2.81 (1.92-4.09) | 4.67 (3.48-6.26) | <.001 |
| M2**d** | | 1.00 | 1.61 (1.15-2.25) | 2.02 (1.41-2.90) | 2.46 (1.66-3.65) | 3.89 (2.85-5.31) | <.001 |
| M3**e** | | 1.00 | 1.61 (1.14-2.25) | 2.03 (1.38-2.98) | 2.44 (1.60-3.73) | 3.85 (2.75-5.39) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.36 (1.15-1.60) | 1.20 (0.99-1.46) | 1.33 (1.01-1.75) | 1.56 (1.27-1.93) | .002 |
| M2**d** | | 1.00 | 1.34 (1.16-1.55) | 1.22 (1.04-1.44) | 1.33 (1.03-1.72) | 1.52 (1.25-1.85) | .002 |
| M3**e** | | 1.00 | 1.35 (1.16-1.57) | 1.23 (1.04-1.46) | 1.36 (1.04-1.77) | 1.54 (1.26-1.89) | .002 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.07 (0.78-1.47) | 1.13 (0.93-1.37) | 1.34 (1.03-1.75) | 1.42 (1.12-1.81) | <.001 |
| M2**d** | | 1.00 | 1.00 (0.79-1.26) | 1.07 (0.89-1.28) | 1.22 (1.03-1.45) | 1.22 (1.02-1.45) | <.001 |
| M3**e** | | 1.00 | 1.01 (0.79-1.28) | 1.07 (0.90-1.28) | 1.24 (1.03-1.49) | 1.23 (1.01-1.50) | <.001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S10. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Palmitelaidic Acid Concentrations—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Palmitelaidic Acid (18:1n-7t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 1.10-4.75 | 4.76-6.13 | 6.14-7.46 | 7.47-9.63 | 9.64-27.40 |  |
| **Number of participants** | | 321 | 283 | 269 | 270 | 299 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.42 (0.86-2.36) | 2.30 (1.54-3.44) | 2.46 (1.81-3.34) | 3.50 (2.57-4.75) | <.001 |
| M2**d** | | 1.00 | 1.45 (0.87-2.40) | 2.27 (1.40-3.69) | 2.42 (1.58-3.72) | 3.36 (2.11-5.36) | <.001 |
| M3**e** | | 1.00 | 1.45 (0.88-2.38) | 2.27 (1.41-3.65) | 2.42 (1.59-3.68) | 3.38 (2.13-5.36) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.29 (1.05-1.58) | 1.42 (1.17-1.71) | 1.71 (1.17-2.14) | 1.87 (1.48-2.36) | <.001 |
| M2**d** | | 1.00 | 1.33 (1.06-1.65) | 1.45 (1.16-1.80) | 1.71 (1.32-2.23) | 1.84 (1.44-2.35) | <.001 |
| M3**e** | | 1.00 | 1.33 (1.07-1.67) | 1.45 (1.17-1.79) | 1.72 (1.33-2.23) | 1.83 (1.44-2.33) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.84 (1.23-2.74) | 2.72 (1.72-4.53) | 3.57 (2.33-5.47) | 6.01 (4.10-8.81) | <.001 |
| M2**d** | | 1.00 | 2.25 (1.56-3.24) | 3.35 (2.16-5.20) | 4.80 (3.36-6.87) | 7.68 (5.55-10.61) | <.001 |
| M3**e** | | 1.00 | 2.31 (1.66-3.22) | 3.45 (2.24-5.30) | 4.91 (3.36-7.18) | 8.00 (5.90-10.83) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.47 (1.11-1.97) | 1.70 (1.16-2.48) | 1.99 (1.47-2.70) | 2.48 (1.84-3.35) | <.001 |
| M2**d** | | 1.00 | 1.35 (0.99-1.83) | 1.52 (0.97-2.40) | 1.81 (1.26-2.61) | 2.21 (1.50-3.25) | <.001 |
| M3**e** | | 1.00 | 1.38 (1.01-1.88) | 1.58 (1.04-2.41) | 1.85 (1.29-2.66) | 2.28 (1.56-3.31) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.01 (0.82-1.25) | 1.09 (0.82-1.45) | 1.01 (0.83-1.23) | 1.03 (0.79-1.33) | .864 |
| M2**d** | | 1.00 | 1.03 (0.82-1.29) | 1.08 (0.83-1.42) | 1.02 (0.82-1.27) | 1.00 (0.74-1.35) | .959 |
| M3**e** | | 1.00 | 1.03 (0.83-1.29) | 1.09 (0.84-1.42) | 1.03 (0.82-1.29) | 0.99 (0.74-1.34) | .948 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 0.85 (0.62-1.15) | 1.23 (0.87-1.72) | 1.24 (1.05-1.46) | 1.41 (1.02-1.94) | .006 |
| M2**d** | | 1.00 | 0.87 (0.69-1.10) | 1.23 (0.91-1.68) | 1.17 (0.96-1.43) | 1.34 (0.97-1.86) | .020 |
| M3**e** | | 1.00 | 0.87 (0.69-1.09) | 1.21 (0.90-1.63) | 1.15 (0.96-1.38) | 1.33 (0.97-1.81) | .018 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S11. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Palmitelaidic Acid Concentrations—NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Palmitelaidic Acid (18:1n-7t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 0.88-2.70 | 2.71-3.49 | 3.50-4.24 | 4.25-5.44 | 5.45-33.1 |  |
| **Number of participants** | | 432 | 458 | 433 | 451 | 459 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.52 (1.18-1.96) | 1.75 (1.35-2.28) | 2.00 (1.48-2.71) | 2.97 (2.36-3.74) | <.001 |
| M2**d** | | 1.00 | 1.40 (1.04-1.88) | 1.67 (1.28-2.17) | 1.84 (1.46-2.33) | 2.68 (2.23-3.23) | <.001 |
| M3**e** | | 1.00 | 1.48 (1.11-1.98) | 1.79 (1.37-2.32) | 1.99 (1.57-2.52) | 2.87 (2.37-3.48) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.35 (1.13-1.61) | 1.46 (1.23-1.73) | 1.62 (1.30-2.01) | 1.75 (1.45-2.11) | <.001 |
| M2**d** | | 1.00 | 1.28 (1.08-1.51) | 1.43 (1.22-1.68) | 1.55 (1.27-1.89) | 1.66 (1.41-1.95) | <.001 |
| M3**e** | | 1.00 | 1.29 (1.09-1.53) | 1.45 (1.23-1.71) | 1.58 (1.30-1.93) | 1.69 (1.43-1.99) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.55 (1.74-3.76) | 3.30 (2.25-4.85) | 5.52 (4.20-7.25) | 10.90 (8.25-14.39) | <.001 |
| M2**d** | | 1.00 | 2.62 (1.72-3.68) | 3.75 (2.33-6.05) | 6.25 (4.51-8.67) | 12.17 (8.81-16.82) | <.001 |
| M3**e** | | 1.00 | 2.97 (2.00-4.43) | 4.44 (2.78-7.09) | 7.30 (5.17-10.29) | 13.82 (9.95-19.20) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.45 (1.03-2.03) | 1.89 (1.35-2.63) | 2.16 (1.52-3.07) | 3.24 (2.43-4.31) | <.001 |
| M2**d** | | 1.00 | 1.31 (0.99-1.74) | 1.69 (1.30-2.22) | 1.83 (1.33-2.52) | 2.72 (2.13-3.48) | <.001 |
| M3**e** | | 1.00 | 1.36 (1.01-1.84) | 1.77 (1.33-2.35) | 1.92 (1.38-2.67) | 2.82 (2.17-3.66) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.00 (0.83-1.21) | 1.04 (0.88-1.22) | 1.12 (0.94-1.32) | 1.10 (0.96-1.24) | .579 |
| M2**d** | | 1.00 | 0.98 (0.81-1.18) | 1.04 (0.90-1.20) | 1.12 (0.99-1.27) | 1.09 (0.98-1.21) | .044 |
| M3**e** | | 1.00 | 1.00 (0.82-1.22) | 1.07 (0.91-1.26) | 1.16 (1.02-1.32) | 1.12 (0.99-1.27) | .020 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.08 (0.95-1.23) | 1.14 (0.92-1.40) | 1.21 (0.94-1.56) | 1.28 (1.08-1.53) | .018 |
| M2**d** | | 1.00 | 1.05 (0.91-1.21) | 1.11 (0.94-1.32) | 1.17 (0.99-1.39) | 1.20 (1.05-1.36) | .007 |
| M3**e** | | 1.00 | 1.08 (0.93-1.26) | 1.15 (0.98-1.36) | 1.22 (1.01-1.48) | 1.24 (1.08-1.42) | .003 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on Satterthwaite adjusted F-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S12. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Linoelaidic Acid Concentrations—NHANES 1999-2000**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Linoelaidic Acid (18:2n-6t, 9t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 0.59-1.85 | 1.86-2.42 | 2.43-3.07 | 3.08-4.04 | 4.05-13.10 |  |
| **Number of participants** | | 308 | 315 | 282 | 273 | 264 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.41 (0.88-2.28) | 2.25 (1.51-3.35) | 3.83 (2.73-5.35) | 4.78 (3.26-7.01) | <.001 |
| M2**d** | | 1.00 | 1.18 (0.80-1.73) | 1.96 (1.39-2.75) | 2.94 (2.23-3.87) | 3.79 (2.87-5.02) | <.001 |
| M3**e** | | 1.00 | 1.18 (0.79-1.75) | 1.95 (1.36-2.79) | 2.93 (2.21-3.89) | 3.80 (2.84-5.09) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.23 (0.86-1.75) | 2.08 (1.53-2.83) | 2.11 (1.69-2.65) | 2.32 (1.77-3.03) | <.001 |
| M2**d** | | 1.00 | 1.18 (0.86-1.64) | 1.97 (1.48-2.63) | 1.91 (1.54-2.37) | 2.14 (1.72-2.67) | <.001 |
| M3**e** | | 1.00 | 1.18 (0.85-1.64) | 1.96 (1.45-2.66) | 1.92 (1.54-2.39) | 2.15 (1.71-2.72) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 2.97 (1.55-5.70) | 7.15 (2.90-17.64) | 14.96 (7.17-31.19) | 23.82 (11.09-51.16) | <.001 |
| M2**d** | | 1.00 | 2.64 (1.46-4.77) | 6.83 (2.81-16.62) | 13.50 (6.48-28.14) | 21.90 (10.39-46.18) | <.001 |
| M3**e** | | 1.00 | 2.63 (1.44-4.80) | 6.85 (2.84-16.52) | 13.37 (6.37-28.04) | 21.74 (10.21-46.26) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.14 (0.87-1.49) | 1.30 (0.96-1.76) | 1.53 (1.06-2.21) | 2.00 (1.58-2.54) | <.001 |
| M2**d** | | 1.00 | 1.12 (0.86-1.45) | 1.28 (0.96-1.71) | 1.42 (1.02-1.97) | 1.80 (1.44-2.26) | <.001 |
| M3**e** | | 1.00 | 1.12 (0.88-1.44) | 1.29 (0.98-1.71) | 1.43 (1.03-1.97) | 1.80 (1.44-2.25) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.13 (0.87-1.45) | 1.14 (0.87-1.51) | 1.20 (0.89-1.62) | 1.40 (1.09-1.78) | .012 |
| M2**d** | | 1.00 | 1.07 (0.84-1.37) | 1.08 (0.83-1.42) | 1.13 (0.85-1.50) | 1.31 (1.05-1.64) | .027 |
| M3**e** | | 1.00 | 1.07 (0.85-1.36) | 1.08 (0.82-1.42) | 1.13 (0.85-1.50) | 1.31 (1.05-1.63) | .028 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.10 (0.81-1.49) | 1.15 (0.84-1.57) | 1.60 (1.20-2.13) | 1.57 (1.11-2.22) | <.001 |
| M2**d** | | 1.00 | 0.98 (0.76-1.25) | 1.08 (0.87-1.33) | 1.25 (0.98-1.61) | 1.31 (1.05-1.63) | .002 |
| M3**e** | | 1.00 | 0.98 (0.76-1.27) | 1.07 (0.85-1.35) | 1.25 (0.98-1.61) | 1.33 (1.06-1.67) | .001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on t-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.

**Supplemental Table S13. Adjusted Prevalence Ratios of Metabolic Syndrome and Its Components Among Participants Aged ≥20 Years by Quintiles of Plasma Linoelaidic Acid Concentrations—NHANES 2009-2010**a

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintiles of Plasma Linoelaidic Acid (18:2n-6t, 9t) Concentrations, Prevalence Ratios (95% CI) | | | | | | *P* Value for trendb |
|  | | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** |
| **Range** | | 0.42-1.09 | 1.10-1.38 | 1.39-1.71 | 1.72-2.22 | 2.23-15.1 |  |
| **Number of participants** | | 442 | 425 | 450 | 458 | 458 |  |
| **Metabolic Syndrome** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.51 (1.10-2.08) | 1.64 (1.35-1.98) | 2.21 (1.80-2.71) | 3.26 (2.59-4.11) | <.001 |
| M2**d** | | 1.00 | 1.45 (1.14-1.86) | 1.54 (1.32-1.79) | 1.99 (1.71-2.32) | 2.80 (2.31-3.39) | <.001 |
| M3**e** | | 1.00 | 1.45 (1.14-1.86) | 1.57 (1.34-1.83) | 2.09 (1.78-2.45) | 2.88 (2.37-3.49) | <.001 |
| **Large waistline** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.33 (1.20-1.57) | 1.48 (1.30-1.69) | 1.68 (1.42-1.98) | 1.80 (1.45-2.24) | <.001 |
| M2**d** | | 1.00 | 1.30 (1.12-1.50) | 1.45 (1.29-1.63) | 1.63 (1.39-1.90) | 1.69 (1.41-2.04) | <.001 |
| M3**e** | | 1.00 | 1.30 (1.10-1.52) | 1.46 (1.30-1.64) | 1.68 (1.42-1.98) | 1.74 (1.46-2.09) | <.001 |
| **High triglyceride level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 3.53 (0.93-13.43) | 7.48 (3.00-18.68) | 19.33 (8.05-46.44) | 37.88 (16.05-89.37) | <.001 |
| M2**d** | | 1.00 | 3.67 (1.06-12.73) | 8.14 (3.25-20.36) | 20.23 (8.48-48.29) | 39.53 (16.86-92.67) | <.001 |
| M3**e** | | 1.00 | 3.48 (1.07-11.32) | 7.92 (3.22-19.49) | 18.84 (7.91-44.90) | 36.87 (15.93-85.30) | <.001 |
| **Low HDL cholesterol level** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.64 (1.23-2.18) | 1.57 (1.13-2.16) | 1.86 (1.28-2.70) | 2.82 (2.24-3.54) | <.001 |
| M2**d** | | 1.00 | 1.57 (1.15-2.13) | 1.51 (1.09-2.10) | 1.68 (1.13-2.50) | 2.44 (1.90-3.13) | <.001 |
| M3**e** | | 1.00 | 1.56 (1.14-2.14) | 1.51 (1.08-2.12) | 1.68 (1.10-2.55) | 2.42 (1.85-3.16) | <.001 |
| **High blood pressure** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.28 (1.01-1.62) | 1.19 (1.02-1.38) | 1.33 (1.06-1.66) | 1.61 (1.30-1.98) | <.001 |
| M2**d** | | 1.00 | 1.27 (1.03-1.56) | 1.17 (1.01-1.35) | 1.30 (1.06-1.60) | 1.53 (1.26-1.86) | <.001 |
| M3**e** | | 1.00 | 1.27 (1.03-1.57) | 1.17 (1.01-1.37) | 1.33 (1.08-1.63) | 1.55 (1.28-1.89) | <.001 |
| **High fasting glucose** | |  |  |  |  |  |  |
| M1**c** | | 1.00 | 1.09 (0.77-1.54) | 1.25 (0.94-1.66) | 1.31 (1.09-1.58) | 1.42 (1.11-1.83) | <.001 |
| M2**d** | | 1.00 | 1.08 (0.82-1.42) | 1.20 (0.95-1.51) | 1.22 (1.07-1.40) | 1.26 (1.02-1.56) | .002 |
| M3**e** | | 1.00 | 1.07 (0.81-1.41) | 1.20 (0.95-1.53) | 1.24 (1.07-1.43) | 1.26 (1.02-1.56) | .001 |

Values are medians (ranges) for plasma TFA concentration or adjusted prevalence ratio (95% CIs).

1. HDL, high-density lipoprotein; NHANES, National Health and Nutrition Examination Survey; TFA, trans-fatty acid.
2. P-values are presented for difference across the quintiles of plasma TFA concentrations. All tests were 2-tailed and based on t-test.
3. M1 = adjusted for age, sex, race/ethnicity, and total energy intake.
4. M2 = in addition to M1, adjusted for educational attainment, smoking status, alcohol consumption, physical activity level, statin use, diabetes status, and healthy eating index-2010.
5. M3 = in addition to M2, adjusted for total saturated fatty acids, total polyunsaturated fatty acids, and total cholesterol intakes.