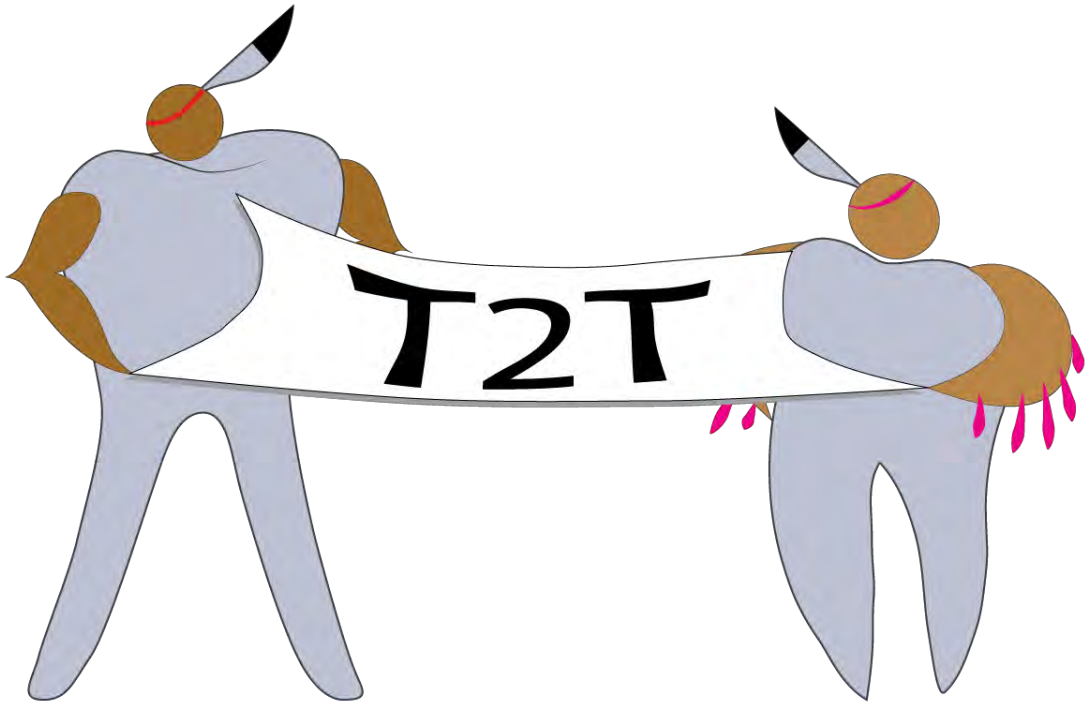


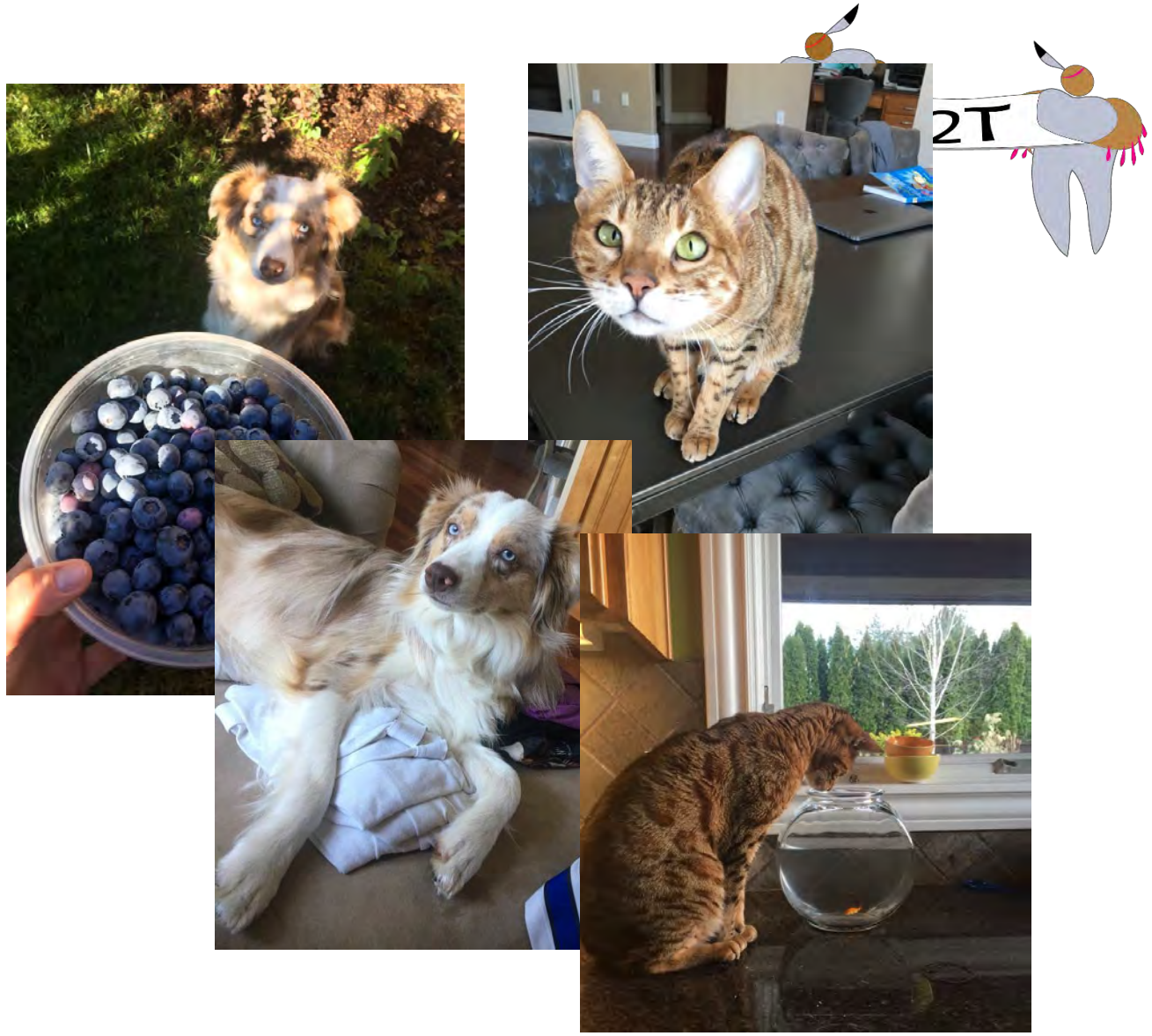
TOTS to Tweens Study: Evaluating the Dental Health Status of NW Tribal Children Age 11-13 Years

Northwest Tribal Dental Support Center Meeting
May 16, 2019

NPAIHB
Indian Leadership for Indian Health

Tam se ne snat

NPAIHB
Indian Leadership for Indian Health



Nicole Smith

NPAIHB
Indian Leadership for Indian Health

TOTS, circa 2003

The Toddler Overweight and Tooth Decay Prevention Study implemented community and family-based interventions to improve breastfeeding and water consumption, and delay the introduction of sugared beverages to babies. AI/AN mothers were enrolled prenatally and followed until the baby turned two years old.

NPAIHB
Indian Leadership for Indian Health

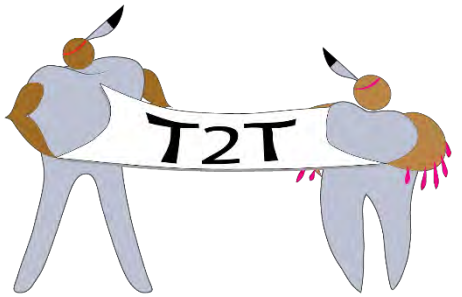
TOTS Goals

- To prevent early childhood obesity in American Indian children
- To prevent early childhood caries in American Indian children

Through changing behaviors of moms

NPAIHB
Indian Leadership for Indian Health

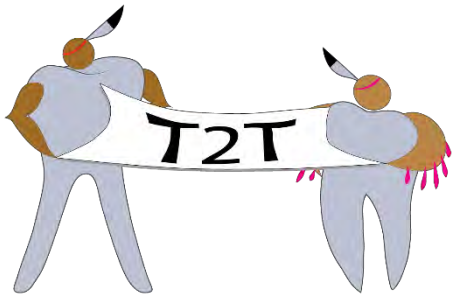
Cohort Study Design



- The *intervention cohort* was children born in three communities during 12 months; expectant mothers were identified through prenatal visits and recruited by tribal coordinators
- The *local comparison cohorts* were children in those communities who were 18–30 months at study start
- A *control longitudinal cohort* consisted of annual samples of children aged 18–30 months in a fourth community, supplying secular trends

NPAIHB
Indian Leadership for Indian Health

Two Intervention Approaches

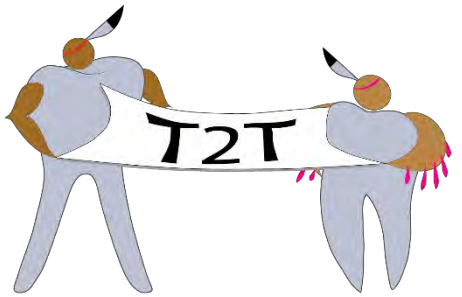


- Community Wide (CW) interventions (3 tribes implemented)
  - raise awareness
  - change public health practice, tribal policy
  - provide health education
  - change environments

  → **↑ breastfeeding**
  ↓ sugared beverages
  ↑ water consumption
- Family intervention (2 tribes) included 8 home visit by lay health workers (LHW) who used motivational interviewing and goal setting to:
  - Increase breastfeeding initiation and duration
  - Limit the introduction of sugared beverages to infants and toddlers
  - Promote the introduction of water for thirst among toddlers

NPAIHB
Indian Leadership for Indian Health

Specific Aims



Test Whether:

1. Community-based intervention alone (CW) leads to

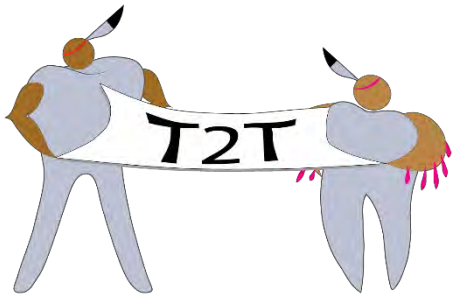
   ⇩ Prevalence of Toddler Obesity — 1 tribe

   ⇩ Prevalence of Tooth Decay

   compared to communities that have not received the intervention (control) — 2 tribes

NPAIHB
Indian Leadership for Indian Health

Specific Aims



Test Whether:

2. Family-based peer counselor + community-based intervention (CW + F) leads to

2 tribes

⇩ Prevalence of Toddler Obesity

⇩ Prevalence of Tooth Decay

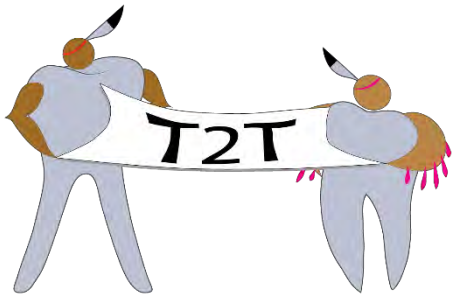
compared to

community-based interventions alone

1 tribe

NPAIHB
Indian Leadership for Indian Health

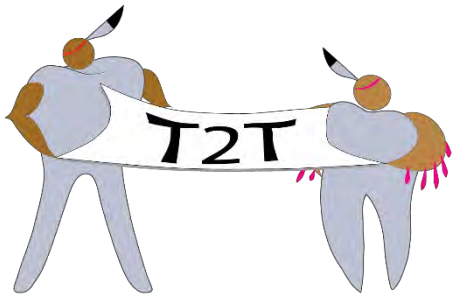
TOTS Data Collection



- Dentist and hygienist recruited, trained in TOTS protocol
- Recruited mother / child pairs
- Height and Weight, breastfeeding measures obtained through WIC/MCH visits
- Study dental exams conducted in tandem with WIC/MCH visits (every 6 months)
- Teeth scored for presence, absence, missing to caries status
- Presence of incipient or carious lesions determined using $D_{1\text{-}2}$MFS index
- For outcome analysis consolidate to tooth level measure D_1t and D_2t, rating each tooth its worst surface, using last dental visit at 18-30 months

NPAIHB
Indian Leadership for Indian Health

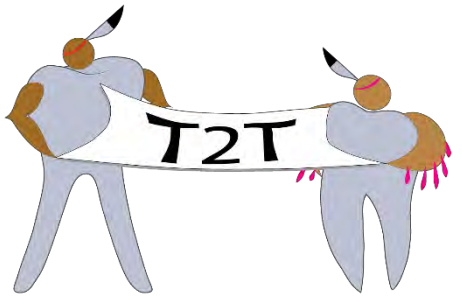
Community Interventions Implemented



- Resolutions passed to limit purchasing sugared-beverages for community events
- Strategic placement water in or by vending machines
- Subsidizing the sale of water
- Workplace policies to allow longer breaks to pump
- Peer Mom gathering to discuss breastfeeding
- Advocacy at local hospitals for mothers intending to breastfeed
- Creation of Tribal workplace breastfeeding rooms
- Community-wide baby showers
- Collaboration with daycares
- Local media

NPAIHB
Indian Leadership for Indian Health

Outcomes



- Breastfeeding rates higher by 14% (CW), 15% (CW+F) at 6 months than national AI rates
- Breastfeeding rates comparable at 12 months
- Parents expressed confidence in ability to curtail family consumption of sugared beverages
- BMI Z scores at 24 months increased in all three intervention tribes
- BMI Z scores increased less in CW+F Tribes
- Difference in height and weight for age not significant
- Simple intervention can mitigate rapid increase in BMI without compromising toddler growth

NPAIHB
Indian Leadership for Indian Health

TOTS Impact Evaluation

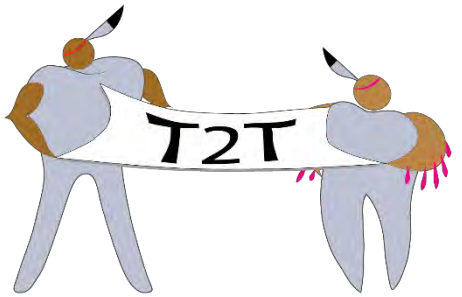
Table 5 Percent of participants expressing confidence and usefulness of the TOTS study in assisting with target behavior change

	Tribe A	Tribe B	Tribe C	Total
Confidence in implementing recommendations				
Breastfeeding	64	54	56	57
Limiting sugar-sweetened beverages for the family	93	92	71	82
Serving water as the primary beverage at meal times	89	80	73	79
Serving water when family members are thirsty	73	48	63	62
Usefulness of the TOTS study in helping change targeted behaviors				
Breastfeeding	40	65	43	49
Help family drink more water	96	92	81	90
Help family drink fewer sugar-sweetened beverages	88	89	80	86

A score of 4.0 or higher on a 5-point scale

NPAIHB
Indian Leadership for Indian Health

Dental Results



- Overall levels of disease were high
- Significant secular rises for both incipient (D_1t) and carious lesions (D_2t) in the control communities
- In terms of presence of D_1t or D_2t, there were statistically significant downward intervention effects in both CW and CW + F Tribes
- Children in intervention communities had fewer detectable carious lesion and those who developed carious lesions had incipient caries more often than cavitated decay

TOTS Dental Results

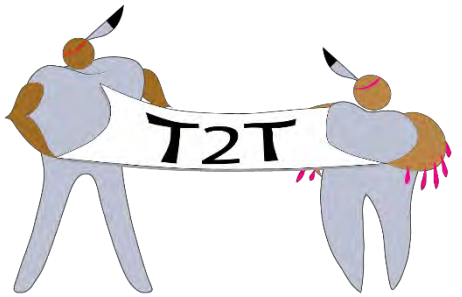


Table 3

Mean (SD) of fraction of affected toddlers in each community and time period

	Community A	Community B	Community C	Community D
Pre-intervention sample				
d_1t	0.448 (0.506)	0.128 (0.339)	0.656 (0.483)	0.444 (0.511)
d_2t	0.414 (0.501)	0.128 (0.339)	0.531 (0.507)	0.278 0.461)
Post-intervention sample				
d_1t	0.340 (0.479)	0.297 (0.463)	0.420 (0.499)	0.595 (0.497)
d_2t	0.234 (0.428)	0.000 (0.000)	0.340 (0.479)	0.429 (0.501)

NPAIHB
Indian Leadership for Indian Health

TOTS Dental Results

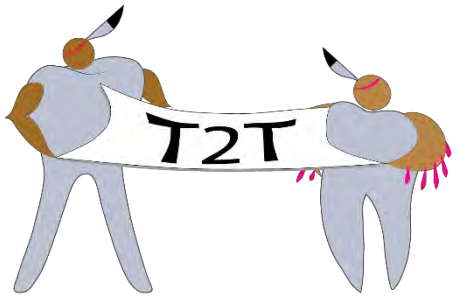


Table 3

Mean (SD) of fraction of affected toddlers in each community and time period

	Community A CW + F	Community B CW	Community C CW + F	Community D Control
Pre-intervention sample				
Incipient decay d_1t	0.448 (0.506)	0.128 (0.339)	0.656 (0.483)	0.444 (0.511)
Cavitated decay d_2t	0.414 (0.501)	0.128 (0.339)	0.531 (0.507)	0.278 0.461)
Post-intervention sample	**Less** decay	**Less** decay	**Less** decay	**Increase** in decay
Incipient decay d_1t	0.340 (0.479)	0.297 (0.463)	0.420 (0.499)	0.595 (0.497)
Cavitated decay d_2t	0.234 (0.428)	0.000 (0.000)	0.340 (0.479)	0.429 (0.501)

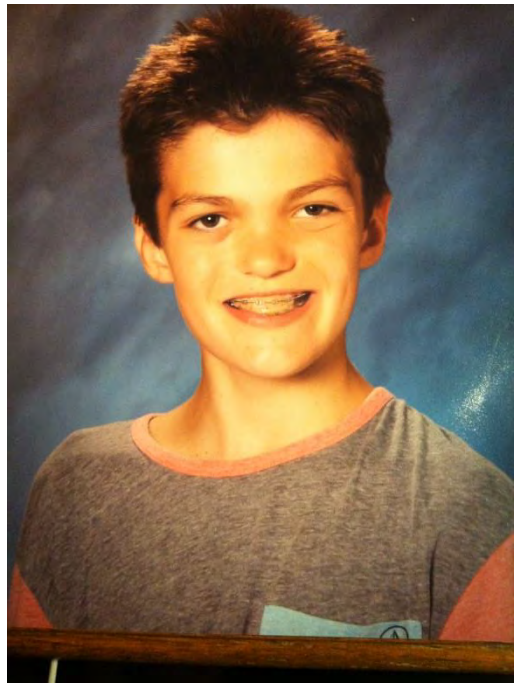
NPAIHB
Indian Leadership for Indian Health

TOTS Goals Revisited

- Did we prevent early childhood obesity in American Indian children? –**No, but we staved off an increase**
- Did we prevent early childhood caries in American Indian children? – **Yes!**
- Did we change behaviors of moms? – **Yes, ↑ breastfeeding; - Yes, ↓introduction of sugared beverages**

NPAIHB
Indian Leadership for Indian Health

10 years later



Children Born:
2003 - 2004

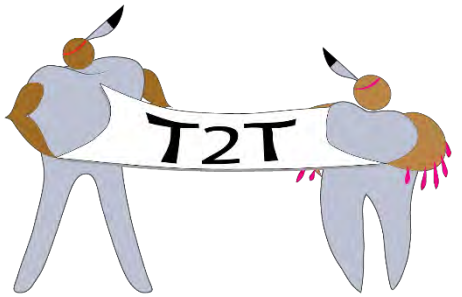
Were 11 – 13 years old

In 2016-2017

TOTS to Tweens is a follow up to The TOTS Study to test whether interventions delivered in TOTS influence prevalence of oral caries in older children.

NPAIHB
Indian Leadership for Indian Health

They're Back….



At the Helm

- **Tom Becker**, MD, PhD, Co-PI
- **Tam Lutz** (Lummi Nation)MPH, MHA, Co-PI

Co-Investigators – Experts in Oral Health

- **Gerardo Maupomé**, BDS, MSc, DDPH, PhD, **Maxine Brings Him Back Janis**, MPH, RDH
- Eli Schwarz, DDS, MPH, PhD

Co- Investigators – Experts in Biostatistics

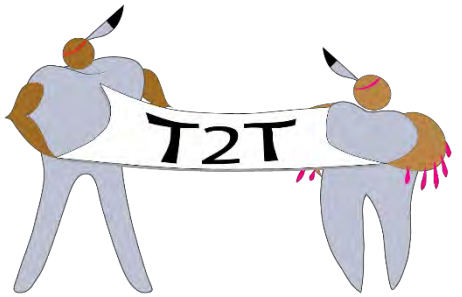
- Jodi Lapidus, PhD
- **Nicole Smith**, MPH

Project Support with history of serving Tribes

- Candice Jimenez (Warm Springs), MPH, GRA

NPAIHB
Indian Leadership for Indian Health

Goal of Follow up Study



Did TOTS have a lasting impact?

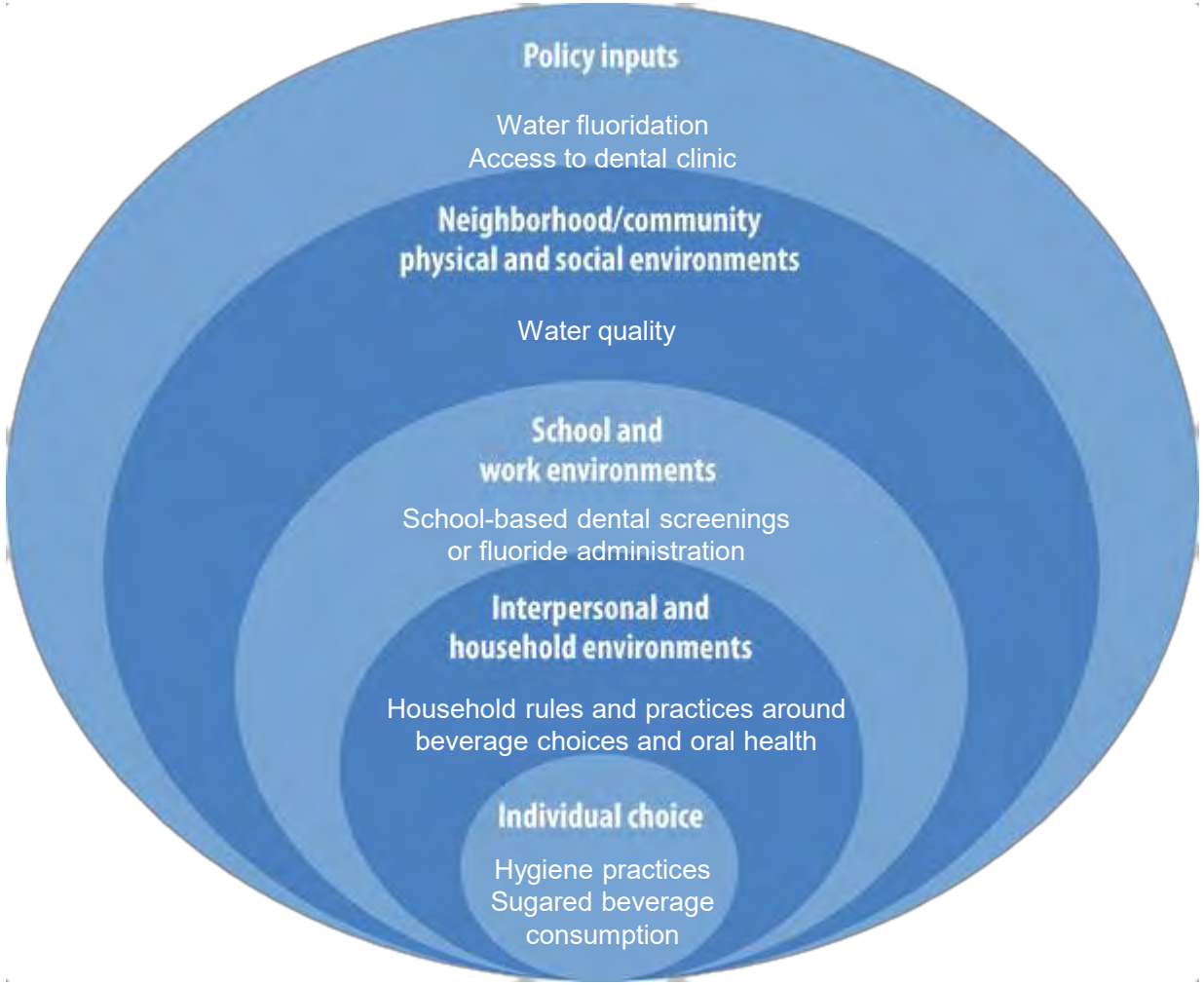
Aims:

- to test whether interventions delivered in TOTS influence the prevalence tooth decay in older children.
- to assess current community, environmental and familial factors that can influence oral health in children & to see if preventive family behaviors have continued.

Same kids… different teeth (!)

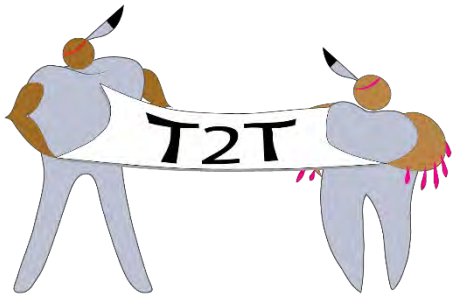
NPAIHB
Indian Leadership for Indian Health

Approach – The Social Ecological Model



NPAIHB
Indian Leadership for Indian Health

Hypotheses



1. Children age 10.5-12.5 who received the TOTS intervention will have a 25% lower DMFT (decayed, missing, or filled teeth) score than children in the non-intervention sites
2. TOTS children will have less decay than fellow tribal member children who did not participate in TOTS
3. Children with the least decay at age 2 will have the least decay in the follow-up screening
4. Mothers/caregivers who participated in TOTS will have more favorable knowledge, attitudes, and behaviors related to oral health than those who did not receive TOTS

NPAIHB
Indian Leadership for Indian Health

Methods

We conducted community and school-based screenings

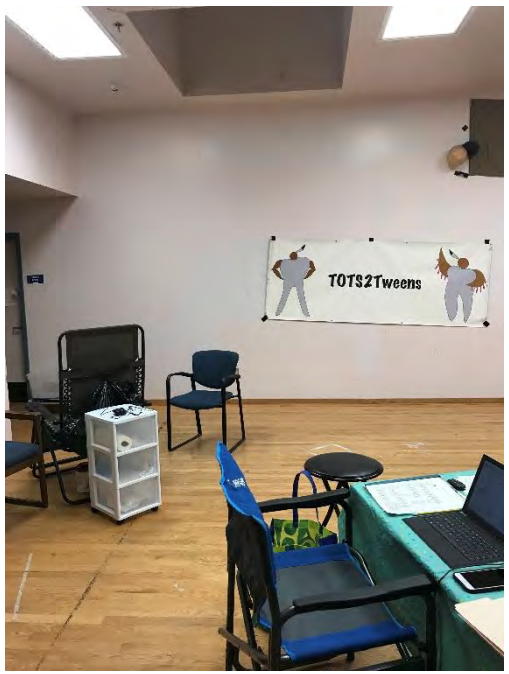
We collected:

- Dental exams on children
- Child behavior questionnaires
- Anthropometric measures (height and weight)
- Parent/caregiver Knowledge Attitudes and Behavior questionnaires
- Follow-up qualitative research

NPAIHB
Indian Leadership for Indian Health

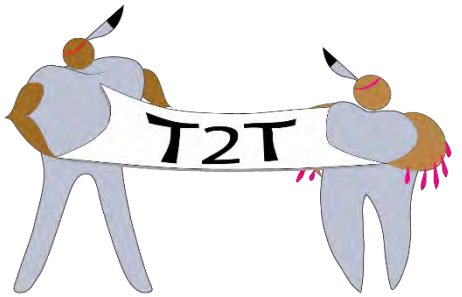
Recruitment & Consent Methods

- Tribal site coordinators used TOTS enrollment lists to contact parents/guardians for consent for the child to participate
- At data collection, children who had participated in the TOTS study were age 11-13 years
- Coordinators used school enrollment lists to recruit children age 11-13 who did not participate in the TOTS study
- At the data collection event, we verified parental consent and obtained child's assent to have teeth examined, measure height and weight and ask the child questions.



NPAIHB
Indian Leadership for Indian Health

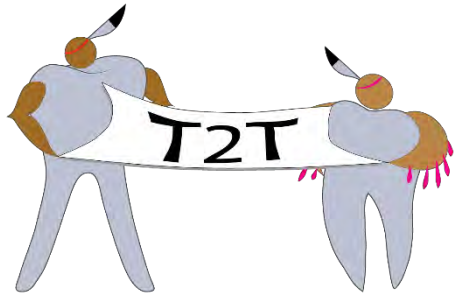
Examiner Methods



- Two dentists and one dental hygienist were trained prior to data collection and calibrated for agreement at the first event.
  - Two examiners collected data for TOTS
- We adapted the World Health Organization (WHO) oral health assessment form for children and collected tooth-level data for both primary and secondary teeth.
  - A tooth was scored as unerupted, sound, carries, filled (w/caries), filled (no caries), missing, sealed, or fixed dental prosthesis.
- In cases of severe decay, we used the PUFA index to record presence of pulpal involvement (P), ulceration (U), fistula (F), and abscess (A).

NPAIHB
Indian Leadership for Indian Health

Child Questionnaire

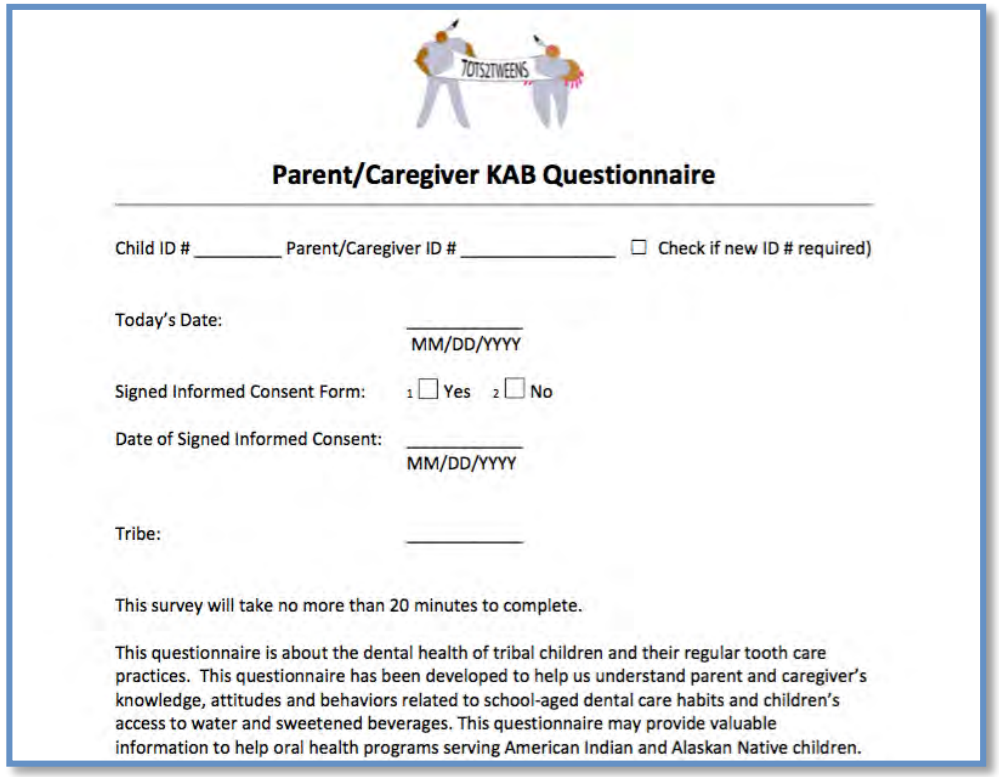


- We measured each child's height and weight and administered a questionnaire, adapted from WHO Oral Health Questionnaire for Children.
- We asked about hygiene practices, mouth pain, tobacco use, and beverage consumption.
- Collected on tablets via Epi Info app

NPAIHB
Indian Leadership for Indian Health

Parent KAB Questionnaire

- Parents or guardians completed a self-administered questionnaire either when they gave consent for their child to participate in the study, if they brought their child to the examination, or at a follow-up after the child participated in the study.
- Questions were selected from TOTS KAB questionnaire or WHO Oral Health Questionnaire for Adults.



Parent/Caregiver KAB Questionnaire

Child ID # _____ Parent/Caregiver ID # _____ ☐ Check if new ID # required)

Today's Date: _____ MM/DD/YYYY

Signed Informed Consent Form: 1 ☐ Yes 2 ☐ No

Date of Signed Informed Consent: _____ MM/DD/YYYY

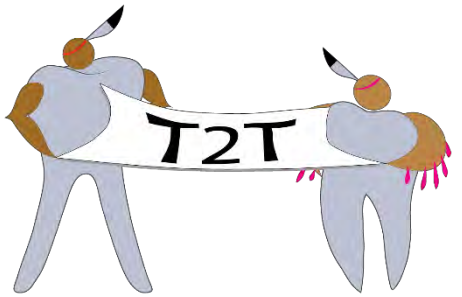
Tribe: _____

This survey will take no more than 20 minutes to complete.

This questionnaire is about the dental health of tribal children and their regular tooth care practices. This questionnaire has been developed to help us understand parent and caregiver's knowledge, attitudes and behaviors related to school-aged dental care habits and children's access to water and sweetened beverages. This questionnaire may provide valuable information to help oral health programs serving American Indian and Alaskan Native children.

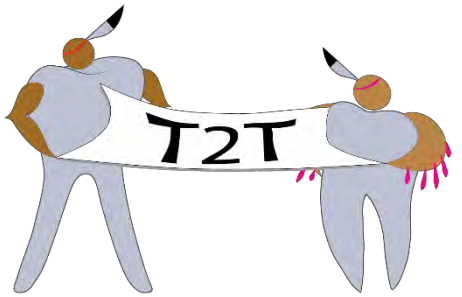
NPAIHB
Indian Leadership for Indian Health

Statistical Methods



- The primary outcome was a count of decayed, missing, or filled secondary teeth in a child's mouth (DMFT).
- Constructed negative binomial models to model DMFT count, offset by permanent teeth count and adjusted for child age and sex across the 3 TOTS intervention levels (control, community, community+family).
- All analyses were done in Stata version 15.

NPAIHB
Indian Leadership for Indian Health



We examined 335 children from the 5 TOTS tribes

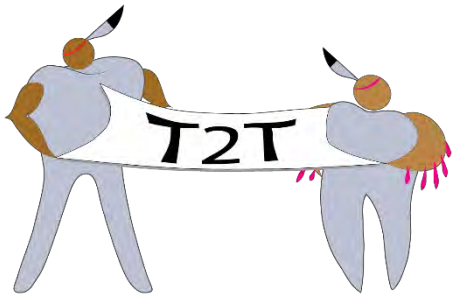
Two tribes implemented community + family TOTS

Children in darker circle received family intervention

One tribe implemented community TOTS only

Two tribes were control (comparison)

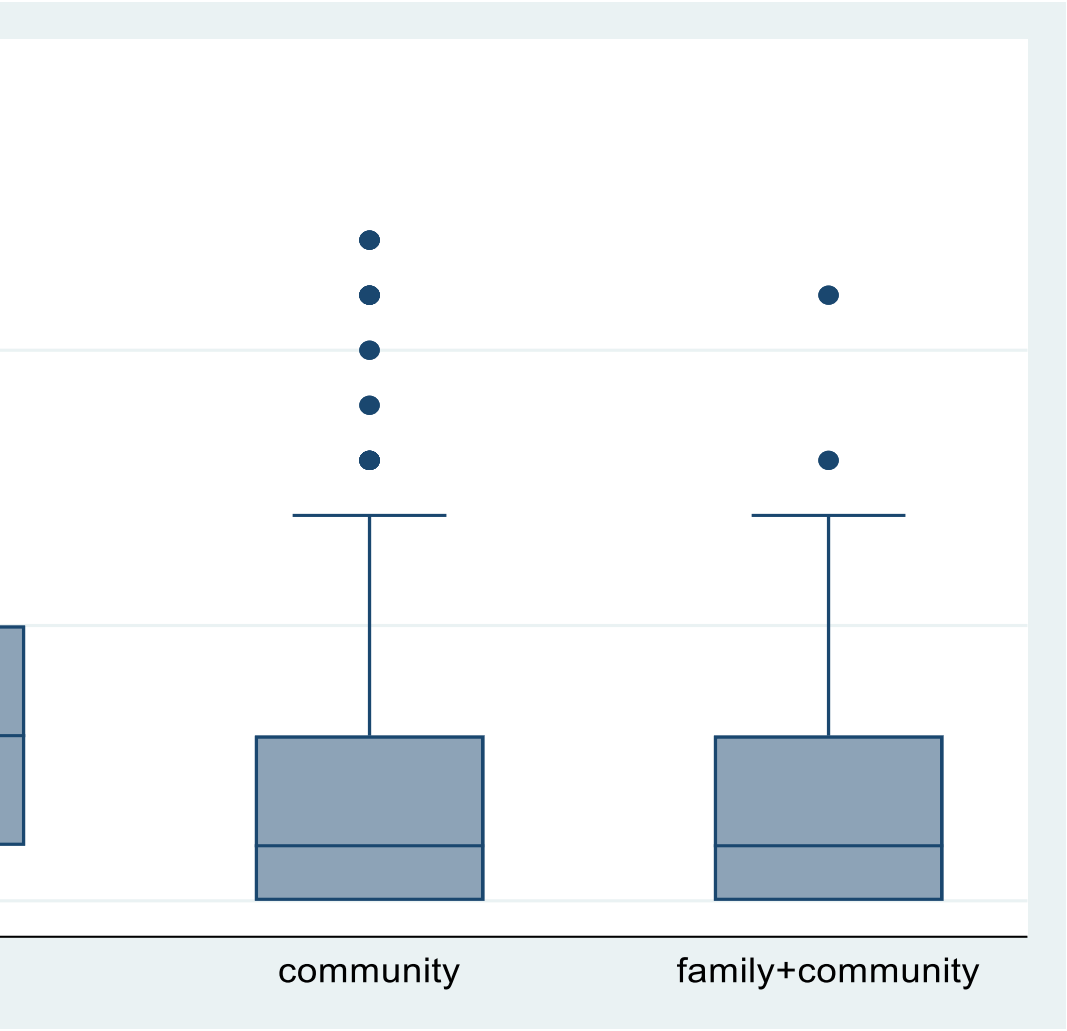
NPAIHB
Indian Leadership for Indian Health



	Family + Community Intervention (n=82)	Community Intervention (n=167)	Control (n=86)
	n (%) or mean ± SD	n (%) or mean ± SD	n (%) or mean ± SD
Age			
11	34 (42%)	76 (46%)	17 (19%)
12	46 (56%)	69 (41%)	25 (29%)
13	2 (2%)	22 (14%)	43 (51%)
Sex			
Boy	45 (55%)	85 (51%)	32 (37%)
Girl	37 (45%)	85 (49%)	54 (63%)
Body Mass Index for Age			
Healthy (5th to <85th percentile)	19 (23%)	51 (31%)	34 (40%)
Overweight (85th to <95th percentile)	18 (22%)	29 (17%)	24 (28%)
Obese (>= 95th percentile)	44 (54%)	86 (52%)	28 (33%)

NPAIHB
Indian Leadership for Indian Health

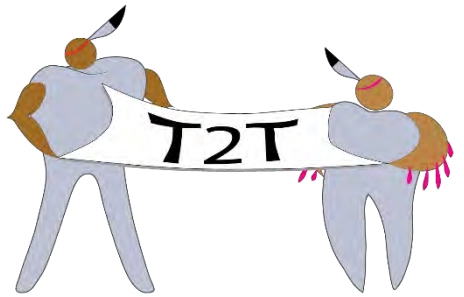
Mean DMFT score by TOTS Intervention Group

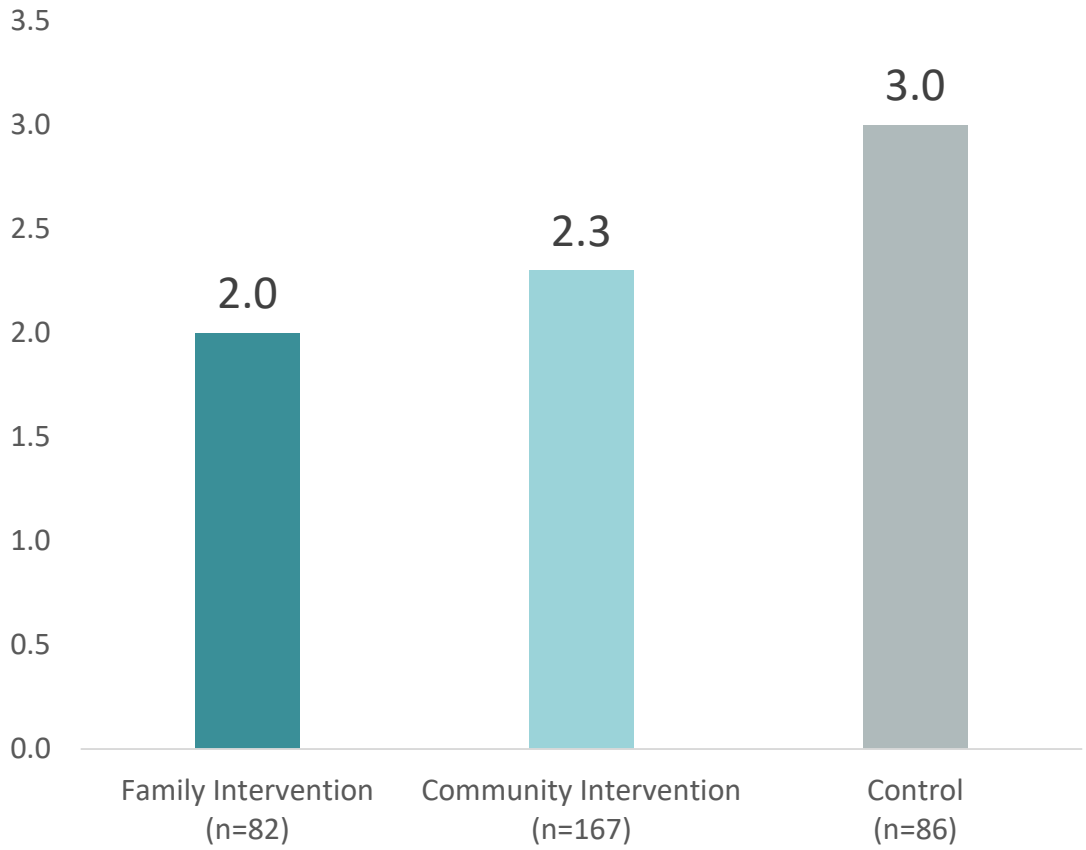


Children from control tribes had a statistically significant higher mean DMFT score – meaning more decay experience in permanent teeth

NPAIHB
Indian Leadership for Indian Health

Adjusted Mean DMFT Scores by TOTS Group

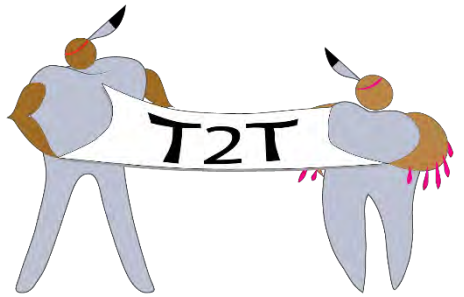




Mean DMFT score remains statistically higher for control children after adjusting for child age and sex and accounting for the total number of permanent teeth in a child's mouth

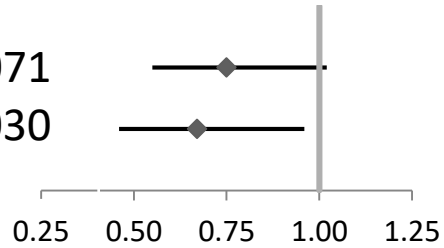
NPAIHB
Indian Leadership for Indian Health

H1: Children who received the TOTS intervention will have a 25% lower DMFT score than children in the non-intervention sites



DMFT risk by TOTS intervention group, adjusted for child age and sex and accounting for permanent teeth count

TOTS Group	RR	95% CI	p-value
Community (vs control)	0.75	(0.55,1.02)	0.071
Community + family (vs control)	0.67	(0.46,0.96)	0.030



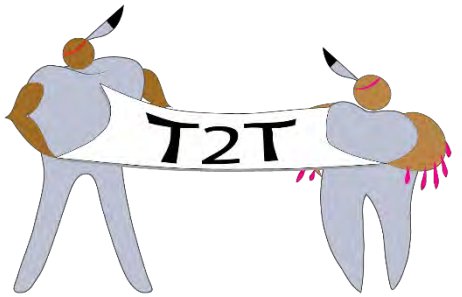
Compared to control, community intervention kids had less risk of decay. This was marginally significant.

C+F children had significantly less risk of decay than control children.

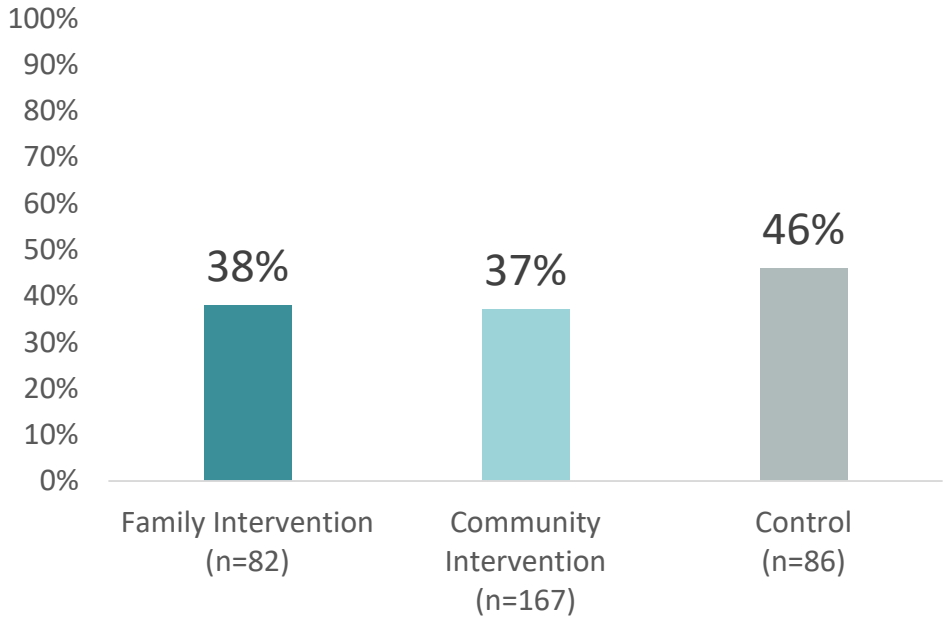
Results are similar when we look at mixed dentition.

NPAIHB
Indian Leadership for Indian Health

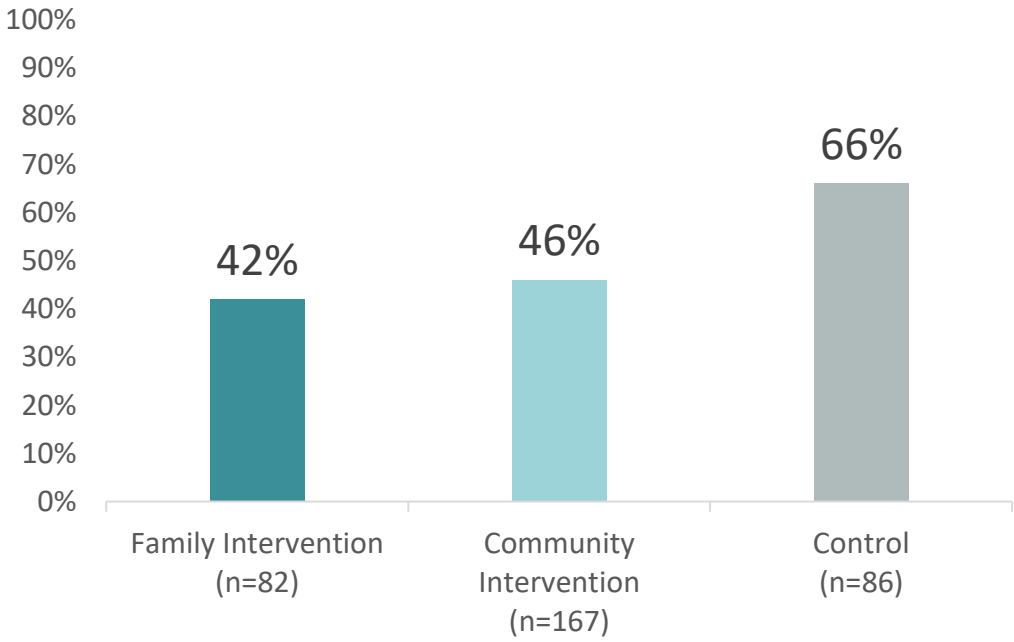
Difference in DMFT Score is Fillings



Percent of children with untreated decay in permanent teeth, adjusted*



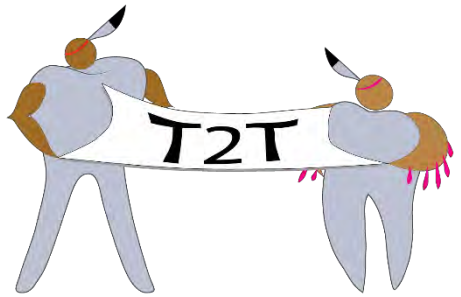
Percent of children with fillings in permanent teeth, adjusted*



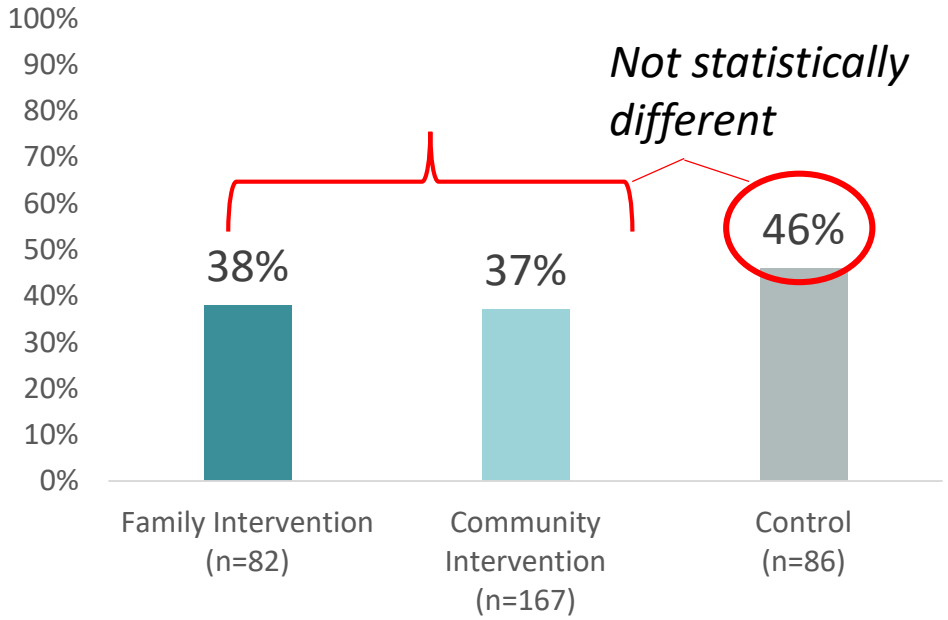
*Adjusted for child age, sex, and permanent teeth count

NPAIHB
Indian Leadership for Indian Health

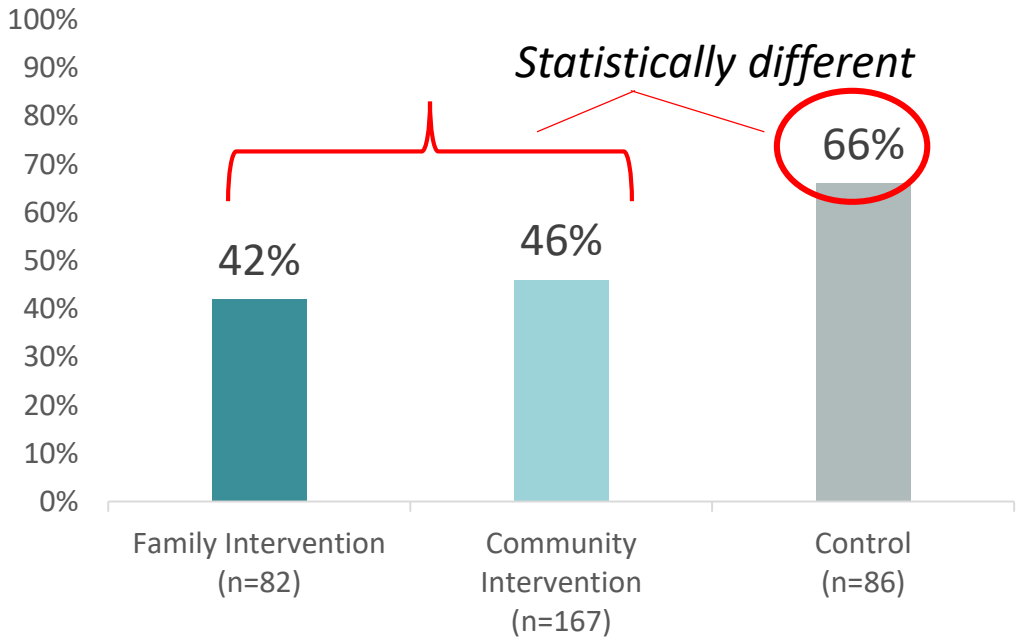
Difference in DMFT Score is Fillings



Percent of children with untreated decay in permanent teeth, adjusted*



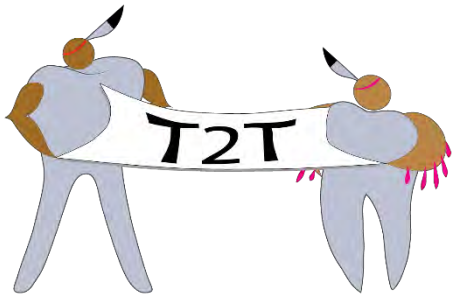
Percent of children with fillings in permanent teeth, adjusted*

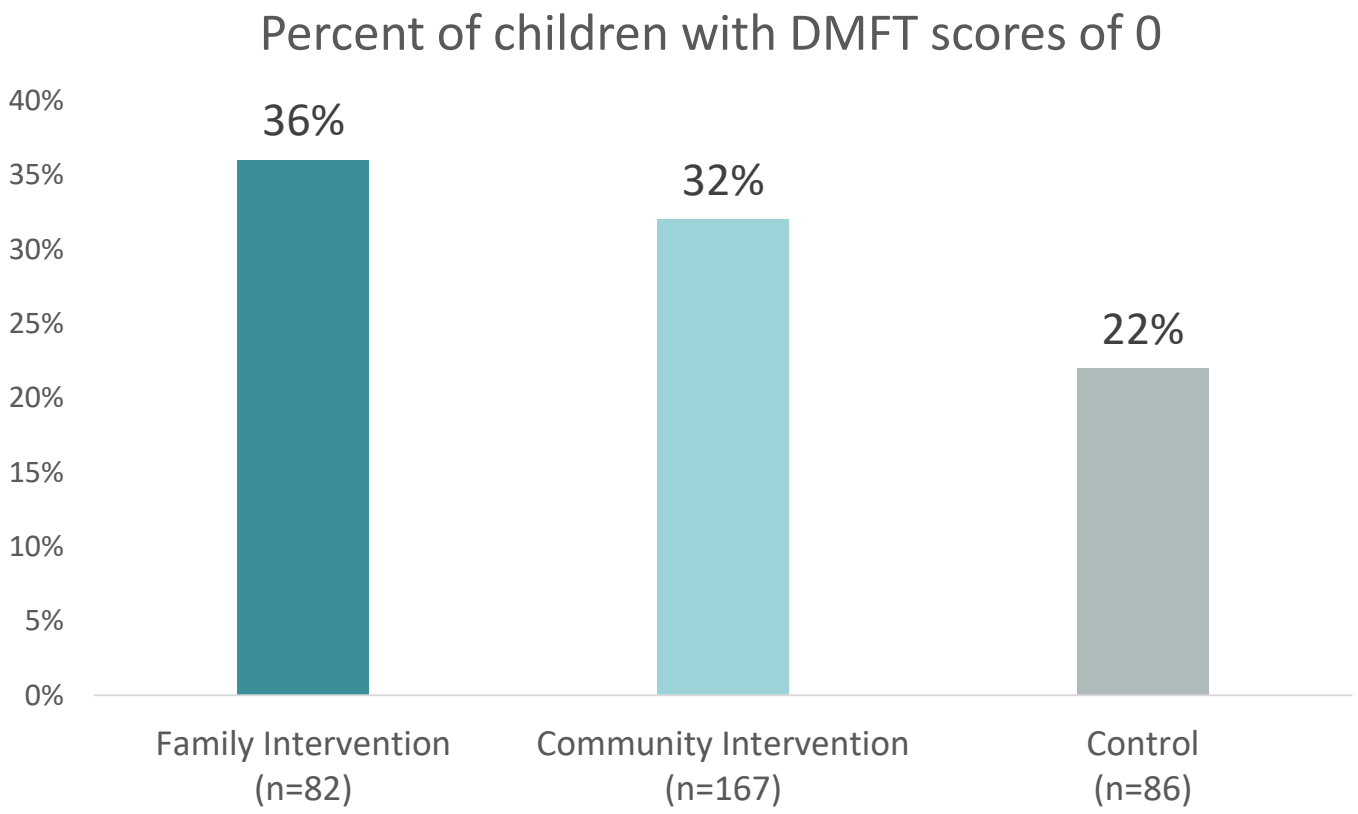


*Adjusted for child age, sex, and permanent teeth count

NPAIHB
Indian Leadership for Indian Health

Children with All Sound Teeth





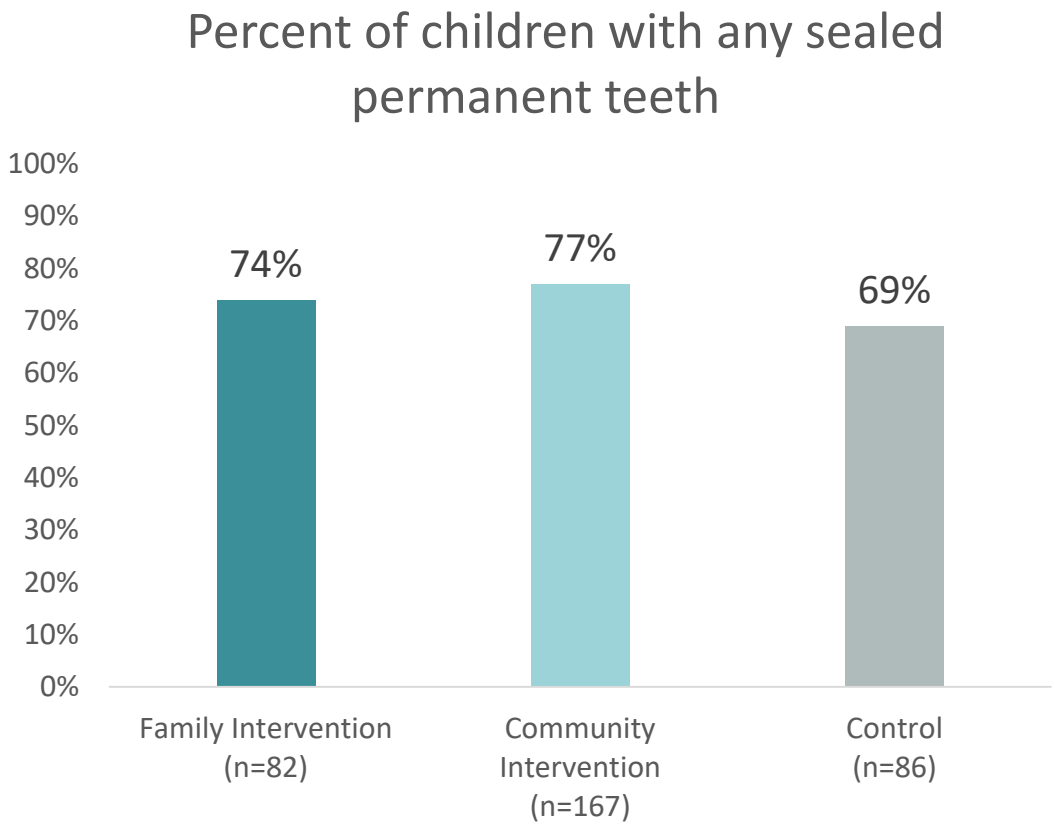
Notice the stepping intervention effect on all the charts. Community intervention has the largest benefit. The family intervention has added value.

This is similar to TOTS findings.

Interestingly, in T2T, community intervention children are from 3 different tribes; in TOTS it was only one.

NPAIHB
Indian Leadership for Indian Health

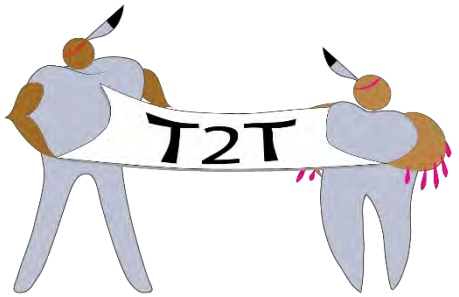
Sealants

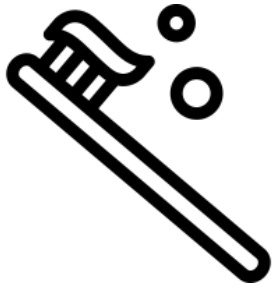


Most children had one or more sealants on permanent teeth

Percent of children with any sealants on permanent teeth was not different by TOTS group

NPAIHB
Indian Leadership for Indian Health





48% said they brush their teeth 2+ times per day
36% said once a day

86% of children said they drink water everyday

47% said they have one or more beverage containing sugar each day

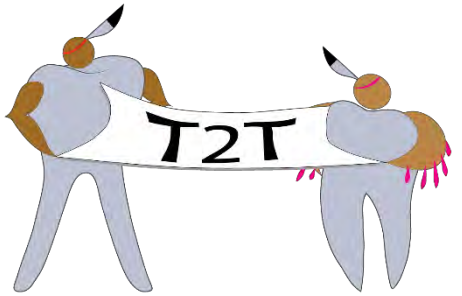
62% said they use dental floss and **72%** said they use mouthwash

Reported behaviors were not different by TOTS group and were not related to DMFT score

NPAIHB
Indian Leadership for Indian Health

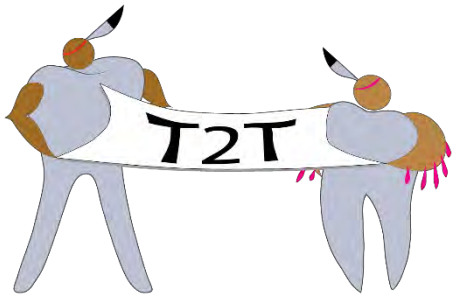
Beverages

Not popular



	Several Times a Day	Everyday	Several Times a Week	Once a Week	Several Times a Month	Never
Water	**48%**	36%	11%	4%	2%	0.3%
Juice	8%	14%	24%	**31%**	14%	9%
Coffee/Tea w/ sugar	0.6%	5%	10%	17%	23%	**44%**
Pop/Soda	5%	7%	21%	**28%**	15%	23%
Diet Pop/Soda	0.6%	0.3%	2%	6%	5%	**86%**
Milk & alternatives	13%	**33%**	25%	13%	5%	12%
Chocolate milk	2%	11%	10%	22%	13%	**43%**
Sports drinks	5%	16%	22%	**28%**	17%	13%
Energy drinks	0.6%	1%	2%	4%	9%	**84%**

NPAIHB
Indian Leadership for Indian Health



Behaviors

- 99% said they never use cigarettes, pipe, cigars, hookah, vape or ecigs

Pain

48% said they did not have a toothache in the past year;
34% said rarely; 8% occasionally; 5% often

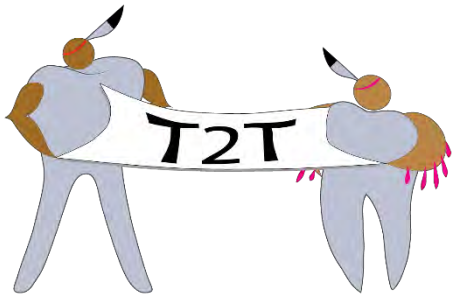
- We noticed that kids who reported discomfort often had braces

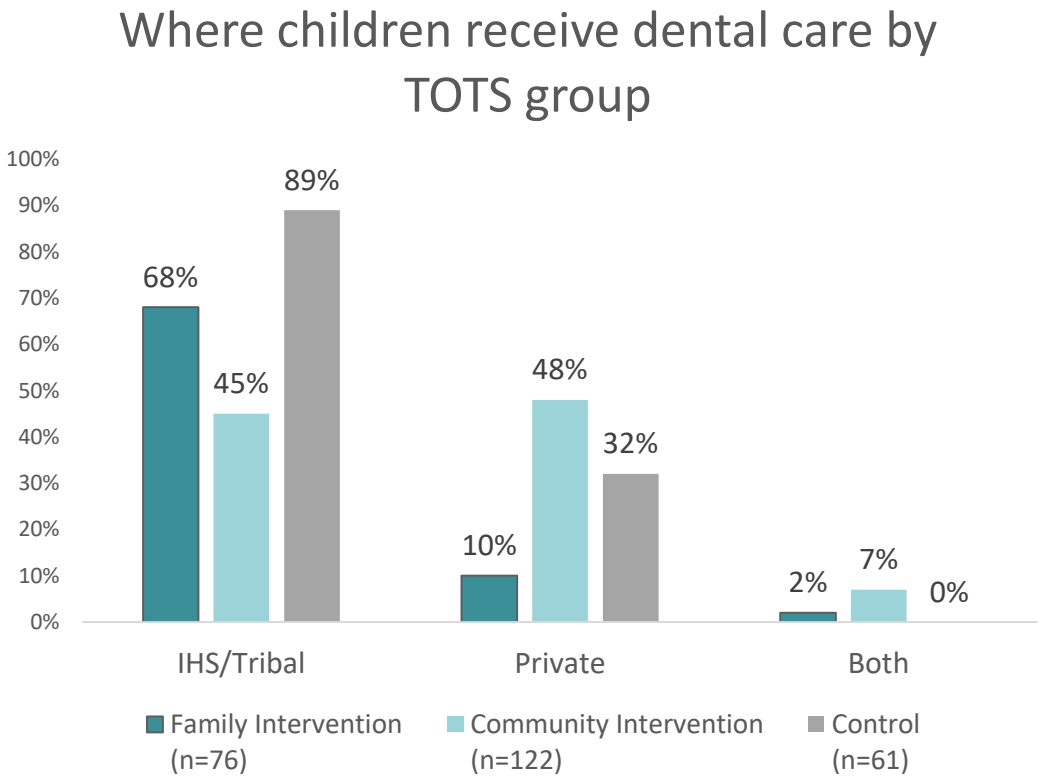
PUFA

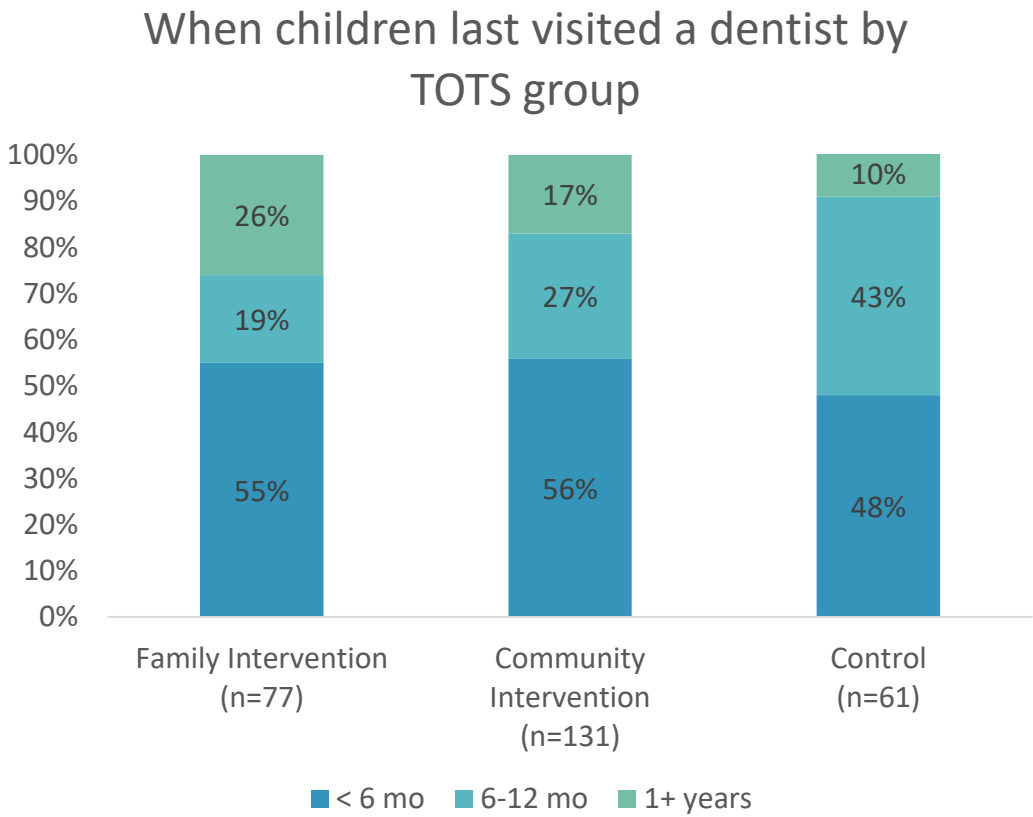
- Only 9 children had PUFA (severe conditions from untreated decay)

NPAIHB
Indian Leadership for Indian Health

Dental Care

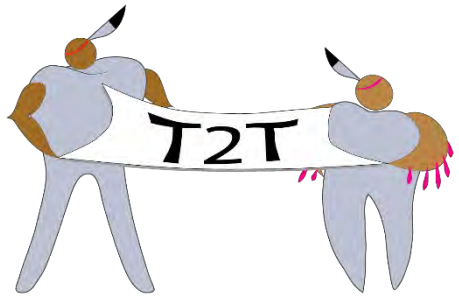


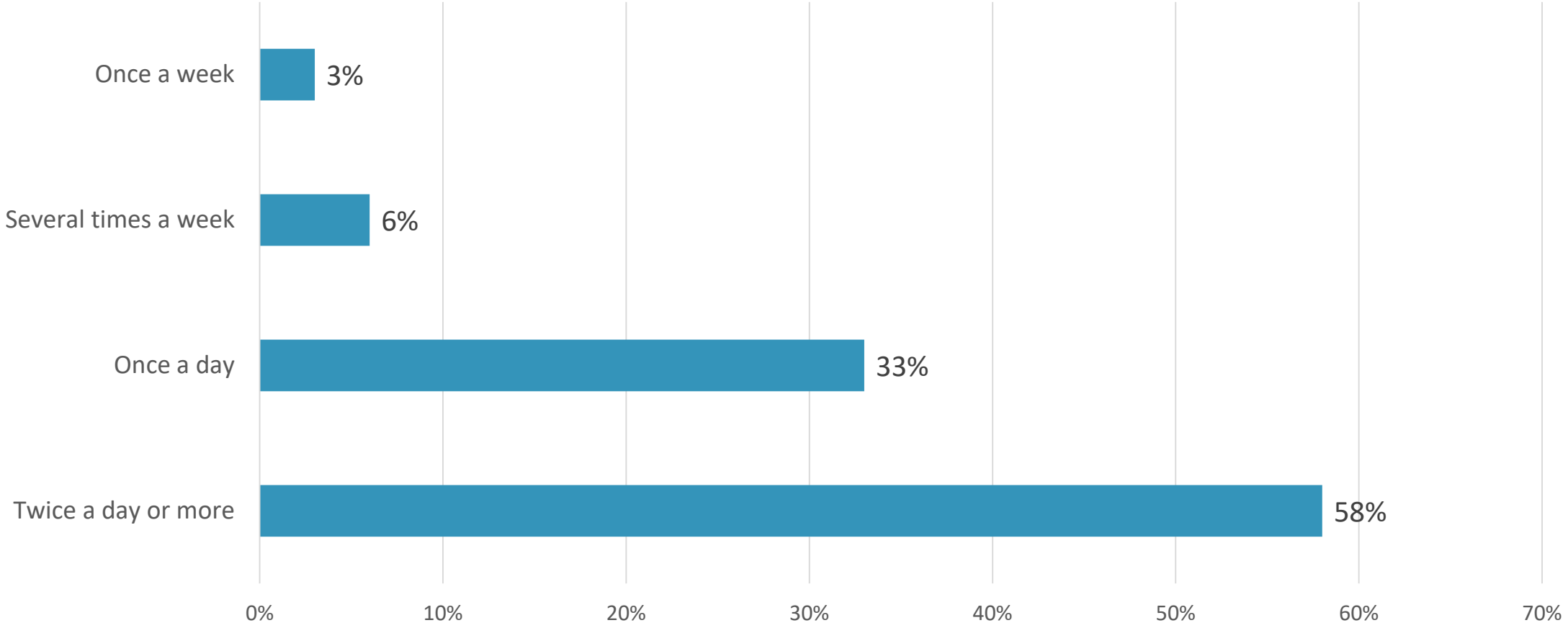




NPAIHB
Indian Leadership for Indian Health

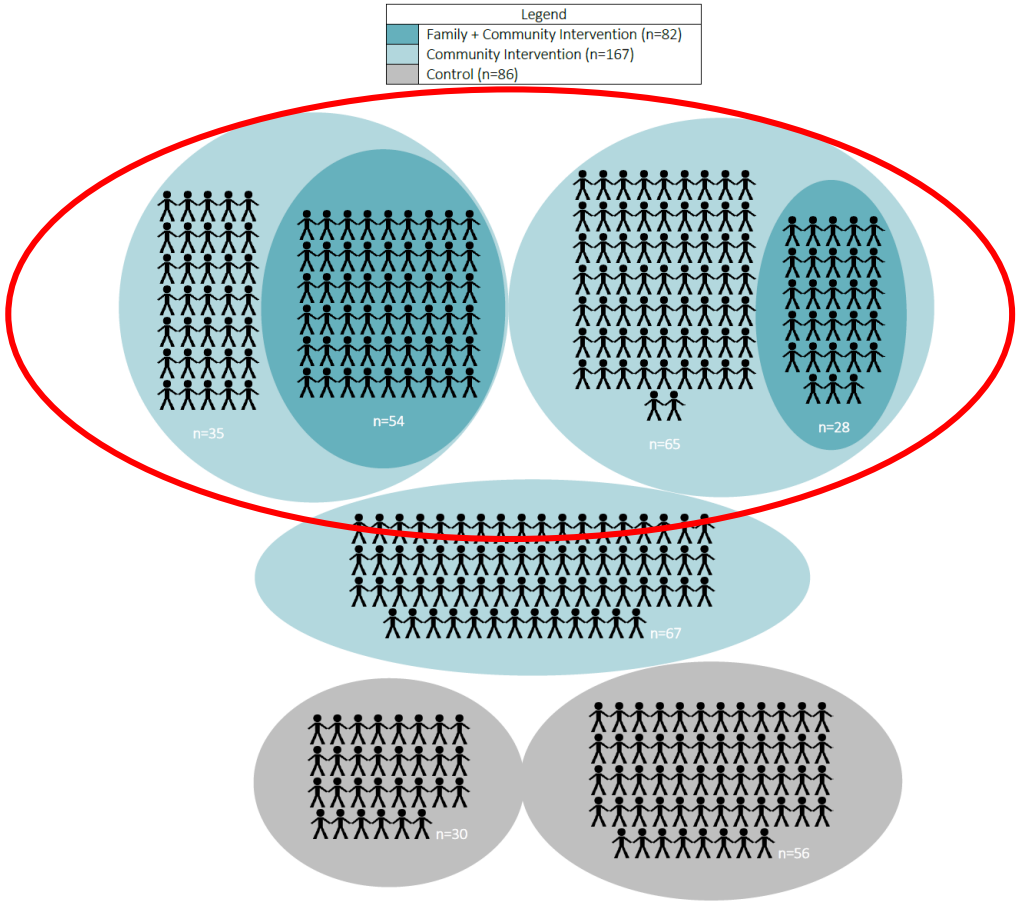
117 parents said their children brush their teeth twice a day or more. Their KIDS said:





NPAIHB
Indian Leadership for Indian Health

H2: TOTS children will have less decay than fellow tribal member children who did not participate in TOTS



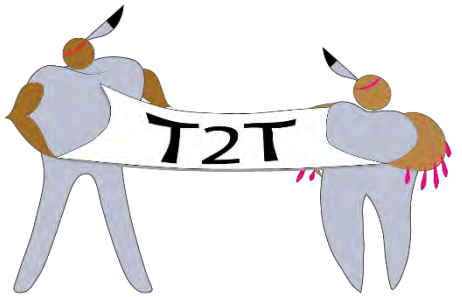
We are not seeing this.

Partly, small numbers.

Mostly, community factors are just that important.

NPAIHB
Indian Leadership for Indian Health

H3: Children with the least decay at age 2 will have the least decay in the follow-up screening



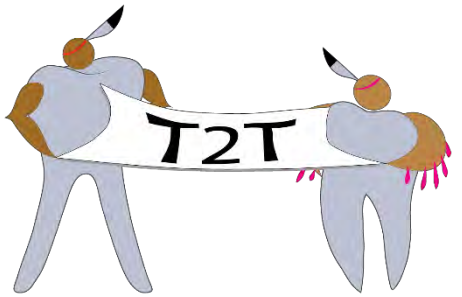
We may or may not do this analysis.

We did not see as many TOTS kids as we hoped.

Same kids, different teeth. Not truly longitudinal.

NPAIHB
Indian Leadership for Indian Health

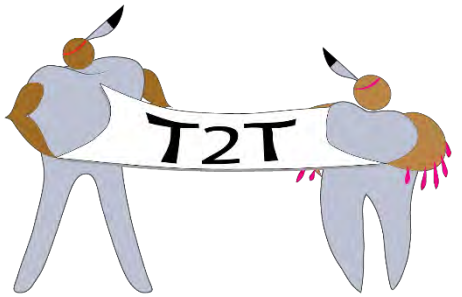
H4: Mothers/caregivers who participated in TOTS will have more favorable knowledge, attitudes, and behaviors related to oral health than those who did not receive TOTS



Analysis is forthcoming

NPAIHB
Indian Leadership for Indian Health

Qualitative themes from parents



Facilitators

- Appreciation for bringing dental health programming out into community: health fairs, school events, open houses
- School-based screenings for all ages
- Ease of receiving oral health products from dental program or buying these types of products in bulk for entire family

Barriers

- Loss of control over food available including school lunches, nearby stores, vending machines, energy drink presence, coffee stands
- Challenges in setting routine oral health appointments in a timely manner rather than months down the road (2 months seemed to be mentioned a lot)

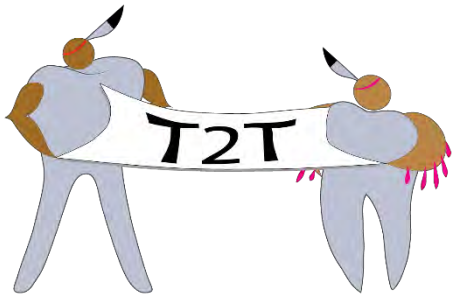
Context

- Ability to let go of control as children reach adolescence with respect to watching over daily brushing, flossing (parents tend to assume it's getting done)
- Many families provide water as a main beverage and have a good view of the drinking water quality

Wish list

- Would like to see more 'kid friendly' dental providers
- Need for more media related oral health content in community; newspapers, social media, clinic, early learning centers, community stores, etc.

Qualitative themes from providers



Facilitators

- Benefit seen from collaboration across community centers including early learning centers, teen parent centers, elder centers, substance abuse programs, etc.
- Implementing 'happy' visits before more invasive visits especially with children or adults who've shared previous traumas associated with dental care

Barriers

- Some clinics see few children due to referring out for pediatric dentistry
- Breaking past stigma around tribal dentistry, i.e. past generations, parents, grandparents' view
- Challenges of direct care vs. tribal care

Needs

- Need for more outreach events and support of oral health programs
- Need for orthodontic care based in community

Context

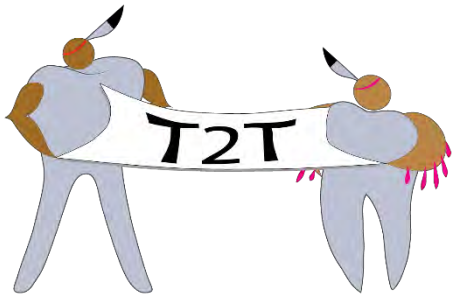
- Large chunk of community who come in for routine care vs. those who only come in when in dental trauma or high pain

Wish list

- Would like to see incentives for children and those with diabetes for recurrent visits
- Bigger clinic, more providers and more appointments offered to the community

NPAIHB
Indian Leadership for Indian Health

Clinics are AWESOME



- Kids are receiving treatment for decay
- Preventive care is high – sealants
- Study is good news for public health – community level factors more important than individual level factors

NPAIHB
Indian Leadership for Indian Health

Acknowledgements

Native American Research Centers for Health (NARCH)

National Institute of Dental and Craniofacial Research

Makah Tribe

Hy’shqe Si’am –Thank You

Email Tam Lutz:
tlutz@npaihb.org

Email Nicole Smith:
nsmith@npaihb.org

NPAIHB
Indian Leadership for Indian Health