Promoting Food Security and Food Sovereignty in Indigenous Communities: Lessons from Tribally-Driven Research

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Valarie Blue Bird Jernigan, DrPH, MPH
Director, Center for Indigenous Health Research and Policy
Oklahoma State University Center for Health Sciences
bluebird.jernigan@okstate.edu

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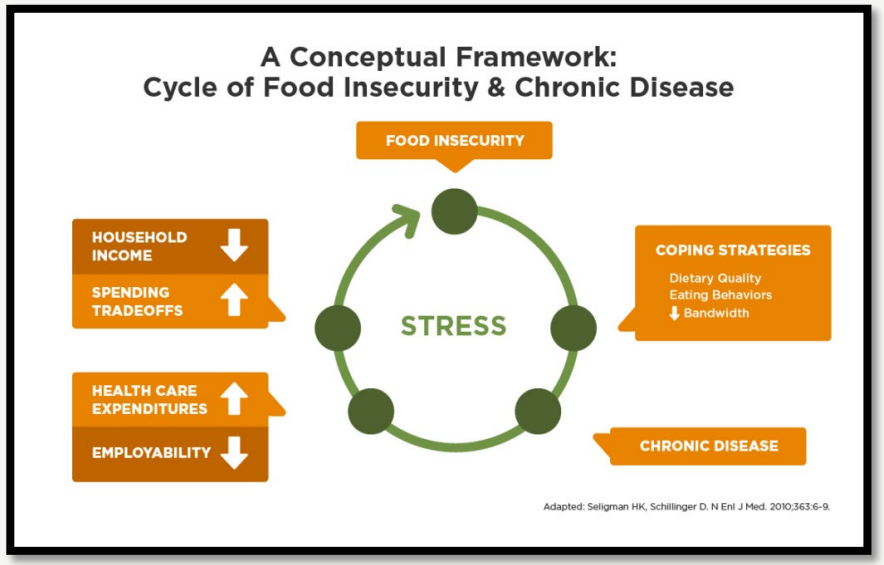
Center for Indigenous Health Research and Policy at Oklahoma State University Center for Health Sciences

COLLEGE OF
Osteopathic Medicine
CHEROKEE NATION

Food Insecurity and Chronic Disease

- Food insecurity – lacking consistent access to enough food for an active and healthy life1
- In 2017, 13% of US population was food insecure1
- Food insecurity is associated with obesity, diabetes, and hypertension:
  - Stress
  - Overconsumption of foods high in sugar, fat, and salt
  - Underconsumption of nutritious foods
  - Feast or famine eating cycles
  - Reduced employability
  - Spending tradeoffs



[1]Alisha Coleman-Jensen, Matthew P. Rabbitt, Christian A. Gregory, and Anita Singh. 2018. *Household Food Security in the United States in 2017*, ERR-256, U.S. Department of Agriculture, Economic Research Service

Prevalence of Food Insecurity in Native Communities

- Studies documented food insecurity prevalence from 39%[2] in California to 76% in Navajo Nation[3]
- Using the Current Population Survey Food Security Supplement, we analyzed the food insecurity trends of Natives compared to other racial and ethnic groups
- From 2000 to 2010, 25% of Natives remained consistently food insecure
- Natives were twice as likely to be food insecure as Whites
- Urban Natives more likely to be food insecure than rural Natives[4]

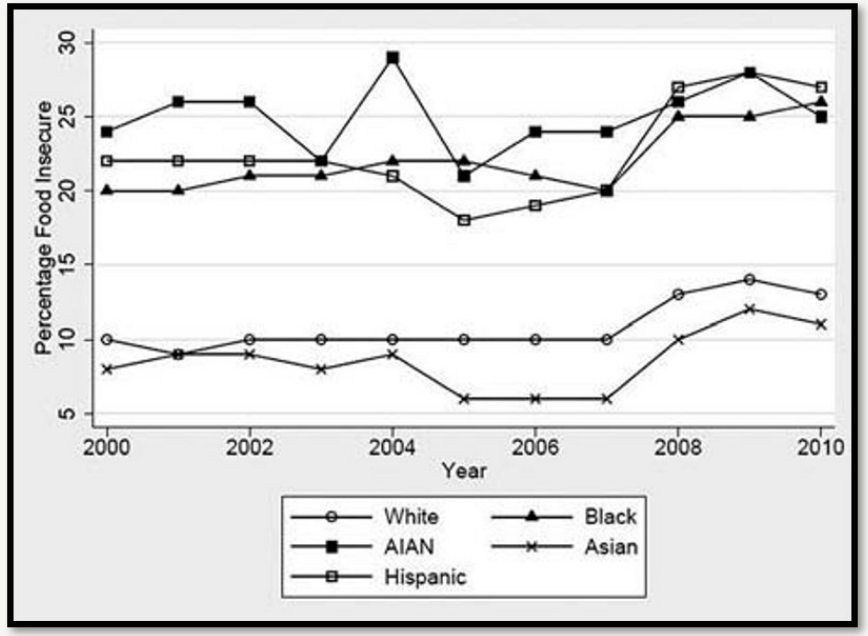


Figure 1. Prevalence of food insecurity by race and ethnicity, 2000–2010.

[2]Jernigan V, Garroutte E, Krantz E, Buchwald D. Food insecurity and obesity among American Indians and Alaska Natives and whites in California. *J Hunger Environ Nutr*. 2013;8:458–471.
[3]Pardilla, M., Prasad, D., Suratkar, S., & Gittelsohn, J. High levels of household food insecurity on the Navajo Nation. *Pub Health Nutr.* 2014; 17(1), 58-65.
[4]Jernigan, et al. Food insecurity among American Indians and Alaska Natives: A national profile using the current population survey–food security supplement. *J Hunger Environ Nutr;* 2017;12 (1): 1-10.

Factors Associated with Food Insecurity in Native Communities

- Limited access/availability to fresh, healthy foods[5]
- Urban Natives have access to corner stores, where goods are expensive, few grocery stores, "food swamps"[6]
- Rural Native communities lack grocery stores; shoppers travel to Wal-Marts[5]
- On reservations, foods are more expensive than in neighboring non-reservation communities[7]

[5]Jernigan, Valarie, et al. "Addressing food insecurity in a Native American reservation using community-based participatory research." *Health Education Research* 27.4 (2011): 645-655.
[6]Hendrickson, Deja, Chery Smith, and Nicole Eikenberry. "Fruit and vegetable access in four low-income food deserts communities in Minnesota." *Agriculture and Human Values*23.3 (2006): 371-383.
[7]McLaury, Kimberly C., et al. "Variation in WIC cash-value voucher redemption among American Indian reservation communities in Washington State." *Journal of hunger & environmental nutrition* 11.2 (2016): 254-262.

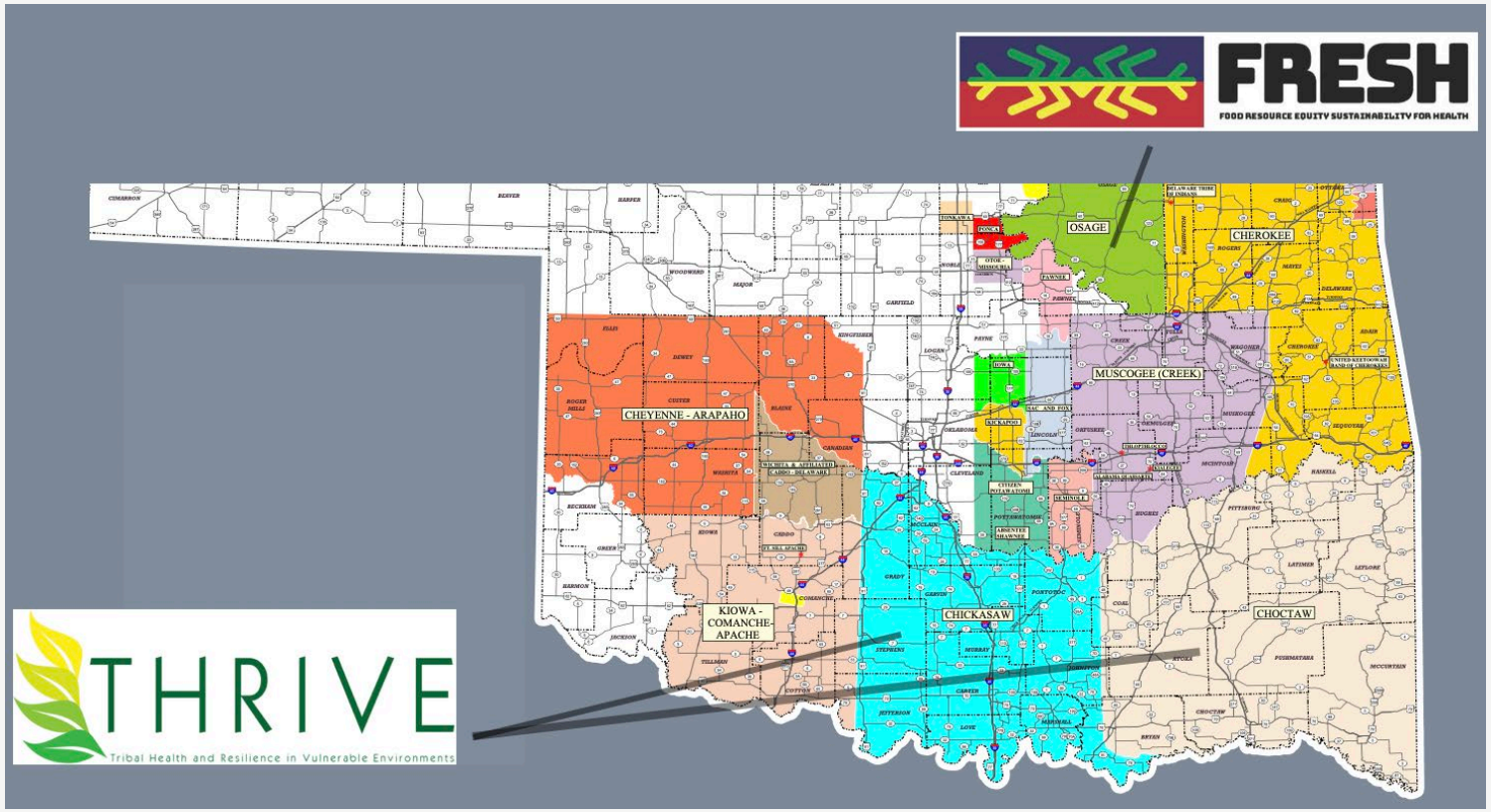
Factors Associated with Food Insecurity in Native Communities cont.

- Farmers in rural areas report the lack of a cash economy to ensure produce stays local[5]
- The limited number of food distributors, restricts options[8]
- Historical reliance on commodity foods has cultivated taste preferences for foods high in fat/sugar/sodium[8]

Improved food security is associated with better dietary intake and lower weight, improved disease management, lower health care costs and overall better health[9]

[5]Jernigan, Valarie, et al. "Addressing food insecurity in a Native American reservation using community-based participatory research." *Health Education Research* 27.4 (2011): 645-655.
[8]Jernigan, Valarie, et al. "Food insecurity and chronic diseases among American Indians in rural Oklahoma: The THRIVE study." *American journal of public health* 107.3 (2017): 441-446.
[9]https://hungerandhealth.feedingamerica.org/understand-food-insecurity/hunger-health-101/

Food Systems Interventions to Improve Health within Oklahoma Native Nations

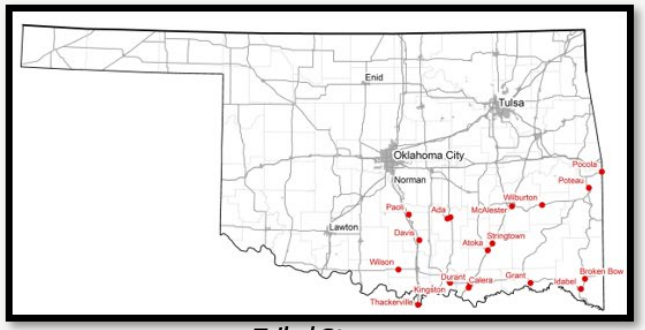


THRIVE preliminary studies: food insecurity and chronic disease among Natives in Choctaw and Chickasaw Nations

- Conducted cross sectional survey of 513 Natives
- Administered USDA 6-item short form Household Food Security Scale
- **58% of Natives surveyed were food insecure**
- Among those who were food insecure, the prevalence of **diabetes** (27.3% vs 18.8%), **obesity** (60.7% vs 45.8%), and hypertension (52.5% vs 42.5%) was higher compared to those who were food secure, even after adjustment for age, gender, education, income, and study site
- **More than 60% of Natives surveyed reported shopping for food at tribal convenience stores 3 or more times per week8**

[8]Jernigan et al. "Food Insecurity and Chronic Diseases Among American Indians in Rural Oklahoma: The THRIVE Study", *American Journal of Public Health* 107, no. 3 (March 1, 2017): pp. 441-446.

THRIVE study question: can we increase healthy food access by improving tribal stores?

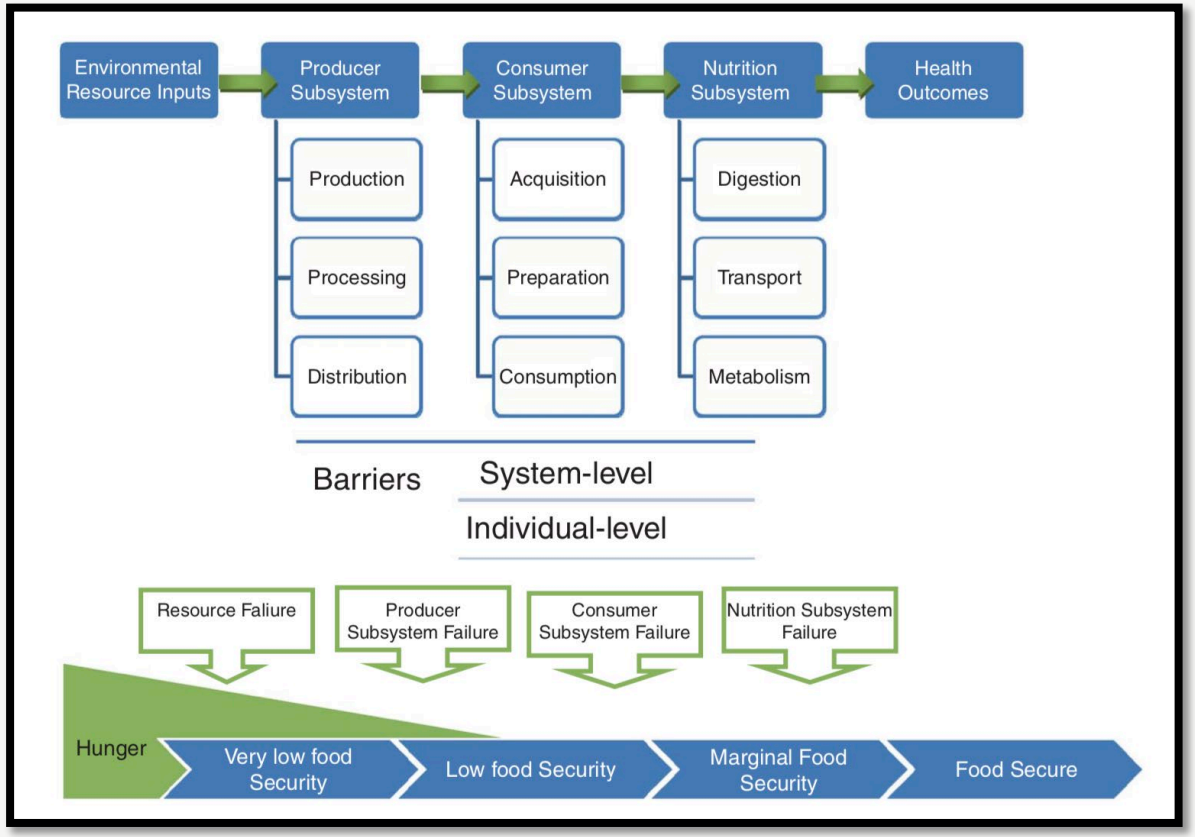


Tribal Stores

Chickasaw Travel Stop, Ada, OK

Choctaw Travel Plaza, Broken Bow, OK

Food System Conceptual Model[10]

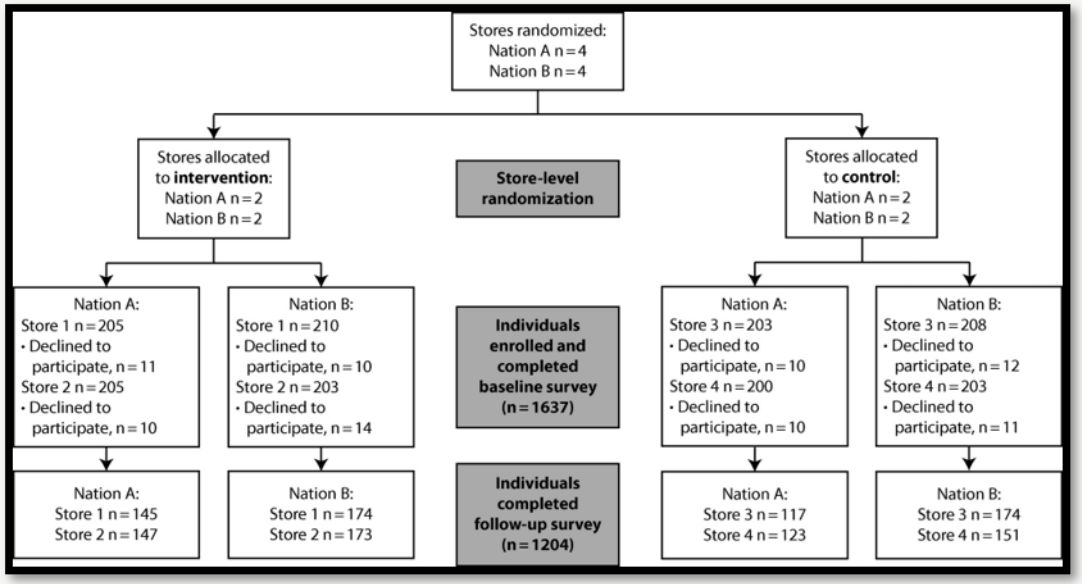


[10]Rutten, L. F., Yaroch, A. L., & Story, M. (2011). Food systems and food security: a conceptual model for identifying food system deficiencies. *J of Hunger & Env Nut*, *6*(3), 239-246.

Design and Methods

- Participatory research orientation
- Cluster control trial with eight stores (4 intervention/4 control)
- Longitudinal cohort study surveyed Native shoppers (n= 1637) before and after the intervention
- Intervention **strategies**:
  - **Product**
  - **Placement**
  - **Promotion**
  - **Pricing**

THRIVE Study Design



Outcomes

- Store:
  - Increased fruit/vegetable availability
  - Store inventory and sales;
  - Nutrition environment measures scores
- Individual:
  - Exposure to interventions
  - Sociodemographic
  - Eating behaviors
  - Self-efficacy
  - Perceived nutrition environment
  - Increased fruit/vegetable purchasing and intake

Intervention strategies development phase one: product[11]

[11]Wetherill, M. et al.. (2018). A Nutrition Environment Measure to assess tribal convenience stores: the THRIVE study. *Health Promotion Practice;* E-pub ahead of print; https://doi.org/10.1177/1524839918800968; September 21, 2018.

Intervention strategies development phase two: placement, promotion, pricing[12]

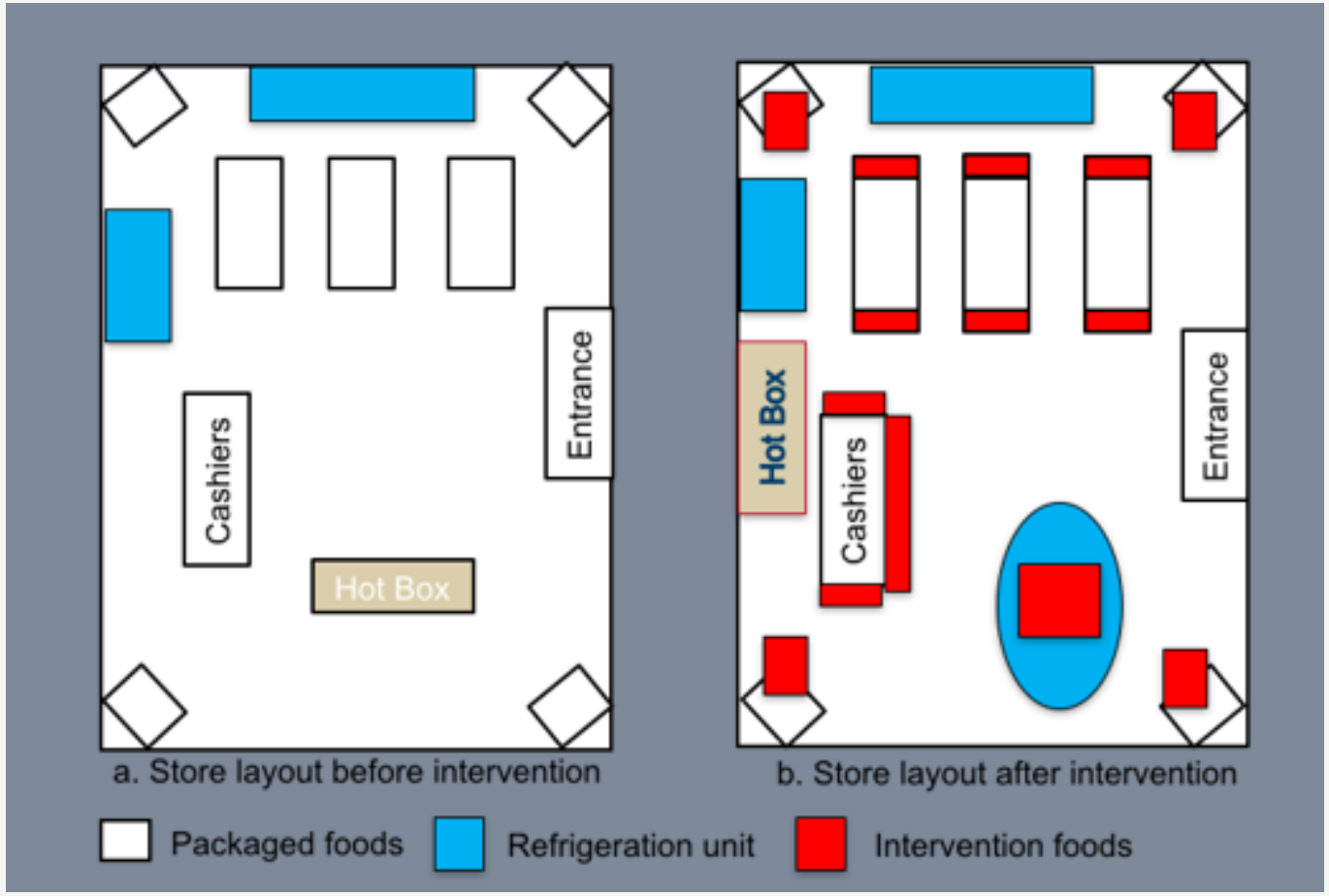
[12] Jernigan, VB et al. (2018). Using Community-based Participatory Research to Develop Healthy Retail Strategies in Native American-Owned Convenience Stores: the THRIVE Study. *Preventive Medicine Reports.* Sep;(11):148-153. PMID: PMC6039850.

Products

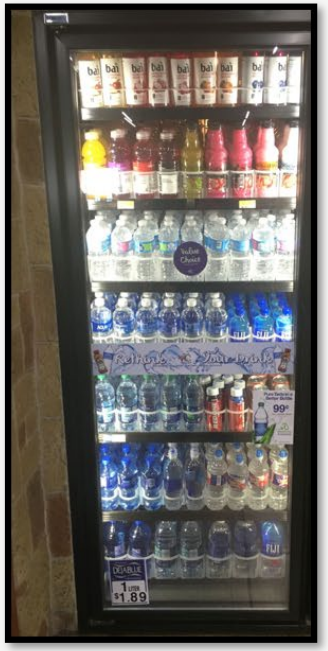

Spinach Harvest Salad
CHOCTAW
TRAVEL PLAZAS
w/ House Raspberry Walnut Dressing
Add Fruit & Nestle 16.9 oz water for only $1.00
$3.99


Grilled Chicken Veggie Wrap
CHOCTAW
TRAVEL PLAZAS
w/ House Raspberry Walnut Dressing
Add Fruit & Nestle 16.9 oz water for only $1.00
$3.99

Placement


Cashiers
Entrance
Hot Box
Hot Box
Cashiers
Entrance
a. Store layout before intervention
b. Store layout after intervention
Packaged foods
Refrigeration unit
Intervention foods

Promotion



Value Choice

Fresher Choice
himona i shahli aiyoa

Pricing


FRESH COMBO
Add a Piece of Fruit & a Bottle of water for $1.00!
FOOD DESTINATION
Lunch To-Go
Snack


FRESHER OPTION
2 for $1.00
Value Choice
Fresher Choice

Statistical Analysis

- **Participants lost to follow-up compared to those completing follow-up surveys**
  - Demographics
  - Fruit and vegetable intake at baseline
- **Intervention stores – promotion effects**
  - Promotion (signs) recall
  - Purchase promoted product
  - Effect of sign on purchase
- **Intervention vs control stores**
  - Perceived nutrition environment (NEMS-P)
  - Food and beverage consumption with an emphasis on healthy items targeted in the interventions (e.g. fruits and vegetables)
- **Effect of dose of exposure to intervention – frequency of shopping at home store**
- **Statistical analyses:**
  - Chi-squared test for categorical variables
  - T-tests for continuous variables
  - Trend analysis for dose effect (frequency of shopping)
  - Confidence intervals for changes over time

Nation A Demographic Characteristics

	Control (n=240)	Intervention (n=292)
Age, mean years (SD)	44.3 (15.5)	41.0 (15.2)
Female, %	53	66
Marital status, %		
Married	51.9	41.6
In a relationship	13.1	21.0
Widowed, Divorced, Separated	21.1	24.7
Never married	13.9	12.7
# of people <18 years living in household, mean # (SD)	1.4 (1.6)	1.8 (1.7)
Education, %		
< high school	5.0	7.2
High school diploma	29.8	24.1
GED	9.2	17.2
Some college or technical school	31.9	33.8
Associate's degree or tech college degree	9.7	5.2
≥ Four-year college degree	14.3	12.4
Employed ≥ part-time, %	82.4	75.2
Body mass index, mean kg/m² (SD)	30.7 (6.8)	31.7 (7.1)

Nation B demographic characteristics

	Control (n=322)	Intervention (n=350)
Age, mean years (SD)	41.9 (14.2)	42.3 (14.3)
Female, %	74	73
Marital status, %		
Married	54.4	53.7
In a relationship	13.7	11.6
Widowed, Divorced, Separated	20.9	21.8
Never married	11.1	12.8
# of people <18 years living in household, mean # (SD)	1.3 (1.4)	1.2 (1.2)
Education, %		
< high school	2.9	3.0
High school diploma	17.0	21.5
GED	4.6	4.2
Some college or technical school	32.7	28.1
Associate's degree or tech college degree	18.0	12.8
≥ Four-year college degree	24.8	30.5
Employed ≥ part-time, %	78.3	83.0
Body mass index, mean kg/m² (SD)	31.2 (6.7)	32.2 (7.4)

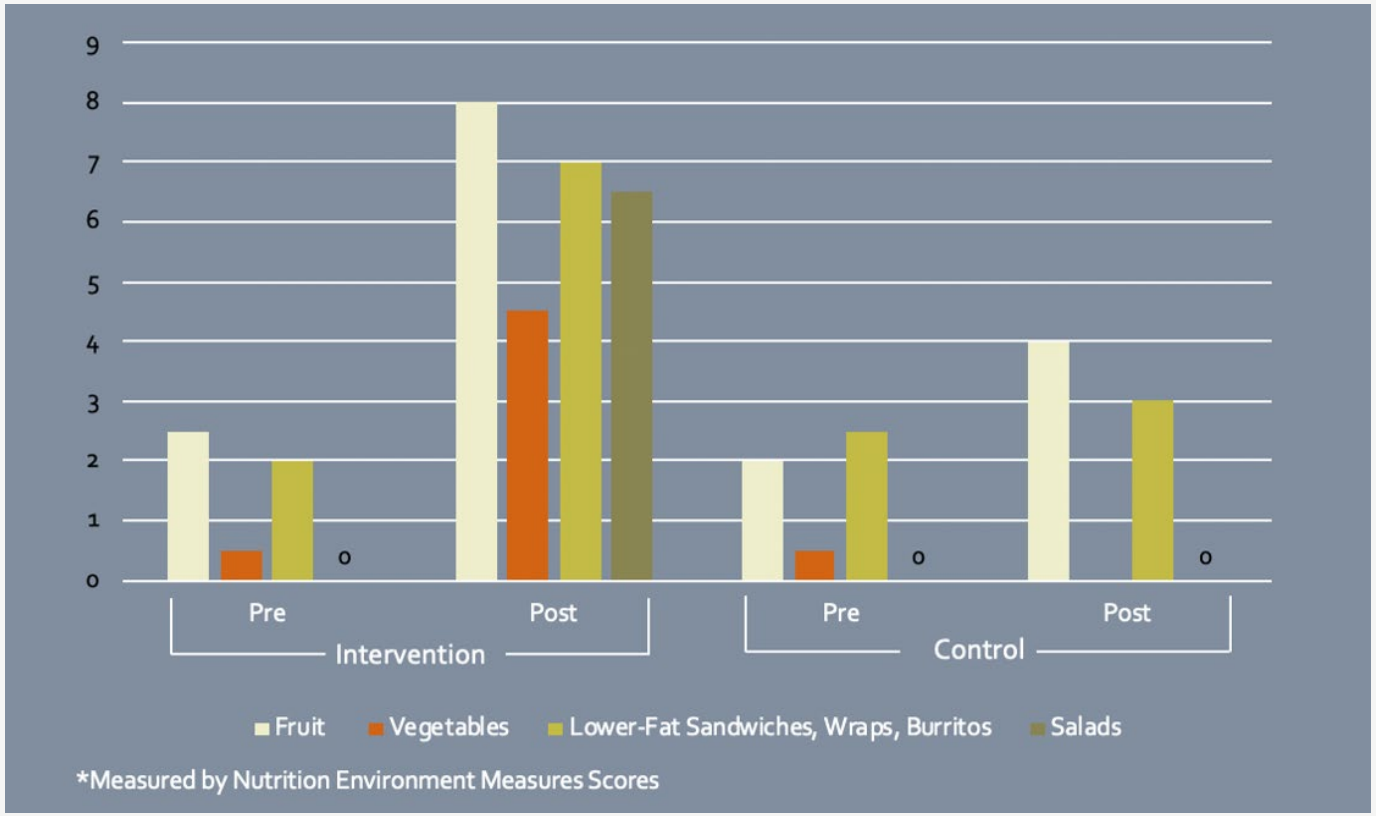
Perceptions of healthy food options at control and intervention stores (Nation A)

	Control store shoppers			Intervention store shoppers			
	Pre (n=127)	Post (n=127)	Within-person effect[1]	Pre (n=255)	Post (n=255)	Within-person effect[1]	Between-group effect[2]
NEMS-P domain	Mean (SD)	Mean (SD)	(95% CI)	Mean (SD)	Mean (SD)	(95% CI)	(95% CI)
All stores:							
Placement/Promotion of unhealthy items	3.18 (0.77)	3.07 (0.73)	-0.11 (-0.26, 0.05)	3.15 (0.73)	3.08 (0.74)	-0.07 (-0.17, 0.04)	0.01 (-0.08, 0.11)
Placement/Promotion of healthy items and nutrition information	3.59 (0.89)	3.56 (1.02)	-0.02 (-0.24, 0.20)	3.45 (0.93)	3.64 (0.90)	0.19 (0.06, 0.33)	0.27 (0.15, 0.39)
Stores with a grill:	(n=0)	(n=0)		(n=147)	(n=147)		
Availability of healthy options at the grill	--	--	--	3.38 (0.83)	3.57 (0.77)	0.19 (0.03, 0.34)	--
The grill promotes healthy options/nutrition information	--	--	--	3.08 (0.57)	3.18 (0.64)	0.10 (-0.02, 0.22)	--
It costs more to buy the healthy options at the grill	--	--	--	3.52 (1.20)	3.46 (1.14)	-0.07 (-0.31, 0.17)	--

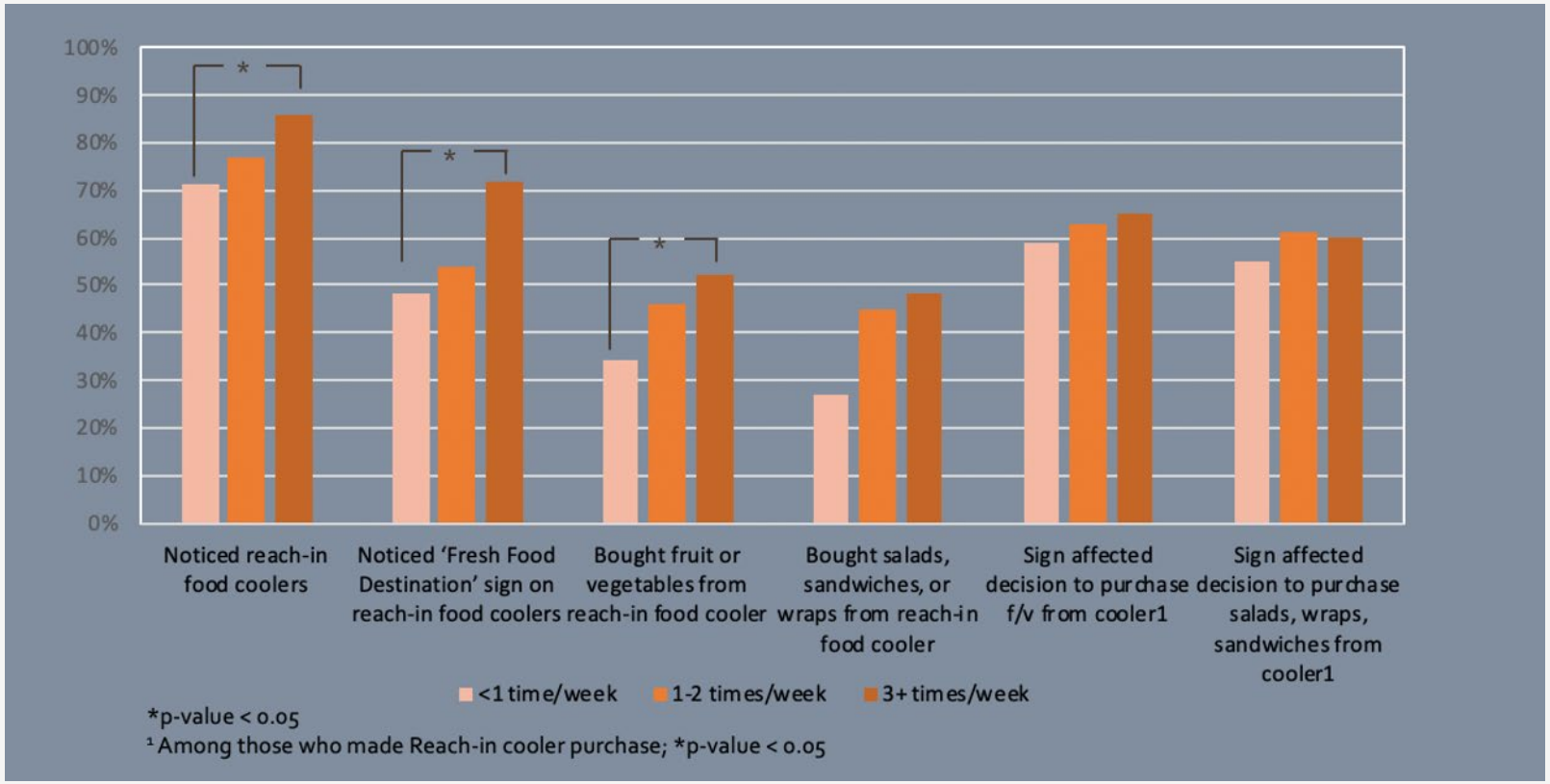
Perceptions of healthy food options at control and intervention stores (Nation B)

	Control store shoppers			Intervention store shoppers			
	Pre (n=316)	Post (n=316)	Within-person effect[1]	Pre (n=340)	Post (n=340)	Within-person effect[1]	Between-group effect[2]
NEMS-P domain	Mean (SD)	Mean (SD)	(95% CI)	Mean (SD)	Mean (SD)	(95% CI)	(95% CI)
All stores:							
Placement/Promotion of unhealthy items	3.31 (0.83)	3.14 (0.66)	-0.16 (-0.26, -0.07)	3.23 (0.80)	3.13 (0.67)	-0.10 (-0.20, -0.01)	0.07 (-0.02, 0.16)
Placement/Promotion of healthy items and nutrition information	3.25 (1.03)	3.39 (0.83)	0.14 (0.01, 0.27)	3.22 (1.05)	3.44 (0.91)	0.22 (0.09, 0.35)	0.09 (-0.07, 0.05)
Stores with a grill:	(n=166)	(n=166)		(n=335)	(n=335)		
Availability of healthy options at the grill	2.81 (0.91)	3.23 (0.77)	0.43 (0.29, 0.57)	2.71 (0.90)	3.34 (0.80)	0.64 (0.52, 0.75)	0.18 (-0.07, 0.44)
The grill promotes healthy options/nutrition information	2.78 (0.88)	3.06 (0.58)	0.28 (0.15, 0.41)	2.78 (0.76)	3.06 (0.57)	0.29 (0.19, 0.38)	0.02 (-0.09, 0.13)
It costs more to buy the healthy options at the grill	3.82 (1.33)	3.50 (1.05)	-0.33 (-0.55, -0.10)	3.84 (1.26)	3.45 (1.09)	-0.38 (-0.54, -0.23)	-0.03 (-0.14, 0.08)

Store Food Availability Pre-Post Intervention *



Trend Analysis of Intervention Exposure Based on Frequency of Shopping[13]



13Jernigan, VB., Salvatore, AL., Williams, M…et al. (2018

Summary and Next Steps

- THRIVE increased healthy food options (perceived and objective measures)
- Influenced decisions to purchase healthier items among a high proportion of shoppers
- Like other studies that only target the environment, we did not see significant changes in overall dietary intake, but we did change purchasing decisions, especially among those shopping more often
- Increased demand for healthy foods as evidenced by spread of intervention strategies
- Resulted in important policy changes: distributors for both Nations expanded suppliers and options
- Next steps: expand intervention strategies, include behavioral change and traditional foods focus, increase local food options

[13]Jernigan, VB., Salvatore, AL., Williams, M…et al. (2018). A Healthy Retail Intervention in Native American Convenience Stores: the THRIVE Community-Based Participatory Research Study. *American Journal of Public Health. 109 (1)*; 132-139.

FRESH Study with Osage Nation

What study question: Can We Intervene More Broadly Upon the Food System?

- Community-initiated study
- Builds upon Osage Nation vision to create a sustainable tribal food system and build food sovereignty
- Multicomponent, multilevel intervention trial
- Aim: to reduce BMI and hypertension among 250 Osage families (total n=500)
- Wait-list control design with tribal head start programs (n=9) in 4 communities
- Intervention currently underway

> "Finally, we have a way to do what we did 200 years ago...feed our own people."
>
> — Raymond Red Corn, Osage Nation Assistant Principal Chief

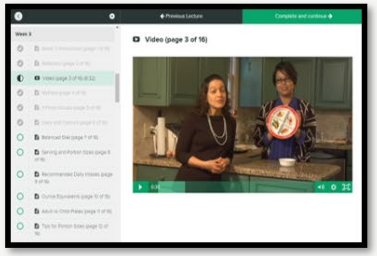
FRESH
FOOD RESOURCE EQUITY SUSTAINABILITY FOR HEALTH

FRESH Intervention Components

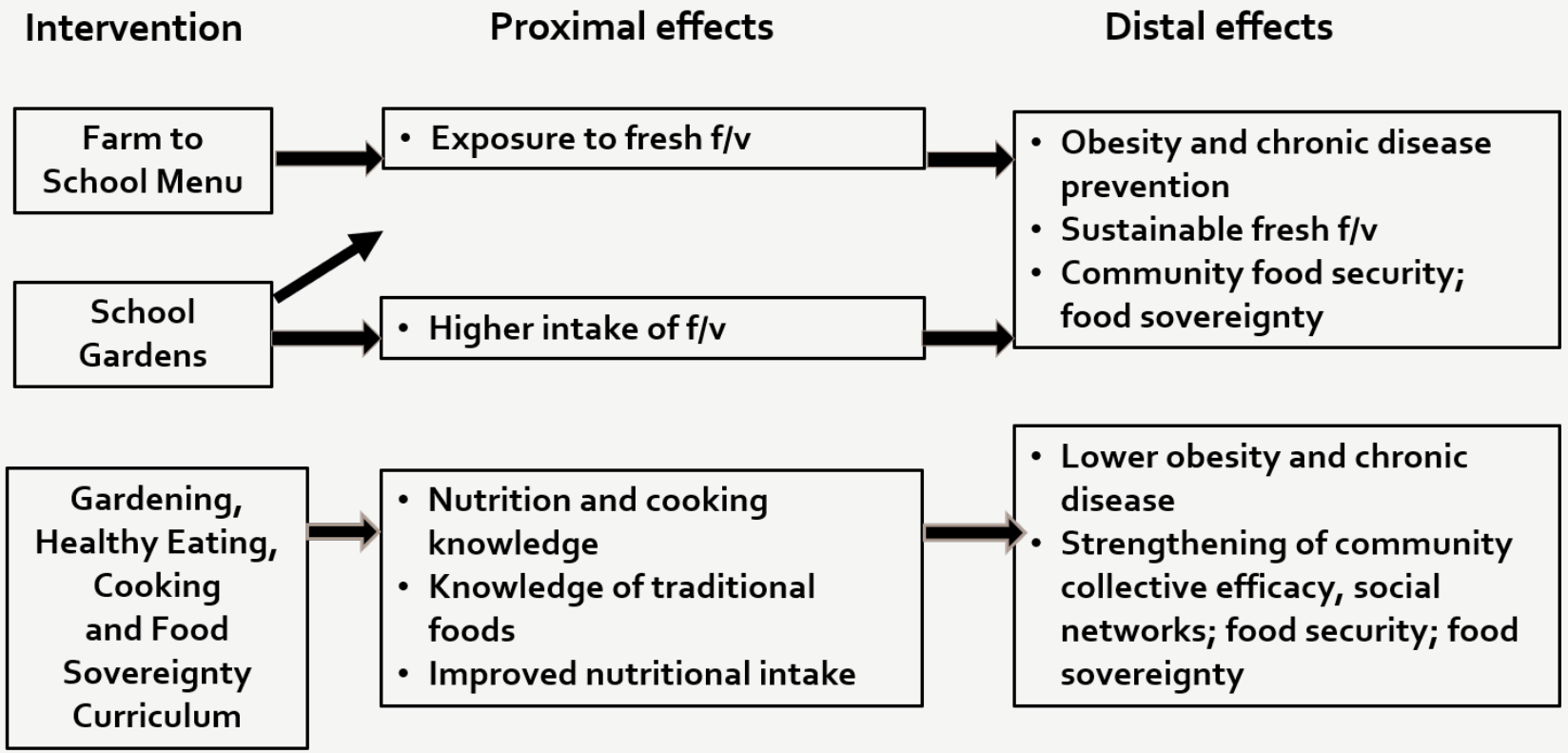
Farm to School Menu

School Gardens

Gardening, Healthy Eating, Cooking and Food Sovereignty Curriculum



FRESH Intervention Components, Processes, and Outcomes



Summary and Conclusions

"We can't heal the people if we don't heal the food system"

-Kamuela Enos
Mao Organic Farms

- Future interventions must:
  - Support sustainable community food systems
  - Food security
  - Culturally and contextually centered interventions that restore the health of the environment, support traditional indigenous knowledge, and elevate what's working in Native communities