Centering Communities to Advance Cardiovascular Health:

Lessons from MUTTON-HF—(Medically Utilized Tailored Traditional food to Optimize Nutrition in HF)—An Indigenous FIM program in Navajo Nation

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Outline

- State of Cardiovascular Health
- Community-engagement to determine health priorities and solutions
- Design of Mutton-HF: an Indigenous Food is Medicine Program
- Health impact of MUTTON-HF
- Next steps

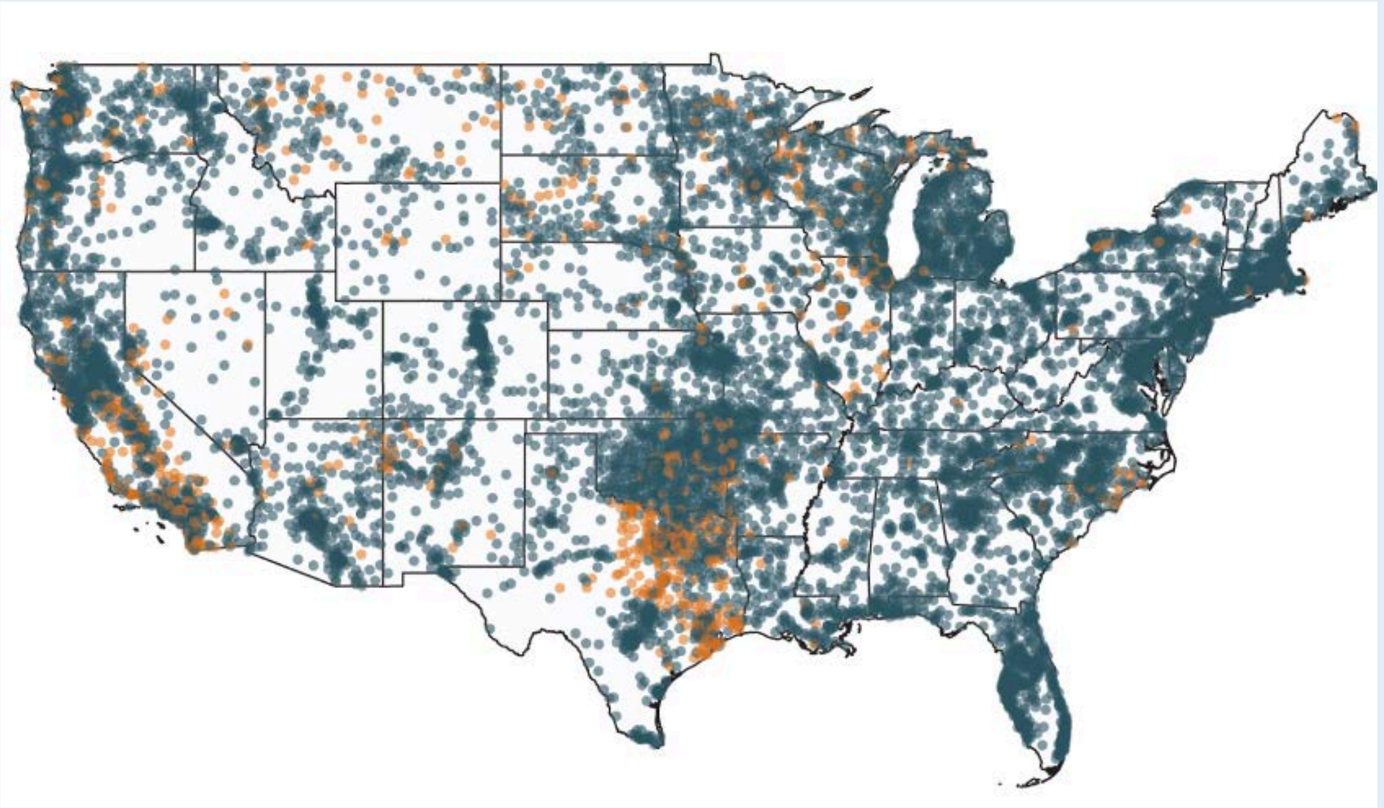
Indigenous Cardiovascular Health

High prevalence of cardiovascular risk factors

- 72.2% hypertension
- 61.3 % hyperlipidemia
- 44.8% diabetes
- 38.7% chronic kidney disease

High prevalence of cardiovascular disease

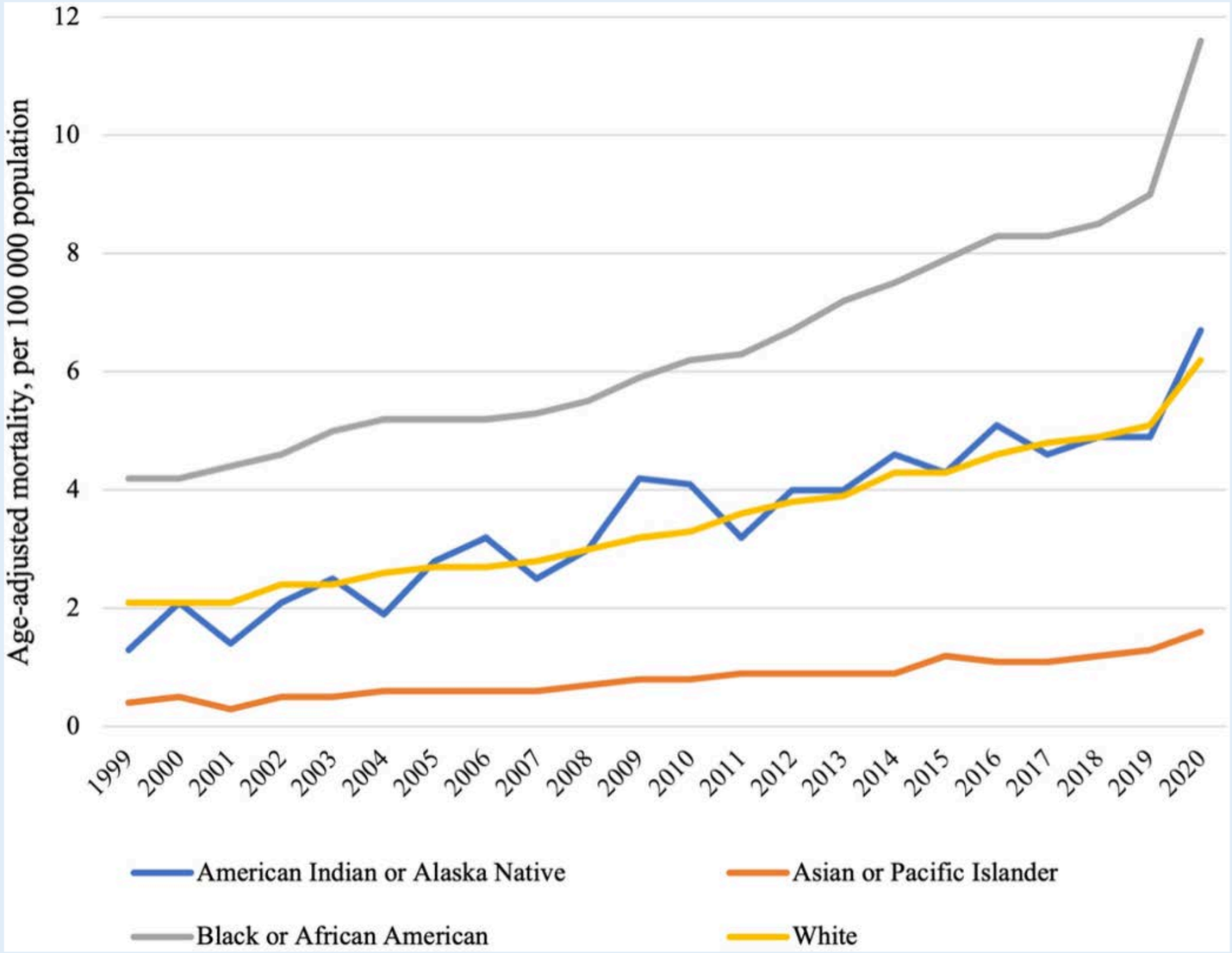
- 1/5 with heart failure
- Over ⅓ with coronary artery disease



***50% of patients had at least 1 severe cardiovascular condition**

Eberly et al. JAMA Netw Open. 2023;6(9):e2334923.

Disparities in Obesity-Related Cardiovascular Death



- **3**-fold increase in obesity-related cardiovascular age-adjusted mortality rates overall
- Steepest increase in mortality among AI/AN individuals
  - **+415**% (‼)

Raisi-Estabragh Z, et al J Am Heart Assoc. 2023 Sep 19;12(18):e028409

Social Determinants of Health Framework

- Descriptive
- Prescriptive
- Linear
- Individual focus
- Deficit based
- Disease based

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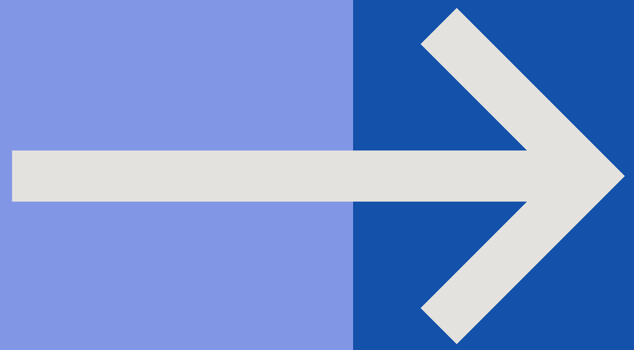


Social Determinant of Health Framework

- Descriptive
- Prescriptive
- Linear
- Individual focus
- Deficit based
- Disease based

Indigenous Determinants of Health Framework

- Action-oriented
- Community-determined
- Holistic
- Collective focus
- Asset based
- Health based

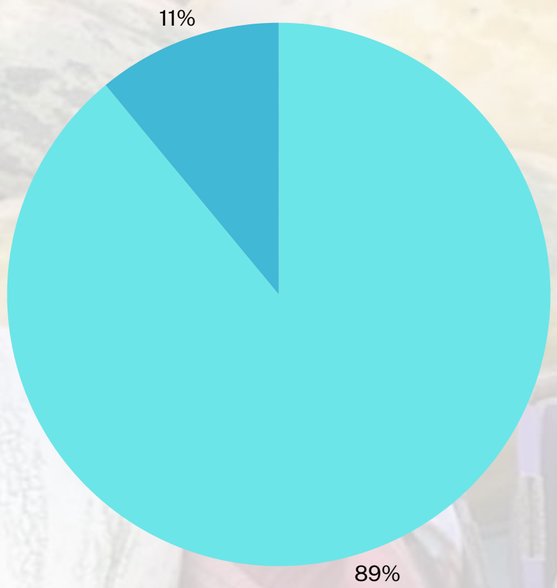
Carroll SR, et al. Int J Environ Res Public Health. 2022 Jun 18;19(12):7495.

Determining Community Priorities and Strategies

- Conducted focus groups, listening sessions, interviews with patients and community members to determine barriers to optimal health, priorities , and design solutions

Food Security: High Priority

- Food insecurity is a major driver of poor cardiovascular health in Indigenous communities
- Desire to reclaim traditional foods for health



89% of patients with cardiac disease reported food insecurity as a major barrier to optimal health, and a high priority

“Traditional foods are our strength”

Eberly LA, et al. Circulation. 2025 Jul 15;152(2):101-112.

MUTTON-HF

In partnership with Navajo Nation Department of Health, Indian Health Service, community partners and farmers, and the American Heart Association

Goal:

- To implement and evaluate a food is medicine program in which patients receive medically tailored meals incorporating traditional and locally sourced food
- Evaluate impact on clinical and patient-centered outcomes + strengthening local food systems and promoting food sovereignty

DESIGN MEALS WITH TRADITIONAL DINÉ RECIPES AND MEDICALLY TAILOR WITH DINÉ DIETITIAN

DESIGN OF MUTTON-HF

Design of Meals

- Designed with Navajo dietician, Denee Bex
- Incorporated traditional Diné (Navajo) foods and recipes
- Met American Heart Association (AHA)'s sodium-restricted Dietary Approaches to Stop Hypertension (DASH) guidelines + AHA Heart-Check Food Nutrition Requirements

Sample Meals

Chiiłchin Apple Harvest Oatmeal Breakfast
Blue Corn Mush and Blueberry Breakfast
Blue Corn Pancake Breakfast
Green Chili Breakfast Veggie Scramble
Southwest Omelet Breakfast Plate

Pumpkin Neeshjizhii Stew
Three Sisters Chowder
Mutton Rainbow Stew Dinner
Navajo Beef with Squash/Corn
Garden Veggie Enchilada Bowl
Navajo Bounty Harvest Bowl

DESIGN MEALS WITH TRADITIONAL DINÉ RECIPES AND MEDICALLY TAILOR WITH DINÉ DIETITIAN

PARTNER WITH LOCAL DINÉ FARMERS AND RANCHERS TO SUPPLY PRODUCE AND MEAT

DESIGN OF MUTTON-HF

Supporting Local Farmers/Ranchers to Advance Food Sovereignty

- Focus on sourcing local and Indigenous grown food
- Supported a network of local Navajo farmers and ranchers

DESIGN MEALS WITH TRADITIONAL DINÉ RECIPES AND FOODS MEDICALLY TAILOR WITH DINÉ DIETITIAN

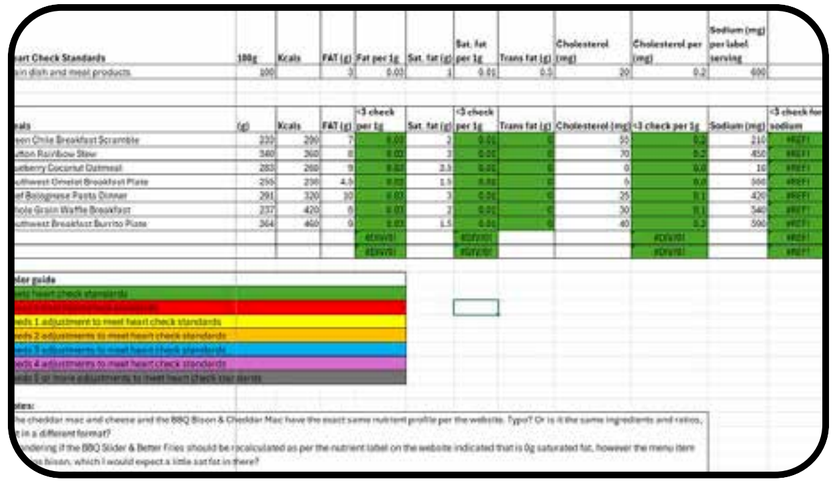
PARTNER WITH LOCAL DINÉ FARMERS AND RANCHERS TO SUPPLY PRODUCE AND MEAT

PRODUCE MEDICALLY AND CULTURALLY TAILORED MEALS WITH TOCABE, A NATIVE-RUN MEAL COMPANY

DESIGN OF MUTTON-HF

Recipe development

Dietitian (Denee Bee with Tumbleweed Nutrition) met with head of Product & Nutrition at Tocabe to collaborate on meals



Analyzed meals for calories, fat, saturated fat, cholesterol, sodium, fiber, vitamins D, calcium, iron, potassium

Adjusted or approved meals

Meal Development

- Created meals with Tocabe, an Indigenous food company
  - Utilized recipes and locally sourced meat and produce
  - Utilized techniques important to community (i.e. whole animal utilization)
  - Insulated boxes to aid in delivery

DESIGN MEALS WITH TRADITIONAL DINÉ RECIPES AND MEDICALLY TAILOR WITH DINÉ DIETITIAN

PARTNER WITH LOCAL DINÉ FARMERS AND RANCHERS TO SUPPLY PRODUCE AND MEAT

PRODUCE MEDICALLY AND CULTURALLY TAILORED MEALS WITH TOCABE, A NATIVE-RUN MEAL COMPANY

TEST AND REFINE RECIPES AND MEALS WITH PATIENT ADVISORS

DESIGN OF MUTTON-HF

PROVIDE ANY NEEDED HOUSEHOLD APPLIANCES FOR PATIENTS (PROPANE-POWERED FOR THOSE WITHOUT ELECTRICITY)

DESIGN OF MUTTON-HF

Appliance Delivery & Set Up

PROVIDE ANY NEEDED HOUSEHOLD APPLIANCES FOR PATIENTS (PROPANE-POWERED FOR THOSE WITHOUT ELECTRICITY)

DELIVER MEALS TO CENTRAL FOOD HUB

(COMMUNITY PANTRY)

DESIGN OF MUTTON-HF

Development of Delivery Distribution Network

PROVIDE ANY NEEDED HOUSEHOLD APPLIANCES FOR PATIENTS (PROPANE-POWERED FOR THOSE WITHOUT ELECTRICITY)

DELIVER MEALS TO CENTRAL FOOD HUB

(COMMUNITY PANTRY)

ESTABLISH MINI FOOD HUBS ON THE RESERVATION INCLUDING IHS CLINIC

DESIGN OF MUTTON-HF

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DELIVER MEALS TO CENTRAL FOOD HUB

(COMMUNITY PANTRY)

ESTABLISH MINI FOOD HUBS ON THE RESERVATION INCLUDING IHS CLINIC

PATIENT PICK UP AT HUBS OR HOME DELIVERY BY COMMUNITY HEALTH REPRESENTATIVES AS NEEDED

DESIGN OF MUTTON-HF

HEALTH SYSTEM LINKAGES

IHS PATIENT VISIT AND PROGRAM REFERRAL IN CLINIC

PICK UP MEDICALLY TAILORED MEALS AT CLINIC

SUPPORT FROM COMMUNITY HEALTH WORKERS (MEAL/PROPANE DELIVERY + CHECK INS)

DESIGN MEALS WITH TRADITIONAL DINÉ RECIPES AND MEDICALLY TAILOR WITH DINÉ DIETITIAN

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PRODUCE MEDICALLY AND CULTURALLY TAILORED MEALS WITH TOCABE, A NATIVE-RUN MEAL COMPANY

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DELIVER MEALS TO CENTRAL FOOD HUB

PARTNER WITH NAVAJO NATION TO ESTABLISH MINI HUBS ON THE RESERVATION

MEALS DELIVERED TO 'MINI-HUB' INCLUDING IHS CLINIC AND CLINIC FORT PICK UP. PATIENT HOME DELIVERY BY COMMUNITY HEALTH REPRESENTATIVES AND PUBLIC HEALTH NURSES AS NEEDED

DESIGN OF MUTTON-HF

MUTTON Pilot Study

- **20 patients with heart failure at 2 IHS sites in Navajo Nation**
- **14 meals weekly for 4 weeks**
- **Goal: Evaluate implementation outcomes, pre-post clinical outcomes and gain extensive feedback to guide future programmatic**

MUTTON Pilot Study

20 patients with heart failure: 1 month of 14 meals weekly to evaluate implementation outcomes, pre-post clinical outcomes and gain extensive feedback

Feasible

- >90% meals successfully received by patients residing across a vast, rural, >163 km radius
- 90% rated “very easy” to get meals

High Acceptability

- Patient acceptability of intervention: 17 out of 20
- Patient Rating of Program: 9 out of 10

Community Support

- Community farmers and ranchers rated feasibility of supporting the program at 19.8 out of 20
- 100% meals with Native supplied produce/meat

Impact of Behavior

- 85% ate all of the meals
- 85% reported they were “very likely” to change their diet to be heathier moving forward

Pilot Clinical Outcomes

-70% Decrease in Food Insecurity

-5 lbs Decrease in weight for those with obesity

Improvement in cultural connectedness

Increase in KCCQ-12 Quality of Life and Symptoms

Eberly et al. JAMA Netw Open. 2026;9(2):e2556117

Optimized Meals and Delivery

- Gained feedback on all the meals
  - Adjusted meal plan, removed lowest ranked meals, added additional meals

- Gained feedback on delivery and any issues

Meal	Date Consumed	How much did you like this meal? (circle the number of stars with 1 being did not like at all and 5 being really liked)	How much of the meal did you (yourself) eat? (circle which is closest to the amount of the meal you consumed)?
Blue Corn Mush & Hash Breakfast		★ ★ ★ ★ ★	None (or a few bites) · 1/4 · 1/2 · 3/4 · All (or close to it)

What is the impact of locally sourced culturally and medically tailored meals on holistic health?

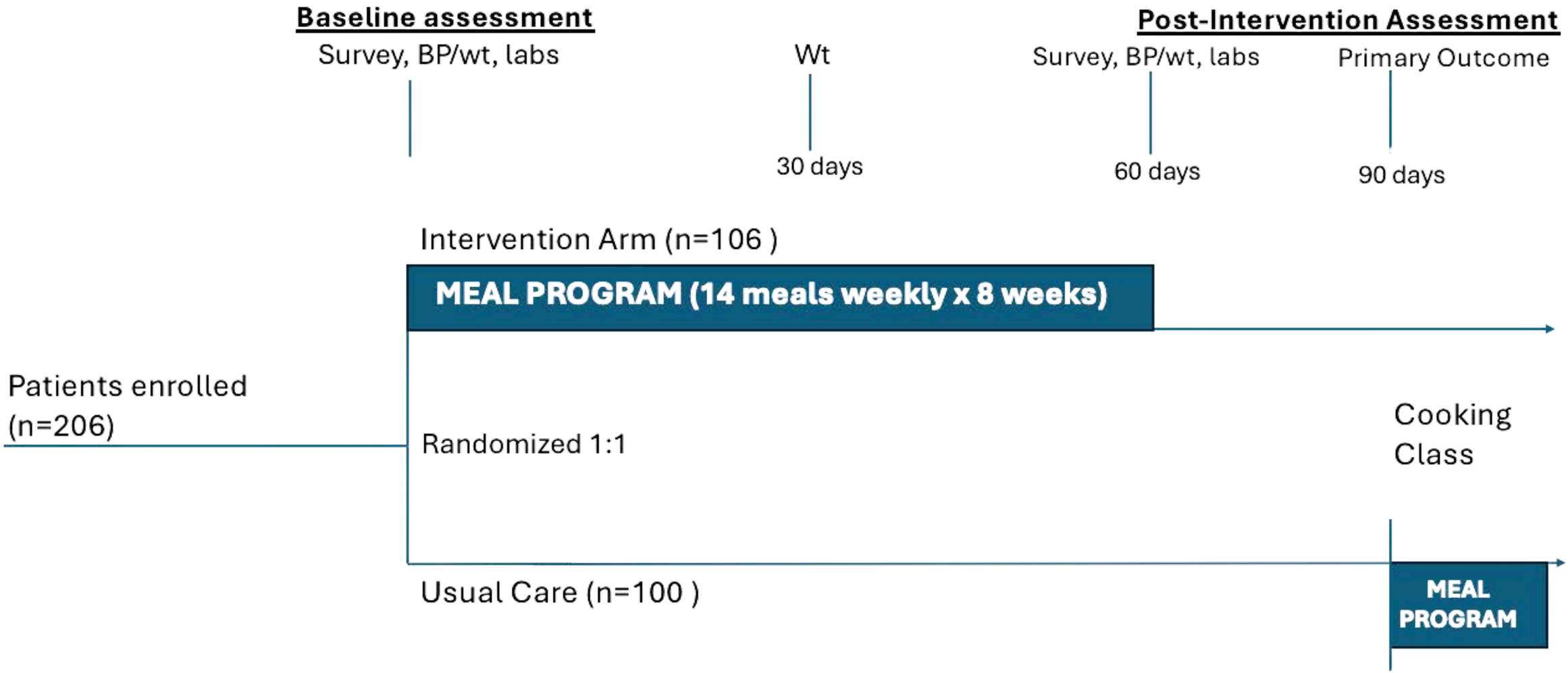
Focus: Heart Failure

- Heart failure is the most common cause of hospital readmissions for >65 yrs
- 45% of patients discharged from hospitals had moderate and 30% severe malnutrition in one study
- Smaller pilot studies in other settings have shown 40-60% reductions in readmission rates

Can reclaiming traditional foods improve heart failure health and outcomes?

Source: Compher et al., *BMC Nutrition*, 2025.

Design


Baseline assessment
Survey, BP/wt, labs
Wt
30 days
Post-Intervention Assessment
Survey, BP/wt, labs
60 days
Primary Outcome
90 days
Intervention Arm (n=106)
MEAL PROGRAM (14 meals weekly x 8 weeks)
Patients enrolled
(n=206)
Randomized 1:1
Cooking
Class
Usual Care (n=100)
MEAL
PROGRAM

Outcomes

Primary Outcome: Proportion of patients with hospitalization or ER visit (all-cause) within 90 days

Secondary Outcomes

- Hospitalizations, ER visits, (all cause and for HF)
- HF-specific health status (KCCQ summary score and subscores)
- Indigenous Nourishment (Indigenous Nourishment Scale)
- Food Security (USDA 6-item Short Form Food Security Survey)
- Financial Strain (Financial Stress Scale)
- Weight, blood pressure
- Clinical biomarkers

Implementation Outcomes

- Farmers/growers, implementators, community partners, patients

Safety Outcomes

Baseline Characteristics (n=206)

65 Average Age

42% Female

53% Food Insecure

46% Water Insecure

20% Without stable electricity

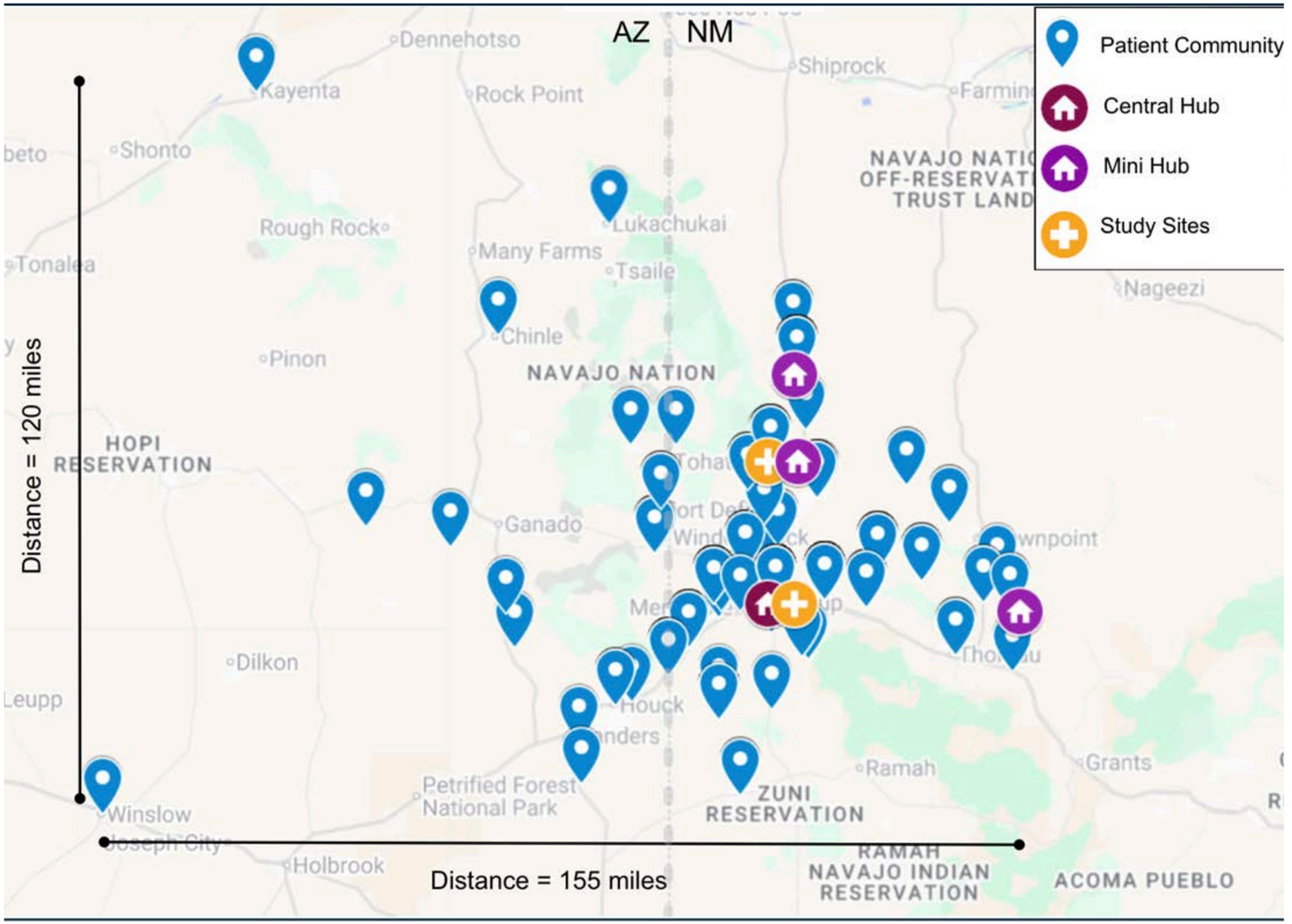
65% Obesity (mean BMI 31)

66% Diabetes

35% Chronic Kidney Disease

High rates of food/water insecurity and comorbidities

Program Reach



Primary Clinical Outcome

Primary Outcome	CMTM vs. Control	Relative Risk (95% CI)	p-value
Hospitalization or ER visit at 90 days	40.6% vs. 57.0%	0.72 (0.54, 0.96)	p=0.02

Clinical Outcomes

Primary Outcome	CMTM vs. Control	Relative Risk (95% CI)	p-value
Hospitalization or ER visit at 90 days	40.6% vs. 57.0%	0.72 (0.54, 0.96)	p=0.02

Secondary Outcomes			
Hospitalization	12.3% vs. 26.0%	0.48 (0.26, 0.89)	0.01
ER Visit	32.1% vs. 44.0%	0.73 (0.51, 1.05)	0.09
HF Hospitalization	3.8 % vs. 13.0%	0.29 (0.10, 0.87)	0.02
ER Visit for HF	0.9 % vs. 1.0 %	0.95 (0.06, 15.05)	1.0

>50% ↓ in hospitalizations

>70% ↓ heart failure hospitalizations

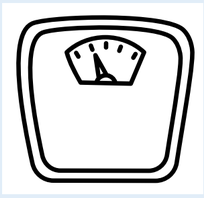
Key Secondary Outcomes

Reduced food insecurity

- CMTM vs. control between group difference of -0.5, p<0.001

Improved KCCQ score and subscores

- Summary: CMTM vs. control between group difference of +5.1, p=0.02
- Social Limitation: CMTM vs. control between group difference of +14.2
- Physical Limitation: CMTM vs. control between group difference of +7.8



Reduced weight

- CMTM vs. control between group difference of -6.3 lbs (p<0.001)

Reduced Blood Pressure

- CMTM vs. control between group difference of -6.7 for SBP (p=0.03) and -3.2 for DBP (p=0.04)

Key Secondary Outcomes

Reduced financial strain

- CMTM vs. control difference of -0.48 (p=0.02)

Indigenous Nourishment increased in both groups (NS between groups)

Clinical biomarkers

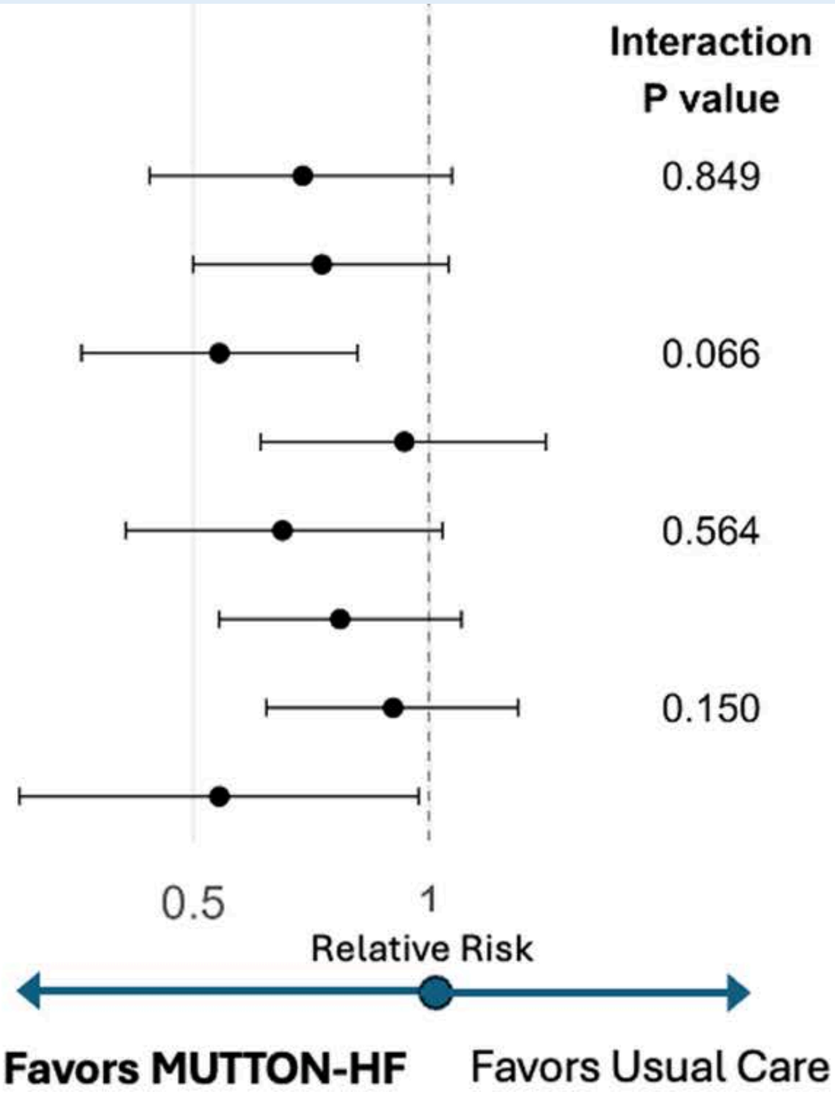
- Creatinine decreased significantly in the intervention group (-0.15, p=0.03)
- NT-pro BNP increased less in the intervention group and cholesterol (including LDL) decreased more in the intervention group but different was NS

Safety Outcomes

Few adverse events and no significant differences in total adverse events between intervention and usual care

Consistent benefit across sex, age, ejection fraction, food security status

Subgroup	No. of patients	RR (95% CI)	Interaction P value
LVEF <50%	99	0.69 (0.44, 1.07)	0.849
LVEF ≥ 50%	103	0.73 (0.50, 1.06)	
Female	87	0.54 (0.36, 0.81)	0.066
Male	118	0.93 (0.61, 1.41)	
Age <65	94	0.65 (0.41, 1.04)	0.564
Age ≥ 65	111	0.77 (0.54, 1.10)	
Low/Very Low Food Security	110	0.90 (0.62, 1.30)	0.150
High Food Security	66	0.54 (0.30, 0.97)	



Cooking Class

Pumpkin Neezhjizhii Soup

Servings: 4 Prep: 10 min Cook: 30 min

Ingredients

2 tbsp oil
1 small yellow onion, chopped
1/3 cup ground neeshjizhii
1 (15oz.) can pumpkin puree
3 cups low-sodium chicken broth, divided
½ tsp pumpkin pie spice
¼ cup maple syrup
Pepper to taste

Toppings
Sunflower seeds, shelled
Sour cream or plain Greek yogurt

Directions

1. Heat a medium pot over medium heat and add the diced onions. Sauté the onion over medium heat until the onion is soft and translucent, about 4 minutes.
2. Add the ground neezhjizhii to the onions and stir to coat the onions, about 1-2 minutes. Turn off heat.
3. Scoop the mixture into a blender with 1 cup chicken broth. Blend until smooth and add back to pot.
4. Turn pot to medium-high heat. To the pot, add pumpkin puree, 2 cups chicken broth, pumpkin pie spice, maple syrup, and pepper. Stir until smooth. Allow to come to a gentle boil, stirring occasionally.
5. Turn heat to low and let simmer for 10 minutes.
6. Serve the soup topped with sunflower seeds, sour cream or Greek or plain yogurt.

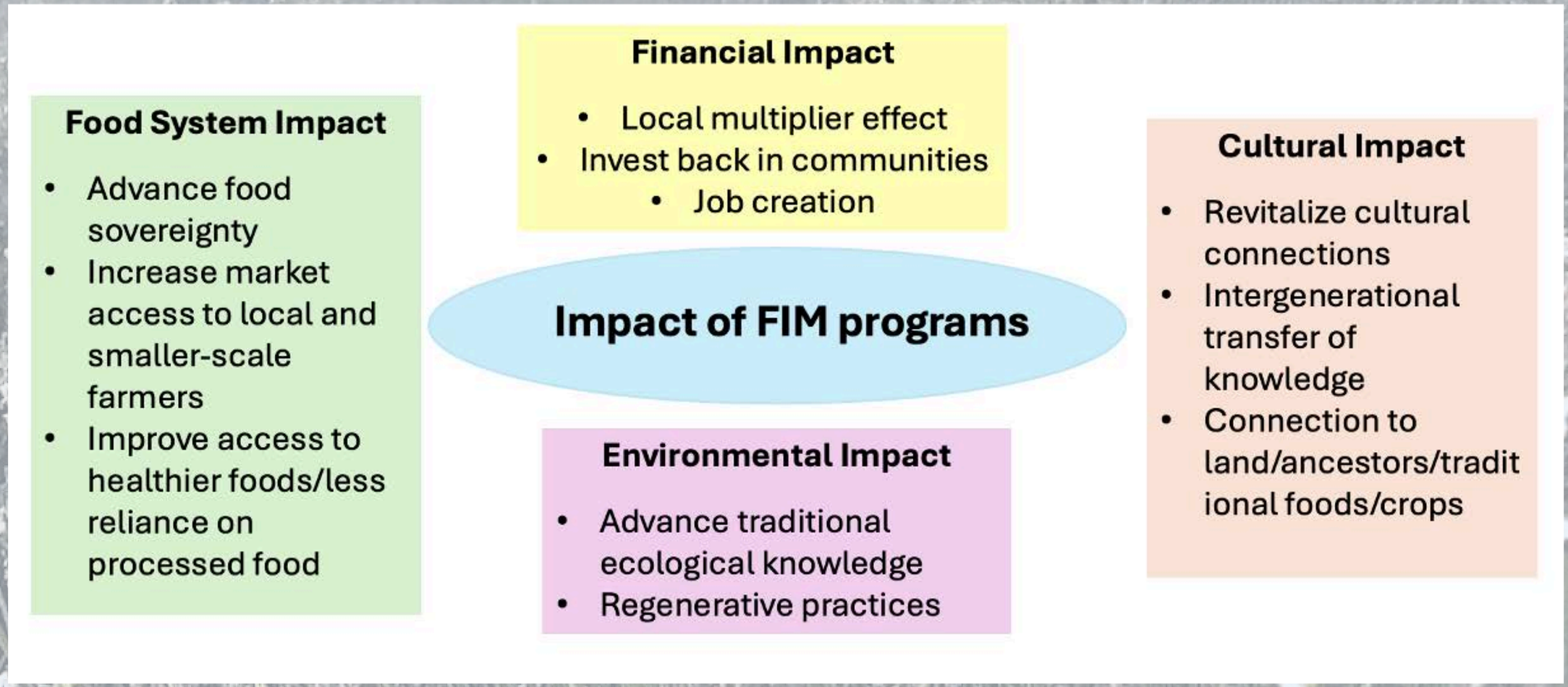
Utensils needed: 2-3 qt pot, knife, cutting board, measuring spoons, dry measuring cups, liquid measuring cups, can opener, blender, stirring spoon, ladle

- Learn favorite recipes from program
- Empower patients to make heart healthy choices


Sandra


“This program changed everything for me” - patient
“I didn’t know that healthy food could taste so good” - patient
“This food reminds me of my Shimásáni” - patient

Farmer and Ranchers Perspectives



"Food is community medicine, food is empowerment"

Participant Reported Key Components for Food is Medicine Programs

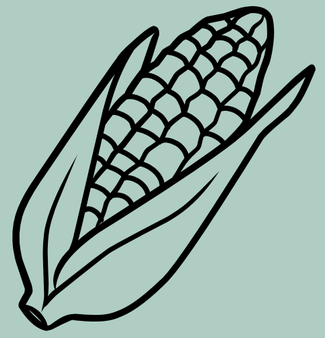
- Inclusion of traditional culturally relevant foods
- Support local food system resilience
- Educational Component
  - Nutrition and cultural focused
- Positive Framing and Messaging
- Importance of Partnerships

Conclusions

- A culturally and medically tailored Indigenous meal program (MUTTON-HF) led to **lower incidence of hospitalizations and ER visits for patients** with HF
    - This was driven mainly by a reduction in hospitalizations, particularly HF hospitalizations
- There were additional benefits on **quality of life, symptoms, measures of food security, financial strain, and weight**
- Leveraging protective assets of Native communities is central to advancing Indigenous health
- Similar models could be adapted and expanded to other communities to improve health

Model Can be Adapted to Other IHS Areas and Tribal Communities

Develop Culturally and Medically Tailored Meals (Key Recipes/Foods)



Source from Local Farmers/Ranchers

Establish Distribution Network including IHS Clinics

CHRs and PHNs to Deliver Meals/ Appliances as needed


Expansion & Next Steps

PATIENT AND COMMUNITY CENTERED OUTCOMES ON HEALTH AND FOOD SOVEREIGNTY

Impact on food systems & sovereignty

Patient perspectives on program & cultural connectedness

Economic Evaluation: Cost Saving/Effectiveness

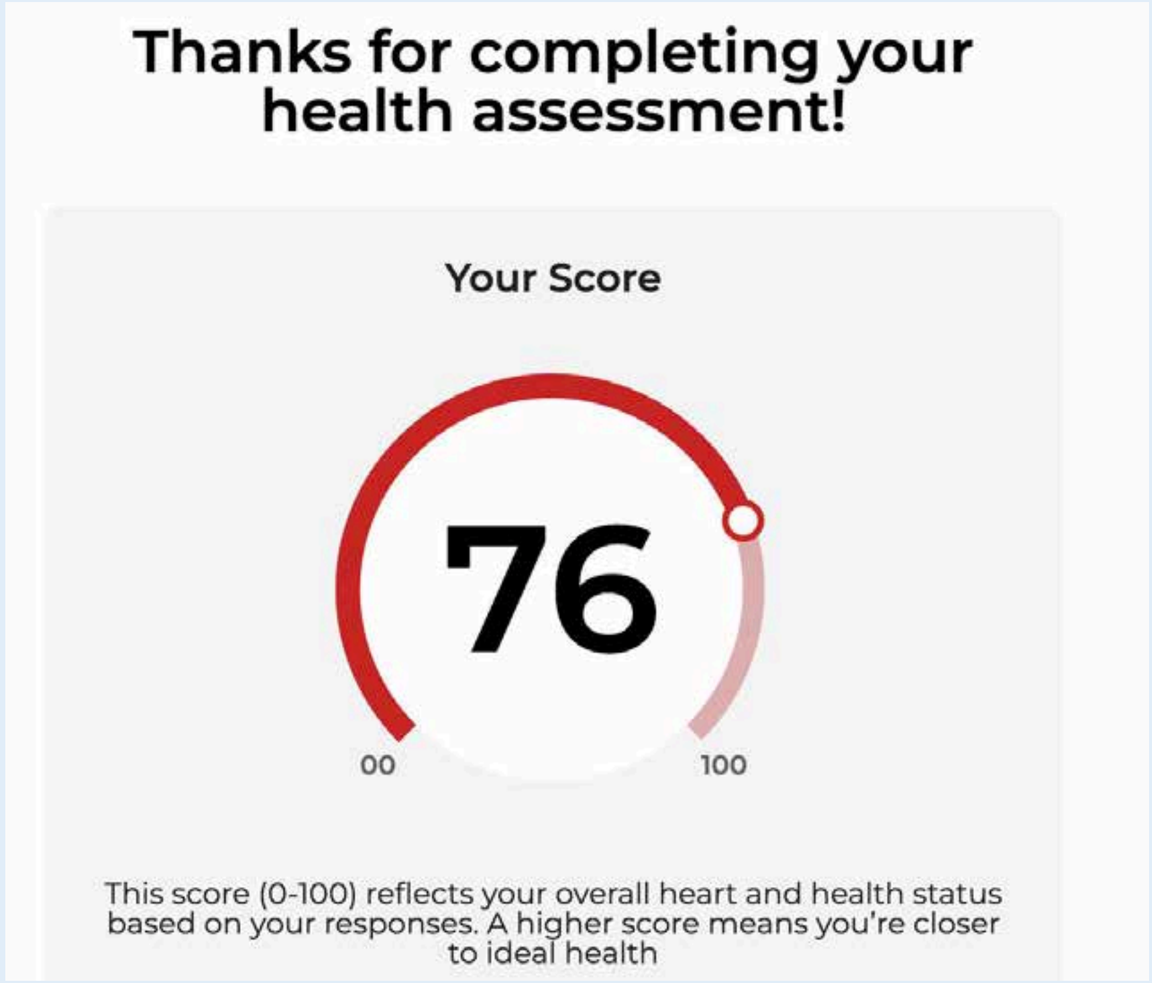
Naashá: Women's Cardiometabolic Clinic

- Prevention Clinic and Program
- Designed for women at high cardiovascular risk

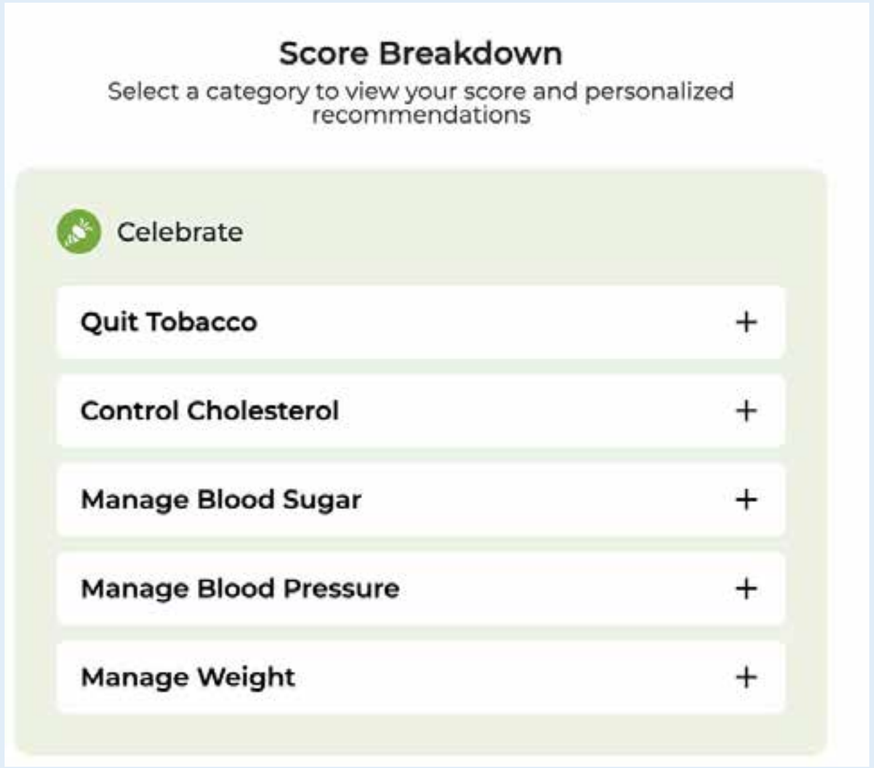
Designed to Target AHA's Life Essential 8

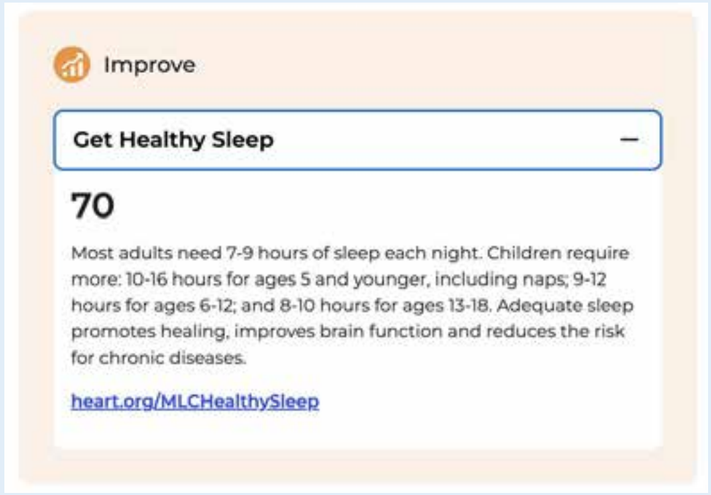
Personalized Cardiovascular Health Assessment

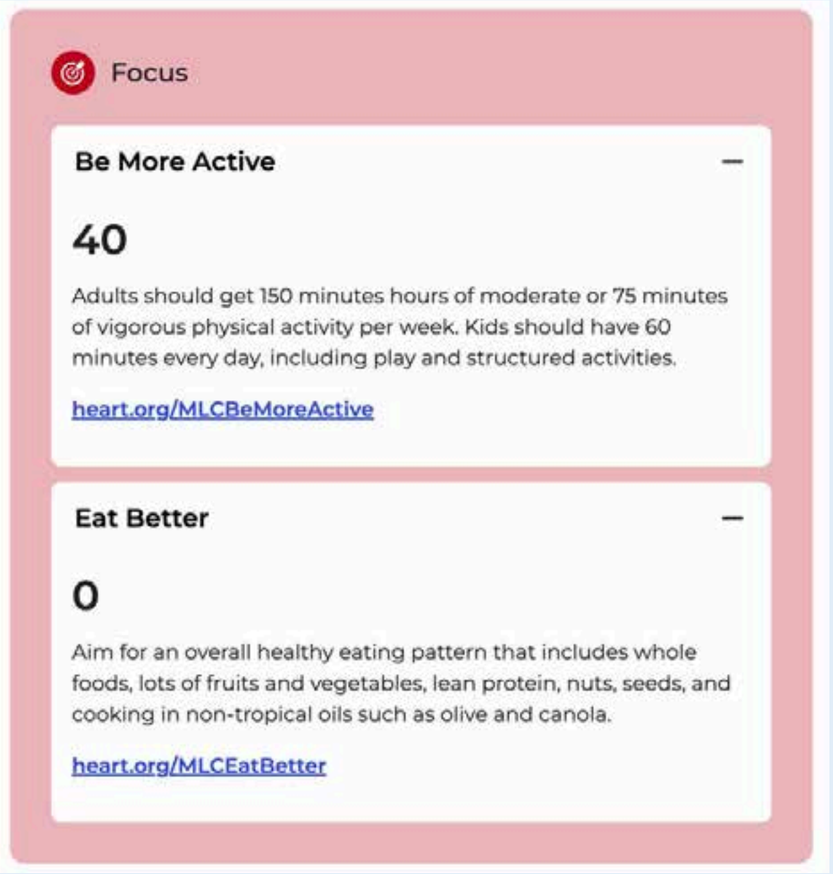
- CVH score strongly associated with lifetime risk of CVD



Tailored Recommendations





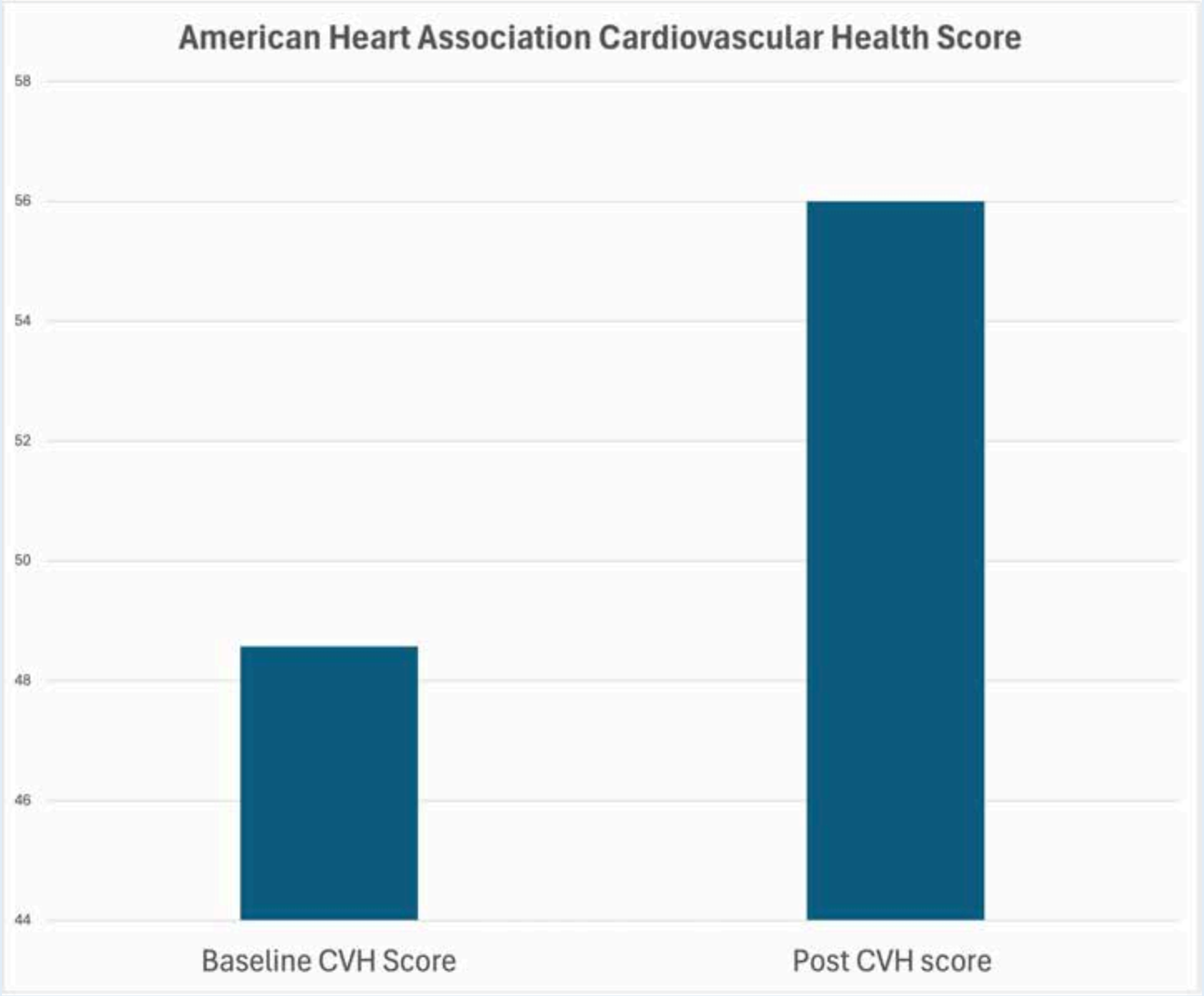


Naashá: Women's Cardiometabolic Clinic

- Nutrition Counseling
- Cooking Classes
- Tailored heart health recommendations
- Exercise classes
- Medically Tailored Meals

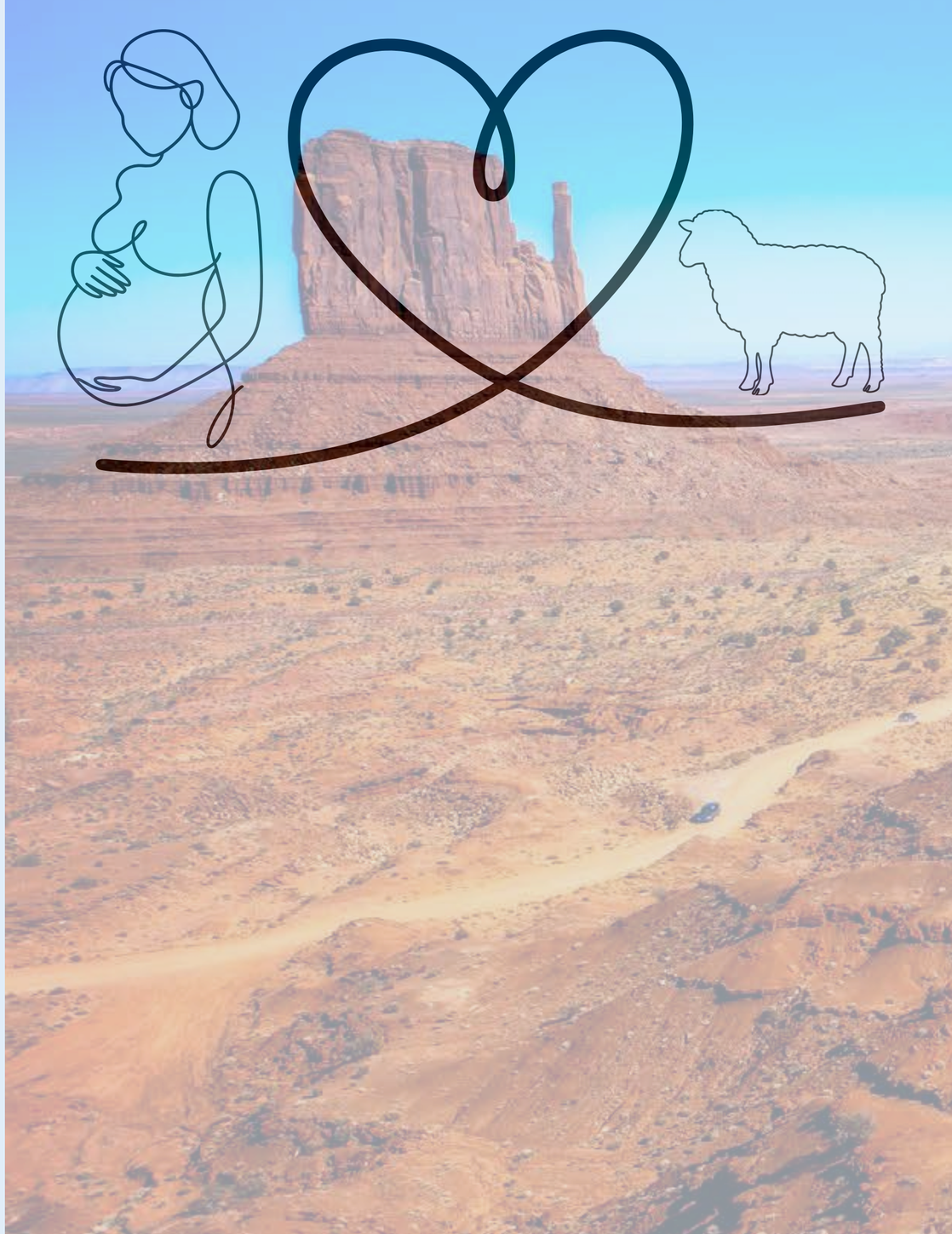
Improvements in Cardiovascular Health

- Improvements in 3 months = correlate with increase in years free from CVD (and ~1 yr increased life expectancy)



MUTTON-MOMS

- Naashá clinic telehealth post partum care + culturally and medically tailored meal program
- Post-partum women at high cardiac risk
    - Obesity plus hypertensive disorders of pregnancy, gestational diabetes, diabetes in pregnancy
- Impact on cardiovascular health score, post-partum well being, longer term cardiovascular health outcomes




ALUMNI
Sandra


Thank You!

WWW.MUTTONHF.COM