

Impact of routine prenatal vitamin D supplementation on rickets, vitamin D deficiency and early childhood cavities.

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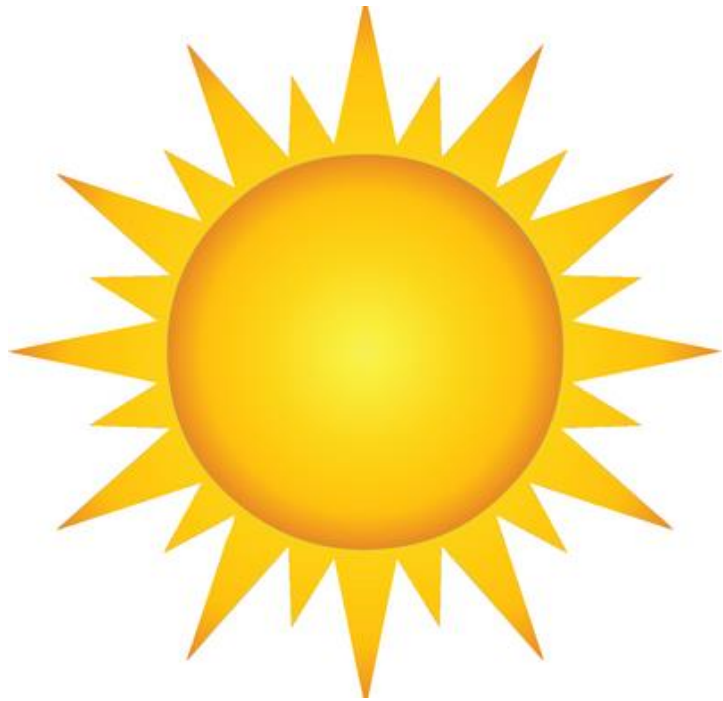
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ALASKA NATIVE
TRIBAL HEALTH
CONSORTIUM

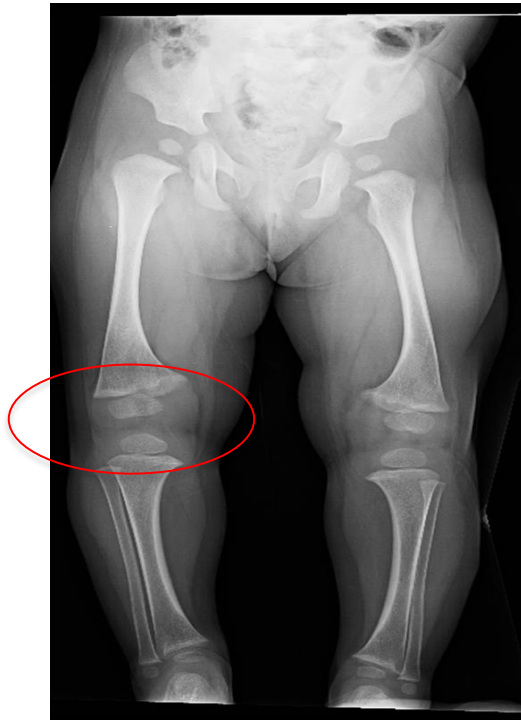
Background: Diet vs. Sunshine

In most populations <10% of Vitamin D is from diet. In Alaska, diet is the most important source for Vitamin D. Salmon and oily fish have the highest content of vitamin D.



Rickets

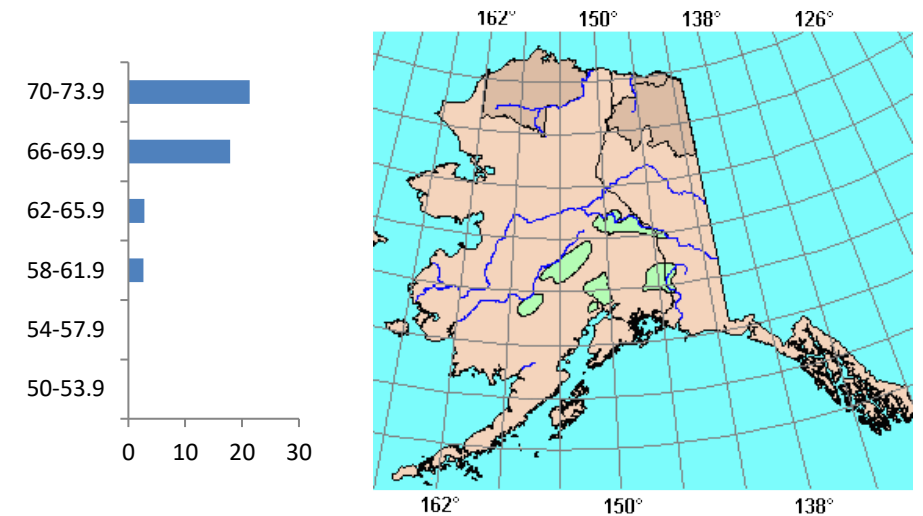
- A state of extreme vitamin D deficiency
 - Insufficient vitamin D → insufficient calcium absorption → PTH increases to maintain eucalcemia → Increased calcium release from bone into blood → decreased bone mineralization → RICKETS
- Peak incidence between 3-18 months old
 - BUT Congenital Rickets has also been described



Rickets/Vitamin D Deficiency in Alaska Native children

- Rickets visits more common in Alaska Native children than in the general US or in other American Indian/Alaska Native children

- Rickets diagnosis increased with higher latitude →



- Rickets and vitamin D deficiency occurred in both breastfed and formula fed infants
- Rickets and vitamin D deficiency were more common in infants who did not receive vitamin D supplementation.

This confirmed the importance of American Academy of Pediatrics recommendation for vitamin D supplementation of infants with 400 IU/day.

Singleton, J Pediatr Endocr Met, 2015

Vitamin D Supplementation of Infants

Because of the increased risk of rickets, at ANMC we did:

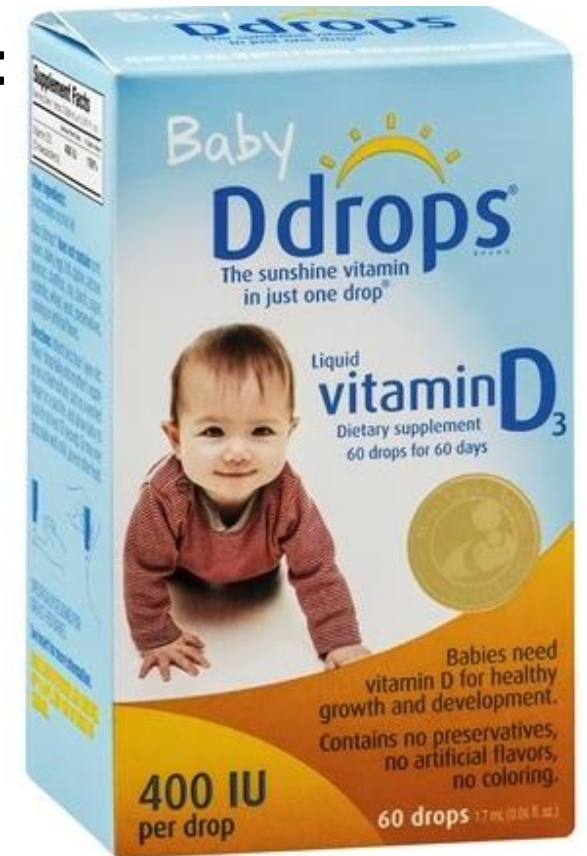
- **Provider Education**

- Infants → supplement with 400 IU/d

- **Switch from Trivisol to D drops**

- to improve compliance

Despite these interventions, we continued to see new cases of rickets every year, including cases of congenital rickets.



Vitamin D and Diet in Pregnancy

- Severe prenatal vitamin D deficiency can lead to overt bone disease from before birth and congenital rickets.
- In Alaska, marine food intake by child-bearing aged women was high in the 1960's –but has dropped to low intake
- Vitamin D levels highly related to traditional marine food intake.
- Low marine food intake and vitamin D levels in Alaska Native pregnant women could put their infants at risk for rickets



Statewide Vitamin D Workgroup Recommendations

TABLE 2. Alaska Vitamin D Workgroup Recommendations for Vitamin D Intake and Supplementation

Population		Dietary Intake/Supplementation	Screening
Newborns and Infants (0–12 months)*	Exclusively or partially breast-fed infants	Consider supplementation with 800 IU/day [†]	Not routinely recommended
	Exclusively formula-fed infants	Consider supplementation with 400 IU/day in addition to the 400 IU/liter contained in the formula	
Pregnant Women*		Consider supplementation with 1,000 IU/day in addition to a daily prenatal vitamin containing 400 IU/day (not to exceed 4,000 IU/day)	Not routinely recommended
Children and Adults (1–70 years)		Follow National Academy of Medicine intake recommendation of 600 IU/day (through diet and/or supplementation)	Not routinely recommended
Elderly (>70 years)		Follow National Academy of Medicine intake recommendation of 800 IU/day (through diet and/or supplementation)	Not routinely recommended

*The increased supplementation recommendations for infants and pregnant women are for the prevention of childhood rickets in Alaska.

[†]Decrease infant supplementation to 400 IU/day if their mother is supplementing with $\geq 4,000$ IU/day of vitamin D while breastfeeding.

http://www.epi.alaska.gov/bulletins/docs/rr2018_04.pdf

YK Delta Prenatal Vitamin D Supplementation

In Fall 2016, Yukon Kuskokwim Health Corporation started routine prenatal vitamin D supplementation with 1,000 IU Vit D in addition to the 400 IU in prenatal vitamins

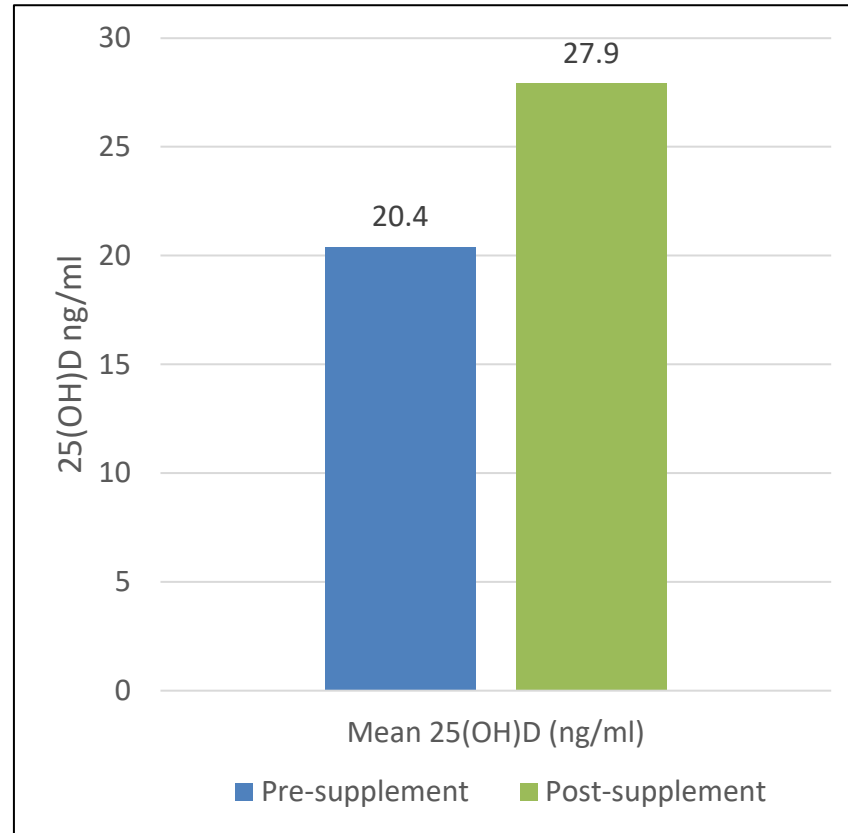
NARCH Prenatal Vitamin D Supplementation Study

We received NIH funding through Native American Research Centers for Health (NARCH) to evaluate impact of prenatal supplementation on vitamin D concentrations.

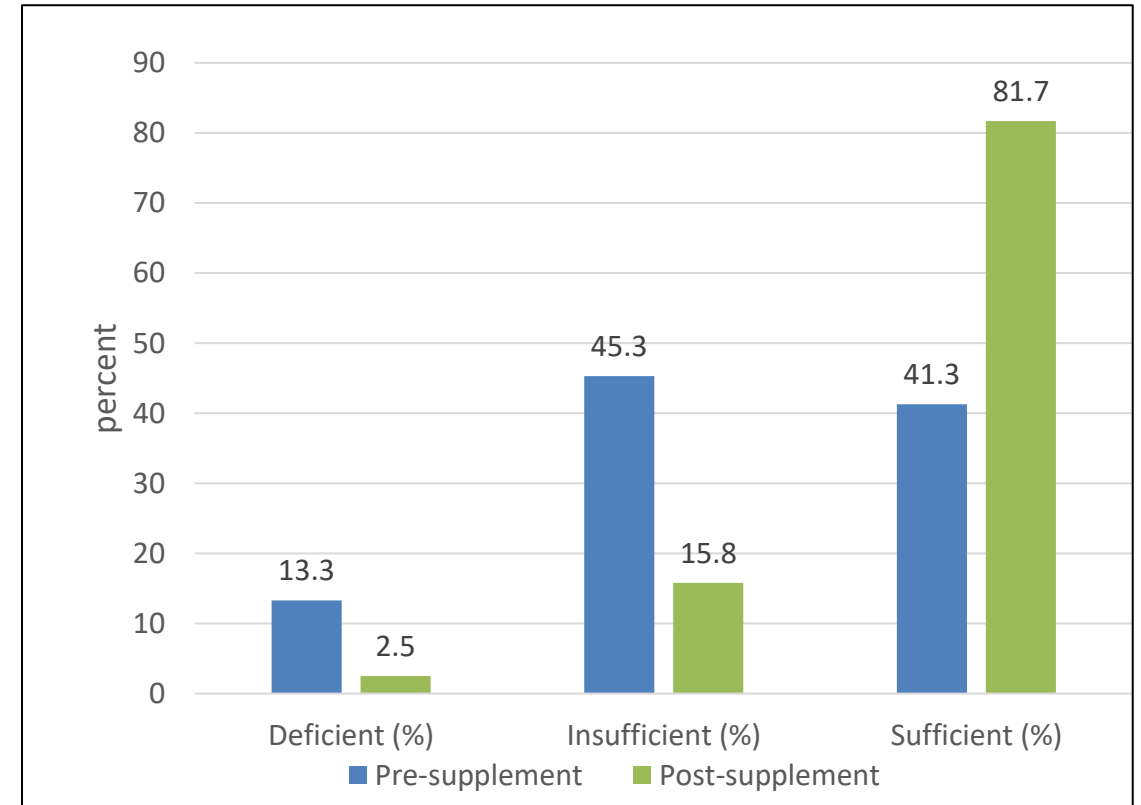


Late pregnancy 25(OH)Vit D levels, YK prenatal women, 2015-16 (pre-) vs. 2017-18 (post-supplement)

Mean 25(OH)D

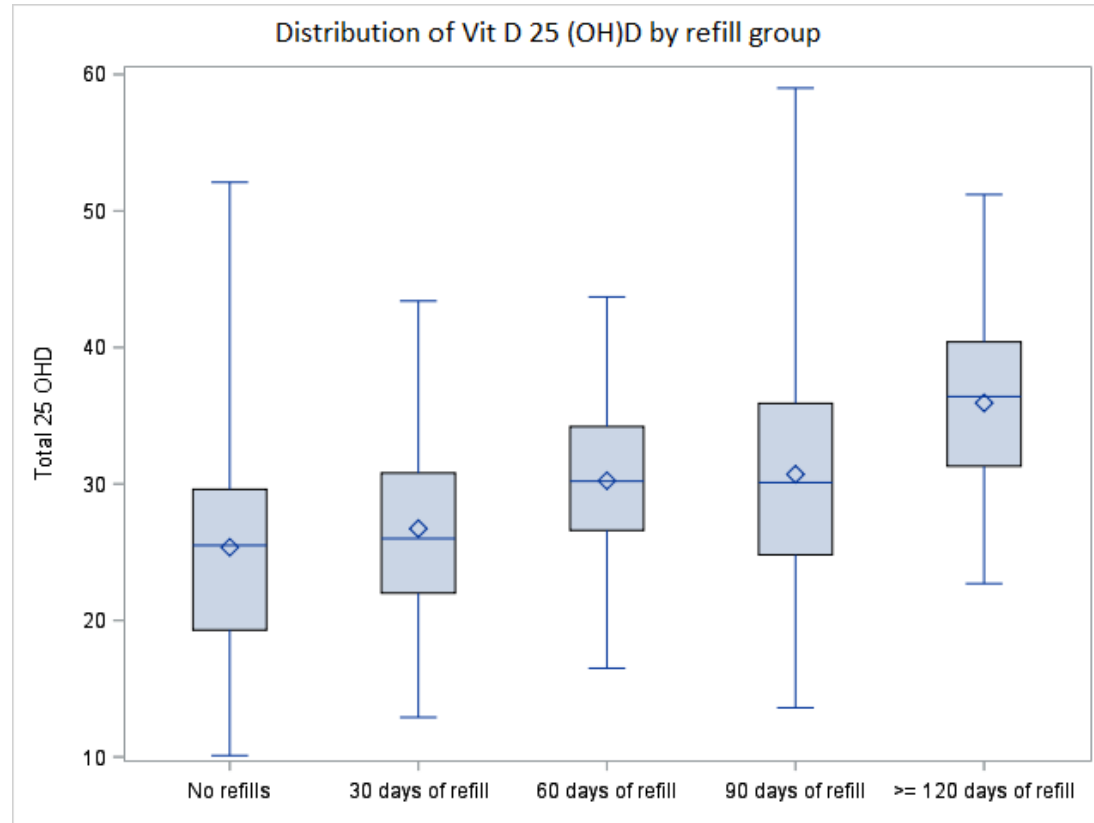


Percent Vitamin D Deficient



Definitions: Deficient <12 ng/ml, Insufficient \geq 12 and <20 ng/ml

days of Vit D refills and mean Late Pregnancy 25(OH)D level

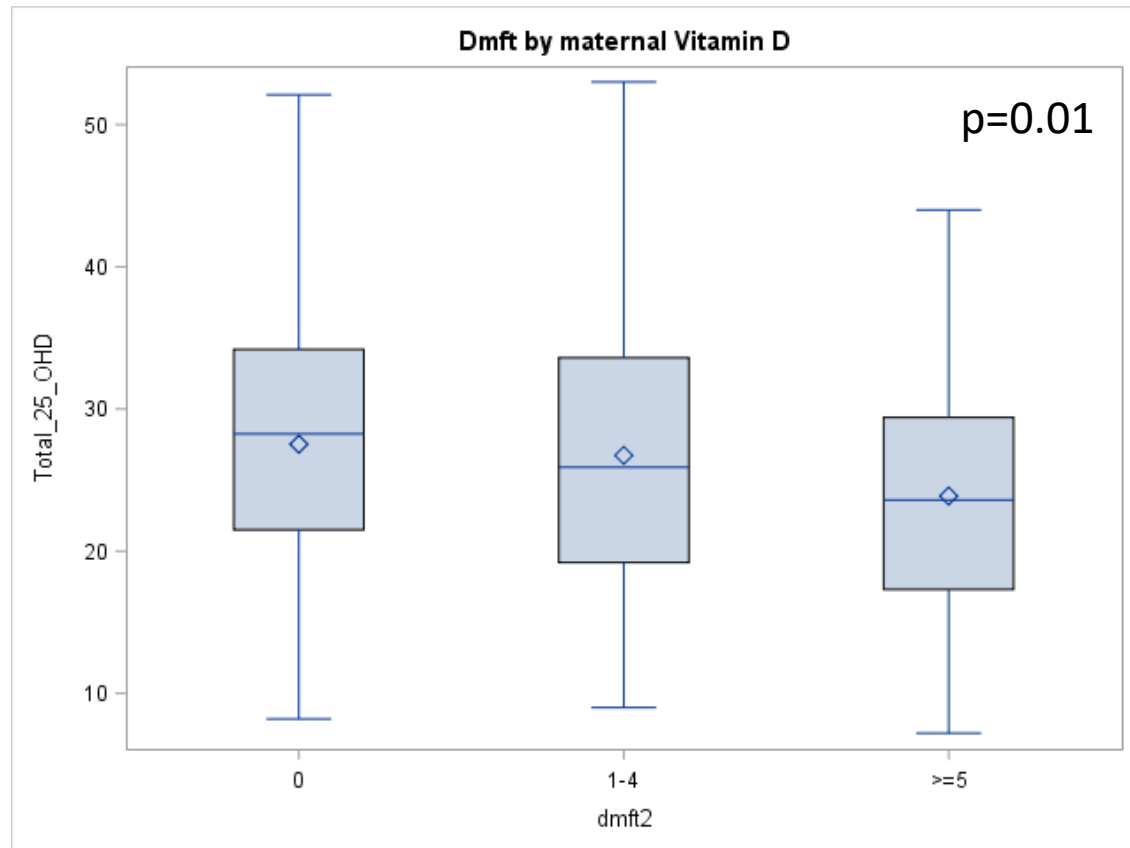


Refill Group

No refills after first prescription
30 additional days of prescription
60 additional days of prescription
90 additional days of prescription
120 or more additional days

Kruskal-Wallis Test: Chi-Square 69.16, DF 4, $p < 0.0001$

Late Pregnancy 25(OH)D levels and dmft scores



Mothers of children 12-36 months with 5 or more decayed, missing, or filled teeth (dmft) had significantly lower mean 25(OH)D levels during late* pregnancy compared to mothers of children with lower numbers of dmft.

*late = 20-40 weeks gestation

This confirms data reported in our earlier observation from the Maternal Organic Monitoring study.

Vit D Supplement On-Line Survey



- Chris Desnoyers (YKHC research coordinator) Melanie McIntyre (YK indigenous investigator) brainstormed about how to get feedback from community members on Vit D Supplementation.
- In 2020 YKHC distributed a Survey Monkey on Vit D supplementation Knowledge Attitudes Behaviors
- 91 participants completed the survey
 - Pregnant Woman 32 (34%)
 - YKHC employee 27 (28%)
 - Mother of Infant 17 (18%)
 - Community Health Aide 15 (16%)
 - Other provider 10 (11%)
 - Mother/Grandmother of young children 4 (4%)
 - Other professionals 3 (3%)
 - Father of infant 0 (0%)



Vitamin D Survey: Results

“Where did you hear about Vitamin D supplement recommendation?”

YKHC Prenatal Provider	31 (44%)
Another YKHC Provider	22 (31%)
Misc Other	7 (10%)
Community Health Aide	6 (9%)
Pharmacy	5 (7%)
School	4 (6%)
Meeting/Conference	4 (6%)
WIC	4 (6%)
Family or Friend	3 (4%)
Flyer	3 (4%)
Webpage	1 (1%)

Vitamin D Survey: Results

“If you are pregnant, are you taking Vitamin D?”

Yes, daily	24 (67%)
Yes, near daily	9 (25%)
Yes, at least weekly	1 (3%)
No	2 (6%)



94% of pregnant women were taking vitamin D!

Thank you!

Rickets study

- Rachel Lescher MD
- Robert Holman MS
- Bradford Gessner MD
- Timothy Thomas MD
- Thomas Hennessy MD
- Matthew Benson MD
- John Rosenfeld MD
- Dana Haberling
- Lisa Bulkow MS
- Anthony Kretz
- Gail Thompson RN
- James Tiesinga MD
- Michael Bruce MD

Marine Biomarker Study

- Diane O'Brien PhD, (CANHR)
- Rosalyn Singleton MD, ANTHC
- Joseph Klejka MD, YKHC
- Bert Boyer (CANHR)
- Ken Thummel (U Washington)
- Lisa Bulkow (AIP-CDC)

Statewide Vit D Workgroup

- Rachel Lescher MD
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- Rosalyn Singleton MD
- Matthew Hirschfeld MD
- Leanne Ward MD
- Ken Thummel PharmD
- Joseph Klejka MD
- David Compton MD
- others

