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

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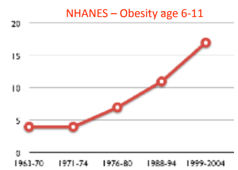
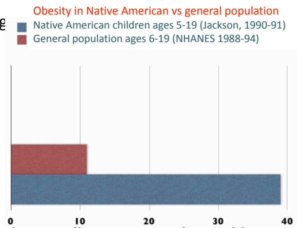
Obesity & Fat-Soluble Vitamin Deficiency: Concerns for Maternal & Child Health

Childhood obesity has increased from the early 1970s by approximately 400%. [1]



Standard interventions, like *Pathways: a school-based, randomized controlled trial for the prevention of obesity in American Indian school-children,* [2] focus on reducing dietary saturated fat.



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. [3]

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,[4] 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 [5] as well as diseases like Type 1 diabetes mellitus [6] or autism. [7]

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. [2]

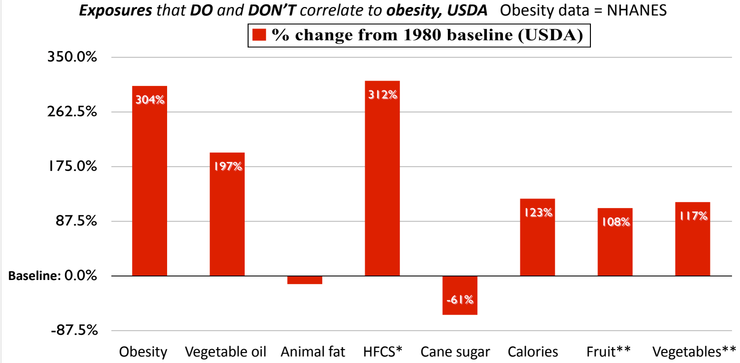
Pathways Results – NO REDUCTION in Body Fat, Weight, BMI

	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. [8]

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.** [9] [10] **Many traditional diets, including indigenous American diets, prioritized these foods high in saturated fat.** [11]
- **Obesity is a risk factor in vitamin D deficiency, and obesity impairs treatment of the deficiency.** [12]
- **Vitamin D and K2 MK-4 deficiency are correlated with low glutathione, a peptide considered protective in autism prevention and early childhood development.** [13] [14] **Vitamin D deficiency is correlated with type 1 diabetes mellitus and other diseases.** [6]

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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