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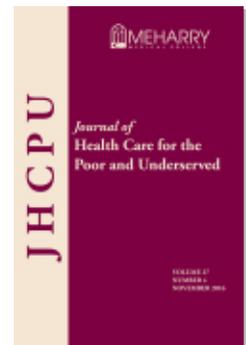
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Applying Concept Mapping Methodology to Identify the Perceptions of Risk and Protective Factors for Childhood Obesity among Southeast Asian Refugees

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Abstract: **Background**. This study identifies Southeast Asian refugee parents' and grandparents' perceptions of the risk and protective factors for childhood obesity. **Methods**. We used a mixed methods approach (concept mapping) for data collection and analyses. Fifty-nine participants engaged in modified nominal group meetings where they generated statements about children's weight status and structuring meetings where they sorted statements into piles based on similarity and rated statements on relative importance. Concept Systems® software generated clusters of ideas, cluster ratings, and pattern matches. **Results**. Eleven clusters emerged. Participants rated "Healthy Food Changes Made within the School" and "Parent-related Physical Activity Factors" as most important, whereas "Neighborhood Built Features" was rated as the least important. Cambodian and Hmong participants agreed the most on cluster ratings of relative importance (r = 0.62). **Conclusion**. The study findings may be used to inform the development of culturally appropriate obesity prevention interventions for Southeast Asian refugee communities.

Key Words: Concept mapping, childhood obesity, Southeast Asians, risk and protective factors.

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Health risks associated with refugee status. In the United States, refugee status may increase the risks for adverse social, physical and mental health outcomes and may also increase the risks for obesity and obesity-related chronic diseases. Beginning in 1975, a large influx of Southeast Asian refugees (i.e., Laotian, Hmong, Cambodian, and Vietnamese) relocated to the United States[1] with large concentrations in the Midwest, West, and New England.[2] These refugees relocated from their homelands due to extreme poverty, hardship, persecution, food insecurity, and starvation caused by years of war and strife.[3] Research findings indicate that Southeast Asian refugees are more likely to report negative life events, live in poverty, have more adverse mental and physical health outcomes, and be more overweight/obese than non-refugee Southeast Asian immigrants and other Asian subgroups.[4–6] The traumas associated with experience as refugees negatively affect physical and psychological well-being and are associated with unhealthy eating behaviors and obesity risk.[3,4,7–9]

Due to such traumas and heightened risks for adverse health outcomes, Southeast Asian refugees may have distinct risk and protective factors that influence childhood obesity within their communities. The aim of the current study is to use a community-engaged research approach to identify Southeast Asian parents' and grandparents' (i.e., Hmong, Laotian, and Cambodian) perceptions of the risk and protective factors for childhood obesity. We did not include Vietnamese refugees in the current study due to the difficulty with recruitment. The development of this knowledge base may help to inform culturally relevant obesity prevention programs for Southeast Asian refugee children and families.

Childhood obesity and refugee status. Childhood obesity continues to be a significant health concern in the United States and is the focus of many public health prevention and treatment efforts.[10–13] Over the past 30 years, obesity has more than doubled among children and quadrupled among adolescents.[13] Additionally, the most recent findings from the National Health and Nutrition Examination Survey (NHANES) show that 17% of children in the U.S. are obese, indicating no significant change in overall obesity prevalence since 2003–2004.[10,13] This high rate of obesity is disconcerting because childhood obesity is associated with obesity in adulthood, earlier onset of chronic diseases, negative effects on quality of life, higher medical costs, and lower life expectancy.[10,14,15]

Furthermore, some racial/ethnic groups are at disproportionate risk for childhood obesity and/or obesity-related comorbidities.[16] Childhood obesity is more prevalent among Native American,[17] Hispanic and African American children,[13] than among Asian and (to a smaller extent) White children.[13] Although Asian children have the lowest overall prevalence of obesity relative to other racial/ethnic groups, they have more body fat at a given body mass index (BMI) and may be at increased risk for obesity-related diseases at BMIs lower than the minimum cut-point for overweight.[18,19] This suggests that research and intervention may be warranted for Asian children who present with BMIs in the less than overweight range. Moreover, certain Asian subgroups (e.g., Southeast Asian refugees) have higher rates of overweight/obesity relative to other subgroups.[20,21,22]

Despite these concerns, there are limited studies available on childhood obesity among Asian children and more specifically Asian subgroups.[23] One review study found that only 0.1% of childhood obesity articles from 1999–2009 included Asians.[23] Addition-

ally, NHANES only began to report data separately for non-Hispanic Asians in the 2011–2012 cycle. These data indicate that 19.5% of Asian children ages 2–19 years are overweight or obese and 8.6% are obese.[13] As suggested earlier, it must be noted that 1) the World Health Organization recommends intervention with Asian populations at a BMI of 23 kg/m², which is lower than the cut-off point for overweight because of higher body fat percentage and increased risk of obesity-related comorbidities;[18,19,23,24] 2) some Asian countries such as Taiwan, China, Thailand, and Vietnam have lower BMI cut-off points to classify overweight/obesity;[19,25–27] and 3) even using standard cut-off points for body mass, Southeast Asian refugee children have higher rates of overweight/obesity than other Asian subgroups.[21,22] The concomitant paucity of information on childhood obesity among Asians and the increased risk of obesity among some Asian subgroups highlight the need to identify and intervene upon the factors related to increased risk of overweight/obesity among Southeast Asian refugee children.[28,29]

While some of the risk factors have been identified in the literature, no research addresses factors that protect against childhood obesity among Southeast Asian refugee families. To identify these risk and protective factors further, we incorporate a socio-ecological model (SEM). A SEM provides a useful framework for gaining a better understanding of the multiple factors that influence health outcomes.[30–32] This framework posits that there is an interactive relationship between personal factors (e.g., gender, self-efficacy), interpersonal factors (e.g., family structure, peer relationships), community factors (e.g., neighborhood), cultural factors (e.g., eating practices) and institutional factors and public policies.[30,33–36] This model is particularly relevant as social and environmental factors such as migration, acculturation, and transition to built environments that facilitate increased intake of high calorie foods and physical inactivity have been reported to contribute to elevated risk for overweight and obesity among immigrant and refugee populations.[37]

Methods

Community-engaged research design. The research design was a community-engaged mixed methods research study. We used this approach because it emphasizes partnerships and collaborations with community organizations and/or representatives from the population of interest to help identify and address issues that affect their wellbeing.[38] We formed a partnership with the Center for Southeast Asians, which is the largest community organization providing social services for Southeast Asian refugee communities in Rhode Island. We worked with our community partner to refine research materials, study protocols, research methodology and interpret study findings, as well as to hire interpreters and translators and to develop recruitment strategies and participant outreach.

We conducted work with the focus populations between August 2013 and February 2014. All study related protocols and questionnaires received approval from the Institutional Review Board for Human Subjects at Brown University.

Participants. We actively recruited participants at English as Second Language (ESL) classes and other activities held at community organizations and at religious and community-related events. Passive recruitment methods included posting flyers at

community organizations and Southeast Asian food markets and snowball sampling. All study participants provided their consent to participate in the study and also received up to a $50.00 financial incentive (i.e., $25.00 for attendance at each session). Study inclusion criteria were self-reported Cambodian, Laotian, or Hmong ethnicity; 19 years of age or older; parent, caretaker, or grandparent of a child between the ages of 3 to 18 years; and able to read or understand English, Khmer, Lao, or Hmong-Mien. Grandparents were included because Southeast Asians often live in extended families with grandparents directing household dietary choices and eating behaviors.[39]

Data collection and analysis. To address the study aims, we used group concept mapping mixed methodology.[40,41,42,43] Concept mapping includes five stages (see Figure 1), including preparing for concept mapping, generating ideas, structuring, analysis, and interpretation.

Stage 1. Preparing for concept mapping is the process used to develop a focus prompt. The focus prompt is a focused question to guide qualitative data collection with study participants. We developed two focus prompts, "What is it about family, friends, schools, and neighborhoods that cause Southeast Asian children to gain too much weight?" and "What is it about family, friends, schools, and neighborhoods that stop Southeast Asian children from gaining too much weight?" We did not use the term *obesity* because our community partner indicated that the Southeast Asian languages did not have a word equivalent to this term and we did not want to encourage weight-related stigma.[44]

Stage 2. Generating the ideas is the process used to elicit ideas from participants. To generate ideas, we held four modified nominal group meetings[45] with seven to 10 participants at each meeting. The nominal group sessions were modified in that participants did not edit statements or prioritize ideas. Each session lasted about two hours. A total of 43 participants engaged in the generating ideas process. Participants generated ideas in a round-robin format until saturation of ideas was achieved. The study Princi-
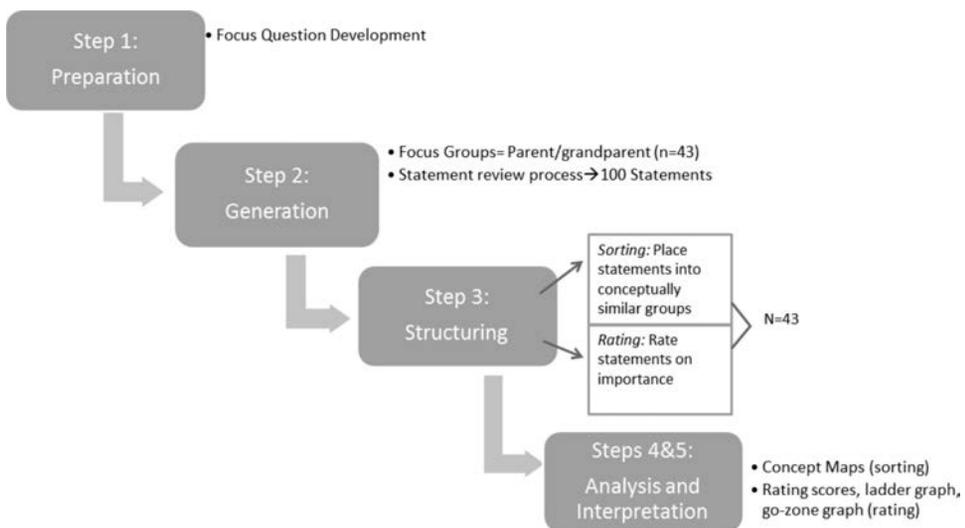

Figure 1. Concept mapping process with Southeast Asian participants.

pal Investigator (Dr. Dulin-Keita), an assistant (study coordinator) and an interpreter participated in the data collection. Due to language diversity among participants, we held separate meetings for each language group. Each language-specific interpreter participated in all relevant data collection meetings for their specific language group.

For purposes of describing the study sample, participants also completed a brief socio-demographic questionnaire and responded to questions regarding acculturation.[46–49] We used the Southeast Asian acculturation scale which asked questions about primary language used for writing and speaking,[50] and participants also reported age of arrival to the United States and the primary language spoken in their home. Participants also reported their perceptions of their children's weight status[51] for each child (age 18 years or younger).

At the conclusion of the four group meetings, participants developed a total of 171 statements. The research team reviewed and edited the statements based on relevancy to the focus prompt, clarity, rewording of statements for neutrality, and removal of duplicate statements and separation of compound ideas. The final statement set included 100 statements related to children's individual behaviors (n = 32), family (n = 31), friends (n = 3), neighborhoods (n = 12), school (n = 9) and culture (n = 13).

Stage 3. Structuring the data required that each participant individually sort and rate the 100 statements generated from the Generating Ideas step of data collection. All previously enrolled participants and new participants were eligible to participate as long as they were representative of the population of interest.[40] A total of 45 participants engaged in the structuring process. For this stage, 29 of the 45 participants were from the generation session and 16 were new participants. New participants completed the survey that was administered to participants in the Generating Ideas stage of data collection.

We used the structuring protocol of Kane and Trochim.[40] For the sorting process, each participant received a set of cards (in random order) with one statement printed on each card. The facilitator instructed participants to read each statement and sort the statements into piles based on similarity in meaning that made sense to the participant. After completing the sorting task, each participant received a rating sheet that included all 100 statements. The facilitator instructed participants to rate each statement based on its relative importance to other statements included in the set (5 = most important relative to the other statements to 1 = relatively unimportant relative to the other statements). Because some participants were not literate in English and/or their native language, we implemented a dyad sorting/rating protocol. For this protocol, the research team and interpreter assisted participants with reading and/or translating of statements only, participants were responsible for completing sorting and rating based on her or his perceptions of meaning and relative importance.

Step 4. Statement analysis. To represent the data visually, we used Concept Systems® software (Concept Systems Incorporated, Ithaca, NY) to conduct all statement analyses.

Data analysis and interpretation. We described participants' demographic characteristics using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. We used Concept Systems° software to develop cluster analysis, bridging values, cluster rating analysis and pattern matches. Prior to analyses, the Concept Systems° software developed a stress value, which is an indicator

of the goodness of fit of the mapped points to the individual sort data. The stress value ranges from 1 (poor fit) to 0 (perfect fit).

Cluster analysis provides a mapped representation of how the statements are grouped or 'clustered' together based on the average group sort (unstructured sorting data). Clusters of statements that are closer together are more similar in meaning whereas clusters that are farther apart are less similar in meaning. Additionally, broadly shaped clusters represent broader concepts (i.e., more diverse set of statements) whereas compact clusters represent narrowly focused concepts (i.e., less diverse set of statements). Bridging values, ranging from 0 to 1, are developed for each cluster to indicate the relationships between clusters. Values closer to 1 indicate that statements in the cluster are more related to distant statements/clusters whereas values closer to 0 indicate that statements in the cluster are more closely associated with neighboring statements/clusters.[40]

Cluster rating analysis provides visual indications of the average relative importance of each of the clusters relative to the other clusters (rating of the 100 statement set based on relative importance of statements). The cluster importance is reflected by the cluster's thickness with more layers representing greater participant-ascribed importance.

We used *pattern match* analysis to compare cluster ratings by each subgroup (Hmong, Laotian, and Cambodian). The analysis provides a correlation coefficient ranging from 0 (no correlation) to 1 (strong correlation) which represents the strength of the correlation between groups.

Interpretation of the data involved determining the final number of clusters to present in the concept map. Because the software uses Ward's algorithm, there is not a fixed limit to the number of clusters that can be derived. Therefore, to determine the appropriate number of clusters, the research team, community partner and an external reviewer trained in concept mapping, reviewed cluster solutions ranging from five to 20 clusters. We determined the final cluster solution based on a socio-ecological model, the theoretical meaning of each cluster, interpretability and parsimony.[40,52] The final analysis resulted in an 11-cluster solution. Cluster labels were determined with input from the research team and community partner.

Results

The demographic characteristics of participants are described in Table 1. There was a total of 59 participants (n = 16 Hmong; n = 30 Cambodian and n = 13 Laotian, respectively). The sample was mostly female (73%). The mean age of participants was 47.8 years. 44% of participants reported having completed a high school degree (equivalent to a high school diploma in the U.S. or country of origin). Of the 94 children reported by parents and grandparents, 15% were perceived to be overweight. Almost two-thirds of participants reported arriving to the U.S. at 30 years of age or younger. 60% of participants reported that their language of origin was the primary language spoken in the home.

The stress value (i.e., representing the goodness of fit of the mapped points to the individual sort data) was 0.28 after eight iterations, which indicated good fit of the mapped points to the individual sort data.[53] The number of sort piles created by participants ranged from three to 27 with an average of 10.33 (± 5.2). The degree of

Table 1.

DEMOGRAPHIC CHARACTERISTICS, ACCULTURATION AND PERCEIVED WEIGHT STATUS OF CHILDREN AMONG SOUTHEAST ASIAN PARENTS AND GRANDPARENTS, N (%) OR MEAN ± SD

	Total (N = 59)	Hmong (n = 16)	Cambodian (n = 30)	Laotian (n = 13)
Gender (% Female)	43 (72.8)	11 (68.8)	24 (80.0)	8 (61.5)
Age	47.8 ±14.2	44.7 ± 13.5	46.2 ± 15.0	55.0 ± 11.3
Education n (%)				
Less than high school	20 (35.7)	1 (7.1)	17 (58.6)	2 (15.4)
High school graduate	25 (44.6)	7 (50.0)	10 (34.5)	8 (61.5)
Some college	7 (12.5)	4 (28.5)	1 (3.4)	2 (15.4)
College Graduate	3 (5.4)	1 (7.1)	1 (3.4)	
Professional degree	1 (1.8)	1 (7.1)	0	1 (7.7)
Not reported	3	2	1	0
Household Income				
Less than 8,000	15 (30.61)	3 (23.1)	10 (40.0)	2 (18.2)
8,000–13,999	6 (12.24)	1 (7.69)	4 (16.0)	1 (9.1)
17,000–19,999	2 (4.08)	1 (7.69)	1 (4.0)	0
20,000–37,999	12 (24.5)	0	2 (8.0)	2 (18.2)
>= 38,000	14 (28.5)	8 (61.5)	8 (32.0)	6 (54.5)
Not reported	10	3	5	2
# of adults in home	3.1 ±1.7	3.3 ±2.7	2.7 ± 1.0	3.6±1.2
# of children in home	2.1±1.8	2.8±2.6	2.1±1.3	1.4±1.3
# of children	2.8 ± 3.0	3.8±4.4	2.2±1.7	2.7±3.1
Perceived weight status of children n (%)				
Underweight	13 (13.8)	4 (20.0)	7 (12.1)	2 (12.5)
About the right weight	67 (71.3)	4 (20.0)	49 (84.5)	14 (87.5)
Overweight	14 (14.9)	12 (60.0)	2 (3.4)	0
Age at arrival to US n (%)				
Born in US	2 (3.5)	1 (6.2)	1 (3.6)	0
≤ 20 years	24 (43.8)	12 (75.1)	11 (39.3)	2 (15.4)
21–30 years	13 (22.8)	2 (12.4)	6 (21.4)	5 (38.4)
31–40 years	14 (24.6)	1 (6.2)	8 (28.6)	5 (38.4)
41–50 years	2 (3.5)	0	2 (7.1)	1 (7.7)
>50 years	1 (1.8)	0	0	0
Missing	2	0	2	0
Language in the home				
Language of origin	34 (59.6)	9 (56.2)	14 (50.0)	11 (84.6)
English	9 (15.8)	5 (31.2)	2 (7.14)	2 (15.3)
Other	1 (1.75)	1 (6.2)	0	0
Equally English and language of origin	13 (22.8)	1 (6.2)	12 (42.86)	0
Missing	2	0	2	0

Cluster Legend

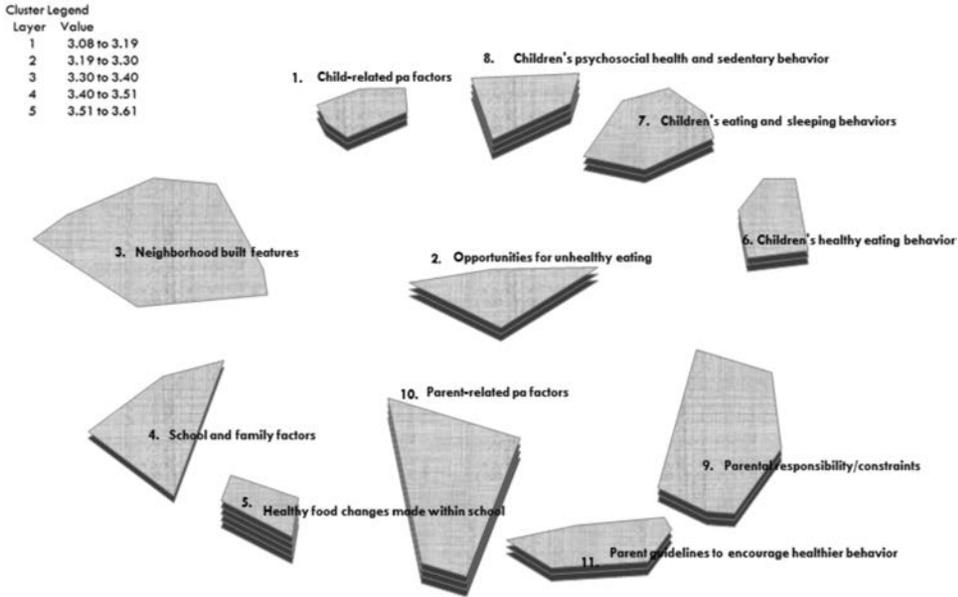| Layer	Value
1	3.08 to 3.19
2	3.19 to 3.30
3	3.30 to 3.40
4	3.40 to 3.51
5	3.51 to 3.61

Figure 2. 11-cluster solution cluster rating map.

similarity between the average number of sort piles by study participants and the final 11-cluster map solution suggests that the concept map meets the criteria for internal representational validity.[53] Figure 2 presents the 11-cluster rating map solution. The individual clusters, statements within clusters and statement ratings are presented in Table 2. We present interpretations of clusters in the order of formation.

1. **Child-related physical activity factors**. The average rating for this cluster was 3.38 and the bridging value was 0.53. The most highly rated statements included, "Children doing more outside activities like walking, soccer, baseball, bike riding and parks," and "Children spending too much time watching TV, playing video games, and on the computer."

2. **Opportunities for unhealthy eating**. The average rating for this cluster was 3.37 and the bridging value was 0.26. Statements in this cluster included, "When parents aren't home, children tend to overeat," and "Families eating out at restaurants such as all you can eat buffets."

3. **Neighborhood built features**. This cluster was rated as the least important with an average rating of 3.08 and the bridging value was 0.68. The themes that emerged related to access to physical activity resources and the presence of other Southeast Asian children in the neighborhood as protective factors.

4. **School and family factors**. The average rating for this cluster was 3.29 and the bridging value was 0.78. The highest rated statement was, "School has gym and recess for exercise." Two statements related to Southeast Asian cultural practices, one of these statements indicated that "Southeast Asian families do not like to throw food away so children overeat to stop food waste."

5. **Healthy food changes made within the school**. Participants rated this cluster as the most important cluster with an average rating of 3.61 and the bridging value was

Table 2.

RISK/PROTECTIVE FACTORS FOR CHILDHOOD OBESITY AMONG SOUTHEAST ASIAN REFUGEE PARENTS AND GRANDPARENTS PRESENTED BY CLUSTER AND AVERAGE IMPORTANCE RATING

Cluster Name	Statement	Average Rating
1. Child-related physical activity factors		**3.38**
54	Children doing more outside activities like walking, soccer, baseball, bike riding, parks	3.8
1	Children spending too much time watching TV, playing video games and on the computer.	3.56
31	Children not playing outside because the neighborhood is not safe too much crime, theft and fights.	3.42
46	Children not spending too much time on video games, computers and TV.	3.29
52	Children bike riding with neighbors.	3.24
19	Children being more active like bike riding with their friends.	3.16
23	Children participating in more Southeast Asian traditional lifestyle like cultural dance and activities.	3.16
2. Opportunities for unhealthy eating		**3.37**
39	When parents aren't home children tend to overeat.	3.58
27	Families eating out at restaurants such as all you can eat buffets and Chinese food.	3.47
91	Abundance of junk food/fast foods places in the neighborhood.	3.27
70	When the entire family is overweight the children will be too.	3.18
3. Neighborhood built features		**3.08**
24	Families have too many activities like Children's many activities such as piano and sports and don't have time to cook.	3.53
6	American lifestyle makes children less physically active compared to old country	3.43
100	Having neighborhood parks or recreation centers.	3.38
43	If more Southeast Asian children live in the neighborhood, then children will play outside more.	3.29
88	Neighborhood children playing too many video games with each other instead of going outside	3.29
68	Neighborhoods affect weight gain for older kids who can go out and purchase their own foods at convenience stores/restaurant.	3.22
64	Friends encouraging children to play video games instead of playing outside.	3.09
85	Living in an area with no access to a yard where kids can play.	2.98
18	Living in an area with no parks	2.89
69	Neighborhoods do not affect children's weight	2.73

Table 2. (*continued*)

Cluster Name	Statement	Average Rating
25	Living in an area with lots of traffic.	2.64
20	Living in an area with no sidewalks.	2.53
4. School and family factors		**3.29**
13	School has gym and recess for exercise.	3.89
75	Schools have after school activities like dances and sports.	3.68
7	Southeast Asian families usually cook more food at each meal than we need.	3.34
92	Teachers allowing children to eat junk food during class.	3.02
11	Families not exercising as a group	2.93
65	Southeast Asian families do not like to throw food away so children overeat to stop food waste.	2.89
5. Healthy food changes made within school		**3.61**
34	Healthy changes made to the school lunch program.	3.82
40	The school lunch program serves more vegetables.	3.77
41	Removing junk food from the school vending machines.	3.57
77	School serve portioned meals	3.55
97	The school lunch program grills, steams, boils and not fry.	3.51
32	Schools not serving fatty foods to children.	3.47
6. Children's healthy eating behavior		**3.38**
49	Children eating more fruits and vegetables	3.76
8	Children drinking more water instead of soda or juice.	3.59
4	Children eating traditional Southeast Asian diet of rice and vegetables and very little meat	3.57
36	Children not eating too much meat	3.47
94	Children eating at the same time every day.	3.45
51	Children not eating too much fast food like hamburgers and French fries	3.34
10	Children not drinking too much soda.	3.31
93	Children not eating too much food.	3.3
50	Children not eating too many sweets like ice cream, cookies, chocolate cake, and candies.	3.27
3	Children not eating breakfast	3.14
2	Children eating brown rice instead of white rice.	2.95
7. Children's eating and sleeping behaviors		**3.39**
74	Children eating too much food.	3.67
59	Children drinking too much soda	3.62
5	Children eating too much fast food like French Fries, hamburgers, pizza and hotdogs	3.52
66	Children not realizing health risks of eating too much	3.51
73	Children eating too much fatty food like cheese	3.49

Table 2. (*continued*)

Cluster Name	Statement	Average Rating
87	Children sleeping too much.	3.42
33	Children eating too much white rice like sticky rice	3.36
84	When children eat as a group they overeat.	3.36
38	Children eating only the unhealthy American and Southeast Asian foods like too much white rice and deli meats	3.36
9	Children eating only American foods and not Southeast Asian foods.	3.33
86	Children eating too much oily and fried food.	3.31
47	Children not knowing there are better choices of foods.	3.27
44	Children eating too much meat	3.22
12	Children not sleeping too much	3.09
8. Children's psychosocial health and sedentary behavior		**3.49**
42	Children not getting enough exercise.	3.89
80	Children eat and watch TV at same time	3.64
90	Children not caring about their weight	3.58
79	Children not having willpower or self-control	3.29
89	Children gain weight when they are depressed or have a lot of stress.	3.29
14	Children going to sleep after eating	3.27
9. Parental responsibility/constraints related to children's eating behaviors		**3.36**
99	When parents often watch child's weight it stops children from gaining too much weight.	3.73
15	Parents buying fewer sugary drinks like soda or juice	3.69
37	Parents not letting children eat too many sweets like chocolate or ice cream.	3.68
26	When parents are not at home, children eat more unhealthy food.	3.64
76	Parents work a lot and don't have time to cook at home	3.5
96	Parents allowing children to eat too many fried or greasy foods like chips.	3.49
58	Parents encouraging schools not to serve unhealthy lunches like Pizza and Chicken Nuggets	3.42
17	Parents not giving children set time for meals	3.39
72	Parents giving children more Southeast Asian food rather than American food	3.36
16	Parents not giving children a lot of fast food like McDonalds or Burger King	3.33
82	Parents not giving children a lot of fatty food like cheese	3.3
57	Parents letting children eat whatever they want	3.25
48	Parents not letting children eat at night.	3.22
45	Parents not letting children eat too much food	3.22
21	Parents not able to afford having enough food in the home.	3

Table 2. (*continued*)

Cluster Name	Statement	Average Rating
22	Parents not limiting portion sizes	2.98
62	Parents giving children only Southeast Asian food	2.96
10. Parent-related physical activity factors		**3.50**
53	Parents making sure children get more exercise.	3.84
98	Parents having play dates with friends at parks, rec centers, or activity centers.	3.61
28	Parents limiting video game, computer, TV and cellphone time.	3.52
78	Parents not encouraging children to play more	3.51
83	Parents encouraging children to play more.	3.51
29	Family having nutrition education using Southeast Asian specific foods and not American foods as the standard	3.5
95	Parents give children too many video games , cell phones and computers that keep them from going outside	3.24
71	Parents encouraging schools to serve more Southeast Asian foods to children.	3.22
11. Parent guidelines to encourage healthier behaviors for children		**3.38**
35	Parents giving children more fruits and vegetables	4.11
30	Parents making children drink more water.	4.07
61	Parents being educated about the types of fruits and vegetables to buy	3.58
67	Parents serving children more fish than meat.	3.44
55	Parents making Southeast Asian lunches for children to take to school	3.11
60	Parents not able to afford healthier foods because of cost.	3.07
81	Parents having exercise equipment at home	3.02
63	Parents not letting children sleep too much.	3
56	Parents who cook using traditional Southeast Asian cooking methods - no oil or butter.	2.98

0.64. Highly rated statements referred to "healthy changes made to the school lunch program," and affirmed, "The school lunch program serves more vegetables."

6. **Children's healthy eating behavior**. The average rating for this cluster was 3.38 and the bridging value was 0.26. Statements related to "Children eating more fruits and vegetables," "Drinking more water instead of soda or juice," and " . . . eating traditional Southeast Asian diet."

7. **Children's eating and sleeping behaviors**. The average rating for this cluster was 3.39 and the bridging value was 0.11. The theme that emerged from this cluster was children's unhealthy behaviors. The highest rated statements included, "Children eating too much food" and "Children drinking too much soda."

8. **Children's psychosocial health and sedentary behavior**. This cluster averaged

Box 1.

HIGHLY RATED STATEMENTS ACROSS ALL SUBGROUPS

1. Children spending too much time watching TV, playing video games and on the computer.
2. Children eating traditional Southeast Asian diet of rice and vegetables and very little meat Children eating too much fast food like French Fries, hamburgers, pizza and hotdogs
3. Children drinking more water instead of soda or juice.
4. School has gym and recess for exercise.
5. Parents buying fewer sugary drinks like soda or juice
6. Families have too many activities like Children's many activities such as piano and sports and don't have time to cook.
7. When parents are not at home, children eat more unhealthy food.
8. Parents limiting video game, computer, TV and cellphone time.
9. Parents making children drink more water.
10. Children not playing outside because the neighborhood is not safe too much crime, theft and fights.
11. Healthy changes made to the school lunch program.
12. Parents giving children more fruits and vegetables
13. The school lunch program serves more vegetables.
14. Children not getting enough exercise.
15. Children eating more fruits and vegetables
16. Children drinking too much soda
17. Schools have after school activities like dances and sports.
18. School serve portioned meals
19. Parents not encouraging children to play more
20. Children eat and watch TV at same time
21. Parents encouraging children to play more.
22. Children sleeping too much.
23. Children not caring about their weight
24. Parents allowing children to eat too many fried or greasy foods like chips.
25. The school lunch program grills, steams, boils and not fry.
26. Parents having play dates with friends at parks, rec centers, or activity centers.
27. When parents often watch child's weight it stops children from gaining too much weight.

an importance rating of 3.49 and the bridging value was 0.28. Ideas from this cluster related to behavioral and psychosocial risk factors for obesity such as "Children not getting enough exercise" and "Children eat and watch TV at the same time."

   9. **Parental responsibility/constraints related to children's eating behaviors**. The average rating for this cluster was 3.36 and the bridging value was 0.21. The highest

rated statement in this cluster was, "When parents often watch child's weight, it stops children from gaining too much weight." Additional statements referred to Southeast Asian cultural food practices as protective.

10. **Parent-related physical activity factors**. Participants rated this cluster as the second most important cluster with an average rating of 3.50. The bridging value for this cluster was 0.42. The most highly rated statement was "Parents making sure children get more exercise." There were two outlier statements in this cluster and both related to Southeast Asian dietary cultural factors.

11. **Parents encouraging healthier behaviors for children**. This cluster averaged an importance rating of 3.38 and the bridging value was 0.28. Statements included "parents giving children more fruits and vegetables," and "parents not letting children sleep too much." There were two statements reflecting Southeast Asian culture as protective, one of these statements was "parents making Southeast Asian lunches for children to take to school."

The *pattern matches* examining the strength of the correlations in cluster ratings between each subgroup are presented in Figure 3. There was very low agreement in cluster ratings of relative importance between Hmong and Laotian participants (r = 0.20). Cambodian and Laotian participants moderately agreed on cluster ratings (r = 0.42). There was also a moderate correlation between Cambodian and Hmong participants on the cluster ratings (r = 0.62).

Discussion

This study used a community-engaged mixed methods research approach to identify the perceived risk and protective factors for childhood obesity among Southeast Asians refugee parents and grandparents. Our study findings offer novel insights into both the risk and protective factors for childhood obesity operating at the individual, interpersonal, community- and cultural levels through the lens of Southeast Asian refugee parents and grandparents. The study findings are also novel in that to our knowledge, no previous studies have identified Southeast Asian refugee parents' and grandparents' perceptions of the protective factors against childhood obesity. The concept mapping results uncovered factors such as healthy food changes made within schools, child-related physical activity, parental involvement in healthy behaviors, and cultural traits that might influence children's weight status. The identification of these factors may lead to the development of intervention components that have the potential to prevent and treat childhood obesity among Southeast Asian refugee children. To date, there is limited research addressing childhood obesity among Southeast Asian refugees and the perspectives of caregivers can help to develop effective, feasible, and acceptable interventions.

Many of the participant generated statements identified risk and protective factors that have been identified in previous research studies. Some of the previously known risk factors that parents and grandparents identified were feeding practices such as pressure to eat and using food as reward,[54–56] children's sedentary behaviors and excessive screen time[57–61] that increase obesity risk. Participants identified protective factors such as efforts to improve the nutritional quality of the national school lunch program,[62–64]
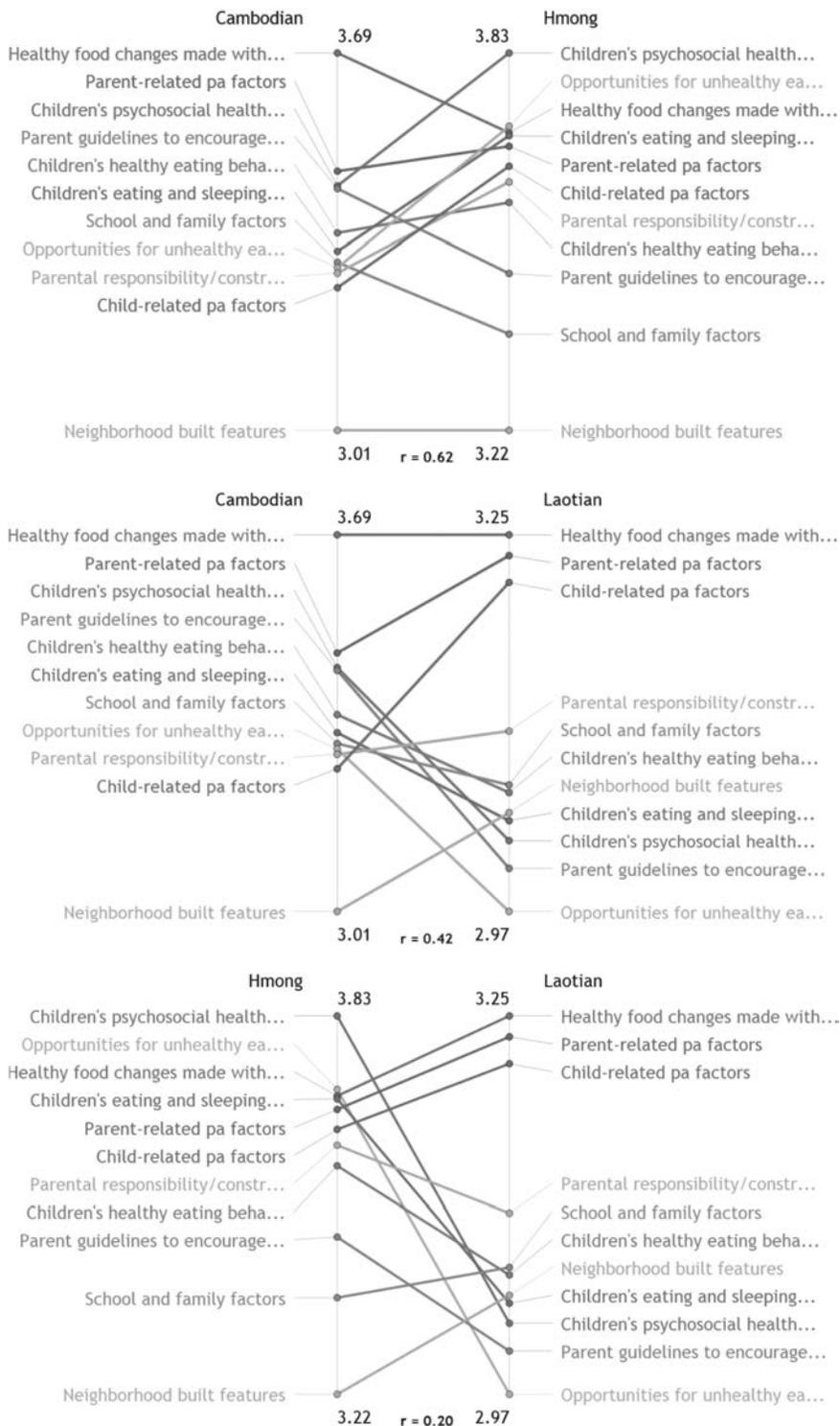
Figure 3. Pattern matches on cluster ratings between each subgroup.

children's participation in physical activity,[65–67] built environment infrastructures that facilitate physical activity such as quality sidewalks and safe parks,[65,68] and parental behaviors such as monitoring of children's diet and role modeling of healthy behaviors[69,70] as protective against obesity.

Although no distinct cluster specific to Southeast Asian cultural risk and protective factors emerged, many cultural statements were embedded in the 11 clusters. Approximately 10% of statements referred to cultural factors. Parents and grandparents identified adhering to a more traditional Southeast Asian diet, the need for nutrition education reflective of Southeast Asian food practices and providing children with more Southeast Asian foods relative to American foods as protective factors. Some research findings suggest that adhering to traditional Southeast Asian diets may be protective.[71] However, as successive generations of Southeast Asian children become more acculturated to U.S. lifestyles, they tend to consume more unhealthy diets characterized by fast food, prepackaged meals, greater intakes of sodium and sugar sweetened beverages.[7,71–73] This process of dietary acculturation to Western diets increases risk factors for obesity and related cardiovascular diseases.[74] Indeed, many of the risk-related statements developed by parents and grandparents identified unhealthy dietary behaviors associated with Western diets.

While the majority of Southeast Asian cultural dietary statements were protective factors, there were a few statements that conveyed some risks. Specifically, parents and grandparents described the heavy consumption of white and/or sticky rice as contributors to obesity. Rice is a staple of Southeast Asian cuisine and while the links between white rice and obesity risk are equivocal,[75,76] a meta-analysis concludes that there is a linear relationship between white rice consumption and increased risk of type 2 diabetes.[77] Additionally, statements indicated that Southeast Asians prepare disproportionate sized meals and eat in the absence of hunger to minimize food waste. However, parents and grandparents rated the aforementioned as one of the least important risk factors for obesity. Previous research suggests that consuming large portion sizes or overfeeding children may be a common practice among Southeast Asian refugees,[7,78,79] and overfeeding may result from the experiences of starvation and malnutrition-related deaths in their homelands.[80] While research suggests that these feeding practice increases obesity risk and teach children to ignore their satiety cues,[69,70] parents and grandparents did not perceive that these practices engendered negative health outcomes.

Additionally, a few of the cultural statements referred to physical activity-related protective factors such as ethnic enclaves (i.e., large concentration of residents of similar racial/ethnic origin) and traditional Southeast Asian cultural activities such as dance.[81] The research findings of Nobari et al.[82] suggest that ethnic enclaves are associated with lower obesity risk among Chinese children because these enclaves provide access to social network members who retain traditional cultural dietary practices and physical activities. Having access to these networks of members from the same ethnic group may promote more physical activity-related behaviors among Southeast Asian refugee children.

There was low to moderate agreement on the relative importance of cluster ratings when examined across Hmong, Laotian and Cambodian participants. However, 28% of the individual statements relating to the risk and protective factors for childhood

obesity were perceived as important across all subgroups (see Supplemental Box). These highly-rated statements could be integrated into childhood obesity interventions that include Laotian, Cambodian, and Hmong refugee families.

Limitations. While this study has a number of strengths, it has limitations as well. This study is limited to one Southeast Asian refugee community in one New England county, which may limit generalizability of study findings. However, participants generated 171 statements and content saturation was achieved after four generating ideas sessions. So, the findings may be relevant to other Southeast Asian refugee communities. Additionally, the use of dyad sorting/rating assistants with some participants may have influenced the individual sorting and rating activities. However, the majority of participants did not require dyad sorting/rating assistants and we do not think that this process diluted the current study findings. Additionally, there were very few statements generated in relation to the neighborhood as a risk/protective factor for childhood obesity. Although we included follow-up prompts to encourage discussion about neighborhood contexts, participants did not relate childhood obesity with neighborhood context and these statements were also rated lower on average. It is possible that participants were unaccustomed to thinking about neighborhood-level factors and instead focused mostly on individual, family and school.

Despite the limitations noted, the study results are strengthened by the application of a novel community-engaged research methodology with a diverse community of Southeast Asian refugees who are often excluded from research studies. The use of concept mapping methodology improved the ecological validity of the study findings because the results were developed within the cultural frameworks of Southeast Asian refugees. The availability of study interpreters and dyad sorting assistants provided the opportunity to include limited-English speaking and low-literate participants. Furthermore, inclusion of both parents and primary caretakers (i.e., grandparents) ensured that we captured a diverse cross-section of participants and reflected the cultural importance of extended kin within Southeast Asian refugee communities. To our knowledge, this is one of few mixed methods studies that examines childhood-obesity related outcomes within Southeast Asian refugee subgroups (i.e., Cambodian, Laotian, and Hmong) and provides significant insights into their perceptions of the risk and protective factors for childhood obesity that may be important for future interventions.

Study implications and next steps. Consistent with our community-engaged research approach, we planned post data collection activities to inform participants of the study results and to plan next steps. Initially, we developed a community presentation with the goal of inviting previous participants to discuss study results in an open forum. However, our community partner suggested that the most appropriate activity would be to develop a two page infographic detailing study activities and results and mail it directly to participants. As such, we collaboratively developed a one page (front and back) infographic that was mailed directly to study participants. The infographic and community presentation were delivered to our community partner for dissemination. We also disseminated findings to local health advocacy organizations to assist with their strategic planning related to ethnic minority health disparities. At this juncture, we are continuing to work with our community partner to utilize the current study results to develop family-based childhood obesity prevention activities that are cultur-

ally relevant for Southeast Asian refugee families and children. Some specific examples of how we are using the study results include developing intervention materials that address refugee experiences with food insecurity and preventing eating in the absence of hunger, describing potential health risks associated with excessive rice consumption and suggesting alternative grains, integrating culture-specific activities to promote physical activity (e.g., traditional activities such as cultural dance and games to encourage physical activity), providing nutrition education using Southeast Asian specific foods, and developing strategies for parents to help resolve the tension between children's preference for unhealthy American foods versus healthy Southeast Asian foods.

Conclusions. This study used concept mapping methodology to identify the perceived risk and protective factors for childhood obesity among Southeast Asian refugee parents and grandparents. The study findings suggest that factors such as changes made to the school lunch program, parent-related physical activity behaviors and children's psychosocial health and sedentary behaviors and cultural factors are key determinants of weight gain/prevention for Southeast Asian children. Future childhood obesity interventions can integrate these themes/factors into behavioral interventions for Southeast Asian refugee families.

Acknowledgments

References

1. Haines DW. Southeast Asian refugees in the United States: The interaction of kinship and public policy. Anthropol Q. 1982;55(3):170–81.
   http://dx.doi.org/10.2307/3318026
2. Gordon LW. 7: Southeast Asian Refugee Migration to the United States. Migr Stud. 1987;5(3):153–73.
   http://dx.doi.org/10.1111/j.2050-411x.1987.tb00959.x
3. Kroll J, Habenicht M, Mackenzie T, et al. Depression and posttraumatic stress disorder in Southeast Asian refugees. Am J Psychiatry. 1989 Dec;146(12):1592–7.
   http://dx.doi.org/10.1176/ajp.146.12.1592
   PMid:2589553
4. Perreira KM, Ornelas IJ. The physical and psychological well-being of immigrant children. Future Child. 2011 Spring;21(1):195–218.
   http://dx.doi.org/10.1353/foc.2011.0002
   PMid:21465861
5. Peck RE, Chuang M, Robbins GE, et al. Nutritional status of Southeast Asian refugee children. Am J Public Health. 1981 Oct;71(10):1144–8.

http://dx.doi.org/10.2105/AJPH.71.10.1144
PMid:7270762 PMCid:PMC1619875

6. Lauderdale DS, Rathouz PJ. Body mass index in a US national sample of Asian Americans: effects of nativity, years since immigration and socioeconomic status. Int J Obes Relat Metab Disord. 2000 Sep;24(9):1188–94.
http://dx.doi.org/10.1038/sj.ijo.0801365
PMid:11033989

7. Kasemsup R, Reicks M. The relationship between maternal child-feeding practices and overweight in Hmong preschool children. Ethn Dis. 2006 Winter;16(1):187–93.
PMid:16599369

8. McBrien JL. Educational needs and barriers for refugee students in the United States: a review of the literature. Rev Educ Res. 2005 Fall;75(3):329–64.
http://dx.doi.org/10.3102/00346543075003329

9. Palinkas LA, Pickwell SM. Acculturation as a risk factor for chronic disease among Cambodian refugees in the United States. Soc Sci Med. 1995;40(12):1643–53.
http://dx.doi.org/10.1016/0277-9536(94)00344-S

10. Khan LK, Sobush K, Keener D, et al. Recommended community strategies and measurements to prevent obesity in the United States. Atlanta, GA: Centers for Disease Control and Prevention, 2009. Available at: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5807a1.htm.

11. Economos CD, Hyatt RR, Must A, et al. Shape Up Somerville two-year results: a community-based environmental change intervention sustains weight reduction in children. Prev Med. 2013 Oct;57(4):322–7. Epub 2013 Jun 10.
http://dx.doi.org/10.1016/j.ypmed.2013.06.001
PMid:23756187

12. United States Department of Agriculture (USDA): Food and Nutrition Service. Special supplemental nutrition program for Women, Infants and Children (WIC): revisions in the WIC food packages - interim rule. Washington, DC: USDA, 2009. Available at: http://www.fns.usda.gov/wic/interim-rule-revisions-wic-food-packages.

13. Ogden CL, Carroll MD, Kit BK, et al. Prevalence of childhood and adult obesity in the United States, 2011–2012. JAMA. 2014 Feb 26;311(8):806–14.
http://dx.doi.org/10.1001/jama.2014.732
PMid:24570244 PMCid:PMC4770258

14. Finkelstein EA, Graham WCK, Malhotra R. Lifetime direct medical costs of childhood obesity. Pediatrics. 2014 May;133(5):854–62. Epub 2014 Apr 7.
http://dx.doi.org/10.1542/peds.2014-0063
PMid:24709935

15. Kumanyika SK, Obarzanek E, Stettler N, et al. Population-based prevention of obesity the need for comprehensive promotion of healthful eating, physical activity, and energy balance: A scientific statement from american heart association council on epidemiology and prevention, interdisciplinary committee for prevention (formerly the expert panel on population and prevention science). Circulation. 2008 Jul 22;118(4):428–64. Epub 2008 Jun 30.
http://dx.doi.org/10.1161/CIRCULATIONAHA.108.189702
PMid:18591433

16. Cossrow N, Falkner B. Race/ethnic issues in obesity and obesity-related comorbidities. J Clin Endocrinol Metab. 2004 Jun;89(6):2590–4.
http://dx.doi.org/10.1210/jc.2004-0339

PMid:15181028

17. Hearst MO, Biskeborn K, Christensen M, et al. Trends of overweight and obesity among white and American Indian school children in South Dakota, 1998–2010. Obesity (Silver Spring). 2013 Jan;21(1):E26-E32.
http://dx.doi.org/10.1002/oby.20022
PMid:23404863

18. Deurenberg P, Deurenberg-Yap M, Guricci S. Asians are different from Caucasians and from each other in their body mass index/body fat per cent relationship. Obesity Rev. 2002 Aug;3(3):141–6.
http://dx.doi.org/10.1046/j.1467-789X.2002.00065.x
PMid:12164465

19. Low S, Chin MC, Ma S, et al. Rationale for redefining obesity in Asians. Ann Acad Med Singapore. 2009 Jan;38(1):66–9.
PMid:19221673

20. United States Census Bureau. Asians fastest-growing race or ethnic group in 2012, Census Bureau reports. Washington, DC: United States Census Bureau, 2013. Available at: http://www.census.gov/newsroom/press-releases/2013/cb13–112.html.

21. Jain A, Mitchell S, Chirumamilla R, et al. Prevalence of obesity among young Asian-American children. Child Obes. 2012 Dec;8(6):518–25.
http://dx.doi.org/10.1089/chi.2011.0077
PMid:23181917

22. Huang KY, Calzada E, Cheng S, et al. Physical and mental health disparities among young children of Asian immigrants. J Pediatr. 2012 Feb;160(2):331–6.e1. Epub 2011 Sep 9.
http://dx.doi.org/10.1016/j.jpeds.2011.08.005
PMid:21907351 PMCid:PMC3645270

23. Sim SC. Childhood obesity in the Asian American and Pacific Islander communities: critical data needs and research priorities. AAPI Nexus. 2011;9(1):184–92.

24. Tan K. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004 Jan 10;363(9403):157–63.
http://dx.doi.org/10.1016/S0140-6736(03)15268-3

25. Hwang LC, Chen SC, Tjung JJ, et al. Body mass index as a predictor of mortality in older people in Taiwan. Int J Gerontol. 2009 Mar;3(1):39–46.
http://dx.doi.org/10.1016/S1873-9598(09)70019-5

26. An Y, Yi S, Fitzpatrick A, et al. Appropriate body mass index and waist circumference cutoff for overweight and central obesity among adults in Cambodia. PLoS One. 2013 Oct 21;8(10):e77897. eCollection 2013.

27. Wang Y, Mi J, Shan X, et al. Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China. Int J Obes (Lond). 2007 Jan;31(1):177–88. Epub 2006 May 2.
http://dx.doi.org/10.1038/sj.ijo.0803354
PMid:16652128

28. Hanlin ER, Hendricks B, Jenkins K, et al. Cardiovascular risk profile: comparison between white and Southeast Asian youth in Wausau SCHOOL project. WMJ. 2009 Jul;108(4):189–93.
PMid:19753824

29. Voorhees J, Goto K, Wolff C. Overweight, elevated blood pressure, acanthosis nigricans

and adherence to recommended dietary and physical activity guidelines among Hmong and White middle school students. J Immigr Minor Health. 2014 Apr;16(2):273–9.
http://dx.doi.org/10.1007/s10903-012-9739-7
PMid:23108641

30. Kellou N, Sandalinas F, Copin N, et al. Prevention of unhealthy weight in children by promoting physical activity using a socio-ecological approach: what can we learn from intervention studies? Diabetes Metab. 2014 Sep;40(4):258–71. Epub 2014 Mar 31.
http://dx.doi.org/10.1016/j.diabet.2014.01.002
PMid:24698814

31. Townsend N, Foster C. Developing and applying a socio-ecological model to the promotion of healthy eating in the school. Public Health Nutr. 2013 Jun;16(6):1101–8. Epub 2011 Oct 13.
http://dx.doi.org/10.1017/S1368980011002655
PMid:22014870

32. Fiese BH, Jones BL. Food and family: a socio-ecological perspective for child development. Adv Child Dev Behav. 2012;42:307–37.
http://dx.doi.org/10.1016/B978-0-12-394388-0.00009-5

33. Richard L, Potvin L, Kishchuk N, et al. Assessment of the integration of the ecological approach in health promotion programs. Am J Health Promot. 1996 Mar-Apr;10(4):318–28.
http://dx.doi.org/10.4278/0890-1171-10.4.318
PMid:10159711

34. Sallis JF, Cervero RB, Ascher W, et al. An ecological approach to creating active living communities. Ann Rev Public Health. 2006;27:297–322.
http://dx.doi.org/10.1146/annurev.publhealth.27.021405.102100
PMid:16533119

35. Krug EG, Mercy JA, Dahlberg LL, et al. The world report on violence and health. Lancet. 2002 Oct 5;360(9339):1083–8. Review.
http://dx.doi.org/10.1016/S0140-6736(02)11133-0

36. Bronfenbrenner U. Ecological models of human development. In: International encyclopedia of education, Vol 3, 2nd ed. Oxford: Elsevier, 1994. Available at: https://www.stolaf.edu/people/huff/classes/Psych130F2010/Readings/Bronfenbrenner1994.pdf.

37. Fu H, VanLandingham MJ. Disentangling the effects of migration, selection and acculturation on weight and body fat distribution: results from a natural experiment involving Vietnamese Americans, returnees, and never-leavers. J Immigr Minor Health. 2012 Oct;14(5):786–96.
http://dx.doi.org/10.1007/s10903-012-9595-5
PMid:22427069 PMCid:PMC3408845

38. Mulligan M, Nadarajah Y. Working on the sustainability of local communities with a "community-engaged" research methodology. Local Environ. 2008 Mar;13(2):81–94. Epub 2008 Apr 9.
http://dx.doi.org/10.1080/13549830701581911

39. Franzen L, Smith C. Food system access, shopping behavior, and influences on purchasing groceries in adult Hmong living in Minnesota. Am J Health Promot. 2010 Jul-Aug;24(6):396–409.
http://dx.doi.org/10.4278/ajhp.080710-QUAL-121
PMid:20594097

40. Kane M, Trochim WM. Concept mapping for planning and evaluation. Thousand Oaks, CA: Sage Publications, 2006.

41. Trochim W, Kane M. Concept mapping: an introduction to structured conceptualization in health care. Int J Qual Health Care. 2005 Jun;17(3):187–91. Epub 2005 May 4.
http://dx.doi.org/10.1093/intqhc/mzi038
PMid:15872026

42. Brannen J, Moss G. Critical issues in designing mixed methods policy research. Am Behav Sci. 2012 Jun;56(6):789–801. Epub 2012 Feb 15.
http://dx.doi.org/10.1177/0002764211433796

43. Freeman LA, Jessup LM. The power and benefits of concept mapping: measuring use, usefulness, ease of use, and satisfaction. Int J Sci Educ. 2004 Feb 6;26(2):151–69.
http://dx.doi.org/10.1080/0950069032000097361

44. Puhl RM, Heuer CA. Obesity stigma: important considerations for public health. Am J Public Health. 2010 Jun;100(6):1019–28. Epub 2010 Jan 14.
http://dx.doi.org/10.2105/AJPH.2009.159491
PMid:20075322 PMCid:PMC2866597

45. Gallagher M, Hares T, Spencer J, et al. The nominal group technique: a research tool for general practice? Fam Pract. 1993 Mar;10(1):76–81.
http://dx.doi.org/10.1093/fampra/10.1.76
PMid:8477899

46. Gibson MA. Immigrant adaptation and patterns of acculturation. Human Dev. 2001;44(1):19–23.
http://dx.doi.org/10.1159/000057037

47. Hazuda HP, Stern MP, Haffner SM. Acculturation and assimilation among Mexican Americans: scales and population-based data. Soc Sci Q. 1988;69(3):687–706.

48. Lopez-Class M, Castro FG, Ramirez AG. Conceptions of acculturation: a review and statement of critical issues. Soc Sci Med. 2011 May;72(9):1555–62. Epub 2011 Mar 24.
http://dx.doi.org/10.1016/j.socscimed.2011.03.011
PMid:21489670

49. Schwartz SJ, Unger JB, Zamboanga BL, et al. Rethinking the concept of acculturation: implications for theory and research. Am Psychol. 2010 May-Jun;65(4):237–51.
http://dx.doi.org/10.1037/a0019330
PMid:20455618 PMCid:PMC3700543

50. Anderson J, Moeschberger M, Chen MS Jr, et al. An acculturation scale for Southeast Asians. Soc Psychiatry Psychiatr Epidemiol. 1993 Jul;28(3):134–41.
http://dx.doi.org/10.1007/BF00801744
PMid:8378809

51. Maynard LM, Galuska DA, Blanck HM, et al. Maternal perceptions of weight status of children. Pediatrics. 2003 May;111(5 Pt 2):1226–31.
PMid:12728143

52. Lebel A, Cantinotti M, Pampalon R, et al. Concept mapping of diet and physical activity: uncovering local stakeholders perception in the Quebec City region. Soc Sci Med. 2011 Feb;72(3):439–45. Epub 2010 Sep 29.
http://dx.doi.org/10.1016/j.socscimed.2010.09.013
PMid:21030123

53. Rosas SR, Kane M. Quality and rigor of the concept mapping methodology: a pooled study analysis. Eval Program Plann. 2012 May;35(2):236–45. Epub 2011 Oct 12.
http://dx.doi.org/10.1016/j.evalprogplan.2011.10.003

PMid:22221889

54. Loth KA, MacLehose RF, Fulkerson JA, et al. Eat this, not that! Parental demographic correlates of food-related parenting practices. Appetite. 2013 Jan;60:140–7. Epub 2012 Sep 26.
http://dx.doi.org/10.1016/j.appet.2012.09.019
PMid:23022556 PMCid:PMC3889702

55. Faith MS, Van Horn L, Appel LJ, et al. Evaluating parents and adult caregivers as "agents of change" for treating obese children: evidence for parent behavior change strategies and research gaps a scientific statement from the American Heart Association. Circulation. 2012 Mar 6;125(9):1186–207. Epub 2012 Jan 23.
http://dx.doi.org/10.1161/CIR.0b013e31824607ee
PMid:22271754

56. Kumanyika SK, Grier S. Targeting interventions for ethnic minority and low-income populations. Future Child. 2006 Spring;16(1):187–207.
http://dx.doi.org/10.1353/foc.2006.0005
PMid:16532664

57. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. Lancet. 2002 Aug;360(9331):473–82.
http://dx.doi.org/10.1016/S0140-6736(02)09678-2

58. Mitchell JA, Mattocks C, Ness AR, et al. Sedentary behavior and obesity in a large cohort of children. Obesity (Silver Spring). 2009 Aug;17(8):1596–602. Epub 2009 Feb 26.
http://dx.doi.org/10.1038/oby.2009.42
PMid:19247272 PMCid:PMC2746930

59. Hu FB, Li TY, Colditz GA, et al. Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. JAMA. 2003 Apr 9;289(14):1785–91.
http://dx.doi.org/10.1001/jama.289.14.1785
PMid:12684356

60. Rey-Lopez JP, Vicente-Rodríguez G, Biosca M, et al. Sedentary behaviour and obesity development in children and adolescents. Nutr Metab Cardiovasc Dis. 2008 Mar;18(3):242–51. Epub 2007 Dec 20.
http://dx.doi.org/10.1016/j.numecd.2007.07.008
PMid:18083016

61. Tremblay MS, LeBlanc AG, Kho ME, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. Int J Behav Nutr Phys Act. 2011 Sep 21;8:98.
http://dx.doi.org/10.1186/1479-5868-8-98
PMid:21936895 PMCid:PMC3186735

62. United States Department of Agriculture (USDA): Food and Nutrition Service. National School Lunch Program (NSLP). Washington, DC: USDA, 2016. Available at: http://www.fns.usda.gov/nslp/national-school-lunch-program-nslp.

63. Story M, Nanney MS, Schwartz MB. Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. Milbank Q. 2009 Mar;87(1):71–100.
http://dx.doi.org/10.1111/j.1468-0009.2009.00548.x
PMid:19298416 PMCid:PMC2879179

64. Wordell D, Daratha K, Mandal B, et al. Changes in a middle school food environment

affect food behavior and food choices. J Acad Nutr Diet. 2012 Jan;112(1):137–41. Epub 2011 Dec 22.
http://dx.doi.org/10.1016/j.jada.2011.09.008
PMid:22709644

65. Babey SH, Hastert TA, Yu H, et al. Physical activity among adolescents. When do parks matter? Am J Prev Med. 2008 Apr;34(4):345–8.
http://dx.doi.org/10.1016/j.amepre.2008.01.020
PMid:18374249

66. Cohen DA, Ashwood JS, Scott MM, et al. Public parks and physical activity among adolescent girls. Pediatrics. 2006 Nov;118(5):e1381–9.
http://dx.doi.org/10.1542/peds.2006-1226
PMid:17079539 PMCid:PMC2239262

67. Wright MS, Wilson DK, Griffin S, et al. A qualitative study of parental modeling and social support for physical activity in underserved adolescents. Health Educ Res. 2010 Apr;25(2):224–32. Epub 2008 Aug 14.
http://dx.doi.org/10.1093/her/cyn043
PMid:18703530 PMCid:PMC2900883

68. Sallis JF, Floyd MF, Rodriguez DA, et al. Role of built environments in physical activity, obesity, and cardiovascular disease. Circulation. 2012 Feb 7;125(5):729–37.
http://dx.doi.org/10.1161/CIRCULATIONAHA.110.969022
PMid:22311885 PMCid:PMC3315587

69. Cardel M, Willig AL, Dulin-Keita A, et al. Parental feeding practices and socioeconomic status are associated with child adiposity in a multi-ethnic sample of children. Appetite. 2012 Feb;58(1):347–53. Epub 2011 Nov 10.
http://dx.doi.org/10.1016/j.appet.2011.11.005
PMid:22100186 PMCid:PMC3264816

70. Cardel M, Willig AL, Dulin-Keita A, et al. Home-schooled children are thinner, leaner, and report better diets relative to traditionally schooled children. Obesity (Silver Spring). 2014 Feb;22(2):497–503. Epub 2013 Sep 20.
http://dx.doi.org/10.1002/oby.20610
PMid:24039204 PMCid:PMC3946420

71. Chen Q, Goto K, Wolff C, et al. Relationships between children's exposure to ethnic produce and their dietary behaviors. J Immigr Minor Health. 2015 Apr;17(2):383–8.
http://dx.doi.org/10.1007/s10903-014-0036-5
PMid:24817576

72. Hardy LL, King L, Hector D, et al. Socio-cultural differences in Australian primary school children's weight and weight-related behaviours. J Paediatr Child Health. 2013 Aug;49(8):641–8. Epub 2013 Jun 4.
http://dx.doi.org/10.1111/jpc.12263
PMid:23731164

73. Stang J, Kong A, Story M, et al. Food and weight-related patterns and behaviors of Hmong adolescents. J Am Diet Assoc. 2007 Jun;107(6):936–41.
http://dx.doi.org/10.1016/j.jada.2007.03.003
PMid:17524713

74. Sanou D, O'Reilly E, Ngnie-Teta I, et al. Acculturation and nutritional health of immigrants in Canada: a scoping review. J Immigr Minor Health. 2014 Feb;16(1):24–34.
http://dx.doi.org/10.1007/s10903-013-9823-7
PMid:23595263 PMCid:PMC3895180

75. Kim J, Jo I, Joung H. A rice-based traditional dietary pattern is associated with obesity in Korean adults. J Acad Nutr Diet. 2012 Feb;112(2):246–53. Epub 2012 Jan 25.
http://dx.doi.org/10.1016/j.jada.2011.10.005
PMid:22732459

76. Kim JA, Kim SM, Lee JS, et al. Dietary patterns and the metabolic syndrome in Korean adolescents 2001 Korean National Health and Nutrition Survey. Diabetes Care. 2007 Jul;30(7):1904–5.
http://dx.doi.org/10.2337/dc06-2591
PMid:17416789

77. Hu EA, Pan A, Malik V, et al. White rice consumption and risk of type 2 diabetes: meta-analysis and systematic review. BMJ. 2012 Mar 15;344:e1454.
http://dx.doi.org/10.1136/bmj.e1454
PMid:22422870 PMCid:PMC3307808

78. Mulasi-Pokhriyal U, Smith C. Investigating health and diabetes perceptions among Hmong American children, 9–18 years of age. J Immigr Minor Health. 2011 Jun;13(3):470–7.
http://dx.doi.org/10.1007/s10903-010-9377-x
PMid:20686849

79. Franzen-Castle L, Smith C. Environmental, personal, and behavioral influences on BMI and acculturation of second generation Hmong children. Matern Child Health J. 2014 Jan;18(1):73–89.
http://dx.doi.org/10.1007/s10995-013-1235-8
PMid:23430294

80. Franzen L, Smith C. Acculturation and environmental change impacts dietary habits among adult Hmong. Appetite. 2009 Feb;52(1):173–83. Epub 2008 Sep 20.
http://dx.doi.org/10.1016/j.appet.2008.09.012
PMid:18848592

81. Portes A, Rumbaut RG. Legacies: the story of the immigrant second generation. Oakland, CA: University of California Press, 2001.

82. Nobari TZ, Wang MC, Chaparro MP, et al. Immigrant enclaves and obesity in preschool-aged children in Los Angeles County. Soc Sci Med. 2013 Sep;92:1–8. Epub 2013 May 31.
http://dx.doi.org/10.1016/j.socscimed.2013.05.019
PMid:23849273 PMCid:PMC3752392