



**FOOD
SYSTEMS
FOR
HEALTH**



NUDGES TO PROMOTE HEALTHY EATING IN SCHOOLS: POLICY BRIEF

Background and rationale

Supporting good nutrition during childhood is the basis for many gains in health and well-being across the life course (1). Good nutrition is critical for achieving the highest attainable health for children and adolescents, as outlined by the Global Strategy for Women's, Children's and Adolescents' health 2016–2030 (2). It is also important for realizing the ambitions of nutrition-relevant and nutrition-enabled Sustainable Development Goals (SDGs) and targets (3). Ultimately, supporting optimal nutrition during childhood responds to children's rights to nutritious food and the best possible health (4).

Given the relevance of diet to obesity and overweight (5), policy action to improve children's diets is central to addressing the substantial and global challenge of childhood obesity. Countries continue to struggle with stemming the rate of childhood overweight and obesity (6), and there were over 300 million children and adolescents worldwide with overweight or obesity in 2016 (5). Obesity has adverse social and economic consequences (7); it also has implications for physical and psychological health in childhood, adolescence and adulthood (8). The importance and magnitude of the challenge posed by childhood obesity is established, and there is an evident need for urgent and accelerated public health actions and strategic investments for achieving the global targets on childhood obesity (8, 9).

Supporting good nutrition during childhood is the basis for many gains in health and wellbeing across the life course.

It is critical to achieving the highest attainable health for children and adolescents, and responds to children's rights to nutritious food and the best possible health.

It is important to acknowledge the short-term and long-term health consequences of children's dietary intake (10), and the importance of intervening early in the life course to establish healthy eating habits, which will contribute towards a healthy diet in adulthood and protection against noncommunicable diseases (NCDs) (11). Children's dietary intake and their food selection is influenced by various factors, including the specific food environment that they are exposed to and within which they select food options (12). It is important to consider children's decision-making, however children can only choose from the selection available, so their choices are constrained by the specific options on offer. Children's choices can be influenced through nudges; that is, small, subtle changes to the physical and social environment that alter the prevailing choice architecture and the context in which decisions are made.

There is growing interest in the potential of nudges (13) to promote healthy dietary practices (14), including within school settings. Whenever healthier options are made available, nudges may shift school children's food selection towards foods that contribute to healthy diets; hence, they offer an important opportunity for action, alongside measures such as nutrition standards for school food (15) and policies related to the provision and procurement of food for healthy diets (16). This policy brief summarizes the rationale and evidence around nudges for promoting healthy eating in school settings. It aims to increase awareness of the opportunities for nudges in a school food setting, and proposes action points for decision-makers to implement nudges for healthier eating in schools.

The focus of this brief is on nudges implemented in the school environment to influence children's food selection while at school (e.g. in school canteens/cafeterias, at food kiosks and tuck shops, and from food vendors and vending machines). The brief pertains to foods (both snacks and meals) and beverages.¹ Not all school meal programmes have food options for children to select from; nevertheless, children may still have the possibility of choosing food at other points within schools (Fig. 1), and this brief is relevant to these situations too. There are further opportunities for intervention relating to choices made by children when outside the school premises (e.g. relating to food brought into school from home, and food purchased by parents or children at vendors or shops outside the school). Although the principles proposed in this brief may be relevant to the food environment around schools, such opportunities are not discussed here.

ABOUT WHO'S FOOD SYSTEMS FOR HEALTH

Today's food systems are simply failing to deliver healthy diets for all. In addition to the suffering this causes to individuals and families, the economic costs to society due to the health and environmental impacts of current dietary patterns are heavy, and often hidden. If food systems are transformed, they can become a powerful driving force towards ending hunger, food insecurity and malnutrition in all its forms. There is no single solution, instead it is recommended to implement coherent portfolios of policies, investments and legislation that prioritise health. At the same time, it is also important to ensure a fair price for the producer and reflect the true environmental, health and poverty costs.

WHO's Food Systems for Health narrative highlights five different ways in which food systems impact on health and embraces the interconnectedness of humans, animals, and the planet. The malnutrition pathway comprises the aspects of food systems that lead to unhealthy diets or food insecurity and therefore contribute to malnutrition in all its forms. Malnutrition and hunger pose the highest risks to human health in terms of death and illness and include obesity, micronutrient deficiencies, stunting, wasting, communicable and noncommunicable diseases and mental illness.

Children's choices can be influenced through nudges; that is, small, subtle changes to the physical and social environment that alter the prevailing choice architecture and the context in which decisions are made.

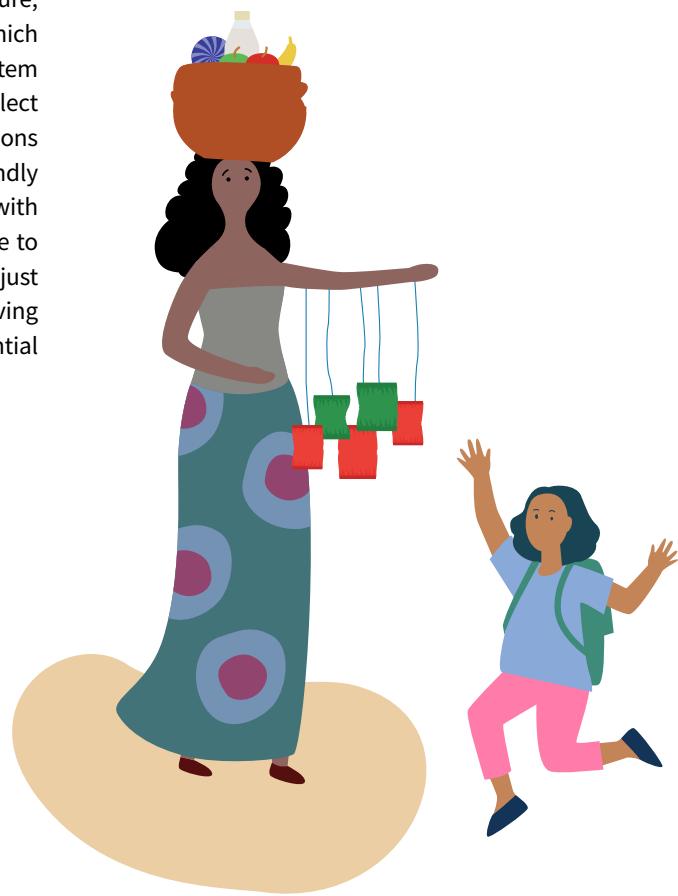
¹ Throughout this brief the term "food and beverages" or "food" is used to refer to foods and non-alcoholic beverages.

Nudges and choice architecture

As an approach, nudging (13) is receiving increasing attention within a variety of public health domains, including in the field of nutrition where there are opportunities to influence food choice. An integral element of nudging is an understanding of the choice architecture and the context within which people make decisions (13); that is, how options are presented to people, and how this influences people's decisions. Any aspect of the choice architecture that adjusts choice behaviour can be classified as a nudge (13). Food choice architecture, specifically, relates to various elements of how food options are framed; it can include aspects such as the relative availability and presentation of the different food options, and the subsequent influence of these factors on the selections people make (17). There are many opportunities to deliberately adjust the choice architecture and introduce nudges to promote or demote the selection of certain food options. Thus, nudge-based interventions can aim to improve children's dietary practices in school. The appropriateness of the specific nudges and their effectiveness depends on various elements related to the context in which they are implemented.

Regardless of whether a nudge-based intervention is in place, there is always the prevailing choice architecture; that is, the pre-existing framing and context in which options are currently being offered. A good system of choice architecture (13) can help children to select healthier food options (i.e. promoting healthier options and demoting others). On this basis, nutrition-friendly choice architecture prioritizes healthier options, with nudges modifying aspects of the choice architecture to facilitate healthier food selection. Nudges look to adjust behaviour in a predictable manner, without removing the options available and without providing substantial economic incentives (13).

In essence, wherever there is a choice to be made from a selection of foods, nudges may be used to shift choice towards or away from specific options. There are many ways to nudge behaviour, and in this domain, nudges are about steering children towards foods that contribute to a healthy diet, while also maintaining their freedom of choice from the options available. Nudges are typically low-cost interventions; however, there might be indirect costs from their implementation (e.g. the time resource of food service and school staff involved) that should not be overlooked. Time constraints have been identified as a barrier to implementing nudge-based interventions in schools (18).



Why nudging is relevant to healthier food selection in schools

Decisions about what to eat can be habitual and automatic, rapid and instinctive, and guided by non-cognitive processing (19); the relevance of this is becoming increasingly apparent (14). Decisions about food selection are subject to the influence of social and environmental cues and are often made in a way that does not require effort, awareness, intent or control (19, 20). Behavioural insights and efforts to understand behaviour and decision-making (21) have contributed to the development of nudge-based interventions in various settings, including schools (22-25).

Historically, school-based approaches to promote healthy dietary practices have emphasized nutrition education (which is incumbent on rational and thoughtful food selection) and the regulation of school food and beverages (which restricts what is offered in school settings). Nudges, on the other hand, can operate within a person's automatic decision-making processes, reducing the cognitive load or physical effort involved in choosing the target option.

Why schools?

Improving the nutritional status of children and adolescents is an effective investment for future generations. Schools offer opportunities and provide an ideal setting to implement nudges for promoting healthy dietary practices to improve health and nutritional status of children because:

- ▶ Intervening in schools can impact a high number of children of different ages and often from different socioeconomic backgrounds.
- ▶ Children typically spend a substantial proportion of their day in school; thus, food consumption in schools matters to children's overall diets.
- ▶ Schools are settings where children might have the opportunity to choose food and beverages from a selection of options that are available.
- ▶ Schools often provide a controlled food environment that is more discrete and manageable than that available beyond the school perimeter.



Food choice in schools

Nudges aimed at promoting selection of healthier food options may be implemented at any point on school premises where children have the opportunity to select between various food (and beverage) options. For example, the school food environment may include a school canteen/cafeteria, food kiosks (where a kiosk holder pays rent to a school and provides food to children), food vendors (where an independent vendor registers with a school and is allowed on school premises to provide food to children) and vending machines. Fig. 1 illustrates these and other examples on school premises, where children may encounter and select food (snacks and meals) and beverages from the available options.

Figure 1

Elements of the school food setting: points where children may select from food options available.

SCHOOL FOOD AND BEVERAGE POINTS

The names and descriptions of the different food and beverage points included here are illustrative and might vary considerably across countries or schools.



Nudging to promote healthy eating as part of an integrated approach

The implementation of appropriate and context specific nudges can modify the school food environment, to facilitate the selection of food and beverages that contribute to a healthy diet.

Nutrition-friendly choice architecture in schools can support the core principles of increasing the intake of whole grains, vegetables, fruit, nuts and pulses; limiting free sugars and sodium intake; and shifting fat intake from saturated fats to unsaturated fats (16). Likewise, supportive food environments can aim to discourage unhealthy foods, such as those that are energy-dense and micronutrient-poor (26).

In this context, nudges create an “enabling environment”, eliminating barriers to making healthier food choices and creating new “enablers” to such choices. Implementing nudges is also about making the healthier choice the easy choice – a rationale outlined within recommendations developed by the Commission on Ending Childhood Obesity to create healthy food environments and improve children’s nutrition (8). Implementing nudges for healthy eating in schools resonates with several of the recommendations (8); also, it aligns with the aspirations of the Nutrition Friendly Schools Initiative and the Health Promoting School approach (27). Promoting healthy diets for children is paramount in protecting against malnutrition in all its forms (11).

As part of an integrated approach that also sets school food and nutrition standards, nudges can contribute to a school food environment that enables healthy dietary practices. Indeed, a review of evidence on nutrition action in schools suggests that school nutrition policies embracing multiple components and approaches (which may include nudge-based approaches) are associated with positive dietary outcomes in children (27). Hence, nudge-based approaches can be used to support other important measures, such as school food and nutrition standards (15) and the provision of foods that contribute to a healthy diet (16).

Case studies: Selection of nudge-based studies in school settings

These four case studies provide examples of nudges implemented in school settings. To date, interventions have predominantly been tested in high-income countries, and this is reflected in the case studies. Nudges are specific to their setting and should be considered, contextualized and tested rather than simply being transposed to another context.

Case study 1

Presentation of fruit, elementary school, USA (39)

This study examined the selection and consumption of apples and oranges at lunchtime in the cafeteria of an elementary school (kindergarten to fourth grade; children aged 5–10 years). The nudge that was tested was the presentation of apples and oranges, served as half a piece of fruit sliced into three wedges (on day 1, with 491 children) and whole pieces of fruit (on day 2, with 488 children).

The sliced apples (prevented from browning with an ascorbic acid solution) and oranges were presented in individual bowls for children to place on their food trays on day 1; on day 2, the whole pieces of fruit were available for children to place on their trays. The selection and consumption of sliced oranges were significantly higher than for whole oranges (16.2% of children selected sliced oranges whereas 5.5% selected whole oranges). However, a similar effect was not seen with apples, and the authors suggested that the effect of slicing on fruit depends on the fruit. The findings also revealed that, in general, younger children were more likely than older children to choose apples and oranges when sliced and were also more likely to consume oranges when sliced.

Next case study on page 8

Nudges to promote healthier food choices

Various nudge-based interventions have been implemented in school settings (22-24), and a review of contextual factors related to school food and nutrition policies found that nudge-based interventions were generally feasible and accepted among children and stakeholders (18).

Nudges previously implemented in interventions have included changes to various elements of the choice architecture. For example, studies have examined adjustments to the placement of food options, their convenience, order, presentation, attractiveness and labelling, and the quantities available, as well as changes to the normativeness of options (22-24). Different nudges are considered to influence decision-making in different ways, for example, by reducing the effort and cognitive load required to make a choice, enhancing salience / making an option more prominent, and emphasizing tastiness, and leveraging social norms (14).

Nudging does not involve eliminating any food options that are available in schools; however, nudges can be implemented to support and complement other measures such as the implementation of school nutrition standards and policies related to the provision and procurement of food. Similarly, making substantial changes to economic incentives is not considered nudging (13). When adopting nudge techniques, the emphasis is on changing the presentation or framing of the pre-existing food options, to promote the selection of the healthier options.

Several typologies and frameworks (28-32) have been developed to help define nudges, and this is a growing area of research. For example, a review on nudging towards healthier food choices (33) classified nudges within an adapted taxonomy of different types of choice architecture interventions (34), including changes to the physical environment, changes to the default option, provision of information, use of salience and social norms. A meta-analysis of nudge-based interventions classified nudges according to whether they were cognitively oriented (e.g. descriptive nutritional labelling), affectively oriented (e.g. hedonic enhancements) or behaviourally oriented (e.g. convenience enhancements) (35).

Fig. 2 provides a selection of nudges within a school setting; (adapted from previous work (14) and categorized according to an adapted taxonomy of

behaviour change interventions (33,34)) these aim to increase the selection of the healthier target food (e.g. snack, main meal or side portion) or beverage. Where the target food is the unhealthy option and the target behaviour is a reduction in the selection of that food, nudges can be designed to discourage the selection of target foods.

Changes to the physical environment:

Placement - this change can be used to display healthier food options in a prominent position; for example, first in line, at the top of the menu, in front of other options in the kiosk or near the checkout. Placement changes can also be used to obscure unhealthy food options from a child's eyeline when the unhealthy target option is to be discouraged. Placing food options further away or less prominently can be effective in reducing their selection (36)(37), and a meta-analysis of nudge-based interventions targeting fruit and vegetables indicated that placement nudges had the largest effect size (38).

Availability – this change can entail increasing the relative share or the number of the healthier food options in a given choice context (e.g. in a vending machine or kiosk). Changes to availability have been shown to influence selection and could contribute to meaningful behaviour change (42). Proposed mechanisms underlying the effects observed with such changes include increased salience and social norms indicated by the greater availability (14).

Contrast – this change highlights or emphasizes the healthier food options relative to other alternatives; for example, by emphasizing these on a school meal menu (e.g. by placing a box around the healthier food options) or by providing an attractive display of the healthier food options. The contrast highlights the target food options with respect to their surroundings and can influence salience bias (perceptual salience), drawing focus to more prominent options, particularly where there are multiple options to choose from.

Presentation – this change relates to the presentation or format of the food options. Examples include serving healthier food options to children in “grab-and-go” containers (17), providing pre-sliced fruit ready to consume (39), presenting healthier food options in attractive stands or on attractive plating, presenting whole wheat bread rolls in fun shapes (e.g. heart shaped) (40) and providing water from chilled water dispensers (41).

Changes to the provision of information:

Descriptives – these changes include assigning appealing descriptive names for target healthier food options; for example, magnificent mango, cool refreshing water, crunchy corn, delicious cauliflower curry and incredible fish burrito. Care is needed to ensure that the language used is age appropriate – descriptions that might be suitable for primary or elementary school children may not be relevant for older children.

Semiotics – these changes include adding symbols or icons (e.g. emoticons or healthy heart logos) to healthier food options (43, 44). This can influence salience and promote selection, especially in contexts where there are many alternatives to choose from. There is emerging evidence of the advantage of subtle messaging compared to an explicit message; for example, healthier food options were more likely to be chosen when these were given a heart logo as opposed to the message “a healthy choice” (45).

Prompts – this change entails prompting children when they are in the food setting; for example, saying “Would you like an apple with your lunch?”. Verbal prompts by canteen/cafeteria staff can significantly increase the likelihood that children choose and consume a serving of fruit with their school lunch (46). Prompts can also be written statements; for example, placing the label “Today’s SPECIAL – Make a fresh choice” next to a target food (17) or using the statement “Let fruit and vegetables put a spring in your step” (47).

Changes to the default

Defaults – this change can include making the healthier food option the default that will be served without the child making an active choice; hence, it will tend to be the option taken because it requires the least cognitive effort. The portion size provided can also constitute a default, and evidence indicates that changes to portion size may be more effective with older children than younger children (48).

The nudges provided in Fig. 2 are just some of the many examples possible. Those presented have been categorized according to type; however, some nudges may have features that relate to more than one type or category. Also, an intervention may entail multiple nudges; for example, placement for one target food and presentation for another target food, such as vegetables offered at the beginning of the lunch line, and fruit in attractive containers (49). Indeed, there is some evidence that interventions adopting multiple nudges have

merit (48). Nudges can also be combined for the same target food (e.g. placed at eye level and with a written prompt). Other aspects can also be incorporated, such as enabling children to pre-order their school lunch, which may lead to healthier food options being selected (50). Pre-ordering can also be combined with nudges on the school menu; for example, the target food options can be placed at the top of the school meal menu that children (or their parents or carers) are choosing from.

Case study 2

Multiple nudges for plant-based foods, secondary school, United Kingdom (17)

This study examined the impact of multiple nudges on the selection by adolescents (980 children aged 11–18 years) of plant-based foods in a secondary school canteen. The target foods were the vegetarian daily specials, sandwiches containing salad, whole fruit and also fruit salad in pots. This was a multi-component intervention with changes in placement, availability, presentation, prompts and semiotics.

The nudges included placing fruit on a stand near the till, presenting vegetarian daily specials in grab-and-go pots, using emoticon stickers (smiley faces) with sandwiches containing salad, and written prompts for the target foods. These prompts were “Today’s SPECIAL – Make a fresh choice” for vegetarian specials, “GOOD for YOU” for fruit, and “Sandwiches with a little bit extra – Get more in your sandwich” for sandwiches with salad. In addition, availability was increased for all target foods.

The selection of target food items increased significantly during the intervention, and adolescents were 2.5 times as likely to select target foods compared with baseline. In addition to the independent effect of the intervention on the selection of target foods, there was an effect on the overall selection of fruit, vegetables and salads, with students three times as likely to select a fruit, vegetable or salad item during the intervention compared with baseline.

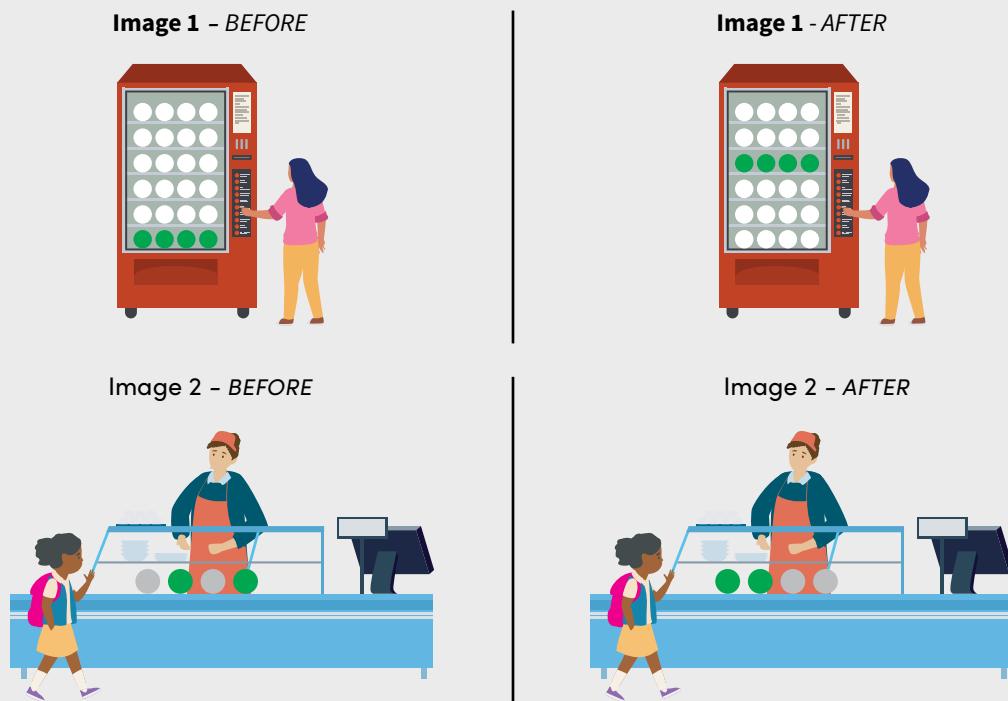
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Figure 2

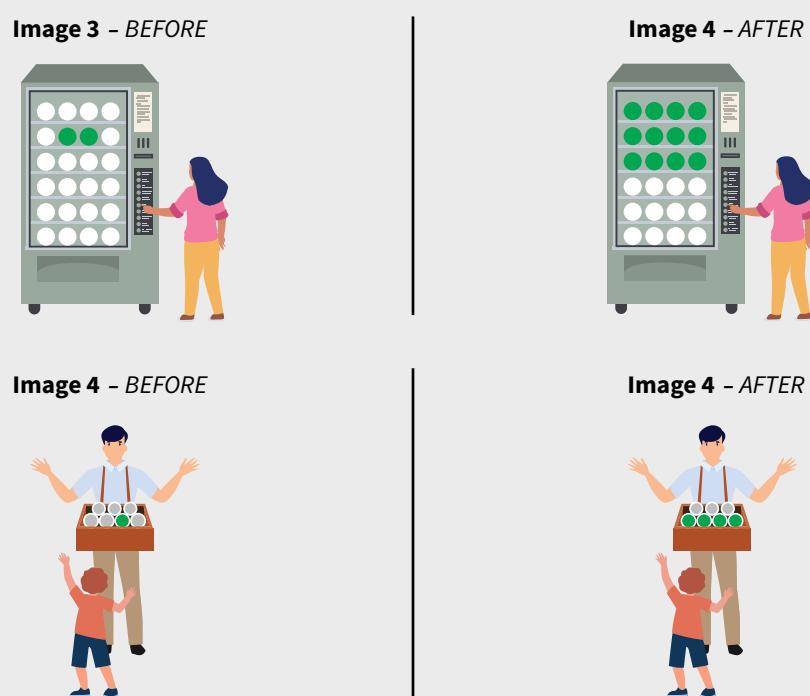
A selection of different nudges within a school food setting (examples adapted from previous work (14) and categorized according to an adapted taxonomy of behaviour change interventions (33, 34)).

Changes to the physical environment

Placement – for example, the target food is placed at eye level in the vending machine (Image 1), first in the line of options at the canteen/cafeteria (Image 2), first on the school meal menu, near the canteen/ cafeteria checkout, in front of other options in food kiosks or other food points.



Availability – for example, more of the target food is available at the vending machine (Image 3), food vendor (Image 4) or at any other food point.



Changes to the physical environment cont.

Contrast – for example, the target food is highlighted on the school meal menu (Image 5), or by the way in which it is displayed at the sanck-bar, the food kiosk or at any other food point.

Image 5 - BEFORE

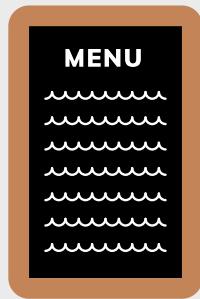
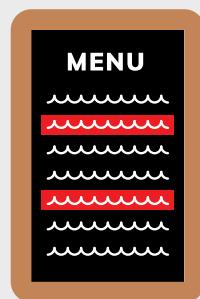


Image 5 - AFTER



Presentation – for example, the target food is presented pre-sliced (Image 6), in attractive stands (Image 7), or in grab-and-go containers.

Image 6 - BEFORE

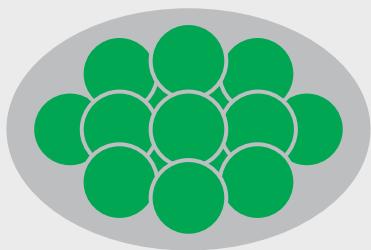


Image 6 - AFTER

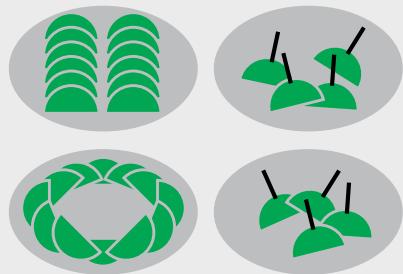


Image 7 - BEFORE



Image 7 - AFTER



Changes to the provision of information

Descriptives - for example, the target food has an appealing name on the school menu (Image 8) or on a food label.

Image 8 - BEFORE

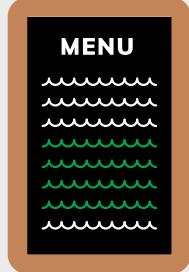
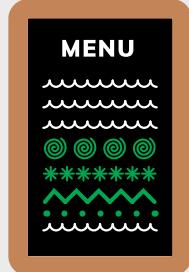


Image 8 - AFTER



Semiotics - for example, a smiley face on labels or containers for the target food (Image 9), in the canteen/cafeteria, kiosk, vending machine or other food point.

Image 9 - BEFORE

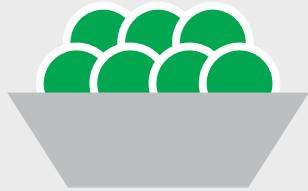


Image 9 - AFTER



Prompts - for example, the canteen/cafeteria staff, kiosk holder or food vendor promotes the target food (Image 10), or there is a label prompting the choice of that food.

Image 10 - BEFORE



Image 10 - AFTER



Changes to the defaults

Defaults - for example, the target food or beverage is provided as the default choice (meals are served with water as default option, Image 11).

Image 11 - BEFORE



Image 11 - AFTER



Evidence on effectiveness

In developing evidence-based strategies to address children's nutrition, it is important to consider the effectiveness of nudges in changing food selections. There is evidence that nudges can result in small but significant changes in food selection, but nudges vary in their effectiveness and context is important. One review reported effect sizes to be moderate to small, with behaviourally oriented nudges (e.g. changing the convenience of options) having greater effects than cognitively oriented nudges (e.g. labelling) (35). That review focused exclusively on interventions in field settings (i.e. canteens/cafeterias, restaurants and grocery stores); it found a small average effect size, although this translated to a substantial (7.2%) change in energy intake (35). When considered on a population basis, this reveals the potential change that nudge-based interventions may have. Even though nudge-based interventions have moderate to small effect sizes, they should be considered for implementation given their low cost. Indeed, on a cost-adjusted basis, the impact of nudges in general has been found to be often greater than that of traditional tools, suggesting that nudging is a valuable approach that should be adopted more often alongside traditional policies (51).

Several studies have examined the impact of various nudges on food choices of children specifically (22, 48, 52) and the available evidence indicates that, overall, the implementation of nudges shows promise. One systematic review of nudge-based dietary interventions (in children) entailing presentation, availability, sizing, prompting/priming and multiple nudges found positive changes in 33 of the 40 studies (83%) (52). Another systematic review of interventions using behavioural insights (including nudges such as changes to the physical environment, salience, and defaults) to improve children's diets found that nearly three quarters (74%) of interventions were effective in changing children's diet-related outcomes (48). Much of the evidence in these reviews (48, 52) came from school settings.

Systematic reviews have also examined nudge-based interventions in school settings exclusively (22-24). One review focused on interventions to promote vegetable intake in schools; it included studies related to, for example, serving style and how vegetables were presented, and changes to the physical environment (24). It included nine studies from the United States of America (USA), two from Canada and one from Denmark,

and reported inconclusive findings, highlighting heterogeneity in the limited number of studies (24). Another larger systematic review examined nudge-based interventions (entailing placement/convenience, marketing/promotion, variety/portion and multiple nudges) across primary and secondary schools (23). Based on the 29 studies reviewed (26 from the USA, and one each from Australia, France and the United Kingdom of Great Britain and Northern Ireland), the authors concluded that nudge-based interventions were positively associated with food selection, and the influence on consumption has yet to be clarified (23). Another systematic review investigated nudges (including changing the order, availability, labelling, attractiveness, convenience and normativeness of selecting healthier food options) to promote healthy food choices in school cafeterias (22). It included 24 studies from the USA and one from the United Kingdom; the results indicated increased selection of the target foods (healthier options) in 17 studies, with 11 studies showing a significant change in consumption (22). Although the review acknowledged limitations in the studies and recommended cautious interpretation of results, it pointed to the low cost of nudges coupled with the potential of significant public health benefit (22).

Overall, evidence on nudges to promote healthier food selection in a school setting appears mixed, but given the relatively low cost of nudges and the existence of the prevailing choice architecture, nudge-based interventions to support children's selection of healthier food options should be implemented. Nutrition-friendly choice architecture can contribute to the selection of healthier options and complement other efforts such as school food and nutrition policies (15) and food procurement for healthy diets (16).

How to design nudges

When planning nudge-based interventions in schools, it is important to recognize that nudges are context specific – their relevance and potential impact depend on the particular setting in which they are implemented. Contextual factors that might influence the implementation and effectiveness of nudging in a given context include the acceptability of nudges among relevant stakeholders, the feasibility of nudges and the generalisability of evidence on the effectiveness of nudges. These contextual factors should be analysed from the perspective of a variety of stakeholders, including food service staff, students, parents and school staff at different levels. Other aspects to consider include food and cultural preferences, food availability, and specific nutrients or foods of concern (e.g. excessive or insufficient intake of particular nutrients or foods). Some of these factors might become barriers to implementation in certain contexts; therefore, it is important to assess and address these as part of the design of a nudge-based intervention before it is tested or scaled up.

Actions to drive nudges for promoting healthy eating in schools

This section outlines the core elements to consider when implementing nudge-based interventions aimed at shifting food choice towards healthy eating options in schools. Prior to action on the ground in schools, the decision-maker(s) and choice architect need to be identified. One or more decision-makers will drive the change, and the choice architect will design the nudges. Decisions about nudge-based interventions to influence food choice in school settings can be undertaken by decision-makers at national, local or school level. Action can be taken for one school or collectively across multiple schools (e.g. in schools managed by the same district authority or served by the same catering company).

Before discussing what nudges need to be put in place, it is important to identify the relevant decision-maker who is critical to driving commitment and action at school level (see the checklist on page 14). The decision-maker raises awareness, advocates for the implementation of interventions, and coordinates overarching policy and implementation. This individual will have responsibility and oversight for school food, and will be the person who can generate a demand or opportunity for the required change.

To drive the school-based changes, it is important to

identify **the choice architect**; that is, the person who is best placed to design and ensure the implementation of the changes that are typical of nudges (e.g. changing the position of food options, adding labels and changing food presentation). This can be the same person as the key decision-maker or a different person. To a large extent, this will depend on the point where the food choice is being considered (e.g. school canteen/cafeteria, food kiosk, tuck shop, food vendor or vending machine) and the school procurement arrangement (e.g. government catering provision or private food kiosk holder). Regardless, one person must play the role of the choice architect and must take responsibility, invest time in following the steps outlined in Fig. 3 and drive the implementation of nudges.

Nudges for healthy eating in schools are typically straightforward and low cost. However, understanding the choice architecture in which they operate, selecting appropriate nudges and implementing those nudges requires time and effort. Decision-makers and choice architects also need to engage and empower stakeholders on the ground. Similarly, for action at district level, alliance with stakeholders across schools is important to ensure effective implementation and monitoring.

Key steps when developing and implementing nudges for healthy eating in schools

This section provides an overview of relevant considerations in the development and implementation of nudges in schools. The process itself entails a number of steps, outlined below.

Step 1. Investigate the prevailing choice architecture

Step 2. Specify the food options and the beverages to be targeted with the nudge-based intervention

Step 3. Establish a shortlist of nudges and select the final nudges to be implemented

Step 4. Implement the nudges

Step 5. Monitor to check fidelity, impact and sustainability

Checklist:

Who might be interested in nudges to promote healthy eating in schools?

The following stakeholders are particularly well placed to initiate or play a role in the implementation of nudges in schools as described in this policy brief:

- ▶ Government officials with responsibility for school food in a district, city or region
- ▶ Nutritionists with responsibility for school food in a district, city or region
- ▶ The chair of the school management committee with responsibility for school food
- ▶ The director, principal or head teacher at a school
- ▶ Senior managers in a school with responsibility for catering provision
- ▶ Managers of catering companies for schools
- ▶ Managers of the school's catering team
- ▶ Vendors with a contract in a school or with authorization to sell food on school premises
- ▶ Parents or other organized groups
- ▶ Representatives of students, such as the students' council or association

Key advocates and decision-makers can be found among the categories above. Advocates and decision-makers can play a role in demanding or instigating action to modify the choice architecture of a variety of food points in schools. The changes to the food choice architecture are made by the choice architect.

Could you be the choice architect?

The choice architect is the individual who designs and oversees the implementation of the changes to the food choice architecture. As the choice architect, you may implement directly the changes that you have designed to promote a specific food option, or you may engage others on the ground to implement the changes that you have designed. You may design the nudges yourself (by following the steps outlined), nominate another person who is better placed to do so, or seek external expert support to implement the recommended steps.

Step 1. Investigate the prevailing choice architecture

The design of appropriate nudges requires detailed characterization of the existing food choice architecture. This can be done, for example, by observing the setting during food service to understand how children use the setting and make selections, photographing and mapping the food setting, interviewing key informants (e.g. food service staff and food vendors) and undertaking focus group discussions with children to gain a better understanding of their food choice in school.

Step 2. Specify the food options and the beverages to be targeted with the nudge-based intervention

In essence, Steps 2 and 3 relate to the two core components that should be considered together: the target food options and the nudges. Step 2 relates to the

food and beverages that are available at the food choice point and how target foods to be promoted or demoted are designated. Ideally, this step should be informed by assessing the nutritional composition of school food options and gathering data on the food options that children select in schools, where available.

A **target food** (e.g. snack, main meal or side portion) or beverage is the option to be promoted or discouraged. In designating target foods, criteria can be established on the basis of nutrition criteria for healthy diets (16). Relevant resources can be reviewed and examples of existing resources are nutrition criteria included in other policy measures; national or regional nutrient-based or food-based dietary guidelines; regional nutrient profile models²; and international nutrition guidance, such as the World Health Organization (WHO) publications Healthy diet factsheet (11), 5 keys to a healthy diet (53), Drinking-water fact sheet (54), other WHO resources on

² Nutrient profile model for the WHO African Region (<https://apps.who.int/iris/handle/10665/329956>); Pan American Health Organization nutrient profile model (<https://iris.paho.org/handle/10665/218621>); Nutrient profile model for the marketing of food and non-alcoholic beverages to children in the WHO Eastern Mediterranean Region (<https://apps.who.int/iris/handle/10665/255260>); WHO Regional Office for Europe nutrient profile model (<https://apps.who.int/iris/handle/10665/152779>); WHO nutrient profile model for South-East Asia Region (<https://apps.who.int/iris/handle/10665/253459>); WHO nutrient profile model for the Western Pacific Region (<https://iris.wpro.who.int/handle/10665.1/13525>).

nutrient requirements and dietary guidelines (55), and the core principles for a healthy diet. In this way, foods or beverages can be designated as target foods and become the focus of subsequent nudges. These criteria can be context specific and may be based on nutrients, foods or preparation techniques (16). The designation of target foods and beverages should be according to the local context and the local school population (e.g. promotion of whole milk may be discouraged in some regions or contexts and promoted in others). Similarly, nudges within schools should complement other efforts such as school food and nutrition standards (15) and policies related to food procurement for healthy diets (16).

At this point, the target behaviour with respect to the target foods should be clearly specified (e.g. increased selection of fruit and vegetables or reduced selection of sugar-sweetened beverages). The behaviour should be based on the desired change or relevant nutrition criteria.

Step 3. Establish a shortlist of nudges and select the final nudges to be implemented

This step involves determining the possible nudges to promote target foods (healthier food options) or discourage target foods (unhealthy food options); for example, based on previously used nudges such as those in Section 4, Fig. 2 and the case studies. It is important to consider whether any of these nudges would be appropriate or could be modified for the target foods. The nudges should be based on a good understanding of the choice architecture, achieved through the activities in Step 1 above. In this way, it is possible to establish a shortlist of nudges that are suited to the designated target foods and the prevailing choice architecture. The final nudges to be implemented are selected from the shortlist, refined and eventually tested before being adopted. This step requires close consultation with relevant stakeholders such as school staff, food service staff, food vendors, food kiosk holders and parents. This can eliminate impractical, unfeasible or unacceptable nudges, and support successful implementation of the intervention and the subsequent roll-out. Similarly, early engagement with relevant staff on the ground fosters ownership and empowerment. The costs relating to each nudge on the shortlist should also be specified, to inform the selection of the final nudges. In this phase, acceptability and feasibility of the nudges can be assessed.

Step 4. Implement the nudges

Nudges are typically low or no cost to implement. For example, many placement nudges are straightforward changes to the position or order of foods, and have no resource implications. Likewise, changes to the descriptive names of food options or the highlighting of options on a menu will have very low or no cost. However, some nudges may have resource implications and any resources required will need to be acquired at this stage. It is also important to consider indirect costs such as the time and effort required for the development and implementation of an intervention.

Step 5. Monitor to check fidelity, impact and sustainability

Once nudges have been implemented, it is critical to check fidelity (i.e. the extent to which the intervention was actually implemented as intended in the original plan (56)), and to monitor impact and sustainability over time (i.e. whether nudges themselves and the changes effected are sustained in the long term). Monitoring impact and sustainability is important to provide a level of feedback control (i.e. to adapt as necessary) and to check for possible unintended consequences (i.e. outcomes that are not planned and expected but may accompany interventions). Unintended consequences may be positive or negative. For example, food waste is one area that may be affected if children's food selections are adjusted, but children then do not consume as much of the designated food. There is some evidence of the food waste implications of such interventions (57). Monitoring impact and sustainability is also crucial in providing data on the effects of the nudges. The data should inform any subsequent decisions; for example, on adjusting the strategies for optimization or on rolling out strategies to other schools.

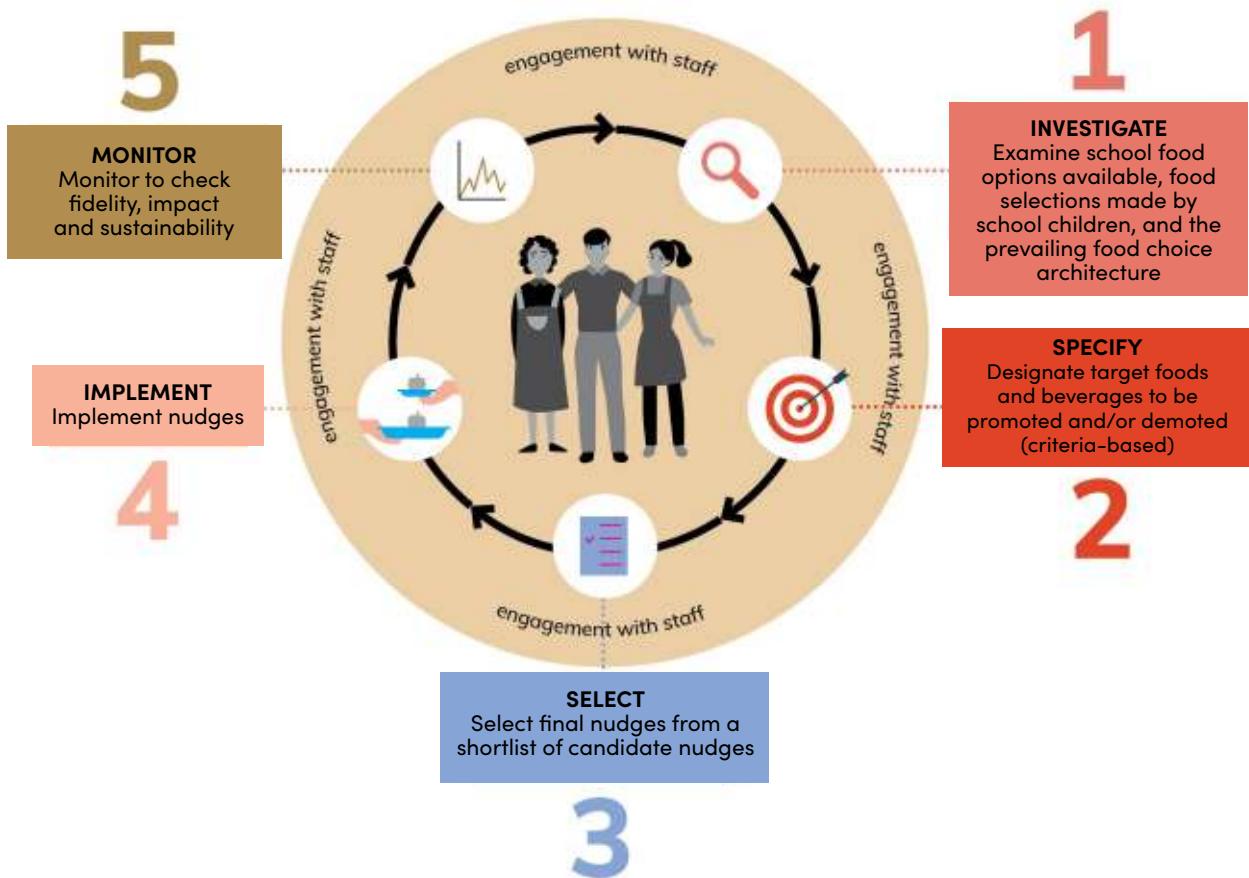
An overview of key steps in the development and implementation of nudges in schools is provided in Fig 3.

Figure 3

Key steps when developing and implementing nudges for healthy eating in schools

- ▶ Engage with staff on the ground (e.g. food service staff, school staff, food vendors and kiosk holders)
- ▶ Examine school food options available, food selections made by school children and the prevailing food choice architecture
- ▶ Designate target foods and beverages to be promoted or demoted (based on set criteria)
- ▶ Select final nudges from a shortlist of candidate nudges
- ▶ Implement nudges
- ▶ Monitor to check fidelity, impact and sustainability

Steps to drive the development and implementation of nudges for healthy eating in schools



Engagement and empowerment

Common challenges with nudge-based interventions can be the development of appropriate and feasible nudges, and their sustained or long-term implementation as intended. The primary responsibility for actions may lie with school management; however, it is important to recognize the need to engage and empower key stakeholders, such as food service staff, school staff or contracted vendors (one or more of whom will implement the changes and may have also been the choice architect) to ensure successful implementation of nudges.

A review of contextual factors for developing and implementing school food and nutrition policies (18) highlighted the importance of supportive school system factors (including the time and space for implementation). Meaningful engagement is critical to the development and implementation of nudge-based interventions. Early engagement provides a solid foundation for dialogue and the design of nudges that are fit for purpose. Engagement is crucial to inform the development and selection of the final nudges. Individuals on the ground are key to informing which nudges are best placed and most suitable for implementation in a specific setting.

There are also opportunities to train stakeholders on the ground to become familiar with nudges in school settings to promote healthy diets and to implement changes. Such training can improve participants' beliefs and self-efficacy about encouraging changes to promote healthier food options; it can also result in significant improvements in the reported use of various nudges (e.g. better placement of healthier options) by managers in their school settings (58).

Implementing nudges does not entail eliminating pre-existing food options; rather, it entails making small changes. Such changes may be more acceptable to stakeholders (e.g. food service staff, school staff, vendors and kiosk holders) than, for example, changes to food provision – hence, the nature of nudges can be useful for engaging stakeholders in healthy eating strategies.

Similarly, nudges are typically low cost to implement; this is relevant when considering affordability for schools and catering providers, and the potential of nudges for implementation and scale up (e.g. at district level).

Case study 3

Multiple nudges for healthier foods and beverages, 10 primary schools, Australia (59)

This trial involved 10 primary schools (kindergarten to sixth grade; 2714 children aged 5–12 years) with online school food ordering systems, which children (or parents on their behalf) used to select school lunch items. The intervention aimed to promote the selection of healthier foods and beverages from the school menu (i.e. those items lower in energy, saturated fat, sugar and salt).

The intervention comprised multiple elements including placement (target foods were listed in the main website display, and listed first within a category), prompts for users to add target foods, round traffic light labels indicating "best choice", "select carefully" and "select occasionally", and appealing descriptions to target foods.

The results indicated that the intervention group had significantly lower energy, saturated fat, and sodium content (no significant differences were found for sugar) in their lunch compared to the control (without the intervention). The authors pointed to the appeal of such interventions as part of larger government strategies to improve children's nutrition.

Next case study on page 18

Meaningful engagement is critical to the development and implementation of nudge-based interventions. Early engagement provides a solid foundation for dialogue and the design of nudges that are fit for purpose.

Challenges and limitations

It is clear that the implementation of nudge-based interventions to improve the food environment and promote healthy dietary practices in schools could facilitate the selection and consumption of foods and beverages contributing to a healthy diet, and therefore is worth consideration. However, a challenge is how to account for the mixed evidence and the limited research on long-term effects. Indeed, calls for further research on nudge-based interventions and sustained behaviour change are in response to much of the research entailing limited follow-up periods (48) or mixed or tentative evidence (22)/(23). However, despite limited evidence, and considering that nudge-based interventions are typically low cost, and have the potential to confer benefit, then their implementation should be considered while awaiting the evidence, in particular on the long-term effects.

Another challenge is a lack of evidence and documented experiences in low- and middle-income countries. Nudges have been used in school-based interventions in a number of countries, predominantly the USA and in Europe to date. There is much scope for nudges in schools in low- and middle-income countries, particularly if these have school food and nutrition policies in place, and offer healthier options. However, the need for further work to examine the effect of nudges in diverse populations is recognized (14). To this end, proposed nudges should be developed, as appropriate, to the specific context; that is, one size does not fit all and actions will vary between individual schools. It is therefore important to contextualize and test; local food contexts and dietary intakes of schoolchildren should be central to the development of nudge-based interventions.

It is important to consider the ethical dimensions to implementing nudges (61) as well as public approval of nudges to promote healthy eating (62, 63), and other potential barriers such as time and space (18). It is also important to distinguish food choice from food consumption – however, food choice does influence consumption, and current evidence of nudge-based interventions for healthy eating indicates that monitoring food choice (instead of the more challenging consumption) may suffice when testing interventions (35).

Finally, the need for further evidence on the potential implications of nudge-based interventions on health equity has been highlighted, with a review of behavioural

insight interventions reporting that most interventions did not explore even one equity element, and those that did typically tested for sex and age (48). Other work has also recognized the need to characterize better study populations and to report results for different population groups (35). Indeed, health equity should be a central consideration in public health interventions in order to ascertain that inequities are reduced and interventions do not worsen inequities (7).

Case study 4

Photographs of carrots and green beans, elementary school, USA (60)

This study was conducted at the cafeteria of an elementary school (kindergarten to fifth grade; 800 children aged 5–11 years). The nudge-based intervention involved providing photographs of carrots and green beans (the target foods) in school lunch tray compartments. This was on the basis that the photographs would indicate to children that other children choose vegetables in these compartments and so they should too. The results showed that there was a significant increase in the percentage of children selecting green beans (6.3% control to 14.8% intervention) and carrots (11.6% control to 36.8% intervention).

For those children who selected green beans, the average amount of green beans consumed did not change; for those selecting carrots, the average amount consumed decreased. However, overall, the consumption of green beans and carrots increased and for all students exposed to the intervention there was a significant increase in the consumption of green beans (1.2 g to 2.8 g per student) and carrots (3.6 g to 10.0 g per student).

... proposed nudges should be developed, as appropriate, to the specific context; that is, one size does not fit all and actions will vary between individual schools.

Conclusions

Evidence shows that the implementation of nudge-based interventions can contribute to improving the school food environment and facilitating the selection and consumption of food and beverages that contribute to a healthy diet in children. It is pertinent to consider that with or without intervention, there is a prevailing choice architecture already in place. On this basis and given the relatively low cost of implementation, nudges within school food settings to support healthy eating should be instigated to complement other efforts such as school food and nutrition policies (15) and food procurement for healthy diets (16). In this way, nudges can contribute to the positive dietary outcomes in children, associated

with school nutrition policies embracing multiple components and approaches (27), and can contribute to healthy lives and well-being for all at all ages and achieving the nutrition-relevant and nutrition-enabled Sustainable Development Goals.

Nudges for healthy eating in schools offer a unique opportunity to change school children's food choice. As part of the efforts to support children's nutrition, there is now the opportunity to use nudges for promoting healthy dietary practices in schools and build nutrition-friendly choice architecture in schools across the globe.

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