

## REVIEW ARTICLE

# Sugar is the “New Tobacco”

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## ABSTRACT

Sugar has received significant attention in the public health community and policy in recent years. Sugar is the biggest public health crisis in the history of the world. Sugar is found in nearly every food. However, there is a big difference between the sugar that occurs naturally in raw, unprocessed foods such as fruits, vegetables, milk, and whole grains, and the type added to prepared or processed foods. Added sugars include every sweetener imaginable: White sugar, brown sugar, corn syrup, high-fructose corn syrup, dextrose, honey, and agave nectar. It is these added sugars that experts say are the root cause of our sugar problem because high amounts of them are found in almost every food we eat, most of which are also high in calories and devoid of nutrients. This review focuses on those problems and its solutions.

**Keywords:** Dental caries, Marketing practices, Public health, Sugar, Sugar-sweetened beverages, Tobacco.

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## BACKGROUND

Sugar has received significant attention in the public health community and policy in recent years.<sup>[1]</sup> Debate on the substantial health impacts of sugar consumption has led to national and international governments introducing policy changes such as taxes on foods high in sugar in response.<sup>[1,2]</sup> The WHO recommended that ideal added sugar consumption should be no more than 5% of total energy intake.<sup>[3]</sup> Lowering sugar consumption has been put forward as a solution to soaring rates of diabetes and obesity. However, there has been less focus on the potential impact on dental decay, the most prevalent disease worldwide.<sup>[4,5]</sup>

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## SUGAR AND ORAL HEALTH

Like other western countries, the dental health of the world population has improved dramatically since the 1970s.<sup>[6]</sup> Few adults now experience total tooth loss, and levels of decay among children in the world compared with children across Europe are low.<sup>[6]</sup> This is largely the result of improved dental care and prevention. Prevention has largely focused on improving oral hygiene practices rather than diet. These practices include toothbrushing twice daily with fluoride toothpaste, fluoride varnish application, and in some areas, water fluoridation.<sup>[7]</sup> The evidence for the protective effect of fluoride in children is strong,<sup>[8]</sup> however, there is conflicting evidence regarding whether oral hygiene habits, such as brushing with fluoride toothpaste, can attenuate the detrimental effects of high sugar diets in children.<sup>[9]</sup> There have been many longitudinal studies on this topic. Longitudinal data can help unravel the cumulative and combined impact of dietary and oral hygiene practices over time.

## Eating Habits

Three of the six food consumption variables remained significantly associated with dental decay after controlling for oral hygiene and socioeconomic confounders. Children were significantly more likely to have dental decay by age 5 if they consumed soft drinks more frequently and if they ate sweets or chocolates once per day or more often. Compared to children who at age 2 mainly ate meals and did not snack much, those who snacked all day but had no real meals had a higher chance of dental decay, which was only partly explained by socioeconomic factors. Children whose parents reported when children were aged 2 that it was difficult to control the amount of sweets and sugary snacks eaten were also more likely to have experienced dental decay by age 5. Significant associations between fruit consumption and dental decay, and between yogurt consumption and dental decay.<sup>[9-13]</sup>

## Oral Hygiene

Children who at age 2 were using a toothbrush less often were more likely to have dental decay at age 5, and there was an incremental association between a decreasing frequency of toothbrushing and higher chances of dental decay. For this variable, the association between

using a toothbrush “less than once/day, rarely or not at all” with dental decay was partly explained by controlling for socioeconomic factors but remained large and significant. Going for less frequent dental check-ups was associated with a lower chance of dental decay since dental decay would be diagnosed and identified at the dentist.<sup>[14,15]</sup>

### Longitudinal Patterns or Sugar Consumption

Among children who brushed less than once/day, those who persistently consumed sweets and chocolates more frequently across time points also had a much higher chance of dental decay compared to those who consistently ate such foods less often at both ages 2 and 5. This suggests a cumulatively higher risk of dental decay for children who both consume higher sugar-containing foods and who also brush less often, even when controlling for confounders. Looking at trends in children’s frequency of consumption of sweets or chocolates in relation to dental decay suggested that those less likely to have dental decay by age 5 were children who consistently ate sweets and chocolates less often at both ages 2 and 5, and this was the case both for children who brushed their teeth once/day and those who brushed twice/day or more often. For children eating sweets or chocolate more frequently (once/day or more), toothbrushing more often (either once or twice/day) attenuated the impact on decay.<sup>[16,17]</sup>

### Socioeconomic Confounders

Children in homes from more disadvantaged backgrounds and non-white ethnic groups were far more likely to experience dental decay. Compared to mothers in managerial and professional occupations, those who had never worked had children with a much higher chance of decay. Children of mothers from non-white ethnic backgrounds were far more likely to experience decay.<sup>[18,19]</sup>

### SUGAR IS THE NEW TOBACCO

Sugar addiction in children and adults is becoming like tobacco addiction. A gap in understanding whether toothbrushing attenuates the impact of dietary sugars on tooth decay in pre-school children and whether there are cumulative effects on dental decay for poor dietary habits which are sustained over time in the early years. The main findings were that frequent consumption of sugar-rich foods was associated with dental decay in children under 5. Lack of parental control, over the amount of sweets or chocolate that children consume also predicted dental decay controlling for confounders. Eating yogurts between meals increased the likelihood of decay while eating fruit reduced the likelihood.<sup>[20-22]</sup>

Controlling for oral hygiene habits attenuated these associations to an extent, but not completely. Brushing less than twice per day was associated with an increased likelihood of tooth decay. Socioeconomic confounders also partly explained these associations, but not fully. The large sizes of the coefficients for the socioeconomic factors suggest that a large part of the dental decay is not explained by either the dietary or the oral hygiene variables in this dataset. Studies have highlighted that toothbrushing did not reduce decay for those children with infrequent consumption of sweets and chocolates at ages 2 and 5. However, for children who ate sweets at least once/day or more, toothbrushing could reduce the chances of decay. Those most likely to have decay at age 5 were children who consistently eat sugary foods more often at both ages 2 and 5, and who also brushed their teeth the least.<sup>[23]</sup> Previous studies in this area were limited and contradictory. The results from this study are in line with Hinds and Gregory<sup>[23,24]</sup> and Masson *et al.*<sup>[8]</sup> who found that toothbrushing does not fully control for the impact of diet on decay. In line with other longitudinal studies, our results highlight that dietary habits in the early years can have a significantly detrimental impact on children’s decay outcomes by age 5. Our longitudinal results also highlight that for children who are frequent consumers of sweet foods, toothbrushing at least daily can partially attenuate the impact of sugar on decay.<sup>[24]</sup>

### CONCLUSION

Our results indicate that consumption of soft drinks, sweets, and chocolates should be reduced to protect against dental decay; however, there are also changes required in relation to dietary practices more generally. Parents who reported feeling less in control of children’s sweet food intake were more likely to have children with decay. It is unclear whether lack of control relates to children being in childcare or issues relating to control and authoritative parenting styles more generally, which can correlate with dental decay. Snacking habits were the variable most strongly associated with decay, with children who snack all day without eating meals having twice the odds of decay as those who snacked less. The results on snacking were consistent with other studies. Parents are advised to limit sugary foods to meal-times. This is an area where oral health programs could strengthen their impact. Thus, sugar remains an ongoing challenge and we will have to work toward it together.

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