

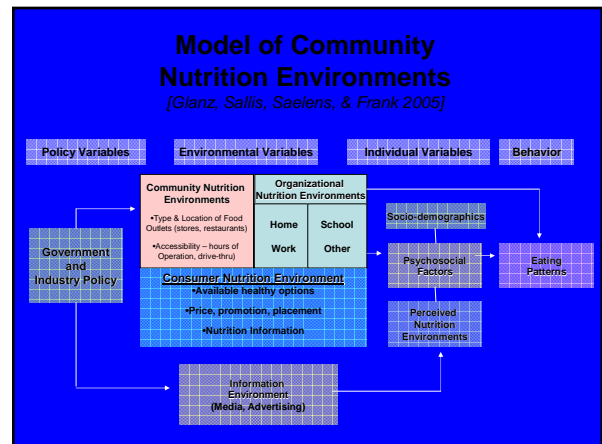
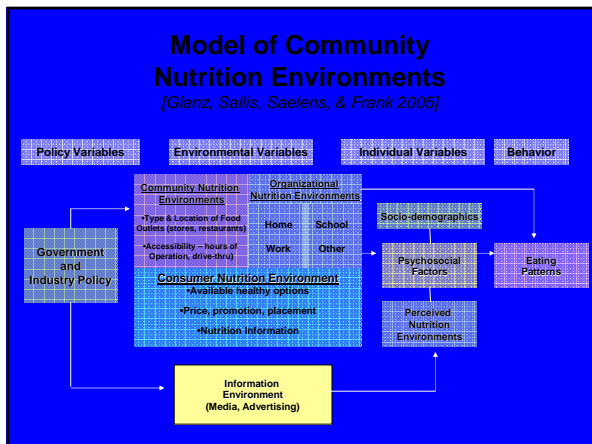
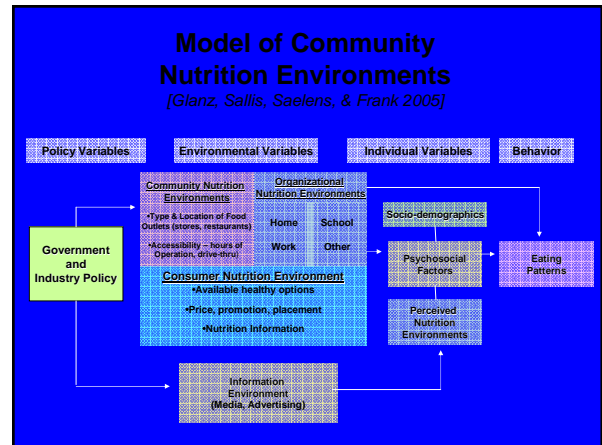
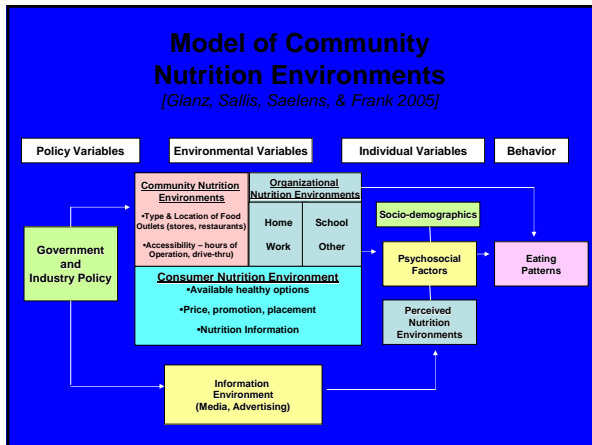
Developing and Sustaining Programs to Modify the Food Environment: The Healthy Stores Projects

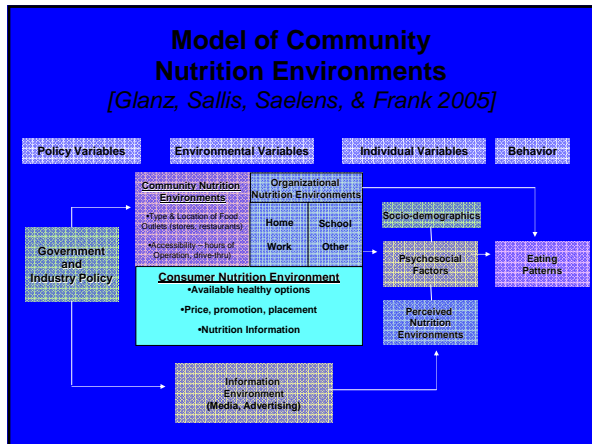
Joel Gittelsohn

Center for Human Nutrition
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Outline

- Conceptualizing the Food Environment
- Approaches for Changing the Food Environment
- Apache Healthy Stores Development and Results
- Sustaining Apache Healthy Stores and Expansion to the Navajo Nation
- Healthy Stores Projects Future Directions





Why change the food environment?

- To modify the context within which illness-producing behaviors are made
- Sustainable
- To reach a large number of people (may help bring about community change)
- To complement individual behavior change programs
- The only practical way of addressing the obesity epidemic on a large scale (Economos and Irish-Hauser 2007)

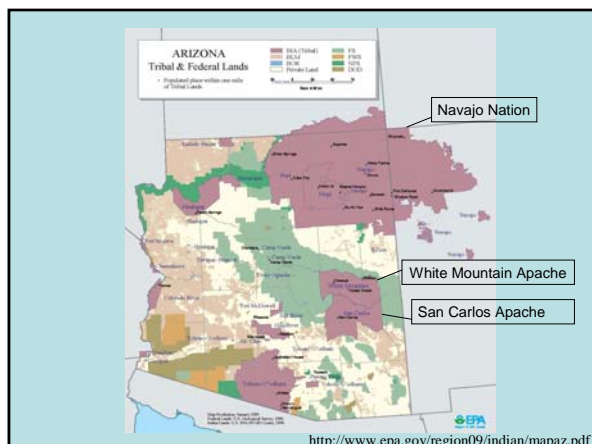
How to Change the Food Environment

- Change access to food
 - Increase availability of healthy food options over less healthy food options (e.g., senior centers)
 - Changes prices on healthier or less healthy foods (or provide coupons)
 - Increase/reduce production of certain foods
 - Change distribution of foods (e.g. to local retailers)
 - Modify physical location of foods (e.g., Shelf level, front or back of store)
- Change setting for education/information
 - Point of purchase
 - Goal: To create demand for healthy foods

Food Store Intervention Trials: Limitations

- Little or no formative research
- Little emphasis on participatory approaches
- Limited use of theoretical frameworks
- Little process evaluation
- None have worked in small stores
- Few intervention strategies, with limited reinforcement/integration of activities
- Limited evaluation (e.g. lack of dietary assessments)
- Tend to be short duration
- No work on sustainability

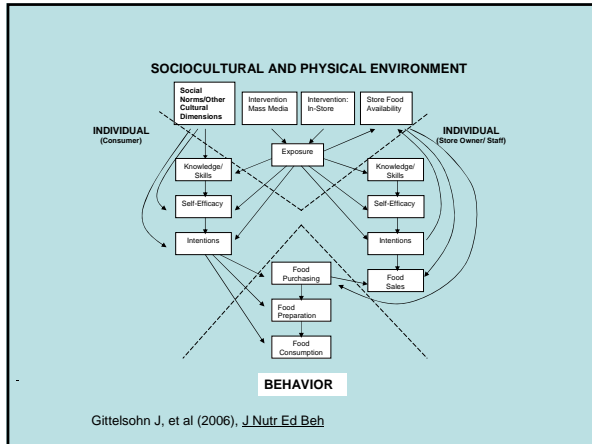
(References: Seymour et al 2004, Glanz et al 1995, Wechsler et al 2000, French and Stables 2005)



Apache Healthy Store Goals



1. To implement a store-centered nutrition program on the White Mountain and San Carlos Apache reservations
2. To increase sales of healthy foods
3. To increase healthy food purchasing, preparation and diets of community members



Formative research conducted

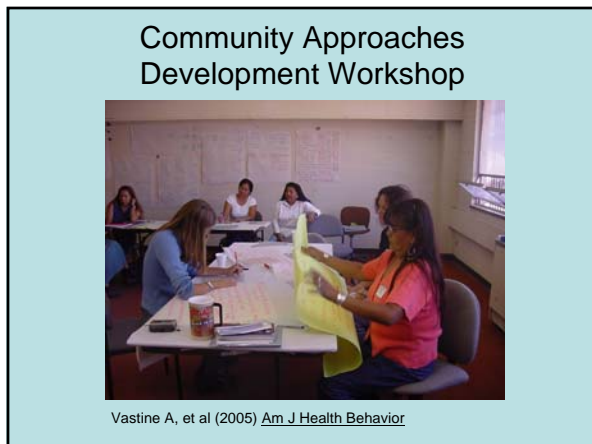
Type of formative research	Number completed
In-depth interviews with large store owners, managers and staff	6
In-depth interviews with small store owners and managers	10
In-depth interviews with store customers	22
In-depth interviews with community leaders	13
Observations of food purchasing in small stores	11
Focus groups for testing intervention materials	7
24 hour dietary recalls	53

- ### Key Issues from Interviews
- From Store Customers: *“I would love to buy/eat healthy foods but they are...”*
 - Too expensive
 - Not available in the stores I shop in
 - Are of poor quality in the stores I shop in
 - From Store Owners/Managers: *“I would love to stock healthy foods but ...”*
 - No one buys them
 - The last time I stocked (xxxxx) it just sat on the shelves

Table 2 The five major sources of energy and the percentage contribution of each to energy, fat and sugar for Apache adults

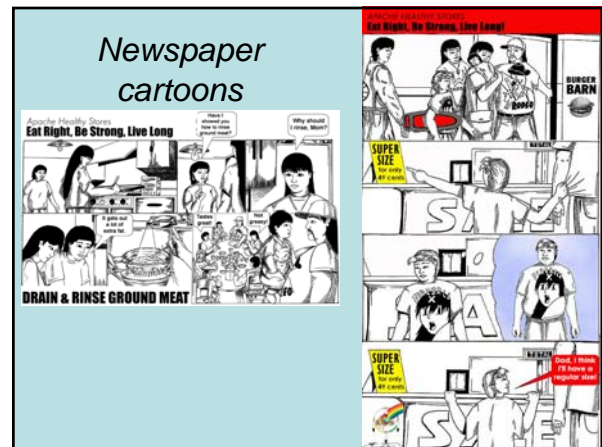
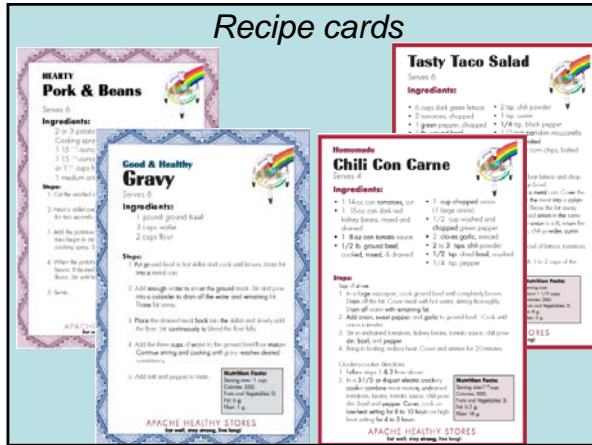
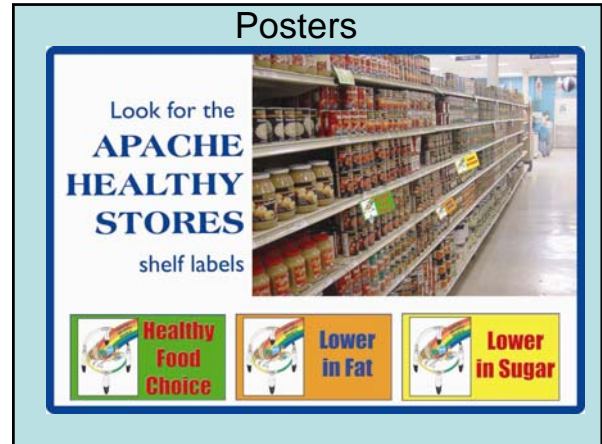
Sources of energy	Contribution to energy (%)	Sources of fat	Contribution to total fat (%)	Sources of sugar	Contribution to total sugar (%)
Crisps, popcorn	10.5	Crisps, popcorn	17.2	Sodas	31.9
Fry bread	7.9	Fry bread	8.4	Orange juice, apple juice	10.6
Sodas	6.2	Fried potato dishes	7.6	Other juices and drinks	10.2
Fried potato dishes	5.4	Eggs	5.0	Sugar	8.2
Apache tortilla and burritos	5.2	Hotdogs and sausages	4.7	Beer	5.4
Total	35.2	Total	42.9	Total	66.3

Sharma et al., 2007, *Public Health Nutr*



Apache Healthy Stores Program Phases (June 2003 – June 2004)

Phase	Theme
0	Teasers
1	Kickoff/Eating Healthy Snacks
2	Start the Day with a Healthy Breakfast
3	Cooking and Eating with Less Fat
4	Quick and Healthy Dinners
5	Drinking Healthy Beverages
6	Healthy Lunches and Snacks



Culturally themed radio announcements



Evaluation

- Study Design: Quasi-experimental
 - WMAT Intervention areas: 4
 - SCAT Intervention areas: 2
 - WMAT Comparison areas: 4
 - SCAT Comparison area: 1
- Consumer Sample:
 - Main food shopper/preparer of the household
 - Baseline: 270 household respondents
 - Post-intervention: 176 of the same respondents

Evaluation Instruments

- Process Evaluation
 - Mass Media log, Store Visit form, Cooking demo observation, Exposure (post intervention)
- Consumer Impact
 - Consumer impact questionnaire (food knowledge, self-efficacy, intentions, purchasing, preparation, etc.)
 - Quantitative food frequency instrument (food consumption)
- Consumer Exposure
- Store Impact
 - Food sales, outcome expectations, self-efficacy and

Quantitative Food Frequency Questionnaire (S Sharma et al 2007)

How often during the last 30 days did you USUALLY eat the following foods and how much do you USUALLY eat (give time)?

1	Usual Portion Size	Never or less than once/month	1	2-3	1	2-3	4-6	1	2 or more
			time/month	times/month	time/week	times/week	times/week	time/day	times/day
1. Fry bread, plain (incl bread in Apache burger fry bread)	___ xA B C'								
2. Indian taco, with beans (incl or cheese, lettuce, tomato, onion sauce)	___ xA B C								
3. Tortilla, plain	___ xA B C D E								
4. Tostito bread, Donkey bread	___ xA C D								
5. Taco (any taco, incl Taco Bell)	___ xF								
6. Burro, burrito, (incl beef or meat, green chili, chicken burrito, chimichanga)	___ xG H J ZZ								
7. Breakfast burrito, breakfast burro	___ xG H ZZ								
8. Bean Burrito	___ xG H ZZ								
9. Enchilada	___ xJ K ZZ								
10. Tamale	___ xJ G ZZ								

*A-ZZ letters representing different food models used for assessing different portion sizes.

Food Models



Apache Healthy Stores: Results (1)

- Process
 - Individual: high dose
 - Store: high dose and reach, moderate fidelity
 - Community: moderate fidelity and reach
 - Curran S, et al (2005) [Health Education Research](#)
- Exposure
 - Intervention area respondents significantly more exposed to almost all intervention components



Socio-demographic Characteristics of the study sample, n=184

Socio Demographic Characteristics	Intervention n=89	Comparison n=95	P value
Female (%), n=183*	95.5	95.7	NS
Age, Mean (SD), n=184	39.7 (11.4)	43.5 (13.6)	0.04
Total years of school completed, Mean (SD), n=182	11.2 (1.4)	10.7 (2.1)	0.06
Material Style of life Score, Mean (SD), n=184	9.4 (5.6)	9.5 (4.6)	NS
Married (%), n=182	29.2	47.3	0.01
Reserve (%):			0.03
White Mountain Apache Tribe	62.9	47.4	
San Carlos Apache Tribe	37	52.6	

NS, Not Significant;
 * Fisher's Exact Test was used
 Chi Square test was used for categorical and dichotomous variables and T test for continuous variables

Socio-demographic Characteristics of the study sample, n=184 (Contd.)

Socio Demographic Characteristics *	Intervention n=89	Comparison n=95
Income <\$ 20,000, (%) (n=106)	62.9	63.5
Full time employed (%), n=182	32.2	27.4
Receiving WIC (%), n=183	32.9	35.8
Receiving Food Stamps (%), n=183	54.6	55.8
Receiving commodity foods (%), n=183	14.8	15.8

* The difference was not significant between the 2 groups.
 Chi Square test was used for categorical variables

Impact of Program on Psychosocial Factors

	Food Knowledge Score		Food Label Reading Score	
	N	181	N	181
R2	0.24		0.24	
	Std beta	p-value	Std beta	p-value
Intervention group (Intervention vs. Comparison)	0.212	0.002	0.037	0.587
Baseline value	0.346	<.0001	0.266	<.0001
Age (years)	-0.097	0.183	-0.309	<.0001
Sex (Female vs. Male)	-0.007	0.918	0.111	0.1
Marital status (Married vs. Others)	-0.025	0.725	-0.032	0.659
Years of Schooling (years)	0.148	0.039	-0.017	0.808
Reserve (SCAT vs. WMAT)	0.024	0.724	0.142	0.039
Food Knowledge Scores	*	*	*	*
Healthy Eating Self-Efficacy Scores	*	*	*	*

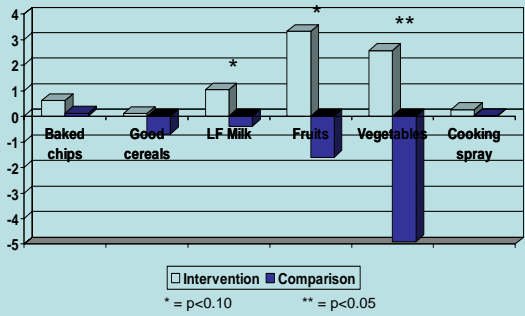
N- Sample Size; Std beta- Standardized beta
 R2 is the variation in the response variable that is contributed by the regression model
 Multiple linear regressions were used with significance level of p <0.05

Impact of Program on psychosocial factors

	Food Self-Efficacy Score		Food Intentions Score	
	N	181	N	181
R2	0.25		0.37	
	Std beta	p-value	Std beta	p-value
Intervention group (Intervention vs. Comparison)	0.019	0.788	-0.029	0.647
Baseline value	0.445	<.0001	0.287	<.0001
Age (years)	-0.109	0.135	0.078	0.27
Sex (Female vs. Male)	0.064	0.344	0.052	0.395
Marital status (Married vs. Others)	0.058	0.418	-0.011	0.868
Years of Schooling (years)	0.058	0.424	0.053	0.427
Reserve (SCAT vs. WMAT)	0.123	0.072	-0.113	0.074
Food Knowledge Scores	0.094	0.189	0.102	0.121
Healthy Eating Self-Efficacy Scores	*	*	0.393	<.0001

N- Sample Size; Std beta- Standardized beta
 R2 is the variation in the response variable that is contributed by the regression model.
 Multiple linear regressions were used with significance level of p <0.05

Impact on promoted foods: Number of times purchased in past month, n=176



Impact on healthy food purchasing and cooking scores

	Healthiness of Cooking Method Score		Healthy Foods Purchasing Freq Score†	
	N	181	N	181
R2	0.17		0.18	
	Std beta	p-value	Std beta	p-value
Intervention group (Intervention vs. Comparison)	0.072	0.329	0.24	0.001
Baseline value	0.249	0.001	0.277	<.0001
Age (years)	-0.019	0.808	0.023	0.767
Sex (Female vs. Male)	-0.015	0.837	-0.033	0.637
Marital status (Married vs. Others)	0.063	0.4	-0.075	0.317
Years of Schooling (years)	0.036	0.64	-0.003	0.965
Reserve (SCAT vs. WMAT)	0.126	0.088	0.064	0.38
Food Knowledge Scores	0.025	0.742	0.043	0.571
Healthy Eating Self-Efficacy Scores	-0.076	0.364	0.095	0.252
Healthy Eating Intention Scores	0.264	0.003	0.038	0.65

N- Sample Size; Std beta- Standardized beta; † Since the dependent variable was positively skewed, log transformed dependent variable (natural log) is used in the model.
 R2 is the variation in the response variable that is contributed by the regression model.
 Multiple linear regressions were used with significance level of p <0.05

Impact of Apache Healthy Stores program on daily gram consumption of foods, preliminary

Food	Pre		Post		T test	P
	Intervention Mean n=69	Comparison Mean n=82	Intervention Mean n=69	Comparison Mean n=82		
Vegetables:	56.5	61.6	71.8	50	26.9	0.01
Fruits:	122.2	136.3	134.5	134.2	14.5	0.58
2% Milk	49.2	90.9	107.4	83.9	65.2	0.065
Unhealthy Snacks: chips, nachos, popcorn	37.3	21.2	31.6	26.7	-11.1	0.267
Fried Breads and Burritos:	132.5	93.6	100.7	108.8	-47.0	0.048
Hamburger dishes	20.4	20.3	34.7	23.7	11.0	0.029
Healthy Cereals: High fiber, low sugar cereals	3	6.4	9	6.5	5.8	0.014

Mean indicates the daily gram weight consumption of that food
Paired t-tests were conducted; N=151

Summary Apache Healthy Stores Results

- Food store environmental intervention associated with modest improvements in:
 - Food-related knowledge
 - Healthy food purchasing
 - Daily gram consumption of healthier food options
 - Increased unit sales of promoted healthy food options
- First food store intervention to show impact on diet

What is Sustainability and How Do We Achieve It?

- Sustainability counts on partnership and community participation
- Should be planned for from the beginning
 - Who will maintain the program after ...
 - Should build partnerships from the beginning
 - Build capacity for the program

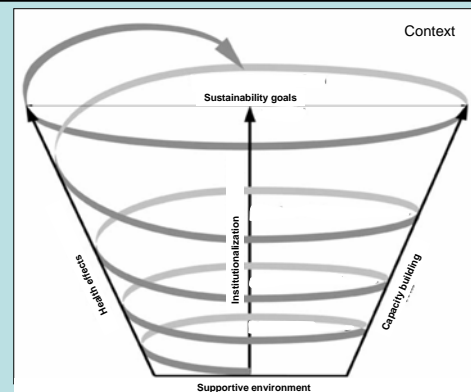


Figure 1. Conceptual Model for Sustainability

(Dressendorfer et al., 2005; Goodman et al., 1989 ; Shediak-Rizkallah & Bone, 1998)

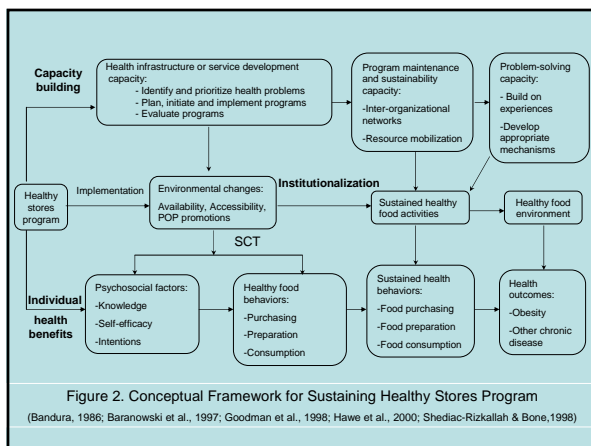


Figure 2. Conceptual Framework for Sustaining Healthy Stores Program

(Bandura, 1986; Baranowski et al., 1997; Goodman et al., 1998; Hawe et al., 2000; Shediak-Rizkallah & Bone, 1998)

How are we making Apache Healthy Stores sustainable?

- Community process
 - Community workshops
 - Community advisory committee
 - Relationship with local IRB
- Partnership with Diabetes Prevention Program
 - Memo of understanding
 - Transfer of program ownership
 - Modification of materials to meet DPP requirements
 - Capacity-building of DPP staff (evaluation, intervention, data analysis and writing)
 - Emphasis on evaluating their ongoing programs as well as AHS
- Ongoing Partnership with Stores


Transfer/Sustainability Data to be Collected

Stake-holders	Categories	Instruments
Diabetes Prevention Program:	Transfer (process)	In-depth interview; document review; participant observation
	Program ownership	Modified version of Community Ownership Scale (Flynn,1995)
	Integration/ Institutionalization	Modified version of LoIn scale (Goodman et al., 1994)
	Capacity-building	Modified Capacity-building Checklist (Hawe et al, 2000); Modified Process evaluation forms from AHS; Modified Scales for Measuring the Capacity of Community-based Initiatives (Lempa et al, 2006)
	Organizational factors	In-depth interview, document review, participation observation
Community:	Cost-benefit	In-depth interview
	Community ownership	Modified Community Ownership Scale (Flynn (1995); participant observations, document reviews, in-depth interviews
	Program effectiveness	Consumer Impact Questionnaire; Store Manager Impact Questionnaire
	Community factors	Modified community participant questionnaire (Ho et al., 2007); In-depth interview, document review, participation observation
Food stores:	Cost-benefit	Consumer Impact Instrument; interviews
		Store Impact Instrument; In-depth interviews

Sustaining (and expanding) Apache Healthy Stores: Anticipated Outcomes

- Pace of transfer, level of integration and institutionalization will differ due to program needs, motivation and support from program managers.
- Differences in capacity, organizational climate and community environment will affect the results on the three reservations.
- San Carlos Apache Diabetes Prevention Program
 - Full transfer of existing program, adaptation and integration of activities (including evaluation)
- White Mountain Apache Diabetes Prevention Program
 - Partial transfer of existing program
- Navajo Special Diabetes Program
 - Full partners in development, implementation

Goals of the Healthy Stores Project for Navajo Nation



- To reduce risk for obesity and other diet-related chronic disease by increasing the availability, purchase, and consumption of healthy foods on the Navajo Nation.
- Specific Aims:
- Implement a self-sustained healthy food store program on the Navajo Nation, based on Apache Healthy Stores study findings, in collaboration with local Navajo stakeholders and others, and using a participatory approach.
- Evaluate the sustainability of the program, and its impact on food sales, purchase and consumption.

Navajo Healthy Stores Formative Research

Type of information	# completed
Food source checklist	151
Dietary recalls	79
IDIs community members	18
IDIs health staff	8
IDIs store management/staff	6
Materials review	41

Navajo Healthy Stores FOOD SOURCE CHECKLIST

Food Source Name: _____ Date: ___/___/___ Data Collector: _____

Location: _____ Accept WIC? ___Yes ___No Accept Food Stamps? ___Yes ___No

Type of Food Source

Supermarket ___1 Medium Store ___2 Small Store ___3 Convenience/ Gas Station ___4 Food Bank ___5 Trading Post ___6 Church ___7
 Chapter House ___8 Senior Center ___9 Community Center ___10 Pharmacy ___11 Farmers Market ___12 Butcher ___13
 USDA/Tribal Commodity Food Distribution Ctr. ___14 Flea Market ___15 Other ___16 _____

Food Source Environment					
Features	Yes	No	Features	Yes	No
Prepared food/carryout			Self (e.g. out of bag)		
Bilingual signage (Navajo/English)			Raw meat out in store?		
Alcohol sold			Foods baked in store?		
Beverage/Drinks			vending machine		

Food Availability (Y/N)

Fresh Vegetables ___	Number of different varieties: 0 1-2 3-4 5-10 11+
Fresh Fruits ___	Number of different varieties: 0 1-2 3-5 6-10 11+
Milk ___	Whole ___ 2% ___ 1% ___ Skim Milk ___ Price of LP milk US\$ ___ gallon (LP=2% fat)
Canned Fruit ___	Baked chips/tortilla chips/baked sheets ___ Frozen Vegetables ___ Canned vegetables ___
W/W bread ___	Liquid oils ___ Bottled/Flavored water ___ LP Creamer ___
100% Fruit Juice ___	Preheats ___ (low sodium? Y/N) ___ Diet Sodas ___ Cooking Spray ___
Low sugar cereals ___	high fiber cereals ___ Lean or extra lean ground meat ___ Artificial sweetener ___
Navajo Traditional Foods ___	Lean ___ (in 1/2 cup sugar) ___ (in 1/2 cup flour) ___ ground meat ___ fat substitute ___

Comments: _____

NDS Project 10/16/2007, Version 3

Type of Food Source by Location

Food Source	On Navajo Nation	Off Navajo Nation, Commonly Used	Total (N)
Convenience/ Gas Station	42	12	54
Small Store	18	5	23
Trading Post	16	11	27
Supermarket	12	20	32
Medium Store	9	0	9
Flea Market	4	0	4
Farmer's Market	0	1	1
USDA/Tribal Commodity Food Distribution	0	1	1
Total	101	50	151



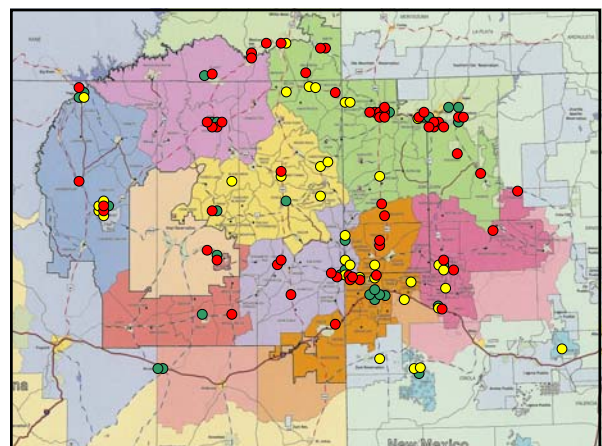
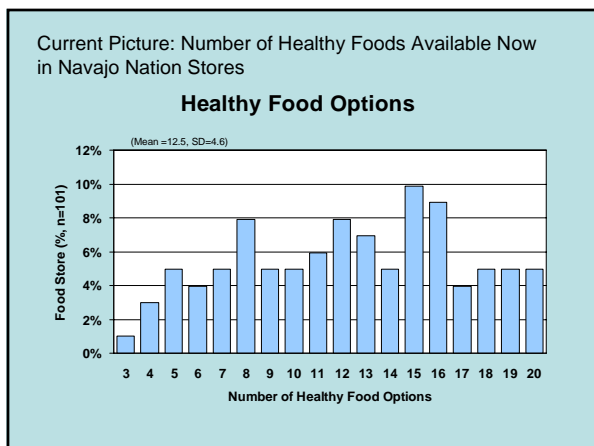
Availability of Different Types of Healthier Foods on Navajo Nation (1)

Food Items	N	% of Total
Bottled Water	100	99.0
Diet Soda	96	95.1
Fruit Juice	92	91.1
Canned Fruits	83	82.2
Fresh Fruits	80	79.2
Canned Vegetables	75	74.3
Pretzels	75	74.3
Baked Chips/tortilla chips/baked cheetos	73	72.3
Low Sugar Cereals	69	68.3
High Fiber Cereals	68	67.3

Availability of Different Types of Healthier Foods on Navajo Nation (2)

Food Items	N	% of Total
Liquid Oils	66	65.4
Artificial Sweetener	64	63.4
Whole Wheat Bread	56	55.5
Low Fat Milk	49	48.5
Frozen Vegetables	47	46.5
Cooking Spray	45	44.6
Salt Substitute	33	32.7
Fresh Vegetables*	29	28.7
Lean or extra lean ground meat	19	18.8
Low Fat Creamer	9	8.9

* More than two types of fresh vegetables



Selected Aspects of the Navajo Food Environment

- Physical
 - Great distance between food sources
 - “Unique” aspects of the food environment
 - Trading posts (offer credit)
 - Gas station stores in abundance
 - Mobile commodity foods distribution points
 - Local vendors
- Consumer
 - Prices and availability of healthy foods better off reservation
- Social
 - Strong connection between local food stores and community members

Navajo Healthy Stores Timeline

- Year 1: Agency council and IRB approvals
- Year 2: Formative research, community workshops, intervention materials development, instrument development and training
- Year 3: Baseline data collection and round 1 implementation
- Years 4-5: Post-intervention evaluation and round 2 implementation

Summary: The Healthy Stores Programs

Apache Healthy Foods/ Dine' Healthy Stores:
USDA/NRI/2005-2008
SUSTAINABILITY/EXPANSION FULL SCALE TRIAL

Baltimore Healthy Stores Feasibility
USDA/FANRP/2004-2006
RWJ/2007-2009
URBAN FEASIBILITY AND FULL SCALE TRIALS

Zhiwaapenewin Akino' maagewin
ADA, FRIF/2004-2006
MULTI-INSTITUTIONAL FIRST NATIONS FEASIBILITY TRIAL

Minobmaadiziwan Kinomaagewin
ADA, FRIF/2006-2007
MULTI-INSTITUTIONAL AMERICAN INDIAN PILOT TRIAL

Healthy Foods Hawai'i
USDA/2004-2007
FOOD SYSTEM FULL SCALE TRIAL

DPREVENT
Target Funder: NIDDK/2007-2011 (FUTURE) MULTI-INSTITUTIONAL FULL SCALE TRIAL

Healthy Foods North
GN/IPY/2006-2008
PRICING FEASIBILITY TRIAL

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 - Diabetes Prevention Programs
 - Kids on the Hill
 - Government of Nunavut, NWT
 - Tribal Governments

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- Baltimore Healthy Stores
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- Zhiwaapenewin Akino' maagewin (First Nations)/MK Healthy Ways
 - American Diabetes Association, Fulbright, Faculty Research Initiative Fund/JHU
- Healthy Foods Hawaii
 - USDA/NRI
- Healthy Foods North
 - Government of Nunavut, Government of NWT
- www.healthystores.org