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39   **Abstract**

40   **Background:** Naturally occurring dietary patterns, a major contributor to health, are not well

41   described among those with cardiovascular disease (CVD) – particularly in light of

42   socioeconomic vulnerability. We sought to identify major dietary patterns in the US and their

43   distribution by CVD, social risk factors, and Supplemental Nutrition Assistance Program

44   (SNAP) participation.

45   **Methods:** This was a cross-sectional study among 32,498 noninstitutionalized adults from the

46   National Health and Nutrition Examination Survey (2009-2020). We used principal component

47   analysis to identify common dietary patterns. Individuals were assigned to the pattern for which

48   they had the highest component score. Using multinomial logit regression, we estimated the

49   percentage whose diets aligned with each pattern in population subgroups stratified by CVD,

50   social risk factors, and SNAP. Analyses were adjusted for age, gender, race and ethnicity, total

51   energy intake, and year, with sampling weights to provide nationally representative estimates.

52   **Results:** Four dietary patterns were identified among US adults: American (33.7%; high in solid

53   fats, added sugars, and refined grains), Prudent (22.6%; high in vegetables, nuts/seeds, oils,

54   seafood, and poultry), Legume (15.8%), and Fruit/Whole Grain/Dairy (27.9%), that together

55   explained 29.2% of dietary variance. More adults with prevalent CVD (37.1%) than without

56   (33.3%, p=0.005) aligned with the American Pattern, with no differences among other patterns.

57   Each additional social risk factor associated with more adults aligned with American (2.5%

58   absolute increase) and Legume (1.3%), and fewer aligned with Prudent (-1.9%) and Fruit/Whole

59   Grain/Dairy (-1.9%) patterns (p<0.001 each). Analysis of dietary patterns across SNAP

60   participation showed higher proportion of SNAP participants and income-eligible SNAP non-

61   participants compared to non-eligible adults for the American (40.2% [38.1, 42.3%], 35.1%

3

62   [32.7, 37.5%], 31.9% [31.0, 32.8%], respectively) and Legume patterns (17.2% [15.6, 18.8%],

63   17.8% [16.1, 19.5%]), 15.4% [14.6,16.1%], respectively) and less for Prudent (17.0% [15.5,

64   18.6%], 20.2% [18.2, 22.3%], 24.2% [23.3, 25.1%], respectively) and Fruit/Whole Grain/Dairy

65   Patterns (25.6% [23.8%, 27.3%], 26.9%[27.6%,29.5%], 28.6% [27.6%, 29.5%], respectively).

66   **Conclusions:** Empirical dietary patterns vary by CVD and socioeconomic vulnerability.

67   Initiatives to improve nutrition in at-risk individuals should consider these naturally occurring

68   dietary patterns and their variation in key subgroups.

69   **Introduction**

70   Poor diet is among the greatest contributing factors to premature death and morbidity in

71   the US, most commonly from cardiovascular disease (CVD).[1,2] Socioeconomically vulnerable

72   populations with food insecurity or other social risk factors also have higher burdens of chronic

73   diseases such as CVD, at least partly related to differences in diet.[3–6] These sociodemographic

74   disparities in nutrition quality and CVD have also failed to improve over time, despite increased

75   scientific understanding of diets and health and investments in government nutrition programs

76   such as the Supplemental Nutrition Assistance Program (SNAP), a federal program with an

77   annual budget of $100 billion.[7–11] A better understanding of how dietary patterns vary by

78   cardiovascular health and socioeconomic vulnerability may inform more effective clinical and

79   public health interventions.

80   The nutritional value of diets can be evaluated by individual food groups, nutrients, or

81   prespecified institutionally-derived dietary pattern scores (i.e. metrics derived to quantify

82   adherence to a particular dietary pattern such as the Healthy Eating Index (HEI) that measures

83   adherence to the US dietary guidelines, Mediterranean diet score, and DASH diet score).[10,12–17]

84   These institutionally-derived dietary scores were developed for generally healthy populations,

85   rather than for individuals with prevalent disease or socioeconomic challenges. They also focus

86   on idealized food consumption, rather than naturally observed patterns of food consumption. The

87   assessment of empirically derived dietary patterns (combinations of foods that comprise an

88   individual's diet) provides a complementary paradigm to inform clinical and public health

89   efforts, especially to improve health equity across groups at risk for adverse outcomes.[18–21]

90   However, few studies have assessed how prevalent disease or socioeconomic vulnerability are

91   associated with observed empirical dietary patterns. This is an important gap because, due to

92   structural barriers and cultural preferences, individuals with CVD or socioeconomic vulnerability

93   may have dietary habits that are overlooked by applying institutionally-derived dietary patterns.

94   To address these important knowledge gaps, we characterized empirical dietary patterns

95   among US adults using updated nationally representative data from the National Health and

96   Nutrition Examination Survey (NHANES). We hypothesized that adherence to these dietary

97   patterns would vary by CVD status, social risk factors, and SNAP participation.

98 **Materials and Methods**

99 *Design, Setting, and Population*

100   NHANES is a continuous program released in two-year cycles that assesses the health

101 and nutrition of US adults and children. NHANES data are sampled using a four-stage cluster

102 design to represent the non-institutionalized civilian population. We pooled data from 2009-2020

103 NHANES cycles to provide a large, contemporary sample (overall response rate = 61.3%). All

104 participants provided informed written consent, completed personal and household

105 questionnaires, and received a health examination in a Mobile Examination Center. The

106 participants provided up to two days of interviewer-administered 24-hour dietary recall using the

107 multiple-pass method. The first recall was obtained during the mobile exam and the second by

108 telephone three to ten days later. Full details of sample design have been published.[22–25] This

109 current study using deidentified data was deemed exempt by the University of Michigan

110 Institutional Review Board. This study followed the Strengthening the Reporting of

111 Observational Studies in Epidemiology-Nutritional Epidemiology reporting guideline.[26]

112   We included all participants age $\geq$20 years (n=32,498). Individuals <20 years were

113 excluded due to differences in determinants of dietary habits and the low prevalence of CVD

114 compared with adults.

115

116 *Dietary Patterns*

117   Relevant food categories (n=29) were identified from USDA Food Pattern categories and

118 converted to standardized servings using the Food Patterns Equivalents Database, including cup

119 equivalents (fruit, vegetables, dairy), ounce equivalents (grains, protein foods), teaspoon

120 equivalents (added sugars), gram equivalents (solid fats and oils), and number of drinks

121   (alcohol).[27] To derive observed dietary patterns, we analyzed food categories using principal

122   components analysis (PCA), a dimensionality reduction method that identifies patterns of

123   variation across multiple variables (**Table 1**).[28] Eigenvalues were calculated and plotted

124   (**Supplementary Figure 1**), which flattened after the fourth dietary pattern. We focused on these

125   four patterns. For each participant we calculated the HEI-2020 score (range 0-100), with higher

126   scores reflecting more compliance with the Dietary Guidelines for Americans.[29]

127

128   *Cardiovascular Disease and Socioeconomic Vulnerability*

129   Prevalent CVD was defined as self-reported prior diagnosis of coronary artery disease,

130   stroke, or heart failure from a health professional. Similar to a prior study,[30] a social risk factor

131   score (hereafter, social determinants of health (SDOH) score) was calculated based on having

132   education less than high school graduation, being unmarried or not living with a partner, having

133   Medicaid, other non-Medicare government health insurance, or being uninsured, experiencing

134   food insecurity (low/very low food security), being unemployed (excluding retired individuals or

135   students), or not having a routine location for healthcare. Unlike the prior study, we excluded

136   income because SNAP participation is a similar marker. Housing was excluded due to systemic

137   missingness from 2017-2020. One point was given for each factor and summed to calculate an

138   overall score, with a higher score representing greater socioeconomic vulnerability. SNAP

139   participation was defined as self-report of anyone in the household participating within the last

140   12 months. Income-eligible SNAP non-participants were defined by annual family income below

141   130% of the federal poverty level (FPL) (income-to-poverty ratio <1.3) without household

142   SNAP participation within 12 months. SNAP non-eligible adults were those with annual family

143   income ≥130% of FPL and no household SNAP participation within 12 months.

144

145   *Covariates*

146   Demographic covariates included age, self-reported gender evaluated as a biologic

147   variable, total energy intake (kcal/day), and race and ethnicity (Hispanic, non-Hispanic Asian

148   (hereafter Asian, available from 2011 forward), non-Hispanic Black (hereafter Black), non-

149   Hispanic White (hereafter White), and other). Race and ethnicity are sociocultural constructs that

150   reflect a history of structural racism and cultural differences that were self-reported based on

151   NHANES-defined categories.[22–25]

152

153   *Statistical Design and Analysis*

154   Population characteristics overall and by CVD, SNAP status, and SDOH score were

155   reported as percent (95% CI) for categorical variables and mean (SD) for continuous variables.

156   Each individual was assigned to the dietary pattern for which they scored the highest. A single

157   multinomial logit model examined the associations of four dietary patterns as the outcome with

158   CVD status, SDOH scores, and SNAP status each evaluated as categorical variables. Marginal

159   outputs from this model estimated the proportion of individuals aligned with each dietary pattern

160   in each subgroup. All models were adjusted for age, gender, race and ethnicity, total energy

161   intake, and NHANES survey cycle. Missing variables in NHANES (**Supplementary Table 1**)

162   were multiply imputed, with results and analyses pooled from 20 imputed data sets.

163   We evaluated results overall and stratified by race and ethnicity. Statistical significance

164   of interactions by race and ethnicity were tested by adding multiplicative interaction terms by

165   CVD status, SDOH score, and SNAP status. A sensitivity analysis was conducted excluding food

166   categories with Kaiser-Meyer-Olkin measure of sampling adequacy <0.5. All analyses utilized

167 NHANES Mobile Examination Center weights to account for the complex survey design to

168 produce nationally representative estimates. Adjustments for multiple comparisons were not

169 performed because we were testing multiple separate hypotheses (see Introduction). Statistical

170 significance was set at two-sided alpha=0.05. Analyses were performed using Stata v16

171 (StataCorp, LLC, College Station, TX).

172   **Results**

173   *Population Characteristics*

174   The study cohort included 32,498 adults representing 231 million US adults age ≥20

175   years (**Table 2**). Self-reported race and ethnicity included Asian (4.7%), Black (11.4%),

176   Hispanic (14.9%), and White (65.0%). Prevalent CVD was present in 8.3%. Social risk factors

177   were common: 14.8% had less than high school education, 37.5% not married or living with a

178   partner, 34.6% publicly insured or uninsured, 15.7% with low or very low food security, 11.6%

179   unemployed, and 15.6% lacking a routine location for healthcare. There were 17.0% SNAP

180   participants, 10.2% income-eligible SNAP non-participants, and 72.8% non-eligible for SNAP.

181   In unadjusted analyses, those with a CVD diagnosis were more likely to be older, male,

182   Black or White, less educated, unmarried or not living with a partner, food insecure,

183   unemployed, have regular healthcare access, have a higher SDOH score, and be SNAP

184   participants or income-eligible SNAP non-participants (**Supplementary Table 2**), highlighting

185   the intersections of CVD with socioeconomic vulnerability. Those with a higher vs. lower SDOH

186   score were younger and more likely to be male, Black, or Hispanic (**Supplementary Table 4**).

187   SNAP participants were younger, higher proportion female and Black individuals, and had a

188   higher SDOH score (**Supplementary Table 3)**, compared to non-eligible adults.

189

190   *Dietary Patterns*

191   Among the four dietary patterns identified (see **Visual Abstract** and **Table 1)**, the

192   "American" Pattern included higher intake of refined grains, meats, cured meats, milk, cheese,

193   oils, solid fats, and added sugars (variance explained: 10.2%). The "Prudent" Pattern was defined

194   by higher vegetables, meat, poultry, seafood, eggs, and oils, and lower milk (variance explained:

195   8.0%). The "Legume" Pattern had higher vegetables and legumes (variance explained = 6.5%).

196   The "Fruit/Whole Grain/Dairy" Pattern included higher fruits, whole grains, soy protein,

197   nuts/seeds, milk, and yogurt, and lower potatoes and eggs (variance explained = 4.6%). About

198   one-third (33.7%) of US adults' diets aligned most closely with the American, followed by

199   Fruit/Whole Grain/Dairy (27.9%), Prudent (22.6%), and Legume (15.8%). Among individuals

200   aligning with each pattern, the mean (SD) HEI score was highest for the Fruit/Whole

201   Grain/Dairy pattern (62.0 [12.0]), followed by Prudent (58.2 [10.8]) and Legume (55.0 [12.5])

202   patterns, and lowest for the American pattern (42.4 [8.9]) (p<0.001).

203

204   *Dietary Patterns by Prevalent CVD*

205   In the fully adjusted model, the proportion of US adults consuming diets aligned with the

206   American pattern was higher among those with CVD (37.1% [95% CI: 34.6, 39.7%]) compared

207   to those without (33.3% [32.4, 34.2%], p=0.005) (**Figure 1, Supplementary Table 5**). The

208   proportion of adults aligned with each the other dietary patterns was similar among those with or

209   without CVD.

210

211   *Dietary Patterns by SDOH score*

212   The SDOH score was associated with all four dietary patterns. Those with more social

213   risk factors were more likely to align with the American and Legume patterns, and less likely to

214   align with the Prudent and Fruit/Whole Grain/Dairy patterns (p-trend<.001 for each, **Figure 2**,

215   **Supplementary Table 6**). Each additional social risk factor was associated with a 2.5% absolute

216   higher percentage of consuming the American, 1.3% higher consuming the Legume, 1.9% lower

217   consuming the Prudent, and 1.9% lower consuming the Fruit/Whole Grain/Dairy Pattern.

218

219   *Dietary Patterns by SNAP Status*

220   SNAP status was associated with all four dietary patterns. The proportion of US adults

221   aligned with the American Pattern was higher among SNAP participants (40.2% [38.1, 42.3%])

222   than income-eligible SNAP non-participants (35.1% [32.7, 37.5%], p<0.001), and both were

223   higher than non-eligible adults (31.9% [31.0, 32.8%], p<0.001 and p=0.01, respectively (**Figure**

224   **3, Supplementary Table 7**). In contrast, the proportion aligned with the Prudent Pattern was

225   lower among SNAP participants (17.0% [15.5, 18.6%]) than income-eligible SNAP non-

226   participants (20.2% [18.2, 22.3%],p=0.006), with both lower than non-eligible adults (24.2%

227   [23.3, 25.1%], p<0.001, and p=0.001, respectively). The proportion aligned with the Legume

228   Pattern was similar between SNAP participants (17.2% [15.6, 18.8%]) and income-eligible

229   SNAP non-participants (17.8% [16.1, 19.5%]), and both higher than non-eligible adults (15.4%

230   [14.6,16.1%], p=0.03, and p=0.009, respectively). The proportion aligned with the Fruit/Whole

231   Grain/Dairy Pattern was lower among SNAP participants (25.6% [23.8%, 27.3%]) than non-

232   eligible adults (28.6% [27.6%, 29.5%], p=0.003), and both were similar to non-eligible adults

233   (26.9%[27.6%,29.5%]).

234

235   *Differences by Race and Ethnicity*

236   The associations of prevalent CVD with dietary pattern were not significantly different

237   by race and ethnicity (p-interaction=0.42; **Supplementary Table 5, Supplementary Figure 2**).

238   The associations of SDOH score with dietary pattern was significantly different by race and

239   ethnicity (p-interaction=0.002; **Supplementary Table 6, Supplementary Figure 3**). A key

240   differences from the entire sample included a lack of association between increasing SDOH

241 score and the American Pattern among Hispanic individuals. The associations of SNAP status

242 with dietary pattern was significantly different by race and ethnicity (p-interaction=0.02;

243 **Supplementary Table 7, Supplementary Figure 4**). Key differences from the entire sample

244 included that SNAP status was not associated with differences in alignment to the Legume diet

245 among White individuals or alignment with the American diet among both Hispanic and Asian

246 individuals.

247   For coefficients of all covariates see **Supplementary Table 8**.

248 *Sensitivity Analyses*

249   Findings were generally similar in sensitivity analyses excluding food categories not

250 meeting measures of sampling adequacy (**Supplementary Tables 9 and 10**).

251 **Discussion**

252   In this nationally representative study of US adults, we identified four predominant

253 dietary patterns and differences in the distribution of these dietary patterns according to prevalent

254 CVD and socioeconomic vulnerability. The least healthy American dietary pattern (HEI-2020

255 score 42.4) was most common overall and more common among those with prevalent CVD,

256 higher SDOH score, or SNAP participating/income-eligible. Higher SDOH score and SNAP

257 participating/income-eligible, but not prevalent CVD, was also associated with the other three

258 empirically derived diet patterns. Adults having more SDOH or SNAP participating/income-

259 eligible were less likely to follow the healthier Prudent dietary pattern (HEI-2020 score 58.2).

260 The healthier Fruit/Whole Grain/Dairy pattern (highest HEI-2020 score 62.0) was also less

261 prevalent among those with higher SDOH score and SNAP participants. Interestingly, the

262 Legume pattern (HEI-2020 score 55.0) was least common overall but *more* common among

263 those with higher SDOH scores, SNAP participating, or SNAP income-eligible.

264   These new findings provide further support for the role of unhealthy diet as a contributor

265 to higher risk for recurrent or incident cardiometabolic events in the setting of established CVD

266 or socioeconomic vulnerability. From a health equity lens, this emphasizes that the most

267 vulnerable individuals, from either a health or socioeconomic standpoint, may require more

268 concentrated nutritional supports to prevent diet-related adverse outcomes. In contrast,

269 socioeconomically vulnerable adults, in particular from Hispanic backgrounds, were more likely

270 to align to a healthier dietary pattern marked by higher legume intake. Legumes have lower cost

271 per serving than other protein foods, are rich in fiber and phytonutrients, and are associated with

272 lower risk of CVD.[31–33] This suggests that, in some cases, there may be healthier dietary patterns

273 that are accessible among socioeconomically vulnerable individuals, which may be further

274   shaped by social and cultural influences. These findings support the need for further

275   investigation of the role of the Legume Pattern, especially for socioeconomically vulnerable

276   individuals.

277   Our findings are also relevant for the burgeoning implementation of "Food is Medicine"

278   approaches to integrate food-based nutritional therapies into healthcare.[34–36] Understanding

279   naturally occurring patterns of dietary intake by CVD and socioeconomic vulnerability can

280   inform clinical interventions and practices to improve nutrition quality, health outcomes, and

281   health equity for all Americans. This is especially important for groups at higher risk related to

282   food insecurity, such as SNAP participants.[12,37–40] Randomized trials have shown that healthier

283   dietary patterns can reduce CVD events by 30-40%.[41–43] Understanding how to introduce

284   healthier food items within existent dietary patterns may facilitate sociocultural relevance of

285   Food is Medicine programs, such as medically tailored groceries or meals; and better ways to

286   incentivize healthier food selection and nutrition education within SNAP. Further, people with

287   diet-sensitive chronic conditions may benefit from dedicated dietary counseling. This is proposed

288   in the federal Medical Nutrition Therapy Act of 2023, which would expand Medicare coverage

289   for dietary counseling to those with CVD and cardiovascular risk factors.[44–48] This is sorely

290   needed because dietary counseling is underutilized in the setting of CVD.[49]

291   Our investigation considered race and ethnicity as a sociocultural construct,[50] whereby

292   individuals may be more likely to follow dietary patterns due to cultural and regional influences

293   and family heritages. Most of the findings in our study were similar across race and ethnicity.

294   Our findings are consistent with prior studies suggesting that a meaningful proportion of the

295   relationships between socioeconomic factors, race and ethnicity, and life expectancy are

296   mediated by behavioral and metabolic risk factors, including diet.[51] Additional research into how

297   dietary patterns are achieved and impacted in the context of socioeconomic vulnerability are

298   needed to help us understand our few observed differences across race and ethnicity.

299   Our findings concur with prior findings in the context of CVD and socioeconomic

300   vulnerability. In the prospectively collected Multi-Ethnic Study of Atherosclerosis cohort four

301   empirical patterns were identified.[18] In their study, a Fats and Processed Meat pattern (analogous

302   to the American pattern in our study) was associated with higher CVD risk (HR of quintile 5 vs

303   1: 1.82 (95% CI: 0.99, 3.35). However, unlike the null finding in our cross-sectional study, a

304   Whole Grain/Fruit pattern was associated with lower risk (HR 0.54 [0.33, 0.91]).[18] In the Nurses'

305   Health Study two dietary patterns were found, with lower risk from a Prudent (HR 0.72 (0.60-

306   0.87)) compared to a Western/Processed food pattern.[19] Studies considering participants in

307   SNAP have found that participants consume fewer healthy foods and nutrients and have lower

308   scores on institutionally-derived diet patterns, at least partly related to structural barriers faced in

309   accessing and affording a healthful diet.[12,37,39,40,52,53]

310   Few prior studies have evaluated naturally occurring dietary patterns in nationally

311   representative US populations. Among US cancer survivors, two dietary patterns were identified,

312   including a Prudent pattern that was associated with lower food insecurity.[54] Two studies

313   identified patterns in nutrient intake in relation to hypertension and bone health, but did not

314   evaluate food groups.[55,56] One study from the early 1990s identified four dietary patterns among

315   Mexican Americans in relation to gallbladder disease, including patterns marked by highly

316   processed food, high vegetables, and high beans.[57] Our study builds upon and greatly extends

317   this prior work by identifying contemporary food patterns and their relations to CVD and

318   socioeconomic vulnerability.

319

320   *Strengths*

321   Study strengths include the large nationally representative cohort and racial and ethnic

322   diversity, which support the reliability and generalizability of our findings. Sensitivity analyses

323   to address shortcomings of the data did not change the results. Lastly, we used rigorous and

324   established methods for the PCA that helps account for correlation between food categories.[58]

325

326   *Limitations*

327   Potential limitations include the cross-sectional nature of the data source, which limits

328   causal inference. Also, NHANES relies on individual self-reports of CVD, SNAP, and social risk

329   factors, which may increase misclassification of these exposures. Dietary habits were assessed

330   using the average of two 24-hour recalls, and longer dietary intake monitoring may increase the

331   accuracy of observations.

332

333   **Conclusion**

334   Empirical dietary patterns vary by both cardiovascular health and especially

335   socioeconomic vulnerability. Initiatives to improve nutrition in at-risk individuals should

336   consider these naturally occurring dietary patterns and their variation in key subgroups.

337   Interventions in health policy and clinical practice should be evaluated to promote healthier

338   dietary patterns among people with or at risk for CVD.

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1   Figure 1: Probability of US Adults Following Four Different Dietary Patterns Across Cardiovascular
2   Disease Status
3

4
5   Note: Proportions are predicted as part of a multinomial logit model.
6
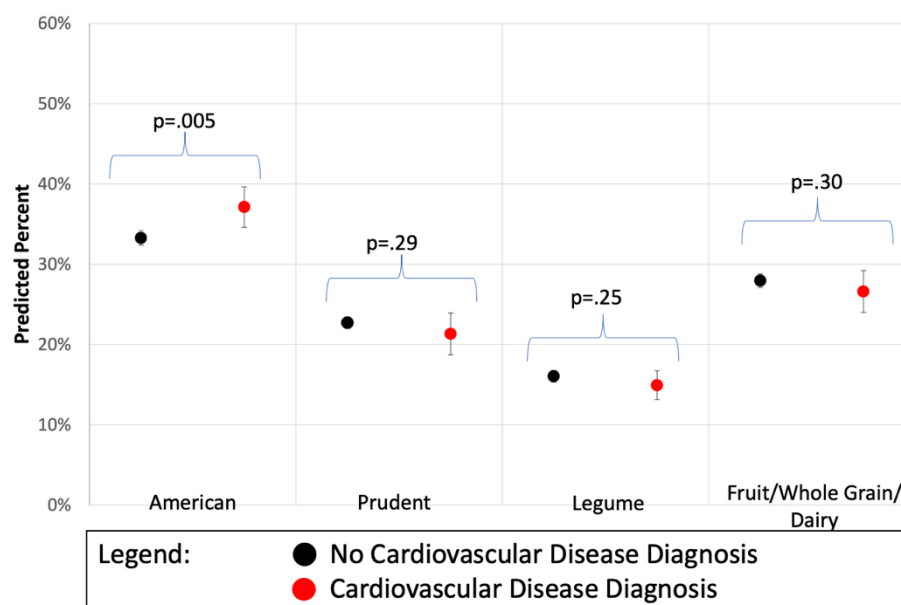
7   Figure 2: Probability of US Adults Following Four Different Dietary Patterns Scross Number of Social
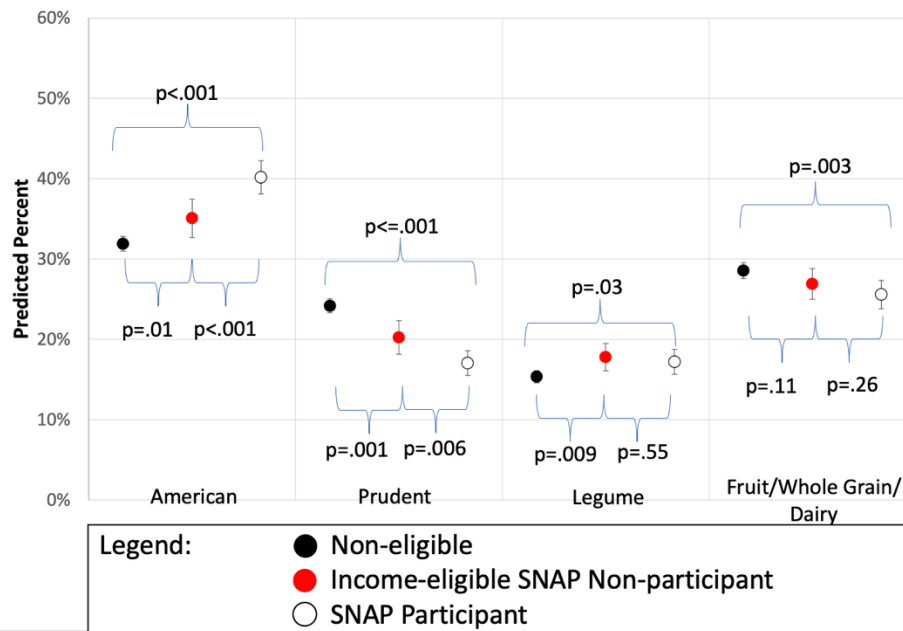8   Risk Factors
9
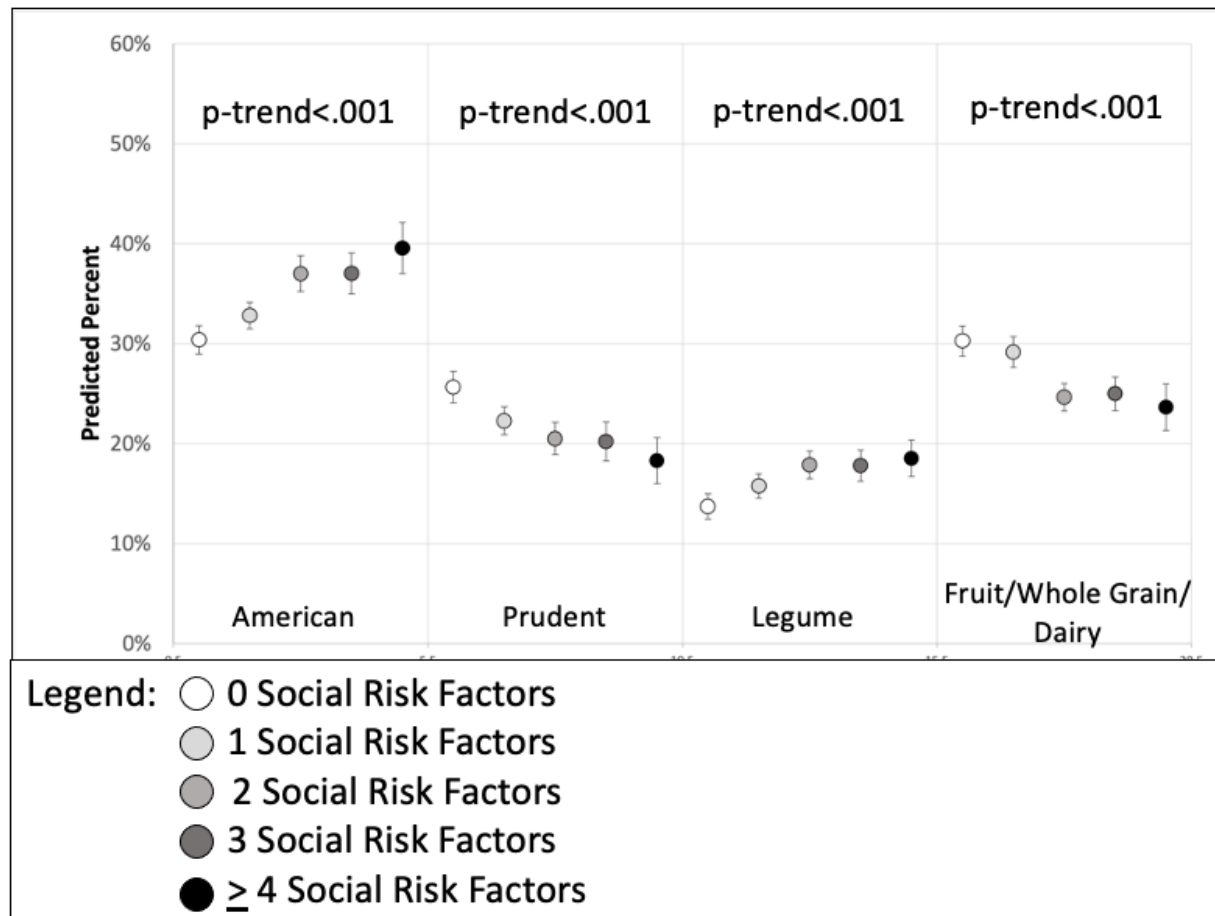
11   Note: Proportions are predicted as part of a multinomial logit model.

12 Figure 3: Probability of US Adults Following Four Different Dietary Patterns Across SNAP Participation
13 Status
14

16 Note: Proportions are predicted as part of a multinomial logit model.

17

18 Table 1: Principal Components Analysis Result Showing Component Loading (>0.15) of the Four Dietary
19 Patterns [a]

Dietary Component	Pattern 1 "American Pattern"	Pattern 2 "Prudent Pattern"	Pattern 3 "Legume Pattern"	Pattern 4 "Fruit/Whole Grain/Dairy Pattern"
Citrus/Melons/Berries				0.28
Other Fruits				0.43
Fruit Juices				
Dark Green Vegetables		0.26		
Tomatoes	0.17	0.16		
Other Red Orange Vegetables		0.24		
Starchy Potatoes		0.21		-0.19
Starchy Non-Potatoes				
Other Vegetables		0.36		
Vegetable Legumes			0.68	
Whole Grains				0.44
Refined Grains	0.41			
Meats	0.16			
Cured Meats	0.26			
Organ Meats				
Poultry		0.22		
Seafood (High Omega-3)		0.20		
Seafood (Low Omega-3)		0.26		-0.15
Eggs		0.19		
Soy Protein				
Nuts/Seeds		0.34		
Protein Legumes			0.68	
Milk	0.25			0.41
Yogurt				0.34
Cheese	0.41			
Oils	0.19	0.53		
Solid Fats	0.53			
Added Sugars	0.36			
Alcohol		0.16		-0.26

20 [a] Components shown after promax rotation. The four dietary patterns were named based on their strongest
21 loading dietary patterns. In *post hoc* testing of the PCA the Kaiser-Meyer-Olkin (kmo) measure of
22 sampling adequacy revealed poor sampling of potatoes, organ meats, poultry, seafoods low in n-3 fatty
23 acids, and nuts/seeds (kmo <0.5). A sensitivity test was performed for the main analysis with these factors
24 excluded.

25   Table 2: Weighted Population Characteristics (n=32,498, representing 230,612,714 US adults)

Characteristic	%(95% CI) or mean (SD)
Age, years	47.7 (17.1)
Female	51.9% (51.3%,52.6%)
Race	-
Asian [a]	4.7% (4.0%,5.6%)
Black	11.4% (10.0%,13.1%)
Hispanic	14.9% (13.0%,17.1%)
White	65.0% (62.0%,67.8%)
Other [a]	4.0% (3.5%,4.5%)
Cardiovascular Disease Diagnosis	8.3% (7.8%,8.9%)
Social Determinants of Health	-
Not High School Graduate or GED recipient	14.8% (13.7%,16.0%)
Not Married or Living with Partner	37.5% 36.2%,38.9%)
Public Insurance or Uninsured	34.6% (33.2%,36.1%)
Low, or Very Low Food Security [b]	15.7% (14.8%,16.6%)
Unemployed	11.6% (10.9%,12.4%)
No Regular Healthcare Access	15.6% (14.8%,16.5%)
Adverse SDOH score	-
0	34.5% (32.9%,36.1%)
1	29.1% (28.3%,30.0%)
2	18.7% (18.0%,19.5%)
3	11.3% (10.6%,12.1%)
$\geq$4	6.4% (5.9%, 6.9%)
SNAP Participation Status	-
Non-eligible	72.8% (71.1%,74.4%)
Income-Eligible Non-Participant	10.2% (9.6%,10.9%)
Participant	17.0% (15.7%,18.4%)
Total energy intake (kcal/day)	3935 (1679)

26   [a] Other included non-Hispanic Asian individuals in the 2009-2010 cohort.
27   [b] Measured using the US Household Food Security Survey Module.