**SUPPLEMENTAL METHOD 1**: DIETARY URATE INDEX VS. DIET QUALITY INDICES

**DIETARY URATE INDEX**

A dietary urate index was computed based on quintiles of each of the 8 components, 5 of which were then summed up to create the total score (Added sugar, alcohol, red meat, legumes and fish), while components 6 through 8 (Dairy, vitamin C and caffeine) were subtracted from the index given their putative inverse relationship with SUA. Thus, the total score could potentially range between -10 (lowest risk of hyperuricemia due to diet) and +22 (highest risk of hyperuricemia due to diet). Therefore, it is expected that the dietary urate index would be inversely related to commonly used diet quality indices. The distribution of each component within its quintile is summarized in **Table S1**. **Figures S3-S5** show a scatterplot of the dietary urate index by each of 3 diet quality indices, along with its predicted value based on a bivariate OLS regression model and the correlation coefficient which is shown to be indicative of a moderate inverse correlation, with a markedly stronger correlation observed with the HEI-2010 score (r=-0.34).

**Table S1.** Dietary urate index quintile by mean±SD of key diet quality indices (2010-HEI, DASH and MAR scores), HANDLS (2004-2009), N=2,138

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Dietary urate index |  |  |
|  |  | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **β±SE** | **P-trend** |
|  |  | **N=433** | **N=572** | **N=427** | **N=289** | **N=417** |  |  |
| Mean±SD |  |  |  |  |  |  |  |  |
| Total dietary urate index score |  | **-2.5±1.5** | **+1.1±0.8** | **+3.5±0.5** | **+5.5±0.5** | **+8.9±1.9** | **+2.73±0.02** | **<0.001** |
|  Added sugars quintile |  | **+2.4±1.3** | **+2.9±1.4** | **+3.1±1.4** | **+3.5±1.4** | **+3.3±1.4** | **+0.23±0.02** | **<0.001** |
|  Alcohol quintile |  | **+1.2±0.8** | **+1.5±1.3** | **+1.9±1.6** | **+2.3±1.8** | **+3.5±1.8** | **+0.54±0.02** | **<0.001** |
|  Red meat quintile |  | **+2.2±1.3** | **+2.7±1.4** | **+3.1±1.4** | **+3.3±1.5** | **+3.6±1.3** | **+0.33±0.02** | **<0.001** |
|  Fish quintile |  | **+1.3±1.0** | **+2.0±1.6** | **+2.6±1.8** | **+3.0±1.8** | **+3.5±1.7** | **+0.53±0.02** | **<0.001** |
|  Legumes quintile |  | **+1.2±0.8** | **+1.3±1.1** | **+1.5±1.3** | **+1.7±1.6** | **+2.6±2.0** | **+0.33±0.02** | **<0.001** |
|  Dairy quintile |  | **+3.8±1.2** | **+3.1±1.4** | **+2.9±1.4** | **+2.7±1.4** | **+2.4±1.3** | **-0.31±0.02** | **<0.001** |
|  Caffeine quintile |  | **+3.6±1.4** | **+3.2±1.4** | **+2.9±1.4** | **+2.8±1.4** | **+2.6±1.3** | **-0.24±0.02** | **<0.001** |
|  Vitamin C quintile |  | **+3.6±1.3** | **+3.1±1.4** | **+2.8±1.4** | **+2.8±1.5** | **+2.6±1.3** | **-0.21±0.02** | **<0.001** |
|  |  |  |  |  |  |  |  |  |
| Total 2010-HEI score |  | **46.3±12.5** | **43.0±12.0** | **41.8±10.8** | **40.5±10.8** | **40.7±9.7** | **-1.33±0.17** | **<0.001** |
|  Total vegetables |  | **2.8±1.4** | **2.7±1.4** | **2.7±1.3** | **2.4±1.3** | **2.7±1.3** | **-0.05±0.02** | **0.010** |
|  Greens and beans |  | 0.96±1.48 | 0.91±1.4 | 0.91±1.4 | 0.78±1.3 | 1.2±1.4 | +0.04±0.02 | 0.055 |
|  Total fruits |  | **2.3±1.8** | **1.7±1.7** | **1.4±1.5** | **1.3±1.5** | **1.0±1.3** | **-0.30±0.02** | **<0.001** |
|  Whole fruits |  | **1.8±1.9** | **1.3±1.7** | **1.1±1.5** | **0.9±1.5** | **0.8±1.3** | **-0.23±0.02** | **<0.001** |
|  Whole grains |  | **2.6±2.9** | **2.1±2.6** | **1.6±2.4** | **1.4±2.0** | **1.1±2.0** | **-0.36±0.04** | **<0.001** |
|  Dairy |  | **5.3±2.6** | **3.9±2.5** | **3.4±2.4** | **2.8±2.2** | **2.2±2.0** | **-0.73±0.04** | **<0.001** |
|  Total proteins |  | **3.9±1.2** | **4.2±1.0** | **4.3±0.9** | **4.4±0.9** | **4.6±0.7** | **+0.15±0.01** | **<0.001** |
|  Seafood and plant proteins |  | **1.1±1.5** | **1.4±1.6** | **1.7±1.6** | **2.0±1.7** | **2.2±1.6** | **+0.29±0.02** | **<0.001** |
|  Fatty acids |  | **4.3±2.6** | **5.0±2.8** | **5.2±2.7** | **5.2±2.7** | **5.6±2.6** | **+0.28±0.04** | **<0.001** |
| Sodium |  | **4.5±3.0** | **4.9±2.9** | **4.8±2.9** | **5.5±2.8** | **5.3±2.9** | **+0.20±0.05** | **<0.001** |
| Refined grains |  | **5.7±2.9** | **6.0±2.8** | **6.2±2.8** | **6.6±2.7** | **6.9±2.5** | **+0.29±0.04** | **<0.001** |
| SOFAAS |  | **10.7±5.2** | **9.2±5.3** | **8.6±5.1** | **7.2±5.2** | **7.1±5.0** | **-0.90±0.08** | **<0.001** |
|  |  |  |  |  |  |  |  |  |
| Total DASH score |  | **2.1±1.5** | **1.8±1.4** | **1.7±1.3** | **1.5±1.2** | **1.5±1.1** | **-0.14±0.02** | **<0.001** |
| Saturated fat |  | **0.19±0.3** | **0.25±0.29** | **0.26±0.30** | **0.28±0.29** | **0.31±0.29** | **+0.03±0.00** | **<0.001** |
| Fat |  | **0.21±0.35** | **0.25±0.38** | **0.26±0.39** | **0.29±0.39** | **0.27±0.38** | **+0.02±0.01** | **0.010** |
| Protein |  | 0.33±0.43 | 0.32±0.44 | 0.35±0.44 | 0.28±0.42 | 0.33±0.43 | -0.00±0.01 | 0.69 |
| Cholesterol |  | **0.28±0.38** | **0.24±0.35** | **0.20±0.34** | **0.19±0.32** | **0.13±0.29** | **-0.04±0.01** | **<0.001** |
| Fiber |  | **0.13±0.26** | **0.08±0.22** | **0.06±0.19** | **0.03±0.13** | **0.04±0.16** | **-0.02±0.00** | **<0.001** |
| Magnesium |  | **0.18±0.30** | **0.11±0.24** | **0.08±0.22** | **0.06±0.18** | **0.05±0.17** | **-0.03±0.00** | **<0.001** |
| Calcium |  | **0.42±0.38** | **0.27±0.35** | **0.21±0.33** | **0.12±0.25** | **0.08±0.20** | **-0.08±0.00** | **<0.001** |
| Potassium |  | **0.16±0.26** | **0.09±0.22** | **0.07±0.19** | **0.04±0.15** | **0.03±0.12** | **-0.03±0.00** | **<0.001** |
| Sodium |  | **0.16±0.34** | **0.18±0.36** | **0.18±0.35** | **0.25±0.39** | **0.21±0.37** | **+0.02±0.01** | **0.017** |
|  |  |  |  |  |  |  |  |  |
| Total MAR score |  | **82.9±16.2** | **77.0±18.5** | **76.8±19.8** | **76.2±23.8** | **77.2±14.9** | **-1.13±0.29** | **<0.001** |
| Copper |  | 0.92±0.15 | 0.88±0.18 | 0.89±0.17 | 0.88±0.19 | 0.92±0.14 | +0.00±0.00 | 0.69 |
| Calcium |  | **0.72±0.25** | **0.62±0.27** | **0.60±0.27** | **0.58±0.29** | **0.57±0.25** | **-0.03±0.00** | **<0.001** |
| Vitamin C |  | **0.98±0.92** | **0.76±0.86** | **0.58±0.67** | **0.68±0.87** | **0.55±0.65** | **-0.10±0.01** | **<0.001** |
| Vitamin B6 |  | 0.88±0.19 | 0.84±0.23 | 0.84±0.21 | 0.83±0.24 | 0.88±0.18 | 0.00±0.00 | 0.75 |
| Vitamin B1 |  | **0.92±0.16** | **0.87±0.20** | **0.86±0.20** | **0.83±0.23** | **0.88±0.18** | **-0.011±0.002** | **<0.001** |
| Vitamin B2 |  | **0.98±0.08** | **0.93±0.15** | **0.93±0.14** | **0.90±0.18** | **0.93±0.14** | **-0.011±0.003** | **<0.001** |
| Niacin |  | **0.94±0.14** | **0.92±0.16** | **0.93±0.14** | **0.92±0.17** | **0.96±0.11** | **+0.005±0.002** | **0.036** |
| Iron |  | 0.86±0.20 | 0.85±0.24 | 0.84±0.23 | 0.83±0.25 | 0.87±0.20 | -0.004±0.003 | 0.23 |
| Vitamin D |  | **0.27±0.21** | **0.23±0.21** | **0.24±0.22** | **0.23±0.22** | **0.23±0.20** | **-0.007±0.003** | **0.045** |
| Vitamin B12 |  | **0.90±0.20** | **0.88±0.22** | **0.91±0.19** | **0.93±0.18** | **0.95±0.12** | **+0.016±0.003** | **<0.001** |
| Vitamin E |  | 0.45±0.25 | 0.40±0.24 | 0.40±0.23 | 0.41±0.26 | 0.42±0.23 | -0.005±0.004 | 0.18 |
| Folate |  | **0.88±0.19** | **0.82±0.23** | **0.81±0.23** | **0.78±0.26** | **0.81±0.22** | **-0.015±0.003** | **<0.001** |
| Zinc |  | **0.86±0.20** | **0.82±0.22** | **0.84±0.21** | **0.84±0.22** | **0.89±0.17** | **+0.010±0.003** | **0.002** |
| Phosphorus |  | 0.96±0.11 | 0.93±0.15 | 0.95±0.12 | 0.94±0.15 | 0.97±0.09 | 0.002±0.002 | 0.23 |
| Vitamin A |  | 0.91±1.00 | 0.77±0.96 | 0.86±1.89 | 0.81±2.44 | 0.67±0.84 | -0.005±0.004 | 0.18 |
| Magnesium |  | **0.68±0.23** | **0.60±0.23** | **0.60±0.24** | **0.60±0.25** | **0.64±0.23** | **-0.008±0.004** | **0.032** |

Q1-Q5: Quintiles, SD=Standard Deviation

**HEI-2010 score**

HEI-2010’s computational steps and statistical code for the 24-hr recalls can be found at the National Cancer Institute website on Applied Research.(1) Moreover, specifically for the HANDLS study, detailed description of the steps used can be found elsewhere. (2) Total and component HEI-2010 scores were calculated for each recall day (day 1 and day 2) and each study visit, then averaged to obtain the mean HEI-2010 total and component scores for both days combined for each of two visits.(3; 4; 5)

**DASH score**

Similarly, using the average of 2 24 hr recalls, another diet quality score, namely the DASH total score was computed. Briefly, DASH goals for 8 target nutrients were identified, namely total fat, saturated fat, protein, fiber, cholesterol, calcium, magnesium, and potassium. Nutrient goals were then indexed to total energy intake (except for macronutrients),

and the DASH score was generated by the sum of all nutrient targets met (maximum score, 9). Individuals with intake meeting a goal intermediate between the DASH goal and the nutrient content of the DASH control diet were given a score of 0.5 for that nutrient.(6)

**MAR score**

Nutrient-based diet quality was determined using models published elsewhere (7; 8). Dietary intakes and RDAs of selected vitamins and minerals (i.e. calcium, magnesium, phosphorus, Vitamins A, C, D, E, B-6, folate, B-12, iron, thiamin, riboflavin, niacin, copper, and zinc) were used to compute a second diet quality index. From the RDA and actual intake of each vitamin and mineral considered, a nutrient adequacy ratio (NAR) was estimated, as follows: NAR =Subject’s daily intake of nutrient divided by the RDA of nutrient. An additional 35 mg vitamin C was applied to the RDA for participants who were reported as current smokers.(9) Each NAR was then expressed as percentage and truncated at 100%. (8) The mean adequacy ratio (MAR), a second measure for overall dietary quality, was estimated as follows: MAR= Sum of all 16 nutrient NARs divided by 16. Annual rates of change in MAR and NAR were computed using a similar approach as for HEI-2010 and components.(3; 4; 5)

**Figure S3**. Scatter plot and prediction of dietary urate index vs. HEI-2010, r=-0.17 (p<0.001), HANDLS (2004-2009), N=2,138

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**Figure S4**. Scatter plot and prediction of dietary urate index vs. MAR score, r=-0.10 (P<0.001), HANDLS (2004-2009), N=2,138 

**Figure S5**. Scatter plot and prediction of dietary urate index vs. DASH score, r=-0.16(P<0.001), HANDLS (2004-2009), N=2,138



**REFERENCES**

1. National Cancer Institute AR, Cancer Control and Population Sciences, (2014) HEI Tools for Researchers

<http://appliedresearch.cancer.gov/hei/tools.html>.

2. National Institute on Aging NNI, Laboratory of Epidemiology and Population Sciences, Health Disparities Section, (2014) Healthy Eating Index 2010 calculation,

<http://handls.nih.gov/06Coll-w01HEI.htm>.

3. Beydoun MA, Fanelli-Kuczmarski MT, Allen A *et al.* (2015) Monetary Value of Diet Is Associated with Dietary Quality and Nutrient Adequacy among Urban Adults, Differentially by Sex, Race and Poverty Status. *PLoS One* **10**, e0140905.

4. Fanelli Kuczmarski M, Cotugna N, Pohlig RT *et al.* (2017) Snacking and Diet Quality Are Associated With the Coping Strategies Used By a Socioeconomically Diverse Urban Cohort of African-American and White Adults. *J Acad Nutr Diet* **117**, 1355-1365.

5. Kuczmarski MF, Beydoun MA, Stave Shupe E *et al.* (2017) Use of Dietary Supplements Improved Diet Quality But Not Cardiovascular and Nutritional Biomarkers in Socioeconomically Diverse African American and White Adults. *J Nutr Gerontol Geriatr* **36**, 92-110.

6. Mellen PB, Gao SK, Vitolins MZ *et al.* (2008) Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. *Arch Intern Med* **168**, 308-314.

7. Raffensperger S, Kuczmarski MF, Hotchkiss L *et al.* (2010) Effect of race and predictors of socioeconomic status on diet quality in the HANDLS Study sample. *Journal of the National Medical Association* **102**, 923-930.

8. Murphy SP, Foote JA, Wilkens LR *et al.* (2006) Simple measures of dietary variety are associated with improved dietary quality. *Journal of the American Dietetic Association* **106**, 425-429.

9. Institute of Medicine FaNB (2000) *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids*. Washington, DC.