Comparing the characteristics of dietary indices in adults and children in Hawaii and the Pacific

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Introduction

- Dietary indices are used to assess dietary patterns in order to quantify diet quality
- Examples of dietary indices include Healthy Eating Index (HEI) and Dietary Approaches to Stop Hypertension (DASH)
- The objective of the study is to compare the characteristics of dietary indices in children vs adults living in U.S.-affiliated Pacific (USAP) islands and Hawaii

Methods

Multiethnic Cohort Study (MEC)

- Prospective cohort study where over 215,000 men and women aged 45-75 years of white, African American, Native Hawaiian, Japanese American, and Latino ethnic backgrounds from Hawaii and Los Angeles participated[1]
- Food frequency questionnaire included ethnic specific food, reliance on food composition table, and large recipe database[1]

Expanded Food and Nutrition Education Program (EFNEP)

- Nutrition education program for low-income population living in every state, the District of Columbia, and United States territories[2]
- 24-hour dietary recall data collected from 2013-2016 among adults aged 18-90 years

Children's Healthy Living Program (CHL)

- Cross sectional study with children aged 2-8 years old from 11 USAP jurisdictions[3]
- Two days of printed dietary records completed by caregiver and wrappers, labels, packages of food were collected[4]

Diet Quality

- Assessed using HEI-2015 and DASH in the MEC data, HEI-2005 in the EFNEP data, HEI-2005 and DASH in the CHL data

Data Analysis

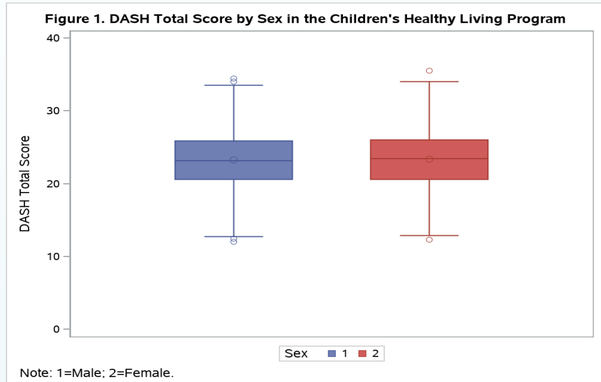
- Averages of the dietary components for food records were taken across days and weighted for weekday and weekend
- Box and whisker plots were created to compare characteristics of the dietary quality indices in children and adults
- Correlation between dietary components was calculated using Pearson's correlation coefficient and visualized with heatmaps

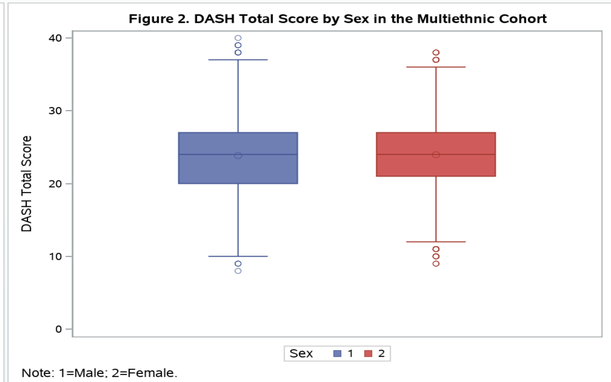
	HEI-2005[2]	HEI-2015[2]	DASH
Component	100 points total (12 components: 5-20 points each)	100 points total (13 components: 5-20 points each)	8-40 points total (8 components: 1-5 points each)
Fruits	Total fruits (includes 100% juice): ≥0.8 cup equiv. (5 points) Whole fruits (except juice): ≥0.4 cup equiv. (5 points)	Total fruits (includes 100% juice): ≥0.8 cup equiv. (5 points) Whole fruits (except juice): ≥0.4 cup equiv. (5 points)	Total fruit: highest quintile
Vegetables	Total vegetables: ≥1.1 cup equiv. (5 points) Dark green/orange vegetables & legumes: ≥0.4 cup equiv. (5 points)	Total vegetables: ≥1.1 cup equiv. (5 points) Greens and Beans: ≥0.2 cup equiv. (5 points)	Excluding potatoes: highest quintile
Nuts			Nuts, seeds, and legumes: highest quintile
Dairy	Milk: ≥1.3 cup equiv. (10 points)	≥1.3 cup equiv. (10 points)	Low-fat dairy: highest quintile
Protein	Meat and beans: ≥2.5 oz equiv. (10 points)	Total Protein: ≥2.5 oz equiv. (5 points) Seafood & Plant Proteins: ≥0.8 oz equiv. (5 points)	
Fats	Oils: ≥12 gram (10 points)	Fatty Acid Ratio: (PUFAs + MUFAs) / SFAs ≥2.5 (10 points)[3]	
Total/whole grains	Total grains: ≥3.0 oz equiv. (5 points) Whole grains: ≥1.5 oz equiv. (5 points)	≥1.5 oz equiv. (10 points)	Highest quintile
Refined grains[4]		≤1.8 oz equiv. (10 points)	
Red and processed meat[4]			Lowest quintile
Sodium[4]	≤0.7 gram (10 points)	≤1.1 gram (10 points)	Lowest quintile
Empty calories[4]	Solid fats, alcohols, and added sugars: ≤20% of energy (20 points) Saturated fats: ≤7% of energy (10 points)	Added sugars: ≤6.5% of energy (10 points) Saturated fats: ≤8% of energy (10 points)	
Sweetened beverages and fruit juice[4]			Lowest quintile

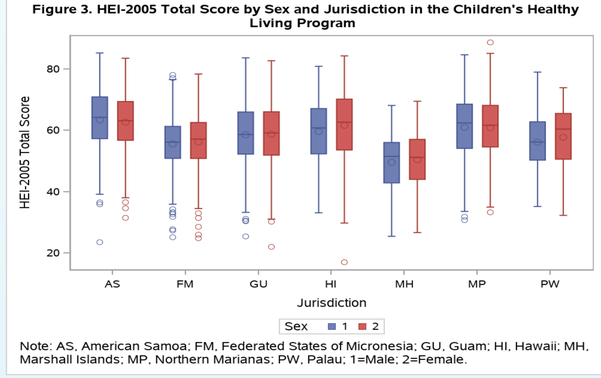
[1] Scoring standards are expressed as cup and ounce equivalents from the MPED whereby 1 oz = 28.3 g and 1 cup = 225 mL; HEI-2005, Healthy Eating Index-2005; HEI-2015, Healthy Eating Index-2015; DASH, Dietary Approaches to Stop Hypertension.
[2] All standards represent amounts per 1,000 kcal (sometimes shown as percentage of energy) except for fatty acids.
[3] PUFA = polyunsaturated fatty acids; MUFA = monounsaturated fatty acids; SFA = saturated fatty acids.
[4] Components were reverse scored such that higher intake was associated with a lower score.

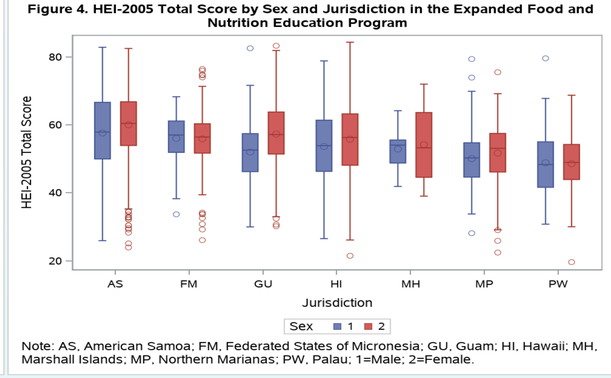
Table 1: Components and optimal quantities for scoring standards for each component of HEI-2005, HEI-2015, and DASH scores by using standardized cup and ounce equivalents from the MyPyramid Equivalents Database (MPED)[1,5,6]

Results









(A)

	Dairy	Fruits	Nuts, seeds, legumes	Red meat	Sodium	Sweetened beverages	Vegetables	Whole grains
Dairy	1	0.25088	0.25931	-0.15274	-0.33489	-0.06725	0.24979	0.33985
Fruits	0.25088	1	0.24138	0.05306	-0.20431	-0.10903	0.43176	0.37225
Nuts, seeds, legumes	0.25931	0.24138	1	-0.2299	-0.44494	-0.10778	0.37167	0.25556
Red meat	-0.15274	0.05306	-0.2299	1	0.62907	0.21124	-0.24878	0.05982
Sodium	-0.33489	-0.20431	-0.44494	0.62907	1	0.21451	-0.55517	-0.21932
Sweetened beverages	-0.06725	-0.10903	-0.10778	0.21124	0.21451	1	-0.06005	0.02591
Vegetables	0.24979	0.43176	0.37167	-0.24878	-0.55517	-0.06005	1	0.32219
Whole grains	0.33985	0.37225	0.25556	0.05982	-0.21932	0.02591	0.32219	1

(B)

	Dairy	Fruits	Nuts, seeds, legumes	Red meat	Sodium	Sweetened beverages	Vegetables	Whole grains
Dairy	1	0.43893	0.09853	-0.15102	-0.34445	0.10535	0.33103	0.42519
Fruits	0.43893	1	0.19113	-0.11781	-0.23629	-0.01979	0.32923	0.3378
Nuts, seeds, legumes	0.09853	0.19113	1	0.05531	-0.11524	-0.02747	0.20444	0.09247
Red meat	-0.15102	-0.11781	0.05531	1	0.49451	0.04656	-0.14179	-0.09492
Sodium	-0.34445	-0.23629	-0.11524	0.49451	1	0.11066	-0.33988	-0.17979
Sweetened beverages	0.10535	-0.01979	-0.02747	0.04656	0.11066	1	0.04597	0.05907
Vegetables	0.33103	0.32923	0.20444	-0.14179	-0.33988	0.04597	1	0.23472
Whole grains	0.42519	0.3378	0.09247	-0.09492	-0.17979	0.05907	0.23472	1

Figure 5: Pearson's correlation coefficient for the DASH components in (A) adult using the Multiethnic Cohort and (B) children using the Children's Healthy Living Program visualized through heatmaps.

Conclusion

- Children and adults have a similar mean DASH total score for males and females
- Children generally have a higher mean HEI-2005 total score than adults across all jurisdictions except Marshall Islands
- American Samoa have the highest mean HEI-2005 score in both adults and children
- Fruits & vegetables, dairy & whole grains, fruits & whole grains, red meat & sodium DASH components are correlated in both adults and children
- In children, dairy & fruits and dairy & vegetables DASH components are correlated
- In adults, vegetables & whole grains and vegetables & nuts, seeds, legumes DASH components are correlated
- In children and adults, there is a strong correlation between DASH and HEI total score (r = 0.66017, P = < 0.0001; r = 0.76032, P = < 0.0001)
- Limitations include underreporting or overreporting of certain foods when using dietary records and results being not generalizable outside the jurisdictions
- Comparing the differences between children and adults is important to allow for the creation of nutrition programs and interventions geared towards specific age groups

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