



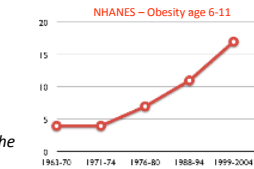
# Dietary Saturated Fat and Fat-Soluble Vitamins in Childhood Health: A New Approach

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## Obesity & Fat-Soluble Vitamin Deficiency: Concerns for Maternal & Child Health

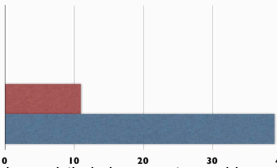
Childhood obesity has increased from the early 1970s by approximately 400%.<sup>(1)</sup>



Standard interventions, like *Pathways*: a school-based, randomized controlled trial for the prevention of obesity in American Indian school-children,<sup>(2)</sup> focus on reducing dietary saturated fat.

Obesity in Native American vs general population  
■ Native American children ages 5-19 (Jackson, 1990-91)  
■ General population ages 6-19 (NHANES 1988-94)

This approach, as per the results of *Pathways*, has not been successful and can lack cultural relevance, particularly for populations with high rates of obesity.<sup>(3)</sup>



Saturated fat reduction may also contribute to a growing problem of fat-soluble vitamin deficiency, with MCH health implications. Vitamin D3 deficiency has garnered the most attention,<sup>(4)</sup> but deficiency in other animal-fat-derived vitamins (e.g. vitamin K2 MK-4) is also of concern, and these may have implications for nervous system, bone and immune system development<sup>(5)</sup> as well as diseases like Type 1 diabetes mellitus<sup>(6)</sup> or autism.<sup>(7)</sup>

Altering the standard, unsuccessful approach of dietary saturated fat reduction, and addressing fat-soluble vitamin deficiency, are not two separate issues but are interrelated, both in etiology and outcomes, with long-term MCH health implications.

## Methods

Examine data from *Pathways*: a school-based, randomized controlled trial for the prevention of obesity in American Indian schoolchildren. *Pathways* goal was to prevent obesity in grades 3-5 (1704 children in 41 schools) over three consecutive years via saturated fat reduction, exercise and student/family education.

Analyze NHANES data on obesity and USDA population-level data on nutrient consumption during years of increased obesity trend.

Study relationship between fat-soluble vitamin deficiency, obesity, diet and child health outcomes (e.g. autism, T1DM). Make recommendations for intervention based on all of the above.

## Saturated fat reduction did not reduce obesity

The approach used in *Pathways* reduced saturated fat and did not reduce or prevent obesity. Results were virtually identical to the control group. The researchers framed the results as a partial success because they reduced fat intake, even though this did not have the desired outcome.<sup>(2)</sup>

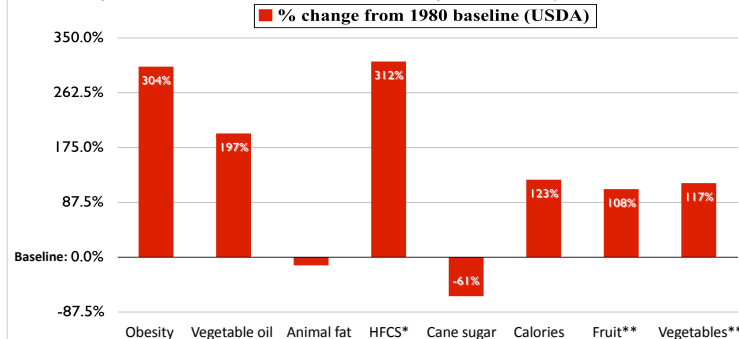
### *Pathways* Results – NO REDUCTION in Body Fat, Weight, BMI

	Intervention (Baseline)	Control (Baseline)	Intervention (Follow-up)	Control (Follow-up)
% Body Fat	32.8	33.3	40.3	40.0
Weight (kg)	32.5	32.9	49.0	49.0
BMI	19.0	19.1	22.0	22.2

## At population level, other exposures correlate

Correlations from population-level USDA exposure data suggest animal fat is not a concern, but vegetable oils and high fructose corn syrup may be.<sup>(8)</sup>

Exposures that DO and DON'T correlate to obesity, USDA Obesity data = NHANES



\*When calculated from 1970, HFCS increase is closer to 900%

\*\* Fruit and vegetables are included to suggest that interventions which focus only on increasing fruit/vegetable consumption to combat obesity may not be justifiable based on USDA data.

## Fat-soluble vitamin deficiencies have relevant implications

• Full-fat dairy, animal fats, organ meats, fatty fish, and eggs are some of the better dietary sources of vitamins D and K2 MK-4, when sourced from animals raised on pasture/wild.<sup>(9) (10)</sup> Many traditional diets, including indigenous American diets, prioritized these foods high in saturated fat.<sup>(11)</sup>

• Obesity is a risk factor in vitamin D deficiency, and obesity impairs treatment of the deficiency.<sup>(12)</sup>

• Vitamin D and K2 MK-4 deficiency are correlated with low glutathione, a peptide considered protective in autism prevention and early childhood development.<sup>(13) (14)</sup> Vitamin D deficiency is correlated with type 1 diabetes mellitus and other diseases.<sup>(6)</sup>

## Implications for Future MCH Health Services Interventions, Research and Policy

If current MCH interventions are not reducing obesity, and may be contributing to fat-soluble vitamin deficiency, approaches should be reconsidered. Implications for:

- ✓ School meal planning, in practice and policy
- ✓ Childhood obesity interventions
- ✓ Strategies for epidemiological studies (cohort, RCTs)
- ✓ Partnership between obesity prevention/intervention, traditional diet education, nutritional advocacy and communities impacted

## Recommendations for Intervention & Research

• Focus on interrelationship between prevention of obesity and fat-soluble vitamin deficiency

• Approaches other than saturated fat reduction in dietary intervention, reflecting existing data and traditional diets

- ✓ Reduce vegetable oil
- ✓ Reduce high fructose corn sweeteners
- ✓ Include high-vitamin traditional fats.
- ✓ Work with communities to determine these. Ensure cultural relevance and community involvement
- ✓ Expand exercise intervention recommendations to include outdoor activity for vitamin D exposure

• Explore application of these recommendations in maternal nutrition and obesity prevention as well

## References

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