

Proceedings of the World Oral Health Forum 2015

**New WHO Guideline
on sugars intake
for adults and children**

Table of Contents

Executive Summary		3
Introduction		4
Presentation 1	WHO Guideline: Sugars intake for adults and children: how was it developed?	5
	Guideline development process	5
	Guideline content	7
	Use of the WHO guideline: selected examples	9
	Take-home message	10
Presentation 2	Sugars: effect on caries and global policy on intake	11
	Classification of sugars	11
	Most recent evidence	11
	How does current intake of sugars compare with the WHO recommendations?	14
	The way forward	14
	Take-home messages	15
Presentation 3	Policy options and advocacy for reducing sugars intake	16
	UK developments	17
	Examples of actions to reduce sugar consumption	17
	Take-home messages	19
Presentation 4	Dentists and sugary drinks: a call to action	20
	A successful case study from New Zealand	20
	Limiting Sugar-sweetened beverages: a multi-faceted approach	22
	Beware of diet drinks	22
	Take-home messages and call to action	22
Open discussion		23
Conclusion		24

Executive Summary

These proceedings are based on the World Oral Health Forum (WOHF) that took place during the FDI World Dental Congress in Bangkok, Thailand on 22 September 2015. The topic for discussion was the new 'Guideline: Sugars intake for adults and children', which was released by the World Health Organization (WHO) in 2015¹.

The WHO guideline recommends that the daily intake of free sugars be limited to less than 10% (or 50 g = approximately 12 teaspoons) of total energy intake in adults and children. A further reduction to below 5% (or 25 g = approximately 6 teaspoons) of total energy intake would provide additional health benefits.

FDI supported the recommendations and adopted a policy statement on dietary free sugars and dental caries later that year². These recommendations are crucial for the promotion of oral health and general health and should be used to assess current intake levels of free sugars in all countries. They can also be used to develop measures to decrease intake of free sugars, where necessary, through a range of public health interventions. Policies to develop food-based dietary guidelines should take into consideration locally available food and dietary customs. Other policies can target better food and nutrition labelling, consumer education, and marketing regulation for food and non-alcoholic beverages high in free sugars.

Due to the importance of sugars as a risk factor for caries and other noncommunicable diseases (NCDs), the WHO guideline and its potential consequences were discussed in the frame of the 2015 WHOHF. The topics covered by the presentations included:

1. WHO Guideline: Sugars intake for adults and children: how was it developed?
2. Sugars: effect on caries and global policy on intake
3. Policy options and advocacy for reducing sugars intakes
4. Dentists and sugary drinks: a call to action

The WHOHF ended with an open discussion on how to action the policy recommendations and the challenges that need to be addressed to aid their implementation on a country level.

1. *Guideline: Sugars intake for adults and children*. Geneva, World Health Organization, 2015.

2. FDI World Dental Federation. Policy statement on dietary free sugars and dental caries. *IDJ* 2016, 66(1): 9-10.

Introduction

Professor Harry-Sam Selikowitz, Moderator of the WOHF and Vice-chair of FDI's Science Committee.

Prof. Selikowitz welcomed all speakers and participants and gave a brief introduction to the topic.

Despite longstanding evidence about the association of increased sugar consumption and dental caries, little action has been taken so far. However, the world is now facing a global emergency in the form of NCDs, which include cardiovascular diseases, cancer, chronic respiratory diseases and diabetes, as well as dental caries and other major oral diseases. Their main causes are not related to bacteria, but lifestyle (tobacco use, excessive alcohol consumption, unhealthy diet including high sugar intake, and lack of exercise). Though largely preventable, NCDs currently cause 60% of deaths globally. According to recent findings, diets high in red meat and sugar-sweetened beverages, and low in fruits and vegetables alone account for 21% of all deaths globally.

From an economic standpoint, a report issued by the World Economic Forum recently identified NCDs as the third largest global risk, “a problem neither the developed world nor the developing world can afford”. NCDs therefore place a heavy burden not only on the health of individuals, but also entire economies. In 2011, the UN High Level Summit on Non-Communicable Diseases, which was only the second UN summit ever discussing a health issue after the AIDS summit held in 2001, concluded that NCDs are a global emergency and that immediate action is necessary. Very recently, two NCDs were earmarked to inform the new WHO guideline on sugars intake for adults and children, namely unhealthy weight gain and dental caries. There is now a momentum which needs to be used to address the issue.

Presentation 1

WHO Guideline: Sugars intake for adults and children: how was it developed?

Dr Chizuru Nishida is Coordinator at the Nutrition Policy and Scientific Advice Unit in the Department of Nutrition for Health and Development at WHO and was the scientist responsible for the development of the sugar guideline. She leads the work on the development and dissemination of science-based guidelines related to dietary goals and policy options for preventing obesity and diet-related NCDs, as well as programme areas related to scaling up the implementation of intersectoral nutrition policies and strategies to address malnutrition in all its forms throughout the life course.

Dr Nishida focused on three key areas of the newly published WHO guideline: guideline development process; guideline content; and the use of the WHO guideline in different contexts.

Guideline development process

In response to a call from the 58th World Health Assembly (May 2005), WHO established the Guidelines Review Committee in 2007 with the purpose of developing and implementing procedures to ensure that WHO guidelines are developed in ways consistent with best practices, emphasizing the appropriate use of evidence. In 2010, WHO implemented a standard guideline development process which is detailed in the WHO Handbook for Guideline Development (2014). This standardized process ensures that WHO guidelines are:

- Consistent with internationally accepted best practices
- Developed based on the best available evidence through systematic reviews
- Developed through a transparent process for evaluating quality of evidence and strength of recommendations using GRADE (**G**rades of **R**ecommendation **A**ssessment, **D**evelopment and **E**valuation)

The development of the guideline on sugars intake was led by the WHO Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Diet and Health. The whole process extended over several years with two main streams of work, the first being the review of evidence through systematic reviews, and the second being the interpretation of the evidence with consideration of the overall balance of risks and benefits and formulation of recommendations.

The first stream of the work, related to evidence review, started with the scoping of the guideline and priority questions for which systematic reviews of evidence should be undertaken. The formulation of key questions was conducted in PICO format, which recommends that questions governing a systematic search of the evidence include four elements: Population, Intervention, Comparator and Outcomes. The priority outcomes for decision-making and developing recommendations were then identified through a rating process by the NUGUG Subgroup on Diet and Health. Based on these ratings, critical and priority outcomes (i.e. unhealthy weight gain and dental caries) were identified and considered when undertaking systematic reviews.

Once the evidence retrieval and synthesis were completed through systematic reviews, the quality of the evidence was assessed using GRADE. This process was implemented by systematic review authors and the outcomes of the evidence assessments were presented to the NUGAG Subgroup on Diet and Health for their review and assessment. After conducting the assessment of the quality of the evidence, the NUGAG Subgroup on Diet and Health interpreted the evidence with explicit consideration for the overall balance of risks and benefits, developed recommendations and assessed their strength. During the interpretation and recommendations phase, they took into consideration not only the quality of evidence generated and compiled, but also diverse values and preferences, balance of benefits and harms, resource implications, priority of programmes, equity and human rights, acceptability and feasibility (the four latter elements are newly included in the 2nd edition of the WHO Handbook on Guideline Development published in 2014). The WHO Secretariat then finalized the recommendations and developed the guideline. In addition to this standard process, two public consultations were conducted during the development of the guideline on sugars intake: one at the initial stage of scoping, and one when the draft guideline was developed. Simultaneous to the public consultation, the draft guideline was also peer-reviewed by external experts. The results of the public consultations are described in detail in the section on the Guideline Development Process in the guideline (2015) and all information is publicly available on the WHO website (http://www.who.int/nutrition/topics/advisory_group/nugag_dietandhealth/en/).

Free sugars: previous WHO guidelines and recommendations

The first guidance on limiting free sugars intake for the prevention of NCDs was developed more than 25 years ago by the WHO Working Group on Diet, Nutrition and the Prevention of Chronic Diseases during their development of population nutrient goals for the prevention of NCDs in 1989 (Reference: TRS 797, 1990). As part of the population nutrient goals, the Working Group recommended a lower limit of 0% of total energy from free sugars, and an upper limit of 10% of total energy. The health issues considered for setting these values were the global increase of unhealthy weight gain and dental caries.

In 1997, the joint FAO/WHO Expert Consultation on Carbohydrates in Human Nutrition reviewed the issues related to free sugars intake, but did not provide any specific recommendation. It only stated that “Excessive intakes of sugars which compromise micronutrient density should be avoided” (Reference: FAO/WHO 1998).

In 2002, the Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases updated the work performed by the 1989 WHO Working Group, and issued the updated population nutrient intake goals which included the recommendation of less than 10% of total energy intake from free sugars (Reference: TRS 916, 2003).

Furthermore, in 2007, the Joint FAO/WHO Scientific Update on Carbohydrates in Human Nutrition performed yet another review, including updated information related to sugars. The outcomes of this scientific update were published in the *European Journal of Clinical Nutrition* in 2008.

It should also be noted that the Joint FAO/WHO Expert Consultation on Recommended Allowances of Nutrients for Food Labelling Purposes held in Helsinki, Finland in 1988, had also agreed that sugars should not be more than 10% of total energy intake. This however was not from the perspective of preventing NCDs, but from the perspective of Recommended Dietary Allowance (RDA) or Recommended Dietary Intake (RDI) with relation to energy intake.

Guideline content

Recommendations

In developing the 2015 guideline, unhealthy weight gain and dental caries were identified as two priority health outcomes for the reasons described below:

Unhealthy weight gain

- In recognition of the rapidly growing epidemic of overweight and obesity worldwide and its role as a risk factor for various NCDs
- Free sugars contribute to the overall energy density of diets and when the energy density of the diet is increased, total energy intake is increased, leading to unhealthy weight gain

Dental caries

- The most common NCD, and the cost of treatment places a heavy burden on the healthcare budgets of many countries
- Uniquely caused by free sugars
- Progressive disease – a caries-free childhood does not necessarily mean being disease – free for life

The NUGAG Subgroup on Diet and Health also considered the effects on diabetes and related outcomes as well as cardiometabolic risk factors. They however considered that diabetes and cardiometabolic risk factors were mediated by body weight and unhealthy weight gain. Hence, only unhealthy weight gain and dental caries were selected as priority health outcomes.

Two systematic reviews were undertaken, one related to unhealthy weight gain and one related to dental caries. These were used to assess the quality of available evidence and inform the development of the following three recommendations.

1. WHO recommends a reduced intake of free sugars throughout the life course (*strong recommendation*)
2. In both adults and children, WHO recommends reducing the intake of free sugars to less than 10% of total energy intake (*strong recommendation*)
3. WHO suggests a further reduction of the intake of free sugars to below 5% of total energy intake (*conditional recommendation*)

These recommendations are accompanied by a series of remarks which provide further guidance on their meaning and context. Therefore, the recommendations and remarks in the guideline should be read together.

Strong versus conditional recommendation: what does it mean?

Together with the guideline, WHO issued an information note (http://www.who.int/nutrition/publications/guidelines/sugars_intake/en/) to facilitate its understanding, in particular regarding the strength of the guideline recommendations.

As stated in the information note, the recommendation to reduce the intake of free sugars throughout the life course is based on analysis of the latest scientific evidence which shows that adults who consume less sugars have lower body weight, and that increasing the amount of sugars in the diet is associated with a comparable weight increase. Furthermore, the evidence shows that children with the highest intake of sugar-sweetened beverages (SSBs) are more likely to be overweight or obese than children with a low intake of SSBs. The recommendation is further supported by evidence of higher rates of dental caries when free sugars intake is more than 10% of total energy intake. Based on the quality of the supporting evidence, these were noted by WHO as *strong recommendations*, meaning that they can be adopted as policy in most situations. Countries can act on them by developing various public health measures, including food-based dietary guidelines, taking into consideration locally available food and dietary customs. Other policy options include food and nutrition labelling, consumer education, regulation of the marketing of high-sugar food and non-alcoholic beverages to children, and fiscal policies targeting foods that are high in free sugars, including SSBs, like those which a number of countries have started to implement. Individuals can also implement these recommendations by changing their food choices and dietary practices.

The suggestion to reduce free sugars intake to below 5% of total energy intake is presented as a *conditional recommendation*, given the nature of existing evidence. As noted in the evidence summary section in the guideline, this recommendation was based on population-based ecological studies that were conducted during a period when sugars availability dropped dramatically from 15 kg per person per year before the Second World War to 0.2 kg per person per year in 1946. This “natural experiment”, which demonstrated a reduction in dental caries, provided the basis for the recommendation that reducing the free sugars intake to below 5% of total energy intake would provide additional health benefits in the form of reduced dental caries. Conditional recommendations are therefore made when there is less certainty about the balance between the benefits and harms or disadvantages of implementing a recommendation. Consequently, policy-making will require substantial debate and involvement of various stakeholders for translating them into action.

Some entities criticized the issuing of conditional recommendations when the guideline on sugars intake was published in March 2015. However, WHO has been doing this for various issues of public health importance even when the quality of evidence may not be strong.

It should also be noted that in July 2015, a few months after the WHO guideline was issued, in the UK, the Scientific Advisory Committee on Nutrition (SACN) report on Carbohydrates and Health was issued recommending that population average intake of free sugars should not exceed 5% of total energy intake for age groups from 2 years upwards. This advice was based on SACN’s assessment of evidence on the effect of free sugars on the risk of dental caries and on total energy intake.

Additional research needs

As part of the guideline, WHO also identified a number of pending questions and research gaps based on the results of the systematic reviews and discussions with the NUGAG Subgroup on Diet and Health. These included:

- Need for longer term (> 8 weeks) RCTs of the effect of increasing or decreasing free sugars intake on body weight
- Need for systematic reviews and meta-analyses of the relationship between free sugars intake and cardiometabolic risk factors, and free sugars intake and diabetes-related outcomes. In the meantime, however several papers have been published with a specific focus on this issue^{3,4}. It might therefore be possible to include additional health outcomes in the future

After issuing of the guideline, several issues and questions were brought to the attention of the WHO Secretariat, which led to the review of the following issues:

Recommendation on non-sugar sweeteners: given the fact that the WHO guideline recommends the reduction of free sugars intake, does WHO recommend using non-sugar sweeteners, for instance the consumption of diet drinks? The answer is NO. WHO does not recommend increasing the consumption of diet drinks. In developing the guideline on sugars intake, non-sugar sweeteners were not included as an exposure. Therefore, WHO is currently developing a guideline on the intake of non-sugar sweeteners.

Economic impact of implementing the WHO guideline: WHO has worked together with OECD to analyze the economic impact on countries of implementing the WHO guideline, in certain timeframes.

Effects of fruit juice consumption: the WHO definition of free sugars includes 100% fruit juices and fruit concentrates which include dried fruits. The validity of including 100% fruit juices as part of free sugars has been questioned. However, a number of recent studies do show a positive relationship between increased consumption of 100% fruit juices and unhealthy weight gain; therefore supporting WHO's position. Further investigations are being conducted to compile available evidence.

Use of the WHO guideline: selected examples

Once a guideline is developed, it is important to ensure that it is translated into action and practice. In response to the question on how WHO supports the translation and implementation of its guidelines, Dr Nishida provided three examples:

1. Translating nutrient guidelines or dietary goals into food-based dietary guidelines (FBDGs)

To support countries in implementing the nutrient guidelines or dietary goals, WHO produces various guideline implementation tools, such as a manual on how to translate nutrient recommendations into FBDGs, and how to implement FBDGs including through the development of educational and advocacy tools like food guides, factsheets and other educational materials.

3. Te Morenga LA, et al. Dietary sugars and cardiometabolic risk: systematic review and meta-analyses of randomized controlled trials of the effects on blood pressure and lipids. *Am J Clin Nutr*, 2014 100(1): 65–79.

4. Yang et al (2014). Added sugar intake and cardiovascular diseases mortality among US adults. *JAMA Internal Medicine*, 174 (4): 516-524.

2. Ensuring the coherence and inputs on obesity and NCD concerns in the development and revision of Codex guidelines and standards – Nutrition labelling

It took several years to ensure that the work of Codex takes into consideration obesity and NCD concerns when developing and/or revising its guidelines and standards. Codex guidelines on nutrition labelling now takes into consideration WHO guidelines and policy measures addressing the prevention of obesity and NCDs. One example is the revision of the mandatory nutrients to be declared in nutrition labelling, which now include total sugars, sodium and saturated fatty acids. This means that if countries are implementing nutrition labelling, these nutrients should be declared on labels, which is excellent progress.

Another example is the development of the nutrient reference values for the nutrients associated with NCDs (NRV-NCDs). Today, three NRV-NCDs have been established: saturated fatty acids, sodium and, potassium, based on the WHO guidelines. Discussions are currently underway to possibly develop NRV-NCDs for sugars as a next step.

3. Developing nutrient profile model(s)

WHO has been developing nutrient profile models in different regions to help countries implement the recommendations on the marketing of foods and non-alcoholic beverages to children. To date, three WHO regions (European, Eastern Mediterranean and American Region)⁵ have developed their regional nutrient profile models, taking into consideration various WHO guidelines, including that on sugars.

Nutrient profile models are also being developed for other purposes, such as for regulating the promotion and sale of food and beverages in and around schools, implementing fiscal policy (i.e. taxation of SSBs) and nutrition labelling (i.e. front-of-pack labelling).

Take-home message

Dr Nishida highlighted today's changing global context, referring to the recommendation related to sugars intake which used to be considered a critically controversial issue. She stated that more countries are ready to act now, especially to take regulatory action to address multiple nutrition challenges and promote healthy diets. There is an increasing global momentum which we could not have even imagined 10 or even 5 years go. We should seize this historical moment to implement effective public health measures, including the reduction of free sugars intake.

5. Since then, two other regions (i.e. Western Pacific and South-East Asia regions) have also developed their regional nutrient profile models.

Presentation 2

Sugars: effect on caries and global policy on intake

Paula Moynihan is Professor of Nutrition and Oral Health and Director of the Centre for Oral Health Research at Newcastle University, UK. She is also Director of the WHO Collaborating Centre for Nutrition and Oral Health at Newcastle University. Her research interests include the interrelationship between nutrition and oral health throughout the life course, and dietary intervention in older adults. As Expert Advisor on sugars and dental health at the WHO Nutrition Guideline Advisory Group, she led the recent WHO commissioned systematic review of evidence on sugars and dental caries that has informed the WHO guideline on dietary sugars. She was also a member of the 2002 WHO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases.

Prof. Moynihan presented the evidence which was used to inform the recommendations included in the WHO guideline on sugar intake.

Classification of sugars

Technically speaking, dietary sugars include all mono- and disaccharides (glucose, galactose, fructose, sucrose, maltose, lactose), added sugars (all added mono- and disaccharides, and sometimes including honey and syrups such as maple syrup, agave nectar, etc.) and natural sugars (physically located in the cellular structure of grains, fruits and vegetables plus those naturally present in milk and milk products). Evidence shows that natural sugars do not make an important contribution to NCDs. It is therefore the intake of sugars, other than natural forms, that have been classified as free sugars. As per the WHO definition (2015), those free sugars include all mono- and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey and syrups, fruit juices and fruit juice concentrates. The intake of these sugars needs to be reduced to preserve dental and general health.

Most recent evidence

The systematic review that was part of the guideline development process asked the following questions:

- What is the effect of an increase in the amount of free sugars intake on dental caries?
- What is the effect of a reduction in the amount of free sugars intake on dental caries?
- What is the effect on dental caries of restricting free sugars intake to <10% of energy intake?

This systematic review included all epidemiological evidence, *i.e.* interventional and observational studies. It included healthy human beings of any age in any country. The intervention, or exposure, was intake of sugars, or change in intake of sugars, which was measured by either grams per day, kilograms per year or the percentage of energy provided by sugars. As for sugars, they included total sugars or free sugars or any component thereof. The dental outcomes included caries incidence, prevalence, and/or severity, measured as decayed, missing and filled teeth. All available databases were searched, there were no date restrictions, no language restrictions, and all age groups and countries were included.

Identified studies included data going back to the 1940s. No randomized-controlled trials were identified, hence the data come from non-randomized intervention studies, longitudinal cohort studies, cross-sectional studies and population surveys. Furthermore, a great diversity in the data and in the studies reported was observed.

A total of 54 studies reported in 65 papers were identified. The vast majority of the studies found were conducted in children (50); only five studies included adults. The studies conducted in adults included two non-randomized intervention trials, one population survey and two cross-sectional studies. Studies in children included one non-randomized intervention trial, eight cohort studies, 19 population surveys and 22 cross-sectional studies.

A strong consistency of data was observed throughout the studies, both those carried out in adults and children. A vast majority of studies found a positive association between the intake of sugars and dental caries. Cross-sectional studies showed a greater diversity, which was expected since such studies measure dental caries and diet at one point in time, while dental caries take time to develop. Cross-sectional studies therefore do not provide such strong data. Nevertheless, most showed either a positive or neutral association. In summary:

- 42 (of 50) studies in children and five (of five) studies in adults reported at least one positive association between sugars and dental caries
- Six studies reported both positive and null findings
- Seven studies reported no associations
- Two studies reported at least one negative association
- The positive associations covered:
 - All age groups
 - Developing, transitional and industrialised countries
 - All decades of publication

The original aim was to perform a meta-analysis of all the data. This however proved impossible due to the diversity in the data reported. For example, there was a range of dental outcomes reported: some studies measured DMFS, others DMFT; some measured percentage with caries, others caries incidence, or increment, some measured visible caries, and others used radiographic assessment. Also, different methods were used to measure sugars intake. Comparisons drawn were also found to be an issue: some studies compared dental caries levels between higher and lower sugars intake and others compared sugars intake between high and low caries groups. There were also differences in controlling or reporting on confounding factors such as fluoride exposure, as well as variations in the length of studies and the years over which the studies were conducted.

When looking at data systematically, the strongest evidence should always be considered. In the absence of RCTs, the eight cohort studies were found to be the best available evidence with which to conduct the GRADE profile on the evidence for the effect of increasing and decreasing free sugars intake on dental caries. Again, all eight studies were conducted on children, and all except for one showed a positive association. There was also evidence for a dose-response and a large size effect. The GRADE profile performed on this data rated the quality of this evidence as moderate.

By pooling data across different study types that reported dental data in a similar way (e.g. DMFT), a crude meta-analysis could be performed to compare levels of dental caries when the intake of sugars was above and below 10% energy intake. This analysis indicated lower dental caries with sugars intake below 10% of energy intake. However, the GRADE profile for comparison of dental caries levels at sugars intake above and below 10% of total energy intake was based on the five cohort studies that had data suitable for comparison, all of which were conducted in children.

For example, Ruottinen found that in those that consumed less than 10% of total energy from sugars, DMFT was 0.5 against 1.4 in those who consumed more than 10% from sugars at age 10. Stecksen-Blicks found in a low caries group that sugars consumption was below 10% of total energy, whilst it was above 10% (~14.5%) in the high caries group. Rugg-Gunn in the UK found that the children with the highest free sugars consumption developed 0.9 dental caries/year more than those with the lowest free sugars consumers. In Brazil, Rodrigues found that those who had higher free sugars consumption (16% of total energy intake) were almost three times more likely to have high dental caries compared to those whose free sugars consumption contributed less than 10% of total energy intake. Finally, Karjalainen found that sugars intake in those that develop dental caries was >10% of total energy, whereas in those that remained cavities free, sugars intake was <9% of total energy. Again, the GRADE profile performed on this data rated the quality of this evidence as moderate⁶.

Significantly lower levels of dental caries were observed when sugars consumption represented less than 10% of energy intake, however free sugars consumption below that level was not shown to eliminate dental caries. For example, in the study by Rodrigues, an average of one cavity per year developed in those with the lowest sugar intake. No cavities developed in the equivalent population in the study by Karjalainen, and 0.5 in the one by Ruottinen. Rugg-Gunn et al found that children with the lowest sugar intake had developed 3.2 DMFS in two years, and in Stecksen-Blicks' study they developed 0-2 cavities in a year. Even these low levels of caries are significant, because it is known that dental caries is a cumulative and progressive disease. Hence low levels in children do not necessarily mean low levels for life. Many of the studies measured caries at the level of cavity, which on the ICDAS scoring (1–6) would correspond to a level 4 and above, and is therefore a measurement performed at a late stage of the disease. Hence when these studies refer to “caries free”, they usually refer to “cavities free” and not to free of dental carious activity.

Several studies have shown the progressive nature of dental caries. Data from the Dunedin Study in New Zealand shows high incidence of dental caries in adults even when DMFS in 12 year-olds is low⁷. In addition, there is also evidence from the USA that dental caries incidence is high in adults even in the presence of fluoride⁸. Further, evidence has shown that caries increases with age, and that today, most caries occur in adults and not in children⁹. The bottom line is that even small improvements in childhood are of significance.

6. References are available in the full WHO guideline on sugars intake for adults and children, available online at: http://www.who.int/nutrition/publications/guidelines/sugars_intake/en/

7. Broadbent JM, Thomson WM, Poulton R. Trajectory patterns of dental caries experience in the permanent dentition to the fourth decade of life. *J Dent Res* 2008 87(1): 69–72.

8. Griffin SO, et al. New coronal caries in older adults: implications for prevention. *J Dent Res* 2005 84: 715–720.

9. Bernabé E, Sheiham A. Age, Period and Cohort Trends in Caries of Permanent Teeth in Four Developed Countries. *Am J Public Health* 2014 104(7): e115–121.

These observations led to the following question: “what is the effect on dental caries of restricting free sugars intake below 5% of daily energy intake”, which amounts approximately to 10 kg per person per year? There is very little epidemiological data on populations with low sugars intake and the data available came from population-based surveys conducted on Japanese schoolchildren around the time of the Second World War. At this time the availability of sugars dropped from a pre-war level of about 15 kg/person/year to about 0.2 kg/person/year. This enabled comparison of dental caries at a time when sugars availability was equivalent to below 5% of energy intake, with a time when it was between 5–10% of energy intake. These meticulously conducted national surveys all showed lower levels of caries when sugars intake was below 5% compared with when it was between 5–10%. They all showed strong log linear relationships between sugars and dental caries. The GRADE process classified this evidence as very low quality. This was due to the biases inherent to population-based studies.

How does current intake of sugars compare with the WHO recommendations?

Again, very few data are available on the intake of free sugars in different populations. Data available from the UK National Diet and Nutrition Survey, published by Public Health England (2014), shows that free sugars provide on average 14.7% of energy in 4 – 10 year olds and 15.6% in 11 – 18 year olds, which is above the recommended limit. For adults it amounts to an average of 11.6% of daily energy intake, which is also above the WHO recommendation.

Data are also available from the NHANES in the USA which shows that the amount of added sugars contributes to about 13% of energy in younger children and about 17% of energy in older children. Added sugars contribute approximately 14% of energy in adults, and intake is slightly lower in older adults. These figures concentrate on added sugars, so they do not include the contribution from fruit juices and fruit juice concentrates. The only other available data that was found from Thailand showed that, on average, sugars intake is approximately 30kg/person/year, which represents about 16% of energy intake for an adult.

The way forward

Considerable action is necessary to bring practice/customs in line with recommendations. It is not just about individuals trying to reduce their intake. Strategies are needed to produce and import less, use less, sell less, market less, advise to eat less, and finally, eat less. We need these upstream approaches to prevention to achieve success downstream.

The WHO recommendations provide guidance to national governments when setting up nutritional policies. As an illustration, the UK has already set its recommended daily intake at 5% of total energy at the population level. Taxing foods and beverages high in free sugars such as sweetened beverages is also an option, even though it has not yet been fully evaluated. Taxing of products however does send a clear message to consumers that these products are not healthy. Reformulation of foods to lower their levels of free sugars has also been considered. In addition, there is a lot of room to improve nutritional labelling of foods, perhaps including a mention of their free sugars content, although this is a controversial area.

Better education is also needed. For instance, nutritionists need to know more about oral health and conversely, dentists need to know more about nutrition. Clear and consistent messages must be shaped, since these are not always in-line with each other.

Health education of teachers, early years' workers, carers, and those who provide food in the workplace is also necessary. Finally, dietary advice in the dental practice is also important. Some claim there is no evidence that such advice works, but there is no evidence that it does not work either.

Take-home messages

- WHO adopted the robust, objective GRADE method for revising guideline recommendations on thresholds for intake of sugars
- An intake of free sugars of <10% of energy intake is associated with lower risk of dental caries and WHO have made a **STRONG** recommendation to limit the intake of populations and individuals to this level
- An intake of free sugars of <10% energy intake does not eradicate dental caries
- Even low levels of caries in childhood are of significance, as dental caries is progressive and the effects of sugars on the dentition are lifelong
- Evidence suggests lower risk of dental caries when sugars intake is <5% of total energy, and WHO made a **CONDITIONAL** recommendation to limit the intake of populations and individuals to this level to protect dental health throughout the life course
- Intake of free sugars in children and adults are above these recommended levels
- Upstream and downstream approaches to sugars reduction are now needed: Policy, taxing, reformulation of foods, clear labelling of added sugars, education of professionals and consumer health education, and appropriate food based dietary guidelines. Only by implementing such measures will we achieve better oral health and general health

Presentation 3

Policy options and advocacy for reducing sugars intake

Modi Mwatsama, MSc, RNutr (Public Health), MFPH is a Registered Nutritionist and Director for Global Health at the UK Health Forum where she leads on NCDs and global health policy. She was Senior Researcher in global health at UCL and Food and Health Programme Manager at Heart of Mersey and is currently advising Public Health England on the UK government's developments on sugar.

In her introduction, Ms Mwatsama briefly referred to various options available to policymakers to help reduce sugar consumption in populations. The prominent place given to diet in the UN/WHO global targets on NCDs highlight its importance as a driver of NCDs: three of the nine global targets are diet-related, including obesity. Furthermore, one additional indicator focuses specifically on sugar. Those are all linked through the role of processed foods. Yet, although their harmfulness is known, sugars consumption and production are globally on the rise as illustrated by the following quotes from the US Department of Agriculture's World Market Forecast¹⁰:

India: *"Consumption is forecast [to rise] on strong demand from soft drink manufactures and the food processing sector."*

Thailand: *"Consumption continues to rise, driven by rising household and industrial use."*

China: *"Higher imports are forecast [due to] rising consumption driven by continued growth in food manufacturing."*

Mexico: *"Consumption remains unchanged."*

Mexico was found to be one of the only countries where sugar consumption is not increasing, perhaps due to the implementation of sharp measures such as the introduction of a tax on sugary drinks to address very high levels of obesity.

Sometimes, a picture speaks more than a thousand words – the pictures from the 'Hungry Planet: what the world eats' project highlight the stark differences in eating habits around the world <http://bit.ly/2gVZ99H>. In the USA and Mexico, fizzy, sugary drinks occupy an important place on the weekly menus of typical families. In Mexico however, fresh fruits and vegetables are also prominently represented, whilst in the USA natural foods are almost absent from the table, which is loaded with processed foods that require labelling. In effect, the whole world is moving towards the US model in terms of dietary habits, with increasing amounts of processed foods.

¹⁰. Sugar: World Markets and Trade. US Department of Agriculture. (<https://apps.fas.usda.gov/psdonline/circulars/sugar.pdf>, accessed 27 October).

In a *Lancet* series focusing on NCDs, evidence for tackling obesity and physical inactivity was summarized¹¹. The top three interventions which were identified were:

- Food advertising regulations which are cost-saving
- Fiscal measures, which are also cost-saving
- Food labelling measures

Regardless of which health outcomes are being measured, the most cost-effective methods are food advertising regulations, followed by fiscal measures, and then food labelling measures. The least effective are mass-media campaigns.

UK developments

In the UK, the Scientific Advisory Committee on Nutrition published its updated sugars guideline in 2015 which sets a new target of 5% of energy intake at population level. Currently, even the 10% target is not reached (see presentation 2), so there is a long way to go to meet the 5% target. Options were therefore investigated under six themes to identify possible pathways to meet this challenge:

- **Theme 1:** Produce and import less
- **Theme 2:** Use less
- **Theme 3:** Sell less
- **Theme 4:** Market less
- **Theme 5:** Recommend less
- **Theme 6:** Eat less¹²

Altogether, 23 different actions were identified to reduce sugar consumption. Examples include issues such as subsidies and taxes on the production side, through to labelling at the other end, all with the aim of enabling consumers to eat less sugar.

Examples of actions to reduce sugar consumption

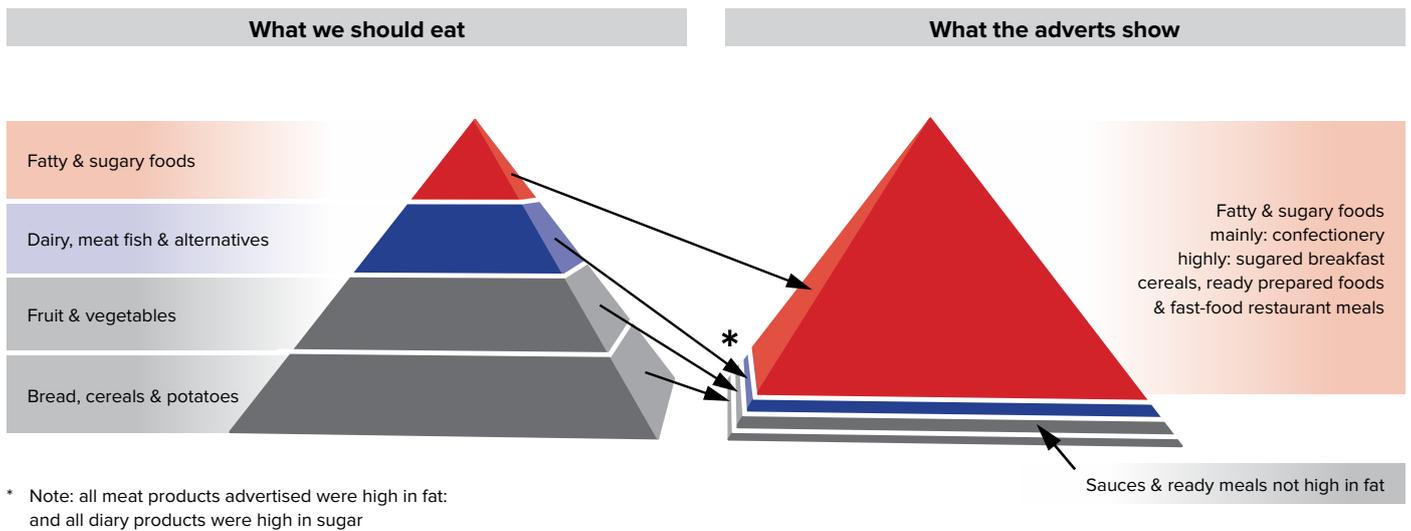
Fiscal measures

Interesting statistics from the USA show that between 2008 and 2009, money spent by soft drinks companies on lobbying Congress members sharply increased. In 2009, the US congress considered introducing a country-wide soft drinks tax, at which point the soft drinks companies invested large amounts to counter this tax – which they did successfully as the measure was dropped. Although the tax was not introduced, this example shows how much the industry dreads this kind of measure.

11. Non-Communicable Diseases Series (2013). *The Lancet*. (<http://www.thelancet.com/series/non-communicable-diseases>, accessed 27 October 2016).

12 See presentation 2.

Marketing and promotion



This picture contrasts the food pyramid for the recommended diet in terms of the proportions of foods that we should be eating on the left, and the advertised diet on the right.

The pyramid on the left shows that we are meant to eat lots of bread, cereals and potatoes and lots of fruit and vegetables as these are at the bottom of the pyramid. At the top, it shows that we are supposed to eat small amounts of fatty and sugary foods.

In sharp contrast the pyramid on the right shows the proportion of advertisements for each category of foods. It shows that the bulk of food advertisements are for fatty and sugary foods which we are supposed to be eating in the smallest amounts. In recognition of marketing as a driver for sugar consumption and other unhealthy diets, the WHO has produced global guidelines on food marketing to children, which also include a review of the evidence and recommendations for governments on how they can implement actions to reduce this marketing to children.

As a response, the world's 11 biggest producers have formed the International Food and Beverage Alliance who has committed to help address diet-related diseases. This Alliance was formed in 2008 and supports WHO's global diet action plan. It has pledged to restrict marketing to children and has periodically reviewed its commitments to make them more stringent. The good news about these commitments is that companies have shown very high compliance rates (ex: >97% on TV and 100% in print media in 2011).

Unfortunately, some activities are not included in their guidance because it is not considered as marketing to children. Packaging, for example, which may display cartoons on sugary products like Nesquik or chocolate bars, is not considered as marketing to children by the global food and beverage companies. Neither is community fundraising. They therefore frequently offer the possibility for organizations to buy large boxes of products like chocolate at a low price, which can then be resold for fundraising purposes. The imagery on these often clearly target children. Again, this is not considered marketing to children. Neither are branded educational materials for schools. Social media is yet another example, as the food and beverage industry claims that most content is user-generated, meaning that it is "not generally within the control of the brand owner", even if it appeals to children. In-store promotion is another example. As an illustration, Kinder, which produces child-friendly eggs, does not consider in-store promotion as marketing to children.

The evidence however contradicts this. A recent study conducted in the UK analyzed supermarket sales and found that end-of-aisle displays significantly increase sales. For instance, in the case of soft drinks, sales increased by 52% as a result of supermarkets having those soft drinks displayed at the end of the aisle.

Food labels

Food labels, as discussed before, have been shown to be highly effective. In a study performed in Europe, consumers were asked which kinds of food labels they prefer. All consumers, whether from Poland, Germany or other countries, expressed a preference for the traffic lights or hybrid labels (combination of traffic lights and daily amounts). However, whilst the UK is the only country in Europe which applies a hybrid traffic light label scheme adopted in 2013, it is currently being challenged in European courts on its legality. The food industry considers that it represents a barrier to trade. Hence, whilst consumers around Europe prefer this format, its future remains uncertain. Instead the industry has now adopted a Guidelines Daily Amounts (GDA) scheme in the European Union which consumers find less helpful for avoiding unhealthy nutrients. Still regarding labelling, health warnings are an absolute no-go area for the industry, although it is an option that was identified as a possible pathway. In a consultation organized in collaboration with Public Health England, all options identified were discussed with a range of stakeholders. The two which the industry felt it could absolutely not support were taxes and health warnings. Such warnings are currently being introduced in Chile to indicate foods that are unhealthy and warn consumers to avoid them.

Education and awareness raising are further options that were identified, and are particularly favoured by the industry. However, from the evidence previously mentioned, it is known that such initiatives (broad education campaigns, mass media campaigns) are much less cost-effective than the upstream measures.

Reformulation

The successful UK salt reduction programme has demonstrated that it is possible to have an impact in terms of reducing a nutrient in the food supply. Reductions of between 20–50% of salt processed food products were achieved over a period of 10 years. Regarding sugar, some companies have responded with global sugar reduction targets. There are however challenges associated with reformulation. First, it requires a level playing field: if one player reduces their amounts of sugars, then other competitors need to play along. Another issue with reformulation pertains to the processing of natural foods. For instance, when preparing smoothies and fruit juices, those sugars which are naturally present in whole fruits are released as more harmful free sugars.

Take-home messages

Two different approaches are needed to tackle NCDs, including the sugar problem. The first relates to traditional foods. We need to protect the healthy aspects of traditional diets and whole foods, namely minimally-processed foods such as vegetables, grains and pulses. The second pertains to processed foods. Taxing, marketing and labelling are the most effective measures needed to tackle these products.

A wide variety of actions will be needed to reduce sugar intakes. This will require:

- Strong government leadership
- Cooperation of the food industry
- Support of public health actors

Presentation 4

Dentists and sugary drinks: A call to action

Dr Robert Beaglehole is Principal Dental Officer and Senior Dentist for the Nelson Marlborough District Health Board in New Zealand. He is also a member of the New Zealand Dental Association (NZDA) political lobby group and is Tobacco Control Advisor to the NZDA. Dr Beaglehole is specialized in dental public health and has worked in dental services for more than 15 years. He has earned a BSc in Physiology and a BDS from Otago University. He also holds a MSc in Dental Public Health.

Dr Beaglehole presented a case study illustrating how advocacy messages can be translated into action, with concrete results.

SSBs have a strong negative impact on populations' oral health, and health in general. There are however paths which can be explored to limit the availability of these products which are causing societies so much harm.

A successful case study from New Zealand

Every day in hospitals and dental clinics around the world dentists have to extract teeth from kids like the one on the picture. This child's name is Jasper, a 3-year-old boy who presented to the dental department with multiple painful, abscessed teeth. He had been suffering for weeks and his mother was beside herself not knowing what to do about the situation.

In New Zealand, like in many other countries around the world, children in such a condition may go to the hospital for treatment. Upon admission, they receive general anaesthesia (GA) to have teeth taken out. A general anaesthesia however is an extremely expensive way to deal with tooth decay, which costs around 2,500 USD.



©Rob Beaglehole

In 2015, Jasper was just one of 5,000 kids age seven years and under to have GA to remove one or more teeth as a result of pain or infection. A total 35,000 children had one or more teeth taken out in New Zealand in 2014, out of a population of around four million. It is absolutely heart breaking to see the pain and suffering of young children – especially because tooth decay is totally preventable.

WHO recently released its new sugar guideline, which recommends that daily sugar intake should ideally be just 5% of total daily calories. This recommendation is based on the totality of evidence linking sugar with obesity, type 2 diabetes and tooth decay. For children, it amounts to just three teaspoons of sugar per day, and for adults this equates to six teaspoons. Shockingly, a can of soft drink contains three days' worth of sugar for a child.

New Zealand has the third highest consumption rate of sugar in the OECD, behind the USA and Mexico. New Zealanders consume 54 kg of sugar per person/year, equivalent to 37 teaspoons of sugar per person/day.

Out of 33,000 items sold in the average supermarket in New Zealand, some contain extremely high levels of sugars: a 1.5 litre bottle of coke contains a whopping 40 teaspoons of sugar and a 2.25 litre bottle contains a staggering 60 teaspoons. Number 10 on the best-seller list is Coca Cola Zero, which does not contain any sugar. However, dentists should refrain from encouraging patients to move from a sugary to a diet variety of coke. We are up against a very powerful opponent. Recently, Coca-Cola was nominated the fourth most popular brand in the world, just behind Google, Amazon and Microsoft. Competition with other brands is fierce, and each brand develops very clever marketing strategies. Coca-Cola and PepsiCo are very large companies with very high visibility.

However, no matter which brand the consumer chooses, in the end they strongly increase their risk of developing tooth decay as well as other diseases:

- One sugary drink each day increases a child's risk of obesity by 60%
- One sugary drink a day increases the risk of type 2 diabetes by 25%
- Diabetes is the number one cause of amputations and second most common reason for blindness

Advocacy towards hospital leaders

SSBs were sold in the very same hospital where, every week, dozens of teeth had to be extracted in children suffering from severe tooth decay. As this was seen as outrageous, the decision was made to initiate a policy to change this. Taking into account that tooth extractions performed weekly under GA cost the hospital 10,000 USD a week, the executive leadership were convinced to adopt a new policy banning SSB on the premises. Even though it does not seem radical, it became the first hospital in the world that did not sell sugary drinks. Following suit, other hospitals in New Zealand were convinced to take similar action. Today, 12 out of 20 hospital systems throughout the country have done so. Two weeks ago, the chief executive of the Ministry of Health in New Zealand wrote a letter to all hospital CEOs in the country, which stated that "As part of a move to reduce childhood obesity in New Zealand, it is requested that no more sugary drinks are to be sold in hospitals". This highlights that advocacy actually works.

Advocacy towards local governments

The next advocacy step was made towards the local government, encouraging the mayor to become the first city in the country where no sugary drinks are sold. This suggestion was taken up, and in 2014 it was announced that the city would introduce a policy banning the sale of sugary drinks on its property and at its events. A few other councils in New Zealand are now following suit. In some other actions, some councils no longer provide sugary drinks at the events they organize. Instead they provide free water, which is extremely successful.

Advocacy towards schools

In 2007, a policy was initiated to remove sugary drinks and junk foods from school property. Unfortunately, in 2007 the then Minister of Education who had just been elected removed the Healthy Food Guidelines. Her view was: “Why should the government decide what schoolchildren should or should not eat”. Advocacy to reinstate these Health Food guidelines has been undertaken ever since. As an illustration, in an action initiated by students, six out of the seven little shops near Hamilton’s Rhodes Street School agreed not to sell junk food to children in school uniforms after the student council asked them not to. This is true leadership.

Limiting SSBs: a multi-faceted approach

Limiting SSBs needs a multi-faceted approach. It is important to highlight to people the massive amounts of sugar included in some products, for example using pictograms. This can be highlighted to patients, but also to policymakers. Different ways of reducing SSBs have been mentioned: removing them from councils and schools, reducing portions, removing them from childrens’ menus such as Happy Meals, prohibiting junk food marketing to children, and taxing SSBs. All of these methods to reduce sugary drinks consumption are effective, evidence-based and highly appropriate.

Beware of diet drinks

Nevertheless, dentists should not advocate for a move to diet sodas and juices: the evidence suggests that so called “diet” drinks are also causing harm. As an example, one recent study from the UK, which followed 22,000 people for eight years, found that those who consumed diet drinks actually weighed more than those who drank sugary drinks at the end of the study. Other studies have come to the same conclusion. Why? People who drink diet drinks believe they are on a diet, and over-compensate by eating other things that contain added sugars. In addition, consuming diet drinks confuses the body, which believes that it is receiving sugar despite this not being the case, thus leading to weight gain.

Another concern pertains to juice, which will also damage your teeth, and contribute to obesity and type 2 diabetes.

Take-home messages and call to action

SSBs are the new tobacco: tobacco control also included taxation issues, advertising and sponsorship issues, marketing bans, and of course bans on tobacco sales in schools. National Dental Associations (NDAs) can take a leadership role in this field by targeting politicians to encourage them to implement:

1. Restrictions on marketing of unhealthy food and drink to children
2. SSB free hospitals, city councils, schools, sports facilities
3. Healthy nutrition policies in schools, councils, municipalities, sports teams

Importantly, every dentist should be aware that local activism can make a difference, not only locally but also globally. It is essential to remember that sugary drinks and sugar are not only about teeth. There should be a stronger interest in type II diabetes and obesity. Very recently, new evidence emerged that there was a direct link between sugar and diabetes, even in the absence of overweight and obesity.

In conclusion, it just does not make sense to sell sickness in our hospitals: SSB consumption is out of control:

- We don't give our young children tobacco to smoke
- We don't give our young children alcohol to drink
- Why do we give our young children sugary drinks?

FDI, practitioners and presidents of NDAs should pick up the pace in raising awareness among their patients, and national policymakers, with a first priority being to get sugary drinks out of schools.

Open discussion

Before opening the discussion, Prof. Selikowitz provided information on sugars consumption and dental caries in Thailand, the WOHF host country. The following points were then raised during the discussion which ensued:

Alternatives: when telling children to refrain from consuming sugary drinks and snacks, viable alternatives should be available. The use of sugar substitutes has not been fully evaluated, and should not be recommended as an alternative, also because sugars are not essential nutrients for consumers.

Anti-SSB campaigns: similarities between tobacco and sugars were mentioned. With regards to tobacco, governments have led hard-hitting campaigns. To date there are no similar examples for the harm of sugars on teeth. There are only a few local examples, which shows that there is still a long way to go.

Evidence on raw sugar: to date there has been little focus on raw (or table) sugar. The main reason for focusing on SSBs is that when drinking tea or coffee, individuals might add one or perhaps two spoons of sugar, never six to nine spoons as is the case with some sugary drinks. As an example, major sources of sugars in the UK are sugary drinks and snacks, as well as breakfast cereals. Added sugar 'at the table' is very low, hence a lesser need to campaign on raw/table sugar. However, in order for the guideline to be applicable globally, there should be a better knowledge of where added sugars come from in different countries in order to inform health promotion efforts.

Evolving priorities: for years, there was a general view within the oral health community that individuals love sugars so much that it would be too difficult to counter. Hence the dental community concentrated on other actions (fluoride, vaccines, etc.) for a long time. However, this new WHO guideline forces the dental community to focus their attention on sugars again. In addition, the recognition that dental caries sits with other NCDs is a very powerful strategy to start considering how to become more effective in combatting not only oral diseases but all NCDs.

Limitations of campaigns: in New York, Mayor Bloomberg was brought to court and lost for reducing the volume of SSBs – the court ruled that the city had gone beyond its legal responsibility. In New Zealand, the action taken focused on banning sugary drinks only. It was quite easy in hospital settings. In councils, (75 in the country) all that was suggested was that they stop selling sugary drinks on their property

(e.g.: swimming pools, sports venues) and also at the events they organized, so there was no legal hurdle. This action shows that it is important to focus on one item in particular, and on kids. Performing advocacy with a clinician's hat, coming with one clinical example and focusing on children was very successful.

Patient education: for dentists, it is often cumbersome to discuss with carers, parents, etc. to raise awareness. It is time consuming, and there is a lack of understanding of the issue. Hence there is a need for dentists and other health practitioners to receive more guidance on how to discuss with parents and carers in order to be understood. This highlights the need for continuing professional development so that guidelines can be translated into simple messages for consumers.

Priority targets: parents represent a priority target, and they can be trained not to feed their children sweets and/or sugary drinks. In addition, governments are also a priority target, one which can be addressed by FDI and NDA leadership. When considering these targets however, it must be remembered that individual behaviours are always influenced by a larger context. Hence, building a healthy environment is essential to help individuals make the right choice.

Conclusion

Prof. Selikowitz thanked everyone for their very fruitful participation and expressed hope that the momentum would be used to translate theory into action.



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