Policy Brief

Promoting Effective School Policies for Childhood Overweight & Obesity Prevention in Lebanon

K2P Policy Briefs bring together global research evidence, local evidence and context-specific knowledge to inform deliberations about health policies and programmes. It is prepared by synthesising and contextualizing the best available evidence about the problem and viable solutions through the involvement of content experts, policymakers and stakeholders.

Policy Brief

+ Included

Description of a health system problem

Viable options for addressing this problem

Strategies for implementing these options

× Not Included

Does not make **recommendations**

1866 AUB American University of Beirut الجامعة الأميركية في بيروت

Faculty of Health Sciences
Knowledge to Policy | K2P | Center

K2P Policy Brief

Promoting Effective School Policies for Childhood Overweight & Obesity Prevention in Lebanon

REPUBLIC OF LEBANON
MINISTRY OF PUBLIC HEALTH

الجمهورية اللبنانية
وزارة التربية والتعليم العالي

Knowledge to Policy Center K2P

Authors
Rana Saleh, Rima Nakkash & Fadi El Jardali

Funding
IDRC provided initial funding to initiate the K2P Center.

Merit Review
The K2P Policy Brief undergoes a merit review process. Internal and external reviewers assess the brief based on merit review guidelines.

Acknowledgements
The authors wish to thank the Impact Team members including Dr. Hala Ghattas, Dr. Linda Shaker Berbari and Mrs. Mitra Tauk for their valuable contributions to this Policy Brief, the process of the citizen consultations and the K2P's initiative to prevent childhood obesity. Thanks to the K2P core team, the Ministry of Public Health and the Ministry of Education for their collaboration. We are grateful to the citizens and key informants that we interviewed during the process of developing this K2P Policy Brief.

Conflict of Interest:
K2P Center declares it has no actual or potential conflict of interest in relation to this policy brief and policy dialogue.

Citation
This K2P Brief should be cited as
Saleh, R., Nakkash, R., & El-Jardali, F. K2P Policy Brief: Promoting Effective School Policies for Childhood Overweight and Obesity Prevention in Lebanon. Knowledge to Policy (K2P) Center, Beirut, Lebanon, March 2019.*
*senior author

Contents

Key Messages **2**

K2P Policy Brief **10**

Element 1 13

Element 2 14

K2P Policy Brief- Full report **28**

The Problem 28

Size of the Problem 28

Underlying Factors 30

Elements of a policy approach to address the problem 35

Policy Elements and Implementation Considerations **37**

Element 1 37

Element 2 45

Implementation considerations and counterstrategies 52

Next Steps **60**

References **62**

Annex 1 **73**

Annex 2 **74**

Key Message

Childhood Obesity and Overweight Over Time in Lebanon

Nationally Representative Study 6-19 years
(Nasreddine et al, 2012)

Overweight

1997: 20%

2009: 21.2%

Obese

1997: 7.3%

2009: 10.9%

Global School-based Student Health Survey 13-15 years
(GSHS, 2011 & 2017)

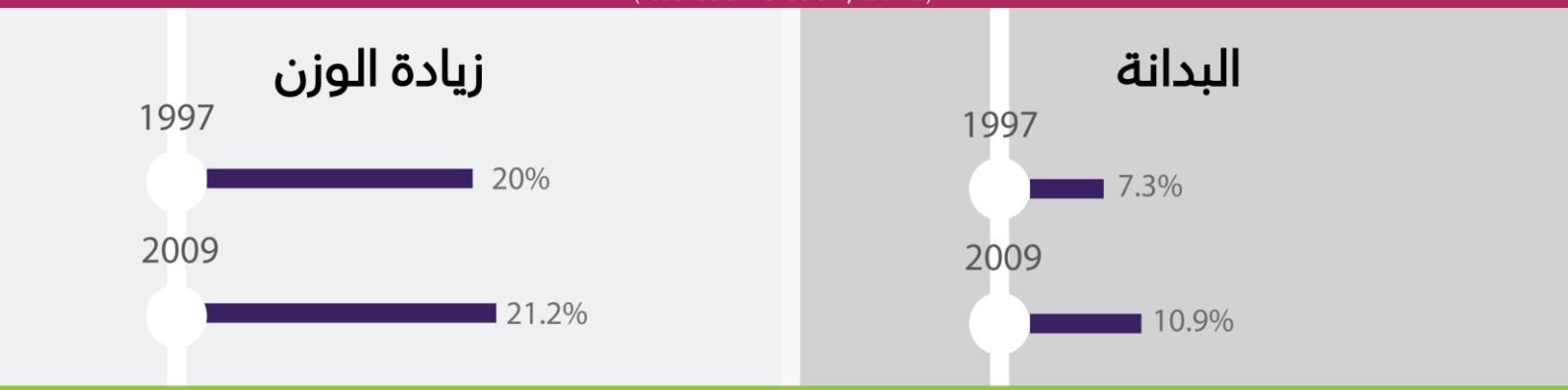
	All Genders	Female	Male
2011		14%	34%
2017		21.5%	30%

	All Genders	Female	Male
2011		4%	9%
2017		5.6%	7%

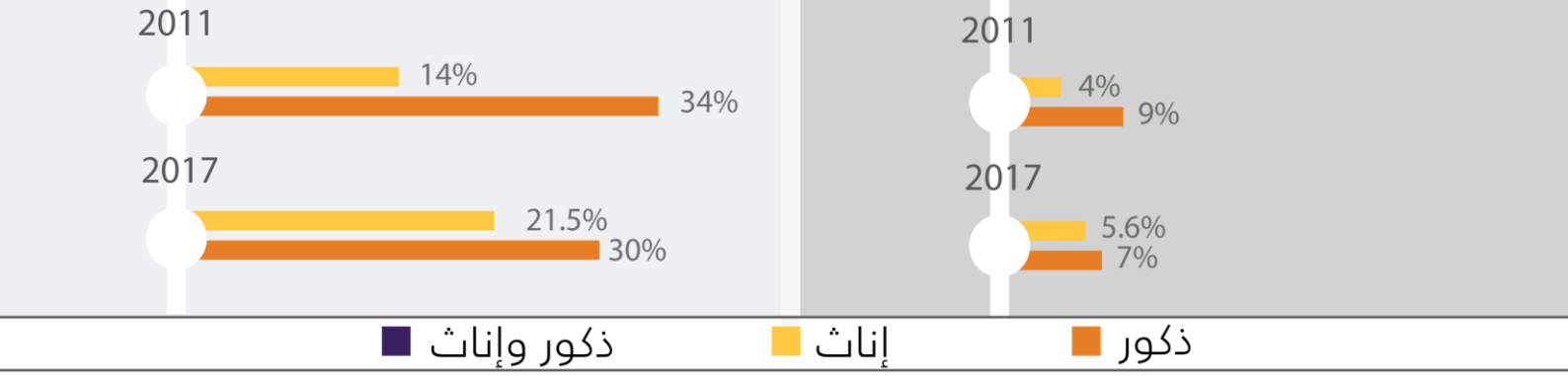
Elements for a Comprehensive Approach to Address Childhood Overweight and Obesity in Lebanese Schools

نسب البدانة وزيادة الوزن لدى الأطفال في لبنان عبر السنين

دراسة تمثيلية وطنية بين سن الـ 6 والـ 19
(Nasreddine et al., 2012)



الدراسة الإستقصائية العالمية لصحة الطالب في المدرسة بين سن الـ13 والـ 15
(GSHS, 2011 & 2017)



العناصر الشاملة لحل مشكلة البدانة وزيادة الوزن لدى الأطفال في المدارس في لبنان

Key Messages

What is the problem

In recent years, there has been an alarming increase in overweight and obesity among children in Lebanon. Childhood overweight and obesity have reached to 32.1%, with 10.9% classified as obese. With one of the highest percentages in the region, childhood obesity in Lebanon has almost doubled in the past decade (7.3% in 1997). With non-communicable diseases (NCDs) currently considered as the primary cause of death in Lebanon, the epidemic of childhood obesity prematurely burdens children and their parents. Furthermore, obesity and non-communicable diseases are protracted to adulthood, thus encumbering the healthcare system as well.

- Prevention of childhood obesity through promoting healthy schools programs is identified as a priority for the WHO 2025 global targets, the Ministry of Education and Higher Education (MEHE) since 1985 as part of promoting school health, and Ministry of Public Health (MoPH) 2016-2020 Strategic Objectives for NCD Prevention and Control.

What do we know about the two elements to address the problem?

Element 1› Controlling the standards, availability, accessibility, affordability and marketing of the food and drinks in the canteens, vending machines and school cafeterias

Sub-elements were

- Banning sweetened beverages and reducing portion sizes, fat content and frequency of selling unhealthy snacks and competitive foods. Increasing the affordability, availability and accessibility of fresh fruits and vegetables, water and healthy snacks in schools
- Setting national nutritional guidelines and providing school meals
- Statutory marketing policies, developed by the government, with legislations, sanctions and a monitoring system to control the nature, exposure and power of marketing, sponsorship and conflict of interest by the private food and beverage sector in schools

Element 2› Integrating nutrition and physical activity programs in the school curricula and health counseling sessions

Sub-elements were

- Integrating nutrition behavioral change programs in the school curriculum in different subjects; supported with extra nutrition, healthy eating and life skills sessions and delivered by teachers or school staff
- Integrating physical activity education in the school curriculum in different subjects; supported with extra physical activity sessions and opportunities through availability of safe facilities, space and equipment to increase time spent in playing, recreation and sports
- Support parents and teachers with knowledge and skills on how to approach children to be more active, eat healthy, and decrease screen time

What implementation considerations need to be kept in mind?

Implementation considerations were identified at the level of students, parents, schools, canteen owners, program delivery personnel, government, and researchers:

- Develop methods to increase **students'** and **parents'** participation
- **School** revenues should not rely on obesogenic food and financial sustainability can be achieved differently
- The **government** can subsidize **schools** and **canteen owners** for providing healthy food. Market strategies can be applied to reduce the cost.
- Leverage on the existing MEHE program for training **teachers** and health educators, with the updated training material they are working on.
- Undertake studies to assess the best mode of delivery for the proposed elements in the Lebanese context by researchers and promote necessary data sharing
- Enhance the regular screening and efficient referral mechanisms, at the **system** level, to monitor the effectiveness of interventions and identify at-risk students, with special care to confidentiality, unified screening methods and well-trained personnel.
- Promote the Physical Education university degree and incentivize physical education teachers
- At the **government** level, Ministry of Education to include public, private and technical schools with the newly developed decisions and decrees, including school nutrition policy.
- Develop a **comprehensive binding school nutrition legislation** that cuts across public, private and technical schools to control the food and beverage environment at schools with clear task division,

standard operating procedures and incentive/disincentive system for all the involved stakeholders.

- Ensure the proper tracking, monitoring and evaluation of the work of health educators, after defining their role and qualifications by MEHE and the Center for Educational Research and Development (CERD) based on the school health strategy.
- Develop a policy to set guidelines for the local **food industries** on the constituents, packaging of products directed for school consumption and for the marketing and sponsorship.
- Issue a **law** to control street vendors and retail stores near schools and prohibit children from leaving the premises during school hours.
- Implement **multisectoral governance** for collaboration and coordination between of local, regional and international **partners** for funding, resources and support in the implementation and evaluation of the programs with unified goals.

الرسائل الأساسية

تعريف المشكلة

في السنوات الأخيرة ارتفعت نسبة الوزن الزائد والبدانة لدى الأطفال في لبنان؛ إذ بلغت نسبة الأطفال الذين يعانون من الوزن الزائد والبدانة 32.1٪؛ ومنها نسبة 10.9٪. للأطفال الذين يعانون من البدانة وتعتبر هذه النسب واحدة من أعلى المعدلات المسجلة في المنطقة، نظراً لنسبة البدانة المرتفعة لدى الأطفال في لبنان مقارنةً بما كانت عليه في العام ١٩٩٧ حيث بلغت ٧,٣٪. وبما أن الأمراض المزمنة تعد، حالياً، السبب الرئيسي للوفاة في لبنان، فوباء بدانة الأطفال يثقل كاهل الأطفال والأهل باكراً. ومع استمرار البدانة واحتمال الإصابة بأمراض مزمنة في مرحلة البلوغ وفيما بعد، مرحلة الرشد، فأصبحت هذه الظاهرة تشكل عبئاً إضافياً على نظام الرعاية الصحية.

- تم تحديد العمل على الحد من بدانة الأطفال عبر إنشاء برامج مدرسية صحية، كإحدى أولويات الأهداف العالمية لعام ٢٠٢٥ التي وضعتها منظمة الصحة العالمية، بالإضافة انها تعتبر واحدة من أولويات وزارة التربية والتعليم العالي منذ عام 1985 للارتقاء بالصحة المدرسية. كما وأنها من أهداف وزارة الصحة العامة الاستراتيجية، الممتدة من العام ٢٠١٦ حتى العام ٢٠٢٠، لمكافحة الامراض المزمنة.

ما الذي نعرفه حول العنصرين اللذين يتم اعتمادهما في المقاربات لمعالجة هذه المشكلة؟

العنصر الأول> **ضبط معايير المنتوجات الغذائية والمشروبات الموجودة في حوانيت (كانتين) وكفيتيريا المدرسة وآليات البيع فيها، وطرق توفرها والوصول اليها وأسعارها وتسويقها.**

أما العناصر الثانوية فكانت:

- حظر المشروبات المحلاة، وتحديد كميات الحصص الغذائية والمأكولات الغنية بالدهون، والحد من بيع الوجبات الخفيفة غير الصحية والمغذية؛ وتيسير وجود الفواكه والخضار الطازجة والوجبات الخفيفة الصحية والماء في المدارس، وسهولة الوصول اليها بأسعار مدروسة.
- وضع قواعد إرشادية غذائية وطنية لتغذية الأطفال وتقديم وجبات مدرسية.
- وضع سياسات من قبل الحكومة للسيطرة على التسويق، مدعّمة بالقوانين التي تفرض عقوبات على المخالفين؛ وإنشاء نظام مراقبة لمكافحة طبيعة

تسويق الأغذية والمشروبات في المدارس والرعاية من قبل القطاع الخاص، كما والحد من تضارب المصالح.

العنصر الثاني> دمج برامج التغذية والنشاطات البدنية في المنهاج المدرسي وحصص الارشاد الصحي

أما العناصر الثانوية فكانت:

- ← دمج برامج التغيير السلوكي الغذائية في المنهاج الدراسي ضمن مواد مختلفة؛ وتُدعّم هذه العملية بحصص دراسية اضافية حول التغذية السليمة ومهارات العيش الصحية، يلقيها معلمون أو أفراد من جهاز التعليم
- ← دمج مادة التربية البدنية، في المنهج الدراسي، ضمن مواد مختلفة؛ وتُدعّم هذه العملية بحصص دراسية اضافية في النشاطات البدنية وبتوفير التسهيلات والمساحة والمعدات اللازمة الآمنة لزيادة أوقات اللعب والترفيه وممارسة الرياضة.
- ← تزويد الأهل والمعلمين بالمعرفة والمهارات التي تمكّنهم من مقاربة الأطفال بطريقة تلفت انتباههم للتركيز على القيام بنشاطات بدنية وتناول أطعمة صحية والحد من اوقات الجلوس أمام الشاشة.

ما هي العوامل التي يجب أخذها بعين الاعتبار عند التطبيق العملي؟

تم تحديد عدة عوامل يجب أخذها بعين الاعتبار عند التطبيق على مستوى: الطلاب والأهل والمدرسة واصحاب الحوانيت (الكانتينات) والجهاز التعليمي والحكومة والباحثين.

- ← تطوير طرق لرفع مستوى مشاركة الطلاب والأهل.
- ← عدم وجوب التعويل على الأطعمة المسببة للبدانة بوصفها كمصدر دخل للمدارس؛ إذ بالإمكان تأمين الموارد المالية بنحو مستدام بطرق أخرى.
- ← تقديم الدعم المالي المناسب، من الحكومة، للمدارس وأصحاب الحوانيت (الكنتينات) لقاء تأمين الأطعمة الصحية. ولتطبيق استراتيجيات لتخفيض التكاليف.
- ← تعزيز برنامج تدريب المعلمين والمرشدين الصحيين في وزارة التربية في بالمواد المحدثة.
- ← قيام الباحثين بدراسات لتحديد الطرق المثلى لتطبيق العناصر المقترحة في السياق اللبناني مدعومة عبر المشاركة بالمعلومات والبيانات اللازمة
- ← التركيز على أهمية الشهادة الجامعية في التربية البدنية وتحفيز أساتذة التربية البدنية.

- على مستوى الحكومة، الالتزام بآلية للمسح المنتظم وللإحالة الفعالة لمراقبة مدى فعالية التدخلات وللتعرّف إلى الطلبة الذين يواجهون خطر زيادة الوزن، مع إعارة أهمية خاصة لمسألة الّسرية، واعتماد طرق موحدة للمسح والكشف، واختيار طاقم مدرّب جيداً.
- على مستوى الحكومة، شمل المدارس الرسمية والخاصة والتقنية في السياسات والقرارات المنبثقة عن وزارة التربية، من ضمنها سياسة الصحة المدرسية.
- سن قوانين ملزِمة وموحدة للتغذية المدرسية، تشمل المدارس الرسمية والخاصة والتقنية، لمراقبة نوعية المشروبات والأغذية في المدارس، تعتمد تقسيم واضح للمهام وقواعد ارشادية موحدة وتبني نظام تحفيزات وعقوبات للتعامل مع جميع الأطراف المعنية.
- متابعة تدريبات المرشدين الصحيين وسير عملهم وتقييمهم الدائم، بعد تحديد دورهم، ومؤهلاتهم، وضمان اتّباعهم للمسار الصائب من قبل وزارة التربية والتعليم العالي ومركز البحوث والتطوير التربوي (CERD)، بالاستناد الى استراتيجية الصحة المدرسية.
- تطوير سياسة لوضع قواعد ارشادية لشركات الأغذية والمشروبات بشأن مكونات المنتجات المخصصة للاستهلاك المدرسي حجمها وكيفية تعليبها؛ كما وشروط التسويق لها.
- إصدار قانون لمراقبة البائعين المتجولين ومتاجر البيع بالتجزئة المجاورة للمدارس ومنع الاطفال من مغادرة المبنى خلال الدوام المدرسي.
- تفعيل إدارة موحدة هدفها التعاون والتنسيق بين الشركاء المحليين والإقليميين والدوليين من قطاعات متعددة من أجل التمويل ودعم عمليتي التطبيق والتقييم للبرامج بأهداف موحدة.

Policy Brief

K2P Policy Brief

The Problem

In recent years, there has been an alarming increase in overweight and obesity among children in Lebanon. With one of the highest percentages in the region, childhood obesity in Lebanon has almost doubled in the past decade. With non-communicable diseases (NCDs) currently considered the primary cause of death in Lebanon, the epidemic of childhood obesity prematurely burdens children and their parents. Furthermore, obesity and NCDs are protracted to adulthood, thus burdening the healthcare system as well.

Size of the Problem

Childhood obesity is a major public health concern in the Eastern Mediterranean Region (6). In Lebanon, the latest national survey of school-aged children aged 6-19 years old was conducted in 2009 and showed that 32.1% were overweight and obese, with 10.9% classified as obese (7). According to the number of children 5-19 years old from the statistical bulletin of the Ministry of Public Health (MoPH) in 2013, those percentages translate to approximately 400,000 overweight and obese, out of which 152,000 were classified as obese children. The current prevalence of obesity among this age group is lower than that reported from the US (17.7%) but higher than that in Syria (11.1%), KSA (5.7%), France (5%) and Iran (1.8%) (8-13). In a comparison study (14) between 2009 and 1997, Lebanon has witnessed approximately a 2 fold increase in childhood obesity in 2009 (7.3% in 1997 vs. 13.2% in 2009) (7). Furthermore, the annual increase in Lebanon in 2009 was +6.7%, higher than the world trend of +5.6% (15), which means that this epidemic will continue to rise if serious interventions are not adopted. In the most recent Global School-Based Student Health Survey in Lebanon (2017), the percentage of overweight and obesity among 13-17 yrs. old students was 24.6% and 5.9% respectively (16).

Pediatric obesity is associated with a number of serious short and long term consequences that can be prevented through implementing proper interventions and policies (17). Short-term complications affect child's quality of life, educational attainment and health. Health complications are mainly comprised of metabolic abnormalities including elevated blood glucose levels, triglyceride and blood cholesterol, insulin resistance, hypertension, and metabolic syndrome (17-20). These health and metabolic consequences have been proven prevalent among obese and overweight schoolchildren in Lebanon (21-24).

As for long term complications, childhood obesity has been considered a strong risk factor for adult obesity (25, 26). Furthermore, it is associated with adult non-communicable diseases like diabetes, cardiovascular diseases and some kinds of cancer. In Lebanon, NCDs are considered the leading causes of death accounting for 85% of deaths (27).

Additionally, childhood obesity is associated with stigmatization, low self-esteem, depression and other psychological disturbances (25, 26). In Lebanon, obesity-related distress can also increase the risk of the use of unhealthy weight loss diets and drugs, especially among girls (24).

On the economic level, childhood obesity healthcare costs escalate with an increase in the prevalence of obesity; those costs can come from direct or indirect costs healthcare during both, childhood and adulthood (28).

WHO identified childhood obesity as one of the top priority Global Nutrition Targets to be addressed by 2025. The global target is to end the increase in childhood overweight (20). MEHE has identified school health as one of their priorities since 1985 with multiple activities put forward to address this priority. Furthermore, the Lebanese strategic objectives for NCD prevention and control for 2016-2020 focused on promoting healthy lifestyles through targeting unhealthy diets, physical inactivity, policies for marketing unhealthy diets and the promotion of healthy school interventions; the latter being considered as a priority intervention to be conducted in 2016. This plan also supported knowledge translation efforts for the creation of policy briefs for NCD prevention and control. Additionally, the MoPH and MEHE developed a joint national school health strategy to address the most pressing challenges related to school health, targeting multiple risk factors for childhood obesity.

Underlying Factors

At the **biological** level, the genetic make-up has been proven to predispose to obesity in the first months of life and increase the risk of weight gain later in life (29). Fetal growth, maternal pregnancy factors, breastfeeding and early childhood are all critical periods for obesity susceptibility (30, 31).

However, these predisposing factors are not the only causes for the rapid increase in childhood obesity. **Behavioral** factors associated with eating and physical activity and environmental factors associated with the infrastructure, media, society, economy and food allow people with biological predisposition to either gain weight later in life or not (29-31).

At the **individual behavioral level**, behaviors related to eating and physical activity can lead to energy imbalance and therefore, obesity. Lebanese adolescents have adopted the western dietary pattern with the nutrition transition, predisposing them to more health risks and obesity compared with those who have the traditional Lebanese dietary pattern (32). In

fact, a study in Lebanon found that some of the predictors of obesity among children include sedentary lifestyle, skipping breakfast, and higher intake of sugar sweetened beverages and fast food (33). The sedentary behavior among adolescents in Lebanon has almost tripled from 19.9% in 1997 to 60.5% in 2009 (7). Moreover, the Global School-Based Student Health Survey in 2017 reported that 47.7% of Lebanese students 13-17 years old drink at least one carbonated soft drink per day (16). Furthermore, Lebanese adolescents who adopt a western dietary pattern are also more sedentary and often tend to skip breakfast (32).

At the **environmental level**, obesogenic environments are associated with childhood obesity (34, 35). Energy imbalance, and subsequently obesity can be a result of changes in factors related to the food type, availability, accessibility, affordability and marketing of food products, as well as factors that hinder adequate physical activity. From the wider scope, globalization, the technological revolution, food subsidy policy, the high spurt in international fast food market and the intensive marketing campaigns targeting children can affect these factors. In Lebanon, even though we have a law governing the marketing of formula milk for infants and a decree on controlling the marketing of food and food products; however, it's not implemented at any level including schools. From the local scope, energy-dense, nutrient-poor and processed foods are readily available for children at affordable prices anywhere they go, especially in schools where they spend most of their days. Physical activity opportunities are reduced both in and outside schools because of the structural setup of many schools and neighborhoods, the preoccupation of schools with the academic performance of their students at the expense of physical activity sessions, and the increased reliance on technology, motorized transport and screen-based leisure time (20, 29).

The etiology of childhood obesity is multifactorial (36), and actions to combat this epidemic require multiple interventions. However, there exists strong evidence linking obesity to diet, physical activity, socio-economic development and changes in the structural and environmental factors such as the living and school environment (37). While still acknowledging the need for multilevel, multicomponent and multiphase interventions to combat childhood obesity (38), schools are a critical starting point (20, 39) with mounting evidence of the effectiveness of multicomponent elements having nutrition and physical activity programs, environmental changes and parental involvement (38-50). In Lebanon, a previous intervention at the school level aiming to reduce and prevent obesity has shown that the inability to change the environment at schools hindered the attainment of positive outcomes (51).

Elements of a comprehensive policy at schools in Lebanon to control and prevent childhood obesity

Element 1

Controlling the Standards and the Availability, Accessibility and Affordability of the Food and Drinks in the Canteens, Vending Machines and School Cafeterias

Fourteen systematic reviews, four meta-analyses and overview of systematic reviews have reinforced the need for changing the school food environment to make healthier choices easier; supporting the goals of nutrition and physical activity education (35, 41-45, 48, 50, 52-58).

In fact, the successful components seemed to be largely attributed to the development and implementation of national school food policies and state policies to alter the competitive food available in canteens, cafeterias and vending machines (35, 39, 40, 42-44, 55, 58-62).

In general, the favorable sub-elements were:

- Eight systematic reviews supported at least one of the following: Banning sweetened beverages and reducing portion sizes, fat content and frequency of selling unhealthy snacks and competitive food while increasing the availability and accessibility of fresh fruits and vegetables, water and healthy snacks and reducing their prices (35, 56, 61, 63-67). A systematic review concluded that banning Sugar Sweetened Beverage (SSB) requires school-based education, follow-up modules, peer support, providing water and other healthy beverages alternatives (66). For the competitive food, color labeling, reducing the portion, package, individual unit or tableware size produced small to moderate effect of food consumption (35, 64). A systematic review has shown that adequate funding and subsidizing programs or policies for schools to promote fruits and vegetables intakes is very effective in improving the dietary intake of students (Jaime & Lock, 2009).
- A systematic review and two reviews supported the need for providing school meals and setting contextualized nutritional guidelines for the available schools meals programs (1, 61, 62, 68).
- Three systematic reviews, a review and WHO's recommendations supported the need for strict control of all forms of marketing and sponsorship from the private food sector (2, 69, 70), including the exposure to unhealthy food and beverages and also the power of different modes of marketing used, the timing, the placement and

the content of marketing messages (2) and subliminal messages (71). The leadership of the government is needed to develop national statutory legislations, policies and frameworks with clear definitions of sanctions and a system of reporting to ensure compliance with the objectives using clearly defined indicators (2) for controlling marketing and managing conflict of interests (72) and prohibiting voluntary regulations (73, 74). Partnerships with the private sector should not be accepted with high risk parties and without proper mitigation strategies, monitoring and transparency with low risk parties (72).

Element 2

Integrating Nutrition and Physical Activity Programs in the School Curricula and Health Counseling Sessions

Thirteen systematic reviews and five meta-analyses have concluded with enough evidence that the integration of both nutrition and physical activity in the school curricula can reduce child and adolescent's body mass index regardless of the program components (38, 42, 44, 47, 48, 50, 54, 55, 58, 75-77). However, the combination is important, as a meta-analysis has shown that focusing on diet interventions and education alone without physical activity is not effective and leads to the return to the original weight (43). These systematic reviews and meta-analyses have shown the importance of the duration of the interventions, being mostly effective when longer than 1 year (38-47, 50, 53, 54, 58, 76, 78). These facts call for a sustainable and universal nutrition and physical activity program that is integrated within the school curricula (79).

The favorable sub-elements were:

- Fifteen Systematic reviews and WHO recommendations have shown the importance of an integrated school curriculum with nutrition education and body image information, promotion and motivation in different subjects within the existing curriculum (38-49, 53, 55, 58, 76) using theories of behavioral change (48, 58), social marketing (80) and interactive teaching techniques (49). This should be supported with extra nutrition, healthy eating and life skills sessions supporting practical skills to encourage the adoption of a healthy lifestyle delivered by teachers or school staff for behavior change (38-49).
- Fourteen systematics reviews, an overview of systematic reviews, reviews and single studies concluded that school policies to increase physical activity opportunities have great impact on

childhood obesity prevention (38-47, 53, 55, 56, 78, 81-84). These policies call for an integrated school curriculum that has physical activity education along with extra physical activity sessions and opportunities supported by the availability of facilities, space and equipment to increase time spent in playing, recreation and sports (during recess, in class, physical education classes, breaks), allowing physical activity to become a routine. The policies' effectiveness were as follows in a descending order (from the most to the least effective): mandatory physical education sessions, classroom activity breaks, walking/biking to schools, afterschool activity programs, standardized physical education curricula, modified playgrounds, modified recess and finally modifying parks in the community (81, 83).

- Support parents and teachers with knowledge and skills on how to approach children to be more active, eat healthy, and decrease screen time (48). According to twelve systematic reviews and meta-analysis, a key element to the success of any intervention for childhood obesity prevention is parental involvement (54, 55, 57, 58, 85). Teaching parents on how to create healthy home environments, how to effectively change behaviors and how to monitor and encourage healthy eating and physical activity are the key learning outcomes for parents (86) to extend the behavior change to families and communities (85). Two systematic reviews identified teachers as the best option for the delivery of these educational sessions (41, 57), but they need to be continuously trained on nutrition education, effective teaching methods, behavior change methods and capacity building for their students (49, 68).

Implementation considerations

Implementation considerations were identified at the level of students, parents, schools, canteen owners, program delivery personnel, government, and researchers. Counterstrategies were also provided for each below.

- Providing fun and interactive session for **students** can increase their level of participation in the activities (87). Assessing the reasons for low **parent's** participation and addressing them is also important (88). Parents will be more willing to accept interventions targeting childhood obesity prevention if these interventions were institutionalized by the government at schools with high levels of **engagement, accountability and confidentiality from the implementers**.

- **Schools'** revenues should not rely on obesogenic food and schools should find other ways for financial sustainability (35). The government can **subsidize** schools and canteen owners for providing healthy food (87). Other market strategies can be applied to reduce the cost.
- Improving school preparedness and their administrative capacity can enhance their financial management.
- Schools should provide guidelines for school lunchboxes for parents.
- Continued training should be provided for **teachers or school personnel** who are providing the interventions, which makes the interventions more sustainable (87, 88). Lebanon has an already established program for training teachers and health educators under the MEHE; and MEHE is currently updating of the training material.
- **Municipalities** and schools should coordinate health awareness and sports competitions along with appropriate after school programs and sports clubs. Municipalities should support in controlling the street vendors and the local shops around the schools.
- Further **research** is needed to assess the best mode of delivering the specific elements in the Lebanese context. Data should be made available (120).
- The Physical Education university degree should be well-promoted and physical education teachers should be incentivized
- Finally, at the **government** level, Ministry of Education to include public, private and technical schools with the newly developed decisions and decrees, including school nutrition policy.
- Develop a comprehensive school nutrition legislation that cuts across **public, private and technical schools** with clear task division, standard operating procedures and incentive /disincentive system (49, 63, 88-90) for proper implementation for all the involved stakeholders (120). A law should be issued to control the **street vendors** and retail stores near the schools and prohibit children from going out of school during school hours (49, 91).
- Schools might implement school-health policies if there was a clear law for it (87, 88). Specific laws should be adopted and monitored for the canteen structure and content.
- Ensure the proper tracking, monitoring and evaluation of the work of health educators, after defining their role and qualifications by MEHE and CERD based on the school health strategy.

- Create a specific multisectoral governance body to collaborate with and coordinate the work of different local, regional and international partners for funding, resources and support in the implementation (120) and evaluation of the programs (49, 63, 88, 90).
- The government should develop a policy for the **food industry** to change the constituents and packaging of the products directed to school consumption (90). New products should be tasty and appealing for children. This policy should also control the marketing, sponsorship and conflict of interest.

موجز للسياسات الصحية العامة

تعريف المشكلة

في السنوات الأخيرة تضاعفت نسبة الوزن الزائد والبدانة لدى الأطفال في لبنان لتصل الى واحدة من أعلى المعدلات المسجلة في المنطقة. وبما أن الأمراض المزمنة تعد، حالياً، السبب الرئيسي للوفاة في لبنان، فوباء بدانة الأطفال يثقل كاهل الأطفال والأهل باكراً. ومع استمرار البدانة واحتمال الإصابة بأمراض غير معدية في مرحلة البلوغ وفي ما بعد، مرحلة الرشد، فأصبحت هذه الظاهرة تشكل عبئاً إضافياً على نظام الرعاية الصحية.

حجم المشكلة

بدانة الاطفال تعتبر من أولويات الصحة العامة في منطقة الشرق الأوسط (*6*). وفي لبنان، تم إجراء آخر دراسة استقصائية وطنية في عام *2009*، عن الأطفال في المدارس الذين تتراوح أعمارهم بين السادسة والتاسعة عشرة؛ وقد اظهرت النتائج أن 32.1٪ من هؤلاء عانوا من الوزن الزائد والبدانة، وأن نسبة الذين يعانون من البدانة بلغت 10.9٪ (*7*). وعن عدد الاطفال الذين تتراوح أعمارهم بين الخامسة والتاسعة عشرة من العمر حسب النشرة الإحصائية التي صدرت عن وزارة الصحة العامة في عام *2013*، تترجم هذه النسب المئوية بالأرقام كالتالي: *400,000* طفل يعاني من الوزن الزائد والبدانة من بينهم *152,000* طفل يعاني من البدانة. في حين أن المعدل الحالي لانتشار البدانة، في أوساط هذه الفئة العمرية، أدنى من المعدل المسجل في الولايات المتحدة (*17.7* %)، لكنه أعلى من نسبة بدانة الاطفال في سوريا (*11.1* %) والمملكة العربية السعودية *(5.7%)* وفرنسا *(5%)* وإيران *(1.8%) (13-8)*. ووفق دراسة مقارِنة *(14)* أُجريت بين العام *2009-1997* ، شهد لبنان ارتفاعا ملحوظاً في نسبة بدانة الأطفال *(7.3%)* في عام *1997* مقابل *(10.9%)*في عام *2009 (7)*.

علاوة على ذلك، تجاوزت نسبة زيادة الوزن وبدانة الأطفال السنوية في لبنان (+6.7%) الاتجاه العالمي (+5.6%)(*51*)، ما يعني أن وباء البدانة وزيادة الوزن سيستمر بالانتشار ما لم يتم تبنّي حلول جدّية.

ووفق أحدث مسح صحّي شمل طلاب المدارس في لبنان (2017)، بلغت نسبة الوزن الزائد والبدانة بين الطلاب الذين تتراوح أعمارهم بين الثالثة عشرة والسابعة عشرة *24.6%* و *5.9%* على التوالي *(16)*.

ترتبط بدانة الاطفال بعدد من العواقب الخطرة، القصيرة والطويلة الأمد، الا أنه من الممكن تفاديها من خلال تطبيق مداخلات وسياسات صائبة (17). ومن المضاعفات القصيرة الأمد، التأثير عل نوعية حياة الطفل وتحصيله العلمي وصحته . تتضمّن المضاعفات الصحية، في الدرجة الأولى، مشاكل في عملية الأيض وتسجيل معدلات عالية من السكر في الدم والدهون الثلاثية والكوليسترول وزيادة في مقاومة الأنسولين، وارتفاع في ضغط الدم ومتلازمة الأيض (20-17). وقد ثبت انتشار هذه العوارض بين أطفال المدارس الذين يعانون من الوزن الزائد والبدانة في لبنان (*21-24*) .أما بالنسبة للمضاعفات الطويلة الأمد، لطالما شكلت بدانة الاطفال أحد العوامل الخطيرة للإصابة بالبدانة في مرحلة الرشد (26-25) بالإضافة الى أنها مرتبطة بالأمراض المزمنة، مثل داء السكري وأمراض القلب والشرايين وبعض أنواع السرطان .وفي لبنان تعد الأمراض المزمنة السبب الرئيسي للوفاة، وهي مسؤولة عن ٨٥ ٪ من مجمل الوفيات (27).

فضلاً عن ذلك، تؤدي بدانة الأطفال الى عواقب على الصحة النفسية، فقد يصبح الطفل عرضة للوصمة الاجتماعية السلبية، انعدام الثقة بالنفس والاكتئاب واضطرابات نفسية أخرى (26-25). وفي لبنان، تتسبب هذه الاضطرابات باعتماد حميات غير صحية وخطرة لخسارة الوزن وتناول عقاقير، خصوصاً بين الفتيات (24).

على الصعيد الاقتصادي، ترتفع تكاليف الرعاية الصحية لبدانة الأطفال تزامناً مع ارتفاع نسبة البدانة؛ تكون عبر تكاليف مباشرة أو غير مباشرة، أثناء مرحلتَي الطفولة والبلوغ (28).

وقد حددت منظمة الصحة العالمية البدانة من أهم أولويات أهداف التغذية العالمية التي يجب التصدي لها بحلول عام 2025. ويتمثل هذا الهدف بوضع حد لارتفاع نسبة الوزن الزائد لدى الأطفال (20). بالإضافة الى ذلك، ان تفادي البدانة بين الأطفال تعتبر احدى أولى أولويات وزارة التربية والتعليم العالي في لبنان حيث تعمل الوزارة على تأمين شروط الصحة المدرسية منذ عام 1985. كما وأن الأهداف الاستراتيجية اللبنانية لوزارة الصحة العامة للوقاية من الأمراض المزمنة ومكافحتها ما بين عامَي *2016-2020*، قد ركزت على تشجيع أساليب العيش الصحية، عبر استهداف الحميات غير الصحية والخمول البدني، والسياسات الرامية إلى منع تسويق الحميات غير الصحية، ودعم المدارس، والمداخلات الداعمة للسلامة الصحية. كما ودعمت هذه الاستراتيجية إعداد موجزات للسياسات من أجل الوقاية من الأمراض المزمنة ومكافحتها. وعلاوة على ذلك، وضعت وزارة الصحة العامة ووزارة التربية والتعليم العالي استراتيجية مشتركة للمدارس الرسمية في سبيل التصدي لأكثر التحديات

الضاغطة المتعلقة بالصحة المدرسية، مستهدفةً عوامل متعددة لمكافحة بدانة الأطفال.

العوامل المسببة

على الصعيد البيولوجي، ثَبت أن التركيبة الجينية تُعرّض حاملها للبدانة في الشهور الاولى من العمر وتزيد من خطورة تعرضه لزيادة الوزن في مراحل عمره اللاحقة (*29*). كما أن فترة نمو الجنين ومرحلة الحمل والرضاعة الطبيعية ومرحلة الطفولة المبكرة تشكل جميعُها فترات حرجة قد تزيد خلالها قابلية السمنة لدى الأطفال (30-31).

بيد أن هذه العوامل التي تعرّض صاحبها للبدانة ليست العامل الوحيد المسؤول عن التزايد السريع لنسبة بدانة لأطفال. إذ إنه ثمة عوامل سلوكية مرتبطة بعادات الأكل والنشاط الجسدي والبيئة المحيطة، اضافة الى وسائل الاعلام والمجتمع والبيئة الاقتصادية والغذاء، وهذه العوامل هي التي تقرر إذا كان وزن الشخص الذي لديه قابلية للإصابة بالبدانة، سيزداد في مراحل لاحقة من حياته أم لا (31-29).

وعلى مستوى سلوك الفرد، فمن شأن السلوكيات المتعلقة بالغذاء والنشاط البدني أن تؤدي إلى اختلال في توازن الطاقة وبالتالي إلى البدانة. لقد تبنّى المراهقون في لبنان النمط الغذائي الغربي تزامناً مع النقلة التغذوية التي نشهدها، ما يعرضهم لمزيد من المخاطر الصحية والبدانة مقارنة بأولئك الذين يتّبعون النمط الغذائي اللبناني التقليدي (*32*). في الواقع، وبناء على دراسة أُجريت في لبنان، تم تحديد مؤشرات البدانة في أوساط الأطفال، وشملت: نمط الحياة الخامل والاستغناء عن وجبة الفطور وزيادة حصة المشروبات المحلاة والوجبات السريعة (*33*). ارتفعت نسبة الخمول بين المراهقين في لبنان على نحو مثير للقلق، فقفزت من 19.9% في عام 1997 إلى 70.5% في عام 2009 (*7*). من ناحية أخرى، ورد في المسح الصحي العالمي لطلبة المدارس للعام 2017 أن 47.7% من الطلاب اللبنانيين ما بين سن الثالثة عشرة والسابعة عشرة، يتناولون مشروباً غازياً واحداً على الأقل يومياً (*16*). بالإضافة الى أن المراهقين اللبنانيين الذين يتبنون نمط الغذاء الغربي يتصفّون بدرجة أكبر من الخمول وغالباً ما يستغنون عن وجبة الفطور (*32*).

أما على مستوى البيئة المحيطة، فترتبط البيئة المسمنة ببدانة الأطفال (34-35). إذ أن سبب اختلال توازن الطاقة وبالتالي البدانة يعود إلى تغيرات في عوامل لها علاقة بنوعية الطعام وتوافر المنتجات الغذائية وتيسرها واتاحتها وتسويقها وأسعارها، فضلاً عن العوامل التي تعيق القيام بالنشاط البدني الكافي؛ ومن المنظور الأوسع، فإن من شأن العولمة والثورة التكنولوجية وسياسة دعم الغذاء والتنامي في

السوق العالمي للأطعمة السريعة وحملات التسويق المكثفة التي تستهدف الأطفال تفاقم مشكلة البيئة المسمنة. وفي لبنان، لا يوجد تطبيق لقانون لمراقبة عملية تسويق الأطعمة والمنتجات الغذائية على أي مستوى من المستويات بما فيها المدارس، على الرغم من وجود قانون لضبط عملية التسويق بشكل عام ولحليب الأطفال الصناعي. ومن المنظور المحلي، تتاح للأطفال الأطعمة المصنعة وذات القيمة الغذائية المتدنية والغنية بالسعرات الحرارية بسهولة، ولقاء أسعار معقولة، أينما ذهبوا، خاصة في المدارس التي يقضون فيها معظم أوقاتهم. كما تقل الفرص التي تتيح للطفل أن يمارس النشاط الجسدي في المدرسة وخارجها بسبب التركيبة البنائية للمدارس والأحياء المكتظة وانشغال القيمين على المدارس بالأداء الأكاديمي لطلابهم على حساب دراسة التربية البدنية، إضافة إلى الاعتماد المتزايد على التكنولوجيا ووسائل نقل وقضاء أوقات الفراغ أمام الشاشة (29-20).

وإذا بحثنا في أسباب بدانة الأطفال نجد أنها متعددة العوامل (*7*)؛ وتتطلب الإجراءات اللازمة لمكافحة هذا الوباء على مستويات عدة. وتوجد أدلة جازمة تربط البدانة بالنظام الغذائي والنشاط الجسدي والنمو الاقتصادي -الاجتماعي والتغيرات في العوامل البنيوية والبيئية كالمحيط المعيشي المدرسي (*36*). ومع الإقرار بالحاجة الى تدخلات متعددة القطاعات والمستويات في سبيل مكافحة بدانة الأطفال (*37*)، تشكّل المدارس نقطة انطلاق هامة ومؤثرة (*20,39*) لوجود أدلة عديدة عن فعالية برامج الأنشطة البدنية، والتغيرات البيئية، وتدخل الأهل (38-50). وفي لبنان، أظهرت دراسة سابقة على المستوى المدرسي، بهدف خفض نسبة البدانة والحد منها، أن العجز عن تغيير البيئة المدرسية أعاق تحقيق النتائج الإيجابية على مستوى صحة الأطفال (*51*).

عناصر سياسة شاملة في المدارس اللبنانية لضبط زيادة بدانة الأطفال والحد منها:

العنصر الأول: نص وضبط معايير المنتوجات الغذائية والمشروبات الموجودة في حوانيت (كانتين) وكفيتيريا المدرسة وآليات البيع فيها، وطرق توفرها والوصول اليها وأسعارها وتسويقها.

أربع عشرة مراجعة منهجية وأربعة تحاليل تجميعية (*meta analysis*) ومراجعة عامة لمراجعات منهجية *(36, 41-45, 48, 50, 52-58)* أثبتت أهمية تحسين البيئة المدرسية. ومن المحبّذ رفع سياسات التغيرات البيئية إلى المستوى الوطني (*36*). في الواقع، بدا أن المقومات الناجحة منسوبة، وإلى حد كبير، إلى تطوير

سياسات غذائية مدرسية وطنية وسياسات حكومية وتطبيقها، بهدف تبديل الأغذية غير الصحية المتواجدة في الحوانيت والكافتيريا *(35, 39, 40, 42, 44, 55, 58-66)*.

على العموم، كانت العناصر الثانوية المحبذة كالتالي:

أ. دعمت ثماني مراجعات منهجية واحداً من العناصر التالية على الأقل: حظر المشروبات المحلاة وتقليل أحجام الحصص ونسبة الدهون ونسبة الإقبال المتكرر على بيع الوجبات الخفيفة غير الصحية، مقابل زيادة توافر الفواكه والخضار الطازجة والماء والوجبات الخفيفة الصحية وتسهيل الوصول اليها، وخفض اسعارها *(36, 56, 61, 63-67)*. وقد خلُصت إحدى المراجعات المنهجية إلى أن حظر المشروبات الغازية يتطلب تربية مدرسية ووحدات متابعة ودعم الأفران واستبدال الماء بهذه المشروبات، وبدائل أخرى من المشروبات الصحية (*66*). وبالنسبة للغذاء التنافسي، يفضل تصنيف ميزات المنتج وتقليل الحصة وتصغير حجم العبوة والوحدة الفردية بحيث تكون كمية الطعام المستهلكة معتدلة (*35, 64*). كما اظهرت إحدى المراجعات المنهجية فعالية التمويل الكافي وبرامج الإعانات أو السياسات المدرسية للتشجيع على تناول الفواكه والخضار كما وتصريف المحصول الزراعي المحلي في المدارس *(61)*.

ب. أيدت إحدى المراجعات المنهجية ومراجعتان منفصلتان الحاجة إلى تأمين وجبات مدرسية ووضع قواعد ارشادية غذائية وطنية للتغذية السليمة للأطفال كما ولبرامج وجبات المدارس المتوفرة *(1, 61, 62, 68)*.

ت. أيدت ثلاث مراجعات منهجية وإحدى المراجعات الأخرى وتوصيات منظمة الصحة العالمية الحاجة إلى القيام بمراقبة مشددة على سبل التسويق والرعاية من قبل قطاع الغذاء الخاص *(2,69, 70)*، وتشمل التعرف إلى المأكولات والمشروبات غير الصحية إضافةً إلى تحديد الأساليب المختلفة للتسويق الأكثر فعاليةً والتدقيق في الرسائل التسويقية العلنية والمبطنة، ووظيفتها ومضمونها *(2,71)*. وقيادة الحكومة ضرورية لوضع قوانين وطنية، سياسات وأطر عمل، مع تعريف واضح للعقوبات المفروضة، ونظام إبلاغ لضمان الالتزام بالأهداف واعتماد مؤشرات محددة بوضوح *(2)* لمراقبة عملية التسويق ومعالجة مسألة تضارب المصالح *(72)*. يستلزم من الحكومة وضع بنود واضحة للعقوبات، وحظر التنظيم الطوعي من قبل قطاع الغذاء الخاص *(73,74)*. ولا ينبغي القبول بشراكات قد تُعد خطرة مع القطاع الخاص. وعند العمل مع أطراف آمنة,

يجب اعتماد استراتيجيات لتخفيف المخاطر والقيام بالمراقبة والاتسام بالشفافية (*72*).

العنصر الثاني: دمج مادتي التغذية والنشاط البدني في المناهج المدرسية كما وادخالها في مناهج الارشاد الصحي

خلُصت ثلاث عشرة مراجعة منهجية وخمسة تحاليل تجميعية (*meta analysis*) مدعّمة بدلائل كافية إلى أن دمج مادتي التغذية والنشاط البدني في المناهج المدرسية من شأنه خفض مؤشر كتلة الجسم لدى الطفل والمراهق بغض النظر عن محتوى كل من هاتين المادتين *(38, 42, 44, 47, 48, 50, 54, 58, 75-77)* . بيد أن للجمع بينهما أهمية وفائدة كما ثبت في التحاليل؛ فالتركيز على تدخلات الحمية الغذائية والتثقيف من دون النشاط البدني ليس أمراً فعالاً ويؤدي إلى العودة الى الوزن السابق *(43)*. وأظهرت هذه المراجعات المنهجية والتحاليل التجميعية (*meta analysis*) أهمية تحديد المدة الزمنية لهذه التدخلات بحيث تزيد درجة فعاليتها لدى اعتمادها أكثر من عام واحد *(38-47, 50, 53, 54, 58, 76, 78)* . وتستدعي هذه الحقائق وضع برنامج وطني ومستدام للتغذية والأنشطة البدنية يُدمَج في المناهج المدرسية *(79)*. وكانت العناصر الثانوية المحبذة كالآتي:

أ. اظهرت خمس عشرة مراجعة منهجية وتوصيات منظمة الصحة العالمية أهمية وجود منهاج مدرسي متكامل تدخل فيه مواضيع التغذية وتلقين معلومات عن صورة الجسد وتعزيزها وتحفيزها، في مواد مختلفة ضمن المنهاج الحالي *(28-49, 53, 55, 58, 76)* وذلك عبر اعتماد نظريات التغيير السلوكي (*48,58*) والتسويق الاجتماعي (*80*) وتقنيات تفاعلية في التعليم (*49*). ويجدر دعم كل هذا من خلال اتبّاع حصص دراسية إضافية للإرشاد الصحي عن التغذية وتناول الأطعمة الصحية ومهارات العيش، لتدعيم المهارات العملية التي تشجع على تبني أسلوب عيش صحي. ويقدم هذه المعلومات اساتذة أو أفراد من الجهاز التعليمي بهدف تغيير السلوكيات *(38-49)*.

ب. خلصت أربع عشرة مراجعة منهجية ومراجعة عامة لمراجعات منهجية ودراسات منفصلة إلى الأثر الكبير للسياسات المدرسية الرامية إلى زيادة فرص القيام بالأنشطة البدنية للحد من بدانة الأطفال *(38-47, 53, 55, 56, 78, 84-81)*. وتدعو هذه السياسات إلى وجود منهاج دراسي متكامل يتضمن النشاطات البدنية مع إعطاء حصص دراسية إضافية، وتُدعَم هذه الدروس بتوفر المساحات اللازمة لها والمعدات الكافية، للتكثيف من

أوقات اللعب والترفيه وممارسة الرياضة الآمنة (في فترات الاستراحة وفي الصف وفي حصص التربية البدنية والفسحة)، ما يجعل النشاط البدني عملاً روتينياً اعتياديا. وجاءت درجات فعالية هذه السياسات وفق الترتيب التنازلي كالتالي (من أكثر إلى أقل): الفصول الدراسية الإلزامية في مادة التربية البدنية، نشاطات صفية بين الحصص، الذهاب إلى المدرسة سيراً على الأقدام/بالدراجة، برامج بعد الدوام الدراسي؛ مناهج تربية بدنية موحدة؛ ملاعب مؤهلة؛ فترات استراحة منصفة؛ وأخيراً تأهيل الحدائق العامة في الوحدات السكنية *(83-81)*.

ت. تزويد الأهل والمعلمين بالمعارف والمهارات المتعلقة بكيفية لفت انتباه الأطفال إلى النشاط الجسدي وتناول مأكولات صحية وتقليل أوقات جلوسهم أمام الشاشة *(48)*. وفق ما خلصت إليه اثنتا عشرة مراجعة منهجية واثنا عشر تحليل تجميعي (*meta analysis*)، وتتمثل إحدى العناصر الأساسية لإنجاح أي نوع من التدخلات للحد من بدانة الأطفال بتدخل الأبوين *(85 ,58 ,57 ,55 ,54)*. إذ إن تعليم الأهل كيفية خلق أجواء بيئية منزلية صحية وكيفية تغيير السلوكيات بفعالية وكيفية مراقبة أطفالهم وحثّهم على تناول المأكولات الصحية والقيام بالنشاطات البدنية *(86)*، لنشر عملية تغيير السلوكيات هذه وايصالنا إلى الأسر والمجتمعات المحلية *(85)*. وقد وصفت مراجعتان منهجيتان المعلمين بالخيار الأمثل لإعطاء هذه الحصص الدراسية *(41, 57)*، ولكنهم بحاجة إلى التدريب المستمر في ما يتعلق بالتربية الغذائية وبطرق التعليم الفعالة وبطرق التغيير السلوكي وببناء القدرات لتعليم طلابهم *(49 & 68)*. بيد أن واحدة من المراجعات المنهجية خلُصت إلى أن التدخلات البنيوية تفيد الفتيان أكثر من الفتيات، عكس التدخلات السلوكية التي تفيد الفتيات أكثر.

ما هي العوامل التي يجب أخذها بعين الاعتبار عند التطبيق العملي؟

تم تحديد اعتبارات التطبيق على مستوى الطلاب والأهالي والمدارس وأصحاب الكانتينات والأفراد الذين يدرسون المواد والحكومة والباحثين. كما توفرت استراتيجيات مضادة لكل منها:

← إعطاء حصة مدرسية متسمة بأجواء التفاعل والمرح للطلّاب، أمر من شأنه رفع مستوى المشاركة في النشاطات (87). وما لا يقل أهمية عن هذا هو القيام بتقييم أسباب عدم مشاركة الأهل ومعالجتها (88). إذ أن الأهل أكثر استعداداً

لتقبل السياسات للحد من بدانة الأطفال لو أضفت الحكومة عليها التابع المؤسسي في المدارس بالترافق مع مستويات عالية من المشاركة والمساءلة والخصوصية من قبل المنفذين.

- يجب أن لا تعتمد ايرادات المدارس على بيع الطعام غير الصحي؛ بل على المدارس إيجاد سبل أخرى لتحقيق الاستدامة المالية (35). إذ بإمكان الحكومة إعطاء اعانات للمدارس ولأصحاب الحوانيت (الكانتينات) لقاء تأمين الغذاء الصحي (87). ومن الممكن تطبيق استراتيجيات أخرى لتقليل الكلفة.
- تحسين مستوى جهوزية المدارس وقدرتها الإدارية من شأنه تعزيز ادارتها المالية.
- يجدر بالمدارس تقديم قواعد ارشادية للأهل في ما يتعلق بالتركيبة الصحية لوجبة الطعام المدرسية.
- دعم التدريبات المستمرة للمعلمين وأفراد الجهاز التعليمي والمرشدين الصحيين من قبل وزارة التربية، حيث يقدمون المعلومات اللازمة حول التدخلات، ما يجعل هذه الأخيرة أكثر استدامة (88 ,87). في حين أن الوزارة تعمل حالياً على تحديث هذا المنهاج.
- على البلديات والمدارس تنسيق التوعية الصحية والمسابقات الرياضية مع برامج رياضية مناسبة، وعلى البلديات المساعدة على مراقبة الباعة المتجولين والدكاكين المجاورة للمدارس.
- ثمة حاجة إلى إجراء أبحاث ودراسات إضافية لتقييم الأساليب الأمثل لتوصيل المعلومات وتطبيق العناصر المحددة في السياق اللبناني. كما ويجب الحث على مشاركة البيانات اللازمة لإجراء هذه الدراسات (120).
- يجب دعم الشهادة الجامعية في مادة التربية البدنية وتحفيز مدرّسي هذه المادة.
- وأخيراً، وعلى مستوى الدولة، شمل المدارس الرسمية والخاصة والتقنية في السياسات والقرارات المنبثقة عن وزارة التربية، من ضمنها سياسة الصحة المدرسية.
- سن قوانين ملزِمة وموحدة للتغذية المدرسية، تشمل المدارس الرسمية والخاصة والتقنية تتسم بتحديد المهام بوضوح وبإجراءات تشغيل قياسية وبنظام المحفزات والعقوبات (90-88 ,63 ,49) كي يتم التنفيذ بالنحو الصائب من قبل جميع المعنيين (120). ويجب إصدار قانون لمراقبة الباعة المتجولين ومتاجر البيع بالتجزئة المجاورة للمدارس وحظر الأطفال من مغادرة المدرسة خلال الدوام (91 & 49).

- ← باستطاعة القيمين على المدارس تطبيق السياسات الصحية المدرسية إذا وجد قانون واضح لذلك (88-87). يجب تبني قوانين محددة ومتابعة تنفيذها في ما يخص بناء الحانوت (الكانتين) المدرسي ومحتواه.
- ← متابعة تدريبات المرشدين الصحيين وسير عملهم وتقييمهم الدائم، بعد تحديد دورهم، ومؤهلاتهم، وضمان اتّباعهم للمسار الصائب من قبل وزارة التربية والتعليم العالي ومركز البحوث والتطوير التربوي (CERD)، بالاستناد الى استراتيجية الصحة المدرسية.
- ← على الدولة وضع سياسة لصناعة الغذاء بهدف تغيير مكونات المنتجات الموجهة للاستهلاك المدرسي وتعليبها (90). كما ينبغي أن تكون المنتجات الجديدة لذيذة وجاذبة للأطفال. ومن أهداف هذه السياسة ضبط التسويق والرعاية المالية وتضارب المصالح مع القطاع الخاص.
- ← إنشاء مجلس إدارة محدد ومتعدد القطاعات للتعاون مع مختلف الشركاء الإقليميين والدوليين وتنسيق العمل معهم (120) من أجل الحصول على ما يلزم من الأموال والموارد والدعم لتنفيذ البرامج وتقييمها (90 ,88 ,63 ,49).

Content

K2P Policy Brief- Full report

The Problem

In recent years, there has been an alarming increase in overweight and obesity among children in Lebanon. With one of the highest percentages in the region, childhood obesity in Lebanon has almost doubled in the past decade. With NCDs currently considered as the primary cause of death in Lebanon, the epidemic of childhood obesity prematurely burdens children and their parents. Furthermore, obesity and non-communicable diseases are protracted to adulthood, thus encumbering the healthcare system as well.

Size of the Problem

Childhood obesity is a major public health concern in the Eastern Mediterranean Region (6). Globally, approximately 10% of school-aged children suffer from childhood obesity and the percentages are only on the rise (15). In Lebanon, the latest nationally representative survey of school-aged children in 2009, for 6-19 years old, showed that 32.1% were overweight and obese, while 10.9% were classified as obese (7). According to the number of children 5-19 years old from the statistical bulletin of the Ministry of Public Health (MoPH) in 2013, the current prevalence translates to approximately 400,000 overweight and obese children and approximately 152,000 obese children. Overweight and obesity were higher among boys, especially in adolescence; boys were five times more likely to be obese than adolescent girls (36). The prevalence of obesity among this age group is lower than the US (17.7%) but higher than Syria (11.1%), KSA (5.7%), France (5%) and Iran (1.8%) (8-13). Furthermore, in a comparison study between 2009 and 1997, Lebanon has witnessed approximately a 2 fold increase in childhood obesity in 2009 (7.3% in 1997 vs. 13.2% in 2009) (7). Similarly, abdominal obesity among this age group has

Background to Policy Brief

A K2P Policy Brief brings together global research evidence, local evidence and context-specific knowledge to inform deliberations about health policies and programs. It is prepared by synthesizing and contextualizing the best available evidence about the problem and viable solutions and options through the involvement of content experts, policymakers and stakeholders.

The preparation of the Policy Brief involved the following steps:

1) *Selecting a priority topic according to K2P criteria*
2) *Selecting a working team who deliberates to develop an outline for the policy brief and oversee the litmus testing phase.*
3) *Developing and refining the outline, particularly the framing of the problem and the viable elements*
4) *Litmus testing by conducting one to one interviews with up to 15 selected policymakers and stakeholders to frame the problem and make sure all aspects are addressed.*
5) *Identifying, appraising and synthesizing relevant research evidence about the problem, elements, and implementation considerations*
6) *Drafting the brief in such a way as to present concisely and in accessible language the global and local research evidence.*
7) *Undergoing merit review*
8) *Conducting Citizen Consultations on the draft Policy Brief and updating it accordingly*
9) *Finalizing the Policy Brief based on the input of merit reviewers, translating into Arabic, validating translation, and disseminating through policy dialogues and other mechanisms.*
10) *Implementing Evidence Informed Advocacy plan through consulting with an Impact team and mobilizing more than 35 policy makers and influencers along with the public.*
11) *Finalizing the Policy Brief based on the input of merit reviewers, the Collaborators, translating into Arabic, validating translation, and disseminating through policy dialogues and other mechanisms.*

increased from 8.5% to 14% (36). Moreover, the annual increase in Lebanon of +6.7% is higher than the world trend of +5.6% (15), which means that this epidemic will continue to rise if serious interventions are not adopted.

In the most recent Global School-Based Student Health Survey in Lebanon (2017), the percentage of overweight and obesity among 13-17 yrs. old students was 24.6% and 5.9% respectively (16). While comparing the GSHS 2011 to the GSHS 2017 data, the prevalence of overweight among 13-15 yrs. old students increased from 24.1% to 25.6% while the prevalence of obesity slightly decreased from 6.7% to 6.4% (16, 92). Nonetheless, the trends of overweight and obesity were different for females and males. The percentage of overweight and obesity appeared to have increased among 13-15 yrs. old female students (from 14.1% to 21.4% for overweight, and from 4.2% to 5.6% for obesity) and decreased among their male peers (from 34% to 30.1% for overweight, and from 9.1% to 7.2% for obesity) (16, 92).

Pediatric obesity is associated with a number of serious short and long term consequences that can be prevented through implementing proper interventions and policies (17). Short term complications affect child's quality of life, educational attainment and health (17). Overweight and obese youth had more sick days from school than normal weight ones by 36% and 37% respectively (93). Furthermore, obesity has been associated with a lower school performance (94). Health complications are mainly comprised of metabolic abnormalities including elevated blood glucose levels, triglyceride and blood cholesterol, insulin resistance, hypertension, and metabolic syndrome (17-20). In fact, type 2 diabetes, which has been widely known as a disease that occurs during adulthood, has been increasing among children as well due to obesity (23, 95). These health and metabolic consequences have been proven to be prevalent among obese and overweight school children in Lebanon (21-24). The prevalence of metabolic syndrome among obese children in Lebanon is 26.4%, higher than that of Emirati obese boys of 13% (87). Furthermore, in a pilot study among Lebanese schoolchildren, 37% of overweight children had abnormal blood glucose levels (23).

Additionally, childhood obesity is associated with stigmatization, low self-esteem, depression and other psychological disturbances (25, 26). In Lebanon, obesity-related distress can also heighten the risk of the use of unhealthy weight loss diets and drugs, especially among girls (24).

As for the long term complications, childhood obesity has been considered as a strong risk factor for adult obesity (25, 26). Furthermore, it is associated with adult non-communicable diseases like diabetes, cardiovascular diseases and some kinds of cancer. In Lebanon, NCDs are considered the leading causes of death accounting for 85% of the deaths (27) (Annex 1).

On the economic level, healthcare costs because of childhood obesity increase with an increase in the prevalence of obesity; those costs can come from direct healthcare or indirect costs during both, childhood and adulthood (28). In the US, the direct annual medical costs of childhood obesity was estimated to be $14.1 billion, mainly attributed to outpatient visits, prescription drugs, mental health visits and emergency room visits (28). In Germany, the indirect lifetime costs per person attributed to childhood obesity were estimated to be €4,209 for men and €2,445 for women (96).

WHO identified childhood obesity as one of the top priority Global Nutrition Targets to be addressed by 2025. The global target is to end the increase in childhood overweight (20). MEHE has identified school health as one of their priorities since 1985 with multiple activities put forward to address this priority. Furthermore, the Lebanese strategic objectives for NCD prevention and control for 2016-2020, set by the MoPH, included an element specifically targeting the prevention of childhood obesity through promoting healthy schools interventions. MOPH and MEHE has developed a joint school health strategy to address the most pressing school health concerns in Lebanon.

Underlying Factors

The underlying factors of obesity are numerous, multifactorial and interconnected. Some factors are modifiable, while others are non-modifiable.

At the **biological level**, the genetic make-up has been proven to predispose obesity in the first months of life and increase the risk of weight gain later in life (29). Biological processes like the hormonal regulations for hunger and satiety can also affect and be affected by the level of fatness in the body (97). Obesity predispositions occur throughout the life span (30, 31). Fetal growth is a critical period for obesity susceptibility. Maternal factors during pregnancy such as pregnancy weight gain, diabetes, inadequate fetal growth patterns and both low and high birth weight have been associated with childhood and adulthood obesity (30, 31). Breastfeeding and healthy weaning practices have also been associated with less risk of obesity among children (30, 31). The life span effect of obesity can also predispose obese mothers to having low birth weight and obese children (30, 31) by at least 10% more (98). Thus, the lifespan and biological cycle of obesity is a vicious cycle.

However, these predisposing factors are not the only blame for the rapid increase in childhood obesity. Behavioral factors associated with eating and physical activity and environmental factors associated with the infrastructure, media, society, economy and food allow people with biological predisposition to either gain weight later in life or not (29-31).

At the **individual behavioral level**, behaviors related to eating and physical activity can lead to energy imbalance and therefore, obesity. Lebanon has undergone the nutrition transition into a more westernized dietary pattern characterized by increased intake of fat, fast food and red meat and a reduced intake of fruits, vegetables and legumes (6). The western dietary pattern has been associated with obesity and non-communicable diseases (6). In fact, Lebanese adolescents with a western dietary pattern were more likely to be obese than those with the traditional Lebanese eating pattern (32). A study conducted in 2014 in Lebanon identified the predictors of obesity among children including, but are not limited to, sedentary lifestyle, skipping breakfast, and the higher intake of sugar sweetened beverages and fast food (33). The sedentary behavior among adolescents in Lebanon has increased alarmingly from 19.9% in 1997 to 60.5% in 2009 (7). Furthermore, the Global School-Based Student Health Survey in 2017 in Lebanon reported that only 13.2% of students 13-17 yrs. old were physically active at least 60 mins per day for the last week and around 47.7% of students 13-17 years old drink at least one carbonated soft drink per day (16). Lebanese adolescents who adopt a western dietary pattern are also more sedentary and often tend to skip breakfast (32).

At the **environmental level**, obesogenic environments are associated with childhood obesity. In recent years, there has been an increased recognition that obesity is not only a result of lifestyle and behavioral factors, but also obesogenic environments that are outside the individual's control that may enhance or hinder having a healthy lifestyle (34, 35). Energy imbalance, and subsequently obesity can be a result of changes in factors related to the food type, availability, accessibility, affordability and marketing of food products, as well as factors that hinder adequate physical activity. From the wider scope, globalization, the technological revolution, food subsidy policy, the high spurt in international fast food market and the intensive marketing campaigns targeting children can affect these factors. From the local scope, energy-dense, nutrient-poor and processed foods are readily available for children in affordable prices anywhere they go, especially in schools where they spend most of their days. Physical activity opportunities are reduced both in schools and outside because of the structural setup of many schools and neighborhoods, the preoccupation of schools with the academic performance of their students on the expense of the physical activity sessions, and the increased reliance on technology, motorized transport and screen-based leisure time (20, 29).

Values and norms shape the perception of the body-image and shape of children and adolescents (20). In some Lebanese cultures, obesity or "fluffiness" is considered the norm, whereas in others, obese children are stigmatized, especially females (24). Parental socioeconomic status and

education are other predictors of childhood obesity in Lebanon (33). Parents act as the child's role model in relation to body image, nutrition and physical activity practices (99). Excess weight among parents can create the normative image in a child's mind about body weight. Parents do not always perceive the issue of their children's obesity as a priority and tend to underestimate their weight status, for example by thinking that the child will out-grow the excess weight, they often do not take the necessary steps to control their child's weight gain (99).

Obesity, hence, is the result of the combination of multiple factors that affect the individual level behavior. However, changes in the environment around children can allow the healthy choice to become the easier choice (20).

The etiology of childhood obesity is multifactorial (36), and actions to combat this epidemic require multiple interventions. However, there exists strong evidence that it is linked to diet, physical activity, socio-economic development and changes in the environmental factors such as the living and school environment (37). While still acknowledging the need for multilevel, multicomponent and multiphase interventions to combat childhood obesity (38), schools are a critical start (20, 39). Most children are at schools with the compulsory primary education; they spend most of their waking time there; and schools are the platform for eating, physical activity and opportunities for learning about healthy behaviors (39). Thus strategies at schools can reach a large number of students at the same time, have the potential of continuity and the possibility of operational and structural changes (48).

According to multiple systematic reviews, policies and interventions targeting school environment have shown promising results in improving knowledge, attitudes and behaviors related to physical activity and diet. Improvements in body mass index and the prevalence of overweight and obesity have also been reported (26-28, 35, 38, 41, 42, 44, 46, 54-56, 58, 76, 85, 96, 100, 101). However, most of these systematic reviews have concluded that multicomponent interventions at schools are more effective in changing the behavior, reducing and preventing obesity than single component interventions (35, 38, 41, 42, 44, 46, 48, 54, 58, 76, 85, 100, 101). In Lebanon, it has been shown by previous interventions at the school level to reduce and prevent obesity, that the inability to change the environment at schools hindered the positive outcomes (51). Problems encountered were related to the unsustainability of the intervention due to its short duration, the inability of to have healthy food and fruits and vegetables in school, inability to convince canteen owners to stop selling unhealthy food and the structural set-up of the school that prevents having extra physical activity (51).

To our knowledge, there are no written nationally binding policies to control public and private schools' environment and ensure that it is health-conducive, specifically anti-obesogenic (table 1). However, there exists a

Ministerial Decision number 1386/ م /2012 to regulate the investments of public schools' canteens. It mainly focuses on the canteens' contractual agreements and food safety. It also prohibits soft drinks and some types of junk food but allows "Manakeesh", croissant and other high-caloric low-nutritive food. Furthermore, it is issued for public schools only and it is not binding for private and technical schools. According to multiple key informants, there are issues related to its proper implementation and monitoring even among the public schools. Ministerial decisions as well are considered less powerful than decrees and laws, where any minister can cancel it. To be noted that MEHE is currently working on upgrading it into a decree.

Table 1. **The history of Lebanese legislations addressing school nutrition**

Date of issuance	Type of legislation	Number/title of the legislation	Description
Dec 1, 1973	Ministerial decision (cancelled)	1133 "Regulating the investments of the school canteens"	A ministerial decision describing the conditions and policies related to how canteens should be invested in schools. One article mentioned maintaining the healthy conditions within the canteens without detailed description of those conditions.
Feb 16, 2010	Ministerial decision (cancelled)	2004/ م /600 "Regulating the public-school canteen investments"	Amendment to the previous ministerial decision, including: - guidelines for the constituents of the products to be sold in the public-school canteens based on Libnor Standards
Oct 12, 2012	Ministerial decision (currently applicable in public schools, sub-optimal implementation)	2012/ م /1386 "Regulating the public school and high school canteen investments"	Amendment to the 2010 decision: including: There is a special focus on the regulations related to the investment of the canteen. Regarding the nutritional regulations, the decision of 2012 has brought some changes to the earlier decisions: Increase in the minimum investment price per student to 4000 L.L. for elementary school children and 6000 L.L. for high school children instead of 2500 L.L. per student for both levels. Giving the authority for school principals and health educators to monitor the

Date of issuance	Type of legislation	Number/title of the legislation	Description
			canteens. The health educators are required to provide the school principals with a monthly report related to the overall work of the canteen. Changed the guidelines for the constituents of the products to be sold in the public-school canteens (initially based on Libnor Standards). The Annex includes details related to food safety requirements/standards, general nutritional specifications, types of healthy foods to be sold, safety in the management of the canteen, in addition to follow-up and monitoring guidelines (locally, regionally and centrally). Added the need to have a nutrition label on the products

This policy brief aims to tackle the issues reported locally and internationally while targeting childhood obesity at the school level.

Elements of a policy approach to address the problem

Many elements can be selected as a starting point for deliberations designed to inform future initiatives of comprehensive policies to promote effective school policies for childhood obesity prevention. Based on evidence and input from key informant interviews, to promote discussion about potentially viable elements, two elements were selected for more in-depth review, these are:

Element 1: Controlling the Standards, Availability, Accessibility, Affordability and Marketing of the Food and Drinks in the Canteens, Vending Machines and School Cafeterias

Element 2: Integrating Nutrition and Physical Activity Programs in the School Curricula and Health Counseling Sessions

The focus in this section is on what is known about these elements. In the next section, the focus turns to the barriers to adopting and implementing these options and to possible implementation strategies to address the barriers.

Elements

Policy Elements and Implementation Considerations

Element 1

Controlling the Standards, Availability, Affordability, Accessibility and Marketing of the Food and Drinks in the Canteens, Vending Machines and School Cafeterias

Fourteen systematic reviews, four meta-analyses and overview of systematic reviews have studied the effect of the change in school food environment on the healthy behaviors and obesity prevention among schoolchildren. These systematic reviews reinforced the need for changing the school food environment as lifestyle changes to make the healthy choice the easier choice; supporting the goals of nutrition and physical activity education (35, 41-45, 48, 50, 52-58). It is noteworthy that one systematic review found that environmental change policies even by themselves have been proven effective (35).

Environmental change policies have the potential to be scaled up to the national level (35). In fact, the successful components seemed to be largely attributed to the development and implementation of national school food policies and state policies to alter the competitive food available in canteens, cafeterias and vending machines (35, 39, 40, 42-44, 55, 58-62). According to a recent systematic review, the main moderators for the reduction of BMI among children at school were increased PA levels, increased fruit intake and lowered Sugar sweetened beverages intake (57).

The cost effectiveness of these interventions has not been thoroughly studied (102). One study showed that schools lost from their revenue after banning competitive food (35). However, two cost-effectiveness studies showed that school environmental-change policies could be cost-effective without affecting the overall profits (102, 103). It was reported that schools should not rely on the sales of obesogenic food for their revenues, and other sustainable fundraising solutions must be created (35).

In general, the favorable sub-elements were

1. *Banning sweetened beverages and reducing portion sizes, fat content and frequency of selling unhealthy snacks and competitive food while increasing the availability and*

SUMMARY

Element 1
Controlling the Standards, Availability, Affordability, Accessibility and Marketing of the Food and Drinks in the Canteens, Vending Machines and School Cafeterias

Element 2
Integrating Nutrition and Physical Activity Programs in the School Curricula

accessibility of fresh fruits and vegetables, water and healthy snacks and reducing their prices

Sugar sweetened beverages (SSB) have been associated with childhood obesity and the risk of developing Type 2 Diabetes. A systematic review of systematic reviews concluded that higher intake of SSB among children increased their risk for developing overweight and obesity by 55%. Furthermore, one to two servings of SSB increased the risk of developing diabetes by 26%. This systematic review highlighted the importance of focusing on the long-term effects of reducing SSB intake on preventing obesity rather than short-term effects on weight loss; losing already gained weight is harder (67).

An overview of systematic reviews has concluded that policies to reduce SSB at schools are one of the most effective interventions in preventing obesity (56). A systematic review concluded that reducing SSB requires school-based education, follow-up modules, peer support, providing water and other healthy beverages alternatives. These strategies are more likely to improve the effectiveness of school policies for SSB reduction and would aid in their sustainability (56, 66). These results were ascertained by another two high quality systematic reviews concluding that substituting SSB with water and other low-calorie beverages was associated with lower weight gain and lower energy intake (55, 65). However, the uncertainty of the effect of beverages with artificial sweeteners on weight gain rather than weight loss was highlighted (66); similarly, the effect of low-calorie sweeteners and fruit juices with outcomes related to cardio metabolic profile is still inconclusive (104).

As to competitive food, multiple efforts have been done to ban minimally nutritious foods and beverages. A systematic review of systematic reviews found moderate-quality evidence that the exposure of children to a larger portion size can increase their consumption (64). However, reducing the portion, package, individual unit or tableware size produced small to moderate effect on food consumption (64). Nonetheless, an overview of systematic reviews has reported that improvement of overall food environment including removing SSB, snacks high in fat, sugar and salt and reformulation of food to reduce fat content were considered very effective (56). Uncertainty still exists on how much the portion sizes should be reduced (64). Another approach used was the color labeling of the entrees in a canteen with green, yellow and red according to caloric content. It resulted in the reduction in the sales of red-labelled food by half and doubled the sales of green-labelled food (35).

Competitive foods are defined as foods providing less than 5% of the Recommended Dietary Allowances (RDAs) per serving from 8 nutrients: vitamin C, vitamin A, protein, iron, calcium, niacin, riboflavin, and thiamin. Examples include candies, chips, ice cream, crackers, etc.... (1).

It is important to mention that studies that have altered only the competitive food in the canteens or vending machines without the other had no significant improvements (61). And studies that had banning policies for sweetened drinks and chips alone without banning other unhealthy food and providing healthier choices had undesirable effects, as the students compensated by buying other processed food like ice cream or by getting processed food from outside the school (61, 105). A systematic review concluded that policies targeting competitive food should not focus on specific products only, but adopt a whole diet approach of food policies targeting the wide range of food sources consumed by school children (61). Thus, it is important to have a comprehensive school-food policy to reach desirable effects (40, 43, 60, 61, 106).

A systematic review has supported the farm-to-school programs as an effective way for childhood obesity prevention (63). Furthermore, the global strategy of WHO on Diet, Physical activity and Health encouraged the support of local produce in interventions (68). The European Union implemented a policy to increase the supply of fruits and vegetables for schools in an aim to support both healthy eating of children and the agricultural produce of those countries (106). A review of the effectiveness of such a policy have concluded that: 1- It increased fruits and vegetables intake by 70%, 2- Its effects lasted on the long term, 3- It had a positive effect of weight reduction, 4- It reduced inequalities in accessing healthy diet (106).

A systematic review has shown that adequate funding and subsidizing programs or policies for schools to promote fruits and vegetables intake is very effective in improving the dietary intake of students. Nonetheless, little is known about the effect of increasing the price or taxation of unhealthy food inside schools on obesity (61).

2. *Providing school meals and setting nutritional guidelines for the available school meals programs.*

Lebanese adolescents in the high SES group consume more calories, fat, protein, iron, vitamin A and vitamin C in comparison with adolescents within the lower SES group. This finding indicates the need for environmental changes for supporting equitable nutritious and healthy eating (107).

Nutritional standards are central for nutrition policies. Nutrition standards should include all food and drinks students might be subject to at schools (62). They specify portion sizes, quality, food safety, energy content, grades (items permitted per grade) and availability (location and timing) (91). More evidence has been built to standards regarding food preparation and procurement as well (91). Two systematic reviews have shown with enough evidence that nutrition standards for food and beverages can significantly

decrease total and saturated fat intake, increase the intake of fruits and vegetables and improve students' dietary intake (55, 61). For example, school lunch programs should offer meals that contain at least one third of the RDAs for calories, protein, iron, calcium and vitamins C & A (1). Furthermore, total fat and saturated fat should not exceed 30% and 10% of the caloric content of the meal, respectively. Yet, there is no consensus on a single nutrition standard for all countries, as each standard has to be relevant to the specific context and needs of the country (91).

In USA, the National School Lunch Program also offers reimbursement for schools applying it (1). Evaluations for this program have shown that students significantly increased their milk, fruits and vegetables intake and lowered sugar-sweetened beverages intake. However, the presence of competitive food in schools has resulted in a moderate participation rate of students (1). Similarly, Japan has introduced a school lunch program and reported improvements of children's knowledge, health indices, and quality of life (108). Furthermore, in a comparison study done in the UK between school lunch programs and packed lunch boxes, the school meals had significantly less calories, sugar, fat and salt amounts (109). A primary study has shown that school breakfast programs have a more positive effect on preventing childhood obesity than school lunch programs (110). Similarly, an overview of systematic reviews, reported that providing school breakfast had positive outcomes on BMI (56).

3. *Controlling the Marketing and Sponsorship from the Private Food Sector*

A systematic review on marketing for children has concluded that: children are subject to extensive marketing campaigns and evocative branding; the marketing is mainly for processed, high fat, sugar and salt and minimally nutritious food; children enjoy, recall and engage with the advertisements. Exposure and power affect food preferences, purchase requests and consumption patterns (69). It leads to increased preference of promoted branded food and non-product specific brand loyalty (69, 111) and increased food and caloric consumption (69). Accordingly, it can influence diet-related health status (69). Strong evidence exists that marketing can affect brand choice and loyalty regardless of the type of the product under the brand (69, 111). Food marketers in low and middle income countries mainly target children through various means, in-schools and outside schools, as they are the influential intermediaries of the purchasing behavior in families (69). Furthermore, an evidence review by WHO concluded that the available evidence underestimates the real problem of marketing

"Marketing" refers to any form of commercial communication or message that is designed to, or has the effect of, increasing the recognition, appeal and/ or consumption of particular products and services. It comprises anything that acts to advertise or otherwise promote a product or service", (p.9). Marketing also encompasses paying for advertising, product placements (paying a product to be used in a movie), sponsorship (paying for any program in schools) and self-promotional means. Marketing food brands should also be restricted (2).

since studies did not account for the mixture of marketing strategies that the private food sector uses (70).

Available marketing policies include statutory policies, self-regulation and educational policies. A systematic review showed that only statutory policies are effective, however, their impacts can only be seen in the long term (73). Two systematic reviews have shown that industry self-regulation are not effective in reducing the risks of marketing among children and that stricter regulations are needed (73, 74), despite the strong levels of improvements and low levels of marketing exposure reported in the industry-funded reports worldwide (74).

Accordingly, the World Health Assembly in May 2010 endorsed, with member states, the need to develop policies to limit the direct and indirect marketing of food and non-alcoholic beverages to children to reduce their exposure to and the power of the marketed food (2). Food that is primarily included in this agreement is high in saturated fat, trans-fatty acids, free sugars, or salt. Those recommendations can reduce children's exposure to marketing and thus reduce the risk of obesity and overweight (69).

WHO has recommended a stepwise approach in order to control marketing to children along with three policy approaches: 1- restricting all forms of marketing of food high in saturated fats, trans-fatty acids, free sugars, or salt to children by addressing exposure and power, 2- restricting all forms of marketing of all foods and beverages to children, 3- restricting marketing of all products to children. The choice of the approaches will depend on a situation analysis of children's status and the kind of marketing they are subject to (2). The marketing restrictions should not only cover the exposure, but also the power through restrictions on the different modes of marketing used, the timing, the placement and the content of marketing message (2), especially with the growing evidence of the potential effectiveness of subliminal messages in marketing (71).

Governments should assume the leadership in the development of national policies with multi-stakeholder platforms to ensure the implementation, monitoring and evaluation. This should be done while avoiding any forms of conflict of interest. This should be accounted for within a national framework with clear definitions of sanctions and a system of reporting to ensure compliance with the objectives using clearly defined indicators (2).

In fact, WHO has issued another guidance on preventing and managing the conflict of interest in the partnership with the private food and beverage sector and in the development of national nutrition policies (72). This guidance asks the government: 1- to question the rationale of the engagement, 2- profiling the private sector to assess its risks, 3- balancing the risks and benefits, 4- managing the risks, 5- monitoring, evaluation and accountability,

6- transparency and communication. This process should be stopped at any level where the risks were identified to be high. High risks could be defined as the party that has a reputation of not being aligned to the public health nutrition goals, having commercial interest, endorsing products or brand, advertising its contribution to promotional material, affecting the independency and jeopardizing the policy arena, providing questionable impact or effectiveness, not abiding by risk mitigation measures and not being transparent and accountable. If risks are medium or low, risk mitigation measures should be implemented. These measure are: questioning and controlling the non-state actor participation in the meetings, not accepting cash or kind contributions, not marketing products/brands and only mention the support in the annual reports of the industry, preventing participation in policy cycle, and setting clear TORs, sanctions and work plans and others (72).

Table 2 **Key findings from systematic reviews and single studies**

Category of finding	Element 1
Benefits	10 systematic reviews have identified the benefits associated with environmental changes: 1- Lower increases in BMI than the controls by 4.5% in areas where there was strong enforcement of the laws, 2- Lower consumption of pastries, juices, sugar-sweetened beverages, energy-dense food, total fat intake, even after school time, 3- Increase in the sales of bottled water and healthy snacks, 4- Increase in the intake of fruits and vegetables and milk, even after school time, 5- Reduction in the sales of red-labelled food by half and a two-fold increase in the sales of green-labelled food, 6- Reduction in fasting plasma glucose and insulin level (35, 38, 43, 52, 53, 60, 61, 102, 105, 106, 112). A systematic review has shown with enough evidence that **nutrition standards** for food and beverages can significantly decrease total and saturated fat intake, increase the intake of fruits and vegetables and improve students' dietary intake (61). A systematic review has shown that policies that included environmental changes aided in **narrowing the inequality** among different SES groups (35). One systematic review found that environmental change policies even by themselves have been proven to be **effective** (35). A systematic review concluded that boys benefit more from the **structural interventions**, while girls benefit more from the behavioral interventions (48).

Category of finding	Element 1
	A systematic review concluded that boys benefit more from the structural interventions such as the change in the food-school environment, while girls benefit more from the **behavioral interventions** such as the change in the curriculum (48).
Potential harms	A systematic review showed that studies that had banning policies for sweetened drinks and chips alone without banning other unhealthy food and providing healthier choices had undesirable effects, as the **students compensated** by buying other processed food like ice cream or by getting processed food from outside the school (61, 105). However, this finding was not consistent among other reviews (35).
Cost and/ or cost effectiveness in relation to the status quo	**Cost-effectiveness** of environmental changes has not been thoroughly studied (102). One primary study showed that schools lost from their revenue after **banning competitive food** (35). Another study showed that discounting the price of healthy food by 25% or 50% can increase its sales by 39% and 93% respectively, without impacting the overall profits of the vending machines (102). A study in China for school-based obesity prevention policies and programs for both education and environment have shown to be **cost-effective** (103).
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach element were pursued)	Uncertainty of the effect of beverages with artificial sweeteners on weight gain rather than weight loss was highlighted (66); similarly, the effect of low-calorie sweeteners and fruit juices with outcomes related to cardio metabolic profile is still inconclusive (104). Uncertainty still exists on how much the **portion sizes** should be reduced (64). The presence of **retail fast food stores** around school areas has been associated with obesity. However, a review did not show increased purchasing and consumption from these stores (35).
Citizen's Values and opinions	Participants in the citizen consultations ascertained the need to change the school environment and make it healthier. These should be in-line with the nutrition education programs provided for the children and their parents.

Category of finding	Element 1
	Restricting the availability and accessibility of unhealthy food in schools while increasing the availability and accessibility of healthy food in school canteens/vending machines/ and cafeterias is the key to prevent childhood obesity at schools. In order to push forward for a healthier environment in schools, governments should enforce strong regulations to ban unhealthy food and provide healthy food in schools. This enforcement should be accompanied by a strong monitoring and a penalty system to ensure proper implementation. Even though a ministerial decision to control the food available at the canteens in public schools is currently present, however, some schools ascertained that it was either not implemented, or the monitoring process was not optimal. A standardized list of food that should be available in schools based on national nutrition guidelines for children. These guidelines, in turn, should be contextualized and adapted to the Lebanese context. On the school level, schools should forbid students from getting unhealthy food from their houses and provide a list for a healthy school-lunch box. The participants suggested providing school meals, sessions for parents and children on reading labels and banning food advertisement in schools. While some participants believed that children should learn how to choose the healthy food by the colored-labels, others believed that all unhealthy food should be completely banned from schools.

Element 2

Integrating Nutrition and Physical Activity Programs in the School Curricula

Thirteen systematic reviews and five meta-analyses have concluded with enough evidence that the inclusion of both nutrition and physical activity in the school curricula can reduce child and adolescent's body mass index (BMI) regardless of the program components (38, 42, 44, 47, 48, 50, 54, 55, 58, 75-77). However, the combination is important, as a meta-analysis has shown that focusing on diet interventions and education alone without physical activity is not effective and leads to the return to the original weight (43), and physical activity interventions alone without education were less effective than the combination (77).

These systematic reviews and meta-analyses have presented the importance of the duration of the interventions, being mostly effective when longer than 1 year (38-47, 50, 53, 54, 58, 76, 78). Less-intensive multi-component programs that have both nutrition and physical activity, repeated over a long period resulted in improvements in the behaviors of the children along with their anthropometric measurements (38, 42-44, 47). Furthermore, longer duration interventions than 1 year produce promising effects on reducing obesity-related outcomes regardless of the SES of the children (79). In fact, a meta-analysis found that reductions in BMI among children were only evident for interventions that lasted more than one year (78). These facts call for a sustainable and universal nutrition and physical activity program that is integrated within the school curricula (79).

In general, the improvements noted in those interventions were more significant among children six to twelve years old and include: (1) Decreased consumption of sugar sweetened beverages, fast food, fried food, and snacks high in fat, sugar and salt, (2) Increased performance on fitness indicators and increased total time spent physically active, (3) Significantly reduced obesity prevalence by 0.8-32.5 percentage points and reduced the likelihood of becoming overweight by 25%, (4) reduced adiposity indicators such as percentage body fat, total fat mass and waist circumference, (5) improved health-related quality of life among children (42, 44, 47, 76, 78).

Two systematic reviews of the effect of internet/computer-based nutrition and physical activity education at schools have shown improved physical activity and better BMI outcomes than regular education in

K2P Citizen Consultations

K2P Citizen Consultations include deliberations among citizens from various backgrounds in different Lebanese governorates to elicit their feedback on the suggested policies, contextualize them and identify their implementation considerations.

Involving the public allows the development of policies that are sensitive to their needs, priorities and expectations (3, 4). Engaging citizens leads to improvements in public education, policy implementation and compliance, better services and thus improved health outcomes. Additionally, it encourages public accountability, transparency and advocacy (4, 5). Empowering citizens to take part in the decisions affecting their health also increases their trust and confidence in the healthcare system (3).

K2P Center held four Citizen Consultations about school policies for childhood obesity prevention in Haret Hrayk, Akkar, Bekaa, and Kesrwan Kaza gathering around 71 citizens from different backgrounds (Public and Private school principals, teachers, school health staff, canteen owners, parents, students and community members). Their Feedback was incorporated to the Policy Brief and also summarized in a K2P Citizen Consultation Summary.

the curricula. Furthermore, students seemed to prefer the internet-based programs (48, 75). Nonetheless, an overview of systematic reviews and a meta-analysis has shown that internet-based programs alone are not effective (56, 113). If coupled with other components such as curricular activities, they can increase the compliance of children to the interventions and reduce drops out from the intervention (113-115).

In general, the favorable sub-elements were:

1. *Integrated school curriculum with nutrition education and body image information, promotion and motivation along with extra nutrition, healthy eating and life skills sessions supporting practical skills to encourage the adoption of a healthy lifestyle delivered by teachers or school staff for behavior change*

Fifteen Systematic reviews and WHO recommendations have shown the importance of integrating nutrition and physical activity behavioral change programs within the existing curriculum (38-49, 53, 55, 58, 76). Even though educational sessions exist in the Lebanese curriculum, these are not based on behavioral change programs, have not been evaluated for effectiveness and comprehensibility and provided as an addition to the curriculum rather than being integrated within multiple sessions in the curriculum. An inadequate number of hours, age-matching information, teaching method and behavioral change approaches to integration can be insufficient for behavior change (68). Hence, it is of value to provide age appropriate information from primary through secondary levels (91). The social cognitive theory has been mainly used to inform the development of the educational material (48, 58). Furthermore, the inclusion of social marketing methods to modify lifestyle choices among youth has been shown to be effective in reducing the prevalence of overweight and obesity by approximately 28%, especially when using at least 5 social marketing benchmark criteria (Annex 2) (80). Nutrition and physical activity education can be taught as a specific subject or as parts of other subjects like science, math and the school's extracurricular activities (49, 68). Methods of education are of key importance, as students are more likely to change behavior if they engage in participatory, enjoyable, action-oriented learning process with emphasis on positive aspects of healthy eating (49). Lifestyle change, life skills and practice sessions such as cooking or preparing healthy recipes can be more effective in building the skills required for behavior change than just education (49, 53). Acquired knowledge, skills and behaviors can then be applied in schools, at home and within the wider community (49).

2. *Integrated school curriculum that has physical activity education along with extra physical activity sessions and opportunities supported by the availability of facilities, space and equipment to increase time spent in playing, recreation and sports (during recess, in class, physical education classes, breaks), allowing physical activity to become a routine*

According to fourteen systematic reviews, an overview of systematic reviews, reviews and single studies, school policies to increase physical activity opportunities for lifestyle change have great impact on childhood obesity prevention (38-47, 53, 55, 56, 78, 81-84). Reported benefits include: 1- improving HDL cholesterol levels, 2- reducing skin-fold thickness, 3- improving fitness among children and adolescents, 4- developing motor skills, 5- developing other social and leadership skills (teamwork and self-confidence), 6- improving the children's achievement and cognitive outcomes (especially among aerobic exercises). It is noteworthy that pubertal stages did not affect the positive outcomes of physical activity interventions (81, 116).

Effective policy options were: 1- increasing the quantity of physical education sessions with at least 50% of its time being active, 2- providing variety of physical activity choices that would fit developmental stages (such as classroom activity breaks: 10 mins, twice per day), 3- integrating physical education within the curriculum mentioning its social, physical and psychological health benefits beyond just the physical education session, 4- providing variety of non-competitive extracurricular physical activity opportunities, 5- providing adequate facilities and equipment for physical activity (slides, swings, balls, fabric tunnels, Frisbees, colored marking on playground surface, developing personalized games by children, etc...) (56, 78, 81, 83, 84). In fact, the policies' effectiveness in increasing the minutes spent physically active were as following in descending order (from the most effective to the least): mandatory physical education sessions, classroom activity breaks, walking/biking to schools, afterschool activity programs, standardized physical education curricula, modified playgrounds, modified recess and finally modified parks in the community (81, 83). While long-term PA interventions are proven to be effective in reducing BMI, a systematic review concluded that weekly PA interventions should not exceed 100 mins to avoid poor adherence from children (117).

Key factors for proper implementation include 1- having a policy to mandate physical education and physical activity opportunities, 2- monitoring for compliance and the effective enforcements of the mandate, 3- training for teachers on providing effective physical education, 4- ensuring the safety of the activities, 5- resources (81, 83).

The economic analysis of multiple policies to promote physical activity at the population level found that school-based physical activity interventions are cost-effective with a median annual cost of $300,000 for every 10,000 people compared to $3,350,000 for community campaigns for example. School-based policies to promote physical activity have the potential to be scaled up to the national level since they are both effective and cost effective (118).

3. *Support for the parents and teachers with knowledge and skills on how to approach children to be more active, eat healthy, and decrease screen time activities*

Three systematic reviews identified teachers as the best option for the delivery of these educational sessions; however, a multidisciplinary team should be approached whenever there is a need (41, 50, 57). Nonetheless, those teachers need to be continuously trained on nutrition education, effective teaching methods, behavior change methods and capacity building for their students. Such trainings aid in the success of the implementation of policies along with their sustainability (49, 50, 68).

According to twelve systematic reviews and meta-analysis, a key element to the success of any intervention for childhood obesity prevention is parental involvement (54, 55, 57, 58, 85). Parental involvement aims at extending the behavioral change to outside the school environment, into the family and community. Parents can become role models at home, expanding the healthy habits protection (48). In fact, a recent systematic review and meta-analysis showed the importance of having combined nutrition and physical activity behavioral change interventions starting from schools with parental engagement to reach to family level interventions (85). A systematic review assessing ways of parental involvement found that all studies involving direct parental involvement were successful in inducing favorable changes in comparison to 64% of the studies utilizing indirect parental involvement (119). Direct parental involvement was defined as parents' presence at nutrition education sessions (workshops or didactic sessions) and sessions for family behavior training or counseling sessions. On the other hand, indirect parental involvement included sending information home to parents, interventions targeting children with a "try this at home component", and merely sending invitations for parents to be involved in the intervention's activities (119). Teaching parents on how to create healthy home environments, how to effectively change behaviors and how to monitor and encourage healthy eating and physical activity are the key learning outcomes for parents (86).

Table 3 **Key findings from systematic reviews and single studies**

Category of finding	Element 2
Benefits	Four systematic reviews and meta-analyses of school policies related to integrating nutrition and physical activity in the curriculum identified significant improvements mainly among children **six to twelve years old** and include: 1- Decreased consumption of sugar sweetened beverages, fast food, fried food, and snacks high in fat, sugar and salt, 2- Increased performance on fitness indicators and increased total time spent physically active, 3- Significantly reduced obesity prevalence by 0.8-32.5 percentage points and reduced the likelihood of becoming overweight by 25% (42, 44, 47, 78). The inclusion of at least 5 social marketing benchmarking criteria in the development of school-based intervention can reduce overweight and obesity among youth by 28% (80). A systematic review concluded that **longer duration** interventions produce promising effects in reducing obesity-related health outcomes regardless of the SES of the children (79). A systematic review and another meta-analysis identified the **benefits of physical activity policies** at school level to include: 1- improving HDL cholesterol levels, 2- reducing skin-fold thickness, 3- improving fitness among children and adolescents, 4- developing motor skills, 5- developing other social and leadership skills (teamwork and self-confidence), 6- improving the children's achievement and cognitive outcomes (especially among aerobic exercises). **Pubertal stages** did not affect the positive outcomes of physical activity (81, 116). A systematic review, a review and WHO recommendations suggested that **teachers** are the most effective in implementing the educational session. Their trainings aid in the success of the implementation of policies along with their sustainability (41, 49, 68). A systematic review concluded that boys benefit more from the structural interventions such as the change in the food-school environment, while girls benefit more from the **behavioral interventions** such as the change in the curriculum (48).

Category of finding	Element 2
	A primary study found that focusing more on lifestyle changes and positive messages about food with no **labelling of a good or bad food** can prevent the stigmatization of students to certain food types (87).
Potential harms	A systematic review has shown that short term interventions that are not sustainable can induce more positive outcomes among higher SES groups compared to lower SES groups (79). Whereas long duration interventions have promising effects regardless of the children's SES (79).
Cost and/ or cost effectiveness in relation to the status quo	**School-based physical activity interventions** are cost-effective with a median annual cost of $300,000 for every 10,000 people. They have the potential to be scaled up to the national level since they are both effective and cost effective (118). No cost-effectiveness studies that we know of have been conducted specifically for school-based nutrition interventions. A cost-effectiveness study in China for integrated school-based obesity prevention policies and programs for both nutrition and physical activity have shown to be **cost-effective** (103).
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach element were pursued)	More studies should be done on the best **theory of behavior change** to be used in the nutrition and physical activity curricula. Proper evaluation and the contextualization of intervention components need to be made specific to the context (48). Parental involvement, the school culture and the **compliance** with the interventions cannot be always controlled (78). A meta-analysis of obesity prevention studies did not find significant weight-gain prevention effects. A possible explanation is that results of weight loss interventions among overweight children can be more easily attainable than weight-gain prevention studies, especially when both use same strategies (45).
Stakeholders views	Two qualitative systematic reviews of the views of stakeholders (students, school principals, parents teachers and other community members) on the role of schools in preventing obesity supported all these approaches as to what needs to be done to reduce obesity along with using

Category of finding	Element 2
	physical activity as a reward and not to withhold it as a punishment or to fill in extra academic sessions (39, 40).
Citizens' Values and Opinions	Nutrition and physical education programs at schools are beneficial in improving the children's awareness around the problem of childhood obesity and the ways to maintain a healthy lifestyle to prevent it. Previous individual school efforts to design and implement health awareness sessions have been proven effective for scale up. The government should set a policy to change the current curriculum to include sessions around health and life skills for children within multiple subjects to be accessible for all children and to ensure sustainable implementation. The integrated school curriculum should not replace the sessions provided by current health tutors, however, they should complement them Encourage children on healthy eating and PA while focusing on promoting the culture of healthy eating and having a healthy body and mind by eating healthy food Avoid the focus on weight Target the awareness at the household level to allow the parents to reinforce the messages conveyed to children from schools Focus on behavior change strategies rather than only giving knowledge Designed as interesting, interactive and age and gender appropriate activities Conveyed in different forms at multiple times and not only in the science class: multiple classes, school plays, school activities, contests, games and competitions and other community and municipality activities Be provided by trained teachers, dietitians, and/or health workers Regularly updated, monitored and evaluated Target Child's preferences in PA to increase their compliance and involvement in the PA sessions

Implementation considerations and counterstrategies

Barriers have been identified from international literature (systematic reviews, reviews and primary studies) with a particular focus on LMICs (39), lessons learned from a local intervention at schools (80), from stakeholder interviews in the process of developing this policy brief which included researchers, professionals in the field and representatives from MoPH and MEHE. For each barrier, a counterstrategy has been detailed below. Furthermore, feedback from citizens around the implementation considerations from the Citizen Consultations (CCs) was also incorporated into the below table.

Table 4 **Key findings from systematic reviews and single studies**

Level	Barriers	Counterstrategies
Student	Low level of participation and interest in the interventions (87, 88, 120).	Creating fun, interactive, skill building programs (49, 87). Engaging youth in participatory interventions for identifying and making changes to their school environment can lead to positive outcomes in terms of weight, PA and dietary change (121).
	CCs: Children having a lot of homework to do at home with more time sitting than engaging in physical activities	CCs: Change from book to electronic teaching after studying the advantages and disadvantages of engaging technology in teaching CCs: Learn from countries with different educational systems and change the education system to allow for less homework
Parents	Low level of participation in school events and program components (42, 87, 88, 119).	Assess the reasons that prevent them from participating in school events (87). Conduct contextualized research on the best method to involve parents (119). Provide transportation means, incentives and/or rescheduling the events to fit their schedules (87, 88). CCs: Companies should give permission for parents to be in school for their children.
	Not accepting to enroll their children in such interventions (87).	Provide them with all the materials their children are receiving (87).

Level	Barriers	Counterstrategies
		Accountability and confidentiality in the intervention delivery can raise confidence of parents in the interventions (122). Institutionalizing the interventions within the school programs can reduce that barrier (87).
	CCs: Cost of healthy eating might lead to increases in the tuition fees or the daily allowance for children. CCs: Parents might provide children with unhealthy school-lunch box	CCs: Provide guidelines for the healthy school-lunch box that can be affordable and monitor the food children get from outside the school. Previous school efforts to give time for children to eat and notify parents on the school-lunch box proved to be effective
	CCs: Cost and transportation concerns for PA sessions	CCs: Schools and communities should provide free clubs, playgrounds and community activities
School	School principals might be reluctant in integrating the programs in different curriculum sessions and only allow these sessions to occur in art and physical activity classes (87).	A state policy can mandate the need to incorporate the programs within the curriculum as it has shown to be more effective and provide sustainability of the outcomes (87, 88).
	CCs: Budget constraints	CCs: Improve school preparedness, school administration capacity and resource management Initiate sensitive discussions about end of life issues (123)
	Schools might be concerned about less profits generated from school canteens if unhealthy food was removed (87).	Convincing schools that profits will not be affected by the new policy (87). Schools should not rely on the sales of obesogenic food for their revenues, and other sustainable fundraising solutions must be created (35).
	Some school structural set-up does not allow having canteens or space for physical activity (87).	These can be subsidized from the government or NGOs to have such structures (90). A stakeholder opinion (researcher in the field) was to have a law for the health-conducive structural set-up of a school before having the permission

Level	Barriers	Counterstrategies
		to open to start the change gradually for the future generations. CCs: at least 50% of the revenue from the canteens should be allocated to improve the canteen structure and set up.
	Street vendors and retail shops having unhealthy food around schools (42, 91).	A state law to control products sold by street vendors and retails shops around schools (91). Schools should not allow their students to go out school premises throughout school time (49). School personnel should be responsible for the coordination of all efforts to implement and monitor the program (91).
	CCs: In some schools, the profit from kiosks go back to the schools.	CCs: Set laws to control canteens outside schools and municipalities to monitor the shops outside schools. CCs: This link should be broken to incentivize schools to monitor the canteens.
Program delivery personnel	Teachers might not agree to implement the interventions as they are not well-trained, overworked and/or low-paid (87).	Continuous training for teachers, along with incentives to provide the interventions (87, 88). In Lebanon, a training program is already in place for the health supervisors and teachers, this program can be expanded with the new intervention material.
	CCs: School meals require extra attention and staff	CCs: Train teachers on handling school meals
	CCs: Shortage in trained PA teachers. Since 1979, there has been no new PE instructors, the majority are old. Some instructors are without a license. No observers for PE teachers to evaluate their work	CCs: Train and hire new PA teachers. Promote a university degree for PA and PE Monitoring of the work of PE instructors at schools
Canteen Owners	Canteen owners might not have enough resources to accommodate having	Canteen owners can be subsidized from the government (87).

Level	Barriers	Counterstrategies
	healthy food with their food safety measures (87).	Agreement with food industry to change the constituents and packaging of the products directed to school consumption (90). Specific and feasible guidelines for food safety should be provided (87, 91).
Researchers	Limited publications on nutrition and physical activity promotion in Lebanese schools. Lack of evaluation of practices to measure outcomes(120).	More research is needed in areas related to implementation of the specified elements (88, 90).
	Specific data regarding details of the program implementation need to be contextualized to identify what works best in our context.	Data sharing between researchers and ministries to assess the situation and evaluate interventions and policies.
Government	**Financing barrier**	
	Restrictions in the budget of ministries to finance such programs, along with the proper human resources needed for implementation and monitoring The MEHE does not have a specific budget for health related programs	Partnership with local, regional and international partners to support the implementation of the programs through providing funding and human resources (49, 50, 63, 88, 90, 120). Reduce retail price of healthy food via more efficient production and distribution (packaging and less spoilage). Provide quantity discounts through bulk packaging (124).
	Governance barriers	
	School health department at the MEHE has jurisdictions only for public schools (covering 31% of total students enrolled)	A state-level written food and physical activity policy that is cross-cutting across all governance structures is required with specific indications for the program components, monitoring and evaluation, standard operating procedures, a clear task division, incentive/disincentive system (49, 62, 63, 88-90).
	MEHE has a school health program implemented in public schools in addition to multiple fragmented programs delivered by MOPH, MOSA, MOI, researchers, and local and international organizations	Having a specific governance body with leadership that can coordinate the implementation of the activities across different stakeholders (NCD PLAN) (120).

Level	Barriers	Counterstrategies
	Delivery barriers	
	Lack of up-to-date data that monitors the obesity prevalence and trends across time and place and that evaluates current practices and policies	Conduct regular monitoring and evaluation of school nutrition policies (120). There exits two types of school BMI measurements, surveillance and screening (125). Surveillance programs gather population level prevalence of obesity. It can monitor growth trends and weight status over time; thus supporting planning, delivery and evaluation of the effectiveness of services or implemented policies (125). On the other hand, BMI screening at schools aids in the identification of the students at risk of obesity and encourages parents' involvement in their children's weight status (63, 125). School BMI screening can also aid as an evaluation tool of effectiveness of the implemented school policies such as curriculum and environment change (126).
	BMI screening at schools might induce stigmatization and bullying in schools, body image dissatisfaction and unhealthy restrictive dieting practices (122)	Ensuring confidentiality during the screening process and if coupled with a comprehensive multicomponent program targeting school children, teachers and parents (122). With the following (126): 1. Following clear standardized guidelines for school-health screening, 2. Referral to effective therapy that is of low cost and readily available in the community. This can be supported in Lebanon through the activation of the referral system from both MOSA and MOPH 3. Organizing and managing screening by trained health staff (school nurses have been found to be the most appropriate personnel to avoid weight misclassifications and to ensure

Level	Barriers	Counterstrategies
		caring and sensitive screening process) 4. Proper interpretation of the data to avoid misclassification through relying not solely on BMI but also other measures before reaching conclusions, 5. Communicating the weight status information with parents in a way that ensures that they will not initiate weight stigma and unhealthy dieting practices for their children.
	CCs: No clearly shared TOR, SOPs, trainings and monitoring of work for health Edu workers in schools despite having manuals in schools. In addition, health Edu workers in schools have limited scope of work.	CCs: Clarify the role, responsibility and qualifications of the health education workers in schools. With regular monitoring on their work.
Structural and cultural	The diversity of socioeconomic concerns and priorities of the public (120).	Engage citizens and youth in the development and implementation of school nutrition policies. School nutrition policies should not only be implemented in schools but also emphasize of environmental, social and communication variables (120).
	CCs: Celebrities advertising unhealthy food and beverages. Industries are powered or owned by policy makers and decision makers The interest of huge food industries	CCs: Strong regulation and enforcement of guidelines to marketing and sponsorship by the food manufacturers Work on stopping the advertising nationally not only in schools
	Polluted irrigating water and pesticides on agricultural crops	Improve water pipes quality in the municipalities Coordinate the efforts between different ministries and organizations
	Lack of playgrounds, safe public spaces and community activities	Having a budget from the municipalities for spaces for playing in neighborhoods, free/supported-fee clubs and community activities Municipality can provide land for investors/NGOs to create

Level	Barriers	Counterstrategies
		activities/playgrounds. Financial support from NGO and civil society and Ministry of youth and sports and related ministries

Next Steps

Next Steps

The aim of this policy brief is to foster dialogue informed by the best available evidence. The intention is not to advocate specific policy elements or close off discussion. The discussion aims at agreeing on what elements will be up-taken and how they should be implemented. Further actions will flow from the deliberations that the policy brief is intended to inform. The deliberations will take place at two levels:

- Deliberation amongst citizens, policy makers and stakeholders in a national policy dialogue regarding the policy elements described in this policy brief
- Refining elements according to the results of the deliberations
- Ensuring proper uptake and implementation via regular monitoring, coalition building and advocacy

References

References

1. Fox S, Meinen A, Pesik M, Landis M, Remington PL. Competitive food initiatives in schools and overweight in children: a review of the evidence. WMJ : official publication of the State Medical Society of Wisconsin. 2005;104(5):38-43.
2. Organization WH. A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children. 2012.
3. Bruni RA, Laupacis A, Martin DK. Public engagement in setting priorities in health care. Canadian Medical Association Journal. 2008;179(1):15-8.
4. Oxman AD, Lewin S, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP) 15: Engaging the public in evidence-informed policymaking. Health research policy and systems. 2009;7(1):S15.
5. Williamson L. Patient and citizen participation in health: the need for improved ethical support. The American Journal of Bioethics. 2014;14(6):4-16.
6. Mehio Sibai A, Nasreddine L, Mokdad AH, Adra N, Tabet M, Hwalla N. Nutrition transition and cardiovascular disease risk factors in Middle East and North Africa countries: reviewing the evidence. Annals of Nutrition and Metabolism. 2010;57(3-4):193-203.
7. Nasreddine L, Naja F, Chamieh MC, Adra N, Sibai AM, Hwalla N. Trends in overweight and obesity in Lebanon: evidence from two national cross-sectional surveys (1997 and 2009). BMC public health. 2012;12:798.
8. Bener A. Prevalence of obesity, overweight, and underweight in Qatari adolescents. Food and nutrition bulletin. 2006;27(1):39-45.
9. Nasreddine L, Mehio-Sibai A, Mrayati M, Adra N, Hwalla N. Adolescent obesity in Syria: prevalence and associated factors. Child: care, health and development. 2010;36(3):404-13.
10. Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007-2008. Jama. 2010;303(3):242-9.
11. Taheri F, Kazemi T. Prevalence of Overweight and Obesity in 7 to 18 Year-Old Children in Birjand/Iran. Iranian journal of pediatrics. 2009;19(2):135-40.
12. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. The Lancet. 2014;384(9945):766-81.
13. El Mouzan MI, Foster PJ, Al Herbish AS, Al Salloum AA, Al Omer AA, Qurachi MM, et al. Prevalence of overweight and obesity in Saudi children and adolescents. Ann Saudi Med. 2010;30(3):203-8.

14. Carlisle S. Health promotion, advocacy and health inequalities: a conceptual framework. Health Promotion International. 2000;15(4):369-76.
15. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. International Journal of Pediatric Obesity. 2006;1(1):11-25.
16. Organization WH. Global school-based student health survey (GSHS)-Lebanon Fact Sheet. 2017.
17. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. The Lancet. 2013;382(9890):427-51.
18. Nasreddine L, Ouaijan K, Mansour M, Adra N, Sinno D, Hwalla N. Metabolic syndrome and insulin resistance in obese prepubertal children in Lebanon: a primary health concern. Annals of nutrition & metabolism. 2010;57(2):135-42.
19. Weiss R, Dziura J, Burgert TS, Tamborlane WV, Taksali SE, Yeckel CW, et al. Obesity and the metabolic syndrome in children and adolescents. New England Journal of Medicine. 2004;350(23):2362-74.
20. IRIS W. Report of the commission on ending childhood obesity. 2016.
21. Nasreddine L, Naja F, Tabet M, Habbal MZ, El-Aily A, Haikal C, et al. Obesity is associated with insulin resistance and components of the metabolic syndrome in Lebanese adolescents. Annals of human biology. 2012;39(2):122-8.
22. Salameh P, Barbour B. Obesity-associated distress in Lebanese adolescents: an exploratory look at a large cohort of students. Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit. 2011;17(12):949-59.
23. Salameh P, Barbour B. Pattern of obesity and associated diabetes in Lebanese adolescents: a pilot study. Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit. 2011;17(3):226-30.
24. Salameh P, Barbour B, Issa C, Rachidi S. Obesity associated behavior in adolescents of private schools in Lebanon. Le Journal medical libanais The Lebanese medical journal. 2011;59(4):179-90.
25. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. The lancet. 2002;360(9331):473-82.
26. Krebs NF, Jacobson MS. Prevention of pediatric overweight and obesity. Pediatrics. 2003;112(2):424-30.
27. IRIS W. Noncommunicable diseases country profiles 2014. 2014.
28. Pelone F, Specchia ML, Veneziano MA, Capizzi S, Bucci S, Mancuso A, et al. Economic impact of childhood obesity on health systems: a systematic review. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2012;13(5):431-40.

29. Butland B, Jebb S, Kopelman P, McPherson K, Thomas S, Mardell J, et al. Foresight. Tackling obesities: future choices. Project report. Foresight Tackling obesities: future choices Project report. 2007.
30. Darnton-Hill I, Nishida C, James W. A life course approach to diet, nutrition and the prevention of chronic diseases. Public health nutrition. 2004;7(1A; SPI):101-22.
31. Gillman MW. A life course approach to obesity. A life course approach to chronic disease epidemiology. 2004;1:473.
32. Naja F, Hwalla N, Itani L, Karam S, Sibai AM, Nasreddine L. A Western dietary pattern is associated with overweight and obesity in a national sample of Lebanese adolescents (13–19 years): a cross-sectional study. British Journal of Nutrition. 2015;114(11):1909-19.
33. Nasreddine L, Naja FA, Sibai AM, Helou K, Adra N, Hwalla N. Trends in nutritional intakes and nutrition-related cardiovascular disease risk factors in Lebanon: the need for immediate action. Journal Medical Libanais - Lebanese Medical Journal. 2014;62(2):83-91.
34. Lake A, Townshend T. Obesogenic environments: exploring the built and food environments. J R Soc Promot Health. 2006;126(6):262-7.
35. Driessen CE, Cameron AJ, Thornton LE, Lai SK, Barnett LM. Effect of changes to the school food environment on eating behaviours and/or body weight in children: a systematic review. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2014;15(12):968-82.
36. Nasreddine L, Naja F, Akl C, Chamieh MC, Karam S, Sibai AM, et al. Dietary, lifestyle and socio-economic correlates of overweight, obesity and central adiposity in Lebanese children and adolescents. Nutrients. 2014;6(3):1038-62.
37. Wang Y, Wu Y, Wilson RF, Bleich S, Cheskin L, Weston C, et al. Childhood obesity prevention programs: comparative effectiveness review and meta-analysis. 2013.
38. Williams AJ, Henley WE, Williams CA, Hurst AJ, Logan S, Wyatt KM. Systematic review and meta-analysis of the association between childhood overweight and obesity and primary school diet and physical activity policies. Int J Behav Nutr Phys Act. 2013;10:101.
39. Clarke J, Fletcher B, Lancashire E, Pallan M, Adab P. The views of stakeholders on the role of the primary school in preventing childhood obesity: a qualitative systematic review. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2013;14(12):975-88.
40. Moise N, Cifuentes E, Orozco E, Willett W. Limiting the consumption of sugar sweetened beverages in Mexico's obesogenic environment: a qualitative policy review and stakeholder analysis. J Public Health Policy. 2011;32(4):458-75.

41. Sharma M. International school-based interventions for preventing obesity in children. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2007;8(2):155-67.
42. Verstraeten R, Roberfroid D, Lachat C, Leroy JL, Holdsworth M, Maes L, et al. Effectiveness of preventive school-based obesity interventions in low- and middle-income countries: a systematic review. The American journal of clinical nutrition. 2012;96(2):415-38.
43. Sobol-Goldberg S, Rabinowitz J, Gross R. School-based obesity prevention programs: a meta-analysis of randomized controlled trials. Obesity (Silver Spring, Md). 2013;21(12):2422-8.
44. Waters E, de Silva-Sanigorski A, Hall BJ, Brown T, Campbell KJ, Gao Y, et al. Interventions for preventing obesity in children. The Cochrane database of systematic reviews. 2011;12(00).
45. Katz DL, O'Connell M, Njike VY, Yeh MC, Nawaz H. Strategies for the prevention and control of obesity in the school setting: systematic review and meta-analysis. Int J Obes. 2008;32(12):1780-9.
46. Brennan LK, Brownson RC, Orleans CT. Childhood obesity policy research and practice: evidence for policy and environmental strategies. Am J Prev Med. 2014;46(1):e1-16.
47. Silveira JA, Taddei JA, Guerra PH, Nobre MR. The effect of participation in school-based nutrition education interventions on body mass index: a meta-analysis of randomized controlled community trials. Prev Med. 2013;56(3-4):237-43.
48. Guerra PH, da Silveira JAC, Salvador EP. Physical activity and nutrition education at the school environment aimed at preventing childhood obesity: evidence from systematic reviews. Jornal de pediatria. 2015.
49. Organization WH. WHO Information Series on School Health Document: World Health Organization; 2003.
50. Lobelo F, Garcia de Quevedo I, Holub CK, Nagle BJ, Arredondo EM, Barquera S, et al. School-based programs aimed at the prevention and treatment of obesity: evidence-based interventions for youth in Latin America. Journal of School Health. 2013;83(9):668-77.
51. Habib-Mourad C, Ghandour LA, Moore HJ, Nabhani-Zeidan M, Adetayo K, Hwalla N, et al. Promoting healthy eating and physical activity among school children: findings from Health-E-PALS, the first pilot intervention from Lebanon. BMC public health. 2014;14:940.
52. Evans CE, Albar SA, Vargas-Garcia EJ, Xu F. School-Based Interventions to Reduce Obesity Risk in Children in High- and Middle-Income Countries. Advances in food and nutrition research. 2015;76:29-77.
53. Lien AS-Y, Tsai J-L, Lee J-T, Wu M-Y, Jiang Y-D, Yen H-R. A Systematic Review and Meta-Analysis of the Effect of Lifestyle Modification on Metabolic

Control in Overweight Children. Evidence-based Complementary and Alternative Medicine : eCAM. 2017;2017:5681909.
54. Bleich SN, Vercammen KA, Zatz LY, Frelier JM, Ebbeling CB, Peeters A. Interventions to prevent global childhood overweight and obesity: a systematic review. The Lancet Diabetes & Endocrinology. 2017.
55. Singh A, Bassi S, Nazar GP, Saluja K, Park M, Kinra S, et al. Impact of school policies on non-communicable disease risk factors – a systematic review. BMC public health. 2017;17(1):292.
56. Cauchi D, Glonti K, Petticrew M, Knai C. Environmental components of childhood obesity prevention interventions: an overview of systematic reviews. Obesity reviews. 2016;17(11):1116-30.
57. Brown EC, Buchan DS, Baker JS, Wyatt FB, Bocalini DS, Kilgore L. A systematised review of primary school whole class child obesity interventions: effectiveness, characteristics, and strategies. BioMed Research International. 2016;2016.
58. Meiklejohn S, Ryan L, Palermo C. A Systematic Review of the Impact of Multi-Strategy Nutrition Education Programs on Health and Nutrition of Adolescents. Journal of Nutrition Education and Behavior. 2016;48(9):631-46.e1.
59. Shepherd J, Harden A, Rees R, Brunton G, Garcia J, Oliver S, et al. Young people and healthy eating: a systematic review of research on barriers and facilitators. Health Education Research. 2006;21(2):239-57.
60. Kumanyika SK, Swank M, Stachecki J, Whitt-Glover MC, Brennan LK. Examining the evidence for policy and environmental strategies to prevent childhood obesity in black communities: new directions and next steps. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2014;15 Suppl 4:177-203.
61. Jaime PC, Lock K. Do school based food and nutrition policies improve diet and reduce obesity? Prev Med. 2009;48(1):45-53.
62. Organization WH. Global strategy on diet, physical activity and health: a framework to monitor and evaluate implementation. 2006.
63. Story M, Nanney MS, Schwartz MB. Schools and Obesity Prevention: Creating School Environments and Policies to Promote Healthy Eating and Physical Activity. Milbank Quarterly. 2009;87(1):71-100.
64. Hollands GJ, Shemilt I, Marteau TM, Jebb SA, Lewis HB, Wei Y, et al. Portion, package or tableware size for changing selection and consumption of food, alcohol and tobacco. The Cochrane database of systematic reviews. 2015;9:Cd011045.
65. Zheng M, Allman-Farinelli M, Heitmann BL, Rangan A. Substitution of sugar-sweetened beverages with other beverage alternatives: a review of long-term health outcomes. Journal of the Academy of Nutrition and Dietetics. 2015;115(5):767-79.

66. Avery A, Bostock L, McCullough F. A systematic review investigating interventions that can help reduce consumption of sugar-sweetened beverages in children leading to changes in body fatness. Journal of human nutrition and dietetics : the official journal of the British Dietetic Association. 2015;28 Suppl 1:52-64.
67. Hu FB. Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2013;14(8):606-19.
68. McKenna ML. Policy Options to Support Healthy Eating in Schools. Canadian Journal of Public Health / Revue Canadienne de Sante'e Publique. 2010;101:S14-S7.
69. Cairns G, Angus K, Hastings G, Caraher M. Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. Appetite. 2013;62:209-15.
70. Cairns G, Angus K, Hastings G, Organization WH. The extent, nature and effects of food promotion to children: a review of the evidence to December 2008: World Health Organization Geneva; 2009.
71. Nuijten KC, Regt AD, Calvi L, Peeters AL. Subliminal advertising in shooter games: recognition effects of textual and pictorial brand logos. International Journal of Arts and Technology. 2012;6(1):5-21.
72. resolution WHA64 PR. Framework of engagement with non-State actors.
73. Chambers SA, Freeman R, Anderson AS, MacGillivray S. Reducing the volume, exposure and negative impacts of advertising for foods high in fat, sugar and salt to children: A systematic review of the evidence from statutory and self-regulatory actions and educational measures. Preventive medicine. 2015;75:32-43.
74. Galbraith-Emami S, Lobstein T. The impact of initiatives to limit the advertising of food and beverage products to children: a systematic review. Obesity Reviews. 2013;14(12):960-74.
75. Whittemore R, Chao A, Popick R, Grey M. School-based internet obesity prevention programs for adolescents: a systematic literature review. The Yale journal of biology and medicine. 2013;86(1):49-62.
76. Al-Khudairy L, Loveman E, Colquitt JL, Mead E, Johnson RE, Fraser H, et al. Diet, physical activity and behavioural interventions for the treatment of overweight or obese adolescents aged 12 to 17 years. Cochrane Database of Systematic Reviews. 2017(6).
77. Feng L, Wei D-M, Lin S-T, Maddison R, Mhurchu CN, Jiang Y, et al. Systematic review and meta-analysis of school-based obesity interventions in mainland China. PloS one. 2017;12(9):e0184704.

78. Gonzalez-Suarez C, Worley A, Grimmer-Somers K, Dones V. School-Based Interventions on Childhood Obesity: A Meta-Analysis. American Journal of Preventive Medicine. 2009;37(5):418-27.
79. Hillier-Brown FC, Bambra CL, Cairns JM, Kasim A, Moore HJ, Summerbell CD. A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity amongst children. BMC public health. 2014;14:834.
80. Aceves-Martins M, Llauradó E, Tarro L, Moreno-García CF, Trujillo Escobar TG, Solà R, et al. Effectiveness of social marketing strategies to reduce youth obesity in European school-based interventions: a systematic review and meta-analysis. Nutrition reviews. 2016;74(5):337-51.
81. Sun C, Pezic A, Tikellis G, Ponsonby AL, Wake M, Carlin JB, et al. Effects of school-based interventions for direct delivery of physical activity on fitness and cardiometabolic markers in children and adolescents: a systematic review of randomized controlled trials. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2013;14(10):818-38.
82. Fedewa AL, Ahn S. The effects of physical activity and physical fitness on children's achievement and cognitive outcomes: a meta-analysis. Research Quarterly for Exercise & Sport. 2011;82(3):521-35.
83. Bassett DR, Fitzhugh EC, Heath GW, Erwin PC, Frederick GM, Wolff DL, et al. Estimated energy expenditures for school-based policies and active living. Am J Prev Med. 2013;44(2):108-13.
84. Lagarde F, LeBlanc C. Policy options to support physical activity in schools. Canadian journal of public health = Revue canadienne de sante publique. 2010;101 Suppl 2:S9-13.
85. Gori D, Guaraldi F, Cinocca S, Moser G, Rucci P, Fantini MP. Effectiveness of educational and lifestyle interventions to prevent paediatric obesity: systematic review and meta-analyses of randomized and non-randomized controlled trials. Obesity Science & Practice. 2017;3(3):235-48.
86. Mercado J, Aufa'I ARAM, Belyeu-Camacho T, Castro R, Vargo AM, Van der Ryn PhD M, et al. A review of promising multicomponent environmental child obesity prevention intervention strategies by the Children's Healthy Living Program. Journal of environmental health. 2016;79(3):18.
87. Habib-Mourad C, Ghandour LA. Time to Act: Lessons Learnt from the First Pilot School-Based Intervention Study from Lebanon to Prevent and Reduce Childhood Obesity. Frontiers in Public Health. 2015;3:56.
88. Horodyska K, Luszczynska A, Hayes CB, O'Shea MP, Langøien LJ, Roos G, et al. Implementation conditions for diet and physical activity interventions and policies: an umbrella review. BMC public health. 2015;15(1):1.
89. Ben-Sefer E, Ben-Natan M, Ehrenfeld M. Childhood obesity: current literature, policy and implications for practice. International Nursing Review. 2009;56(2):166-73.

90. Gortmaker SL, Swinburn BA, Levy D, Carter R, Mabry PL, Finegood DT, et al. Changing the future of obesity: science, policy, and action. The Lancet. 2011;378(9793):838-47.
91. McKenna ML. Policy options to support healthy eating in schools. Canadian journal of public health = Revue canadienne de sante publique. 2010;101 Suppl 2:S14-7.
92. Organization WH. Global School-based Student Health Survey- Lebanon Fact Sheet. 2011.
93. Pan L, Sherry B, Park S, Blanck HM. The Association of Obesity and School Absenteeism Attributed to Illness or Injury Among Adolescents in the United States, 2009. Journal of Adolescent Health. 2013;52(1):64-9.
94. Taras H, Potts-Datema W. Obesity and student performance at school. Journal of School Health. 2005;75(8):291-5.
95. Hannon TS, Arslanian SA. The changing face of diabetes in youth: lessons learned from studies of type 2 diabetes. Annals of the New York Academy of Sciences. 2015;1353(1):113-37.
96. Sonntag D, Ali S, De Bock F. Lifetime indirect cost of childhood overweight and obesity: A decision analytic model. Obesity (Silver Spring, Md). 2016;24(1):200-6.
97. Farooqi IS, O'Rahilly S. Genetic factors in human obesity. Obesity Reviews. 2007;8(s1):37-40.
98. Reilly JJ, Dorosty AR, Emmett PM. Prevalence of overweight and obesity in British children: cohort study. Bmj. 1999;319(7216):1039-.
99. Kumanyika SK. Environmental influences on childhood obesity: Ethnic and cultural influences in context. Physiology & Behavior. 2008;94(1):61-70.
100. Bleich SN, Segal J, Wu Y, Wilson R, Wang Y. Systematic review of community-based childhood obesity prevention studies. Pediatrics. 2013;132(1):e201-10.
101. Hendrie GA, Brindal E, Corsini N, Gardner C, Baird D, Golley RK. Combined home and school obesity prevention interventions for children: what behavior change strategies and intervention characteristics are associated with effectiveness? Health education & behavior : the official publication of the Society for Public Health Education. 2012;39(2):159-71.
102. French SA, Jeffery RW, Story M, Breitlow KK, Baxter JS, Hannan P, et al. Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. American Journal of Public Health. 2001;91(1):112.
103. Meng L, Xu H, Liu A, van Raaij J, Bemelmans W, Hu X, et al. The costs and cost-effectiveness of a school-based comprehensive intervention study on childhood obesity in China. PloS one. 2013;8(10):e77971.
104. Popkin BM, Hawkes C. Sweetening of the global diet, particularly beverages: patterns, trends, and policy responses. The lancet Diabetes & endocrinology. 2016;4(2):174-86.

105. Cullen KW, Watson K, Zakeri I, Ralston K. Exploring changes in middle-school student lunch consumption after local school food service policy modifications. Public health nutrition. 2006;9(06):814-20.
106. de Sa J, Lock K. Will European agricultural policy for school fruit and vegetables improve public health? A review of school fruit and vegetable programmes. European journal of public health. 2008;18(6):558-68.
107. Nabhani-Zeidan M, Naja F, Nasreddine L. Dietary intake and nutrition-related knowledge in a sample of Lebanese adolescents of contrasting socioeconomic status. Food and nutrition bulletin. 2011;32(2):75-83.
108. Tanaka N, Miyoshi M. School lunch program for health promotion among children in Japan. Asia Pac J Clin Nutr. 2012;21(1):155-8.
109. Evans CE, Cleghorn CL, Greenwood DC, Cade JE. A comparison of British school meals and packed lunches from 1990 to 2007: meta-analysis by lunch type. Br J Nutr. 2010;104(4):474-87.
110. Gleason PM, Dodd AH. School breakfast program but not school lunch program participation is associated with lower body mass index. J Am Diet Assoc. 2009;109(2 Suppl):S118-28.
111. Robinson TN, Borzekowski DG, Matheson DM, Kraemer HC. Effects of fast food branding on young children's taste preferences. Archives of Pediatrics & Adolescent Medicine. 2007;161(8):792-7.
112. Chriqui J, Resnick E, Schneider L, Schermbeck R, Adcock T, Carrion V, et al. School District Wellness Policies: Evaluating Progress and Potential for Improving Children's Health Five Years after the Federal Mandate. Brief Report. Volume 3. Robert Wood Johnson Foundation. 2013.
113. Lee J, Piao M, Byun A, Kim J. A Systematic Review and Meta-Analysis of Intervention for Pediatric Obesity Using Mobile Technology. Studies in health technology and informatics. 2016;225:491-4.
114. Mack I, Bayer C, Schäffeler N, Reiband N, Brölz E, Zurstiege G, et al. Chances and limitations of video games in the fight against childhood obesity—A systematic review. European Eating Disorders Review. 2017.
115. Schoeppe S, Alley S, Van Lippevelde W, Bray NA, Williams SL, Duncan MJ, et al. Efficacy of interventions that use apps to improve diet, physical activity and sedentary behaviour: a systematic review. International Journal of Behavioral Nutrition and Physical Activity. 2016;13(1):127.
116. Fedewa AL, Ahn S. The effects of physical activity and physical fitness on children's achievement and cognitive outcomes: a meta-analysis. Research quarterly for exercise and sport. 2011;82(3):521-35.
117. Mei H, Xiong Y, Xie S, Guo S, Li Y, Guo B, et al. The impact of long-term school-based physical activity interventions on body mass index of primary school children – a meta-analysis of randomized controlled trials. BMC public health. 2016;16(1):205.

118. Wu S, Cohen D, Shi Y, Pearson M, Sturm R. Economic Analysis of Physical Activity Interventions. American Journal of Preventive Medicine. 2011;40(2):149-58.
119. Hingle MD, O'Connor TM, Dave JM, Baranowski T. Parental involvement in interventions to improve child dietary intake: A systematic review. Preventive Medicine. 2010;51(2):103-11.
120. Hamadeh S, Marquis M. School Nutrition Policies: Shared and Complementary Perspectives of Lebanese Key Stakeholders. interventions. 2018;5:21.
121. Frerichs L, Ataga O, Corbie-Smith G, Lindau ST. Child and youth participatory interventions for addressing lifestyle-related childhood obesity: a systematic review. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2016;17(12):1276-86.
122. Ruggieri DG, Bass SB. A Comprehensive Review of School-Based Body Mass Index Screening Programs and Their Implications for School Health: Do the Controversies Accurately Reflect the Research? Journal of School Health. 2015;85(1):61-72.
123. Selman LE, Harding R, Beynon T, Hodson F, Coady E, Hazeldine C, et al. Improving end of life care for chronic heart failure patients-" Let's hope it'll get better, when I know in my heart of hearts it won't". Heart. 2007.
124. Chandon P, Wansink B. Does food marketing need to make us fat? A review and solutions. Nutrition reviews. 2012;70(10):571-93.
125. Nihiser AJ, Lee SM, Wechsler H, McKenna M, Odom E, Reinold C, et al. Body mass index measurement in schools*. Journal of School Health. 2007;77(10):651-71.
126. Ikeda JP, Crawford PB, Woodward-Lopez G. BMI screening in schools: helpful or harmful. Health education research. 2006;21(6):761-9.
127. Kopelman P. Health risks associated with overweight and obesity. Obesity reviews. 2007;8(s1):13-7.

Annexes

Annex 1

Medical complications associated with increased body fatness. (127)

Type 2 diabetes

90% of Type 2 diabetics have a body mass index (BMI) of >23 kg/m²

Hypertension

5 fold risk in obesity

66% of hypertension is linked to excess weight

85% of hypertension is associated with a BMI >25 kg/m²

Dyslipidaemia progressively develops as BMI increases from 21 kg/m² with rise in small particle low-density lipoprotein (LDL)

Coronary artery disease (CAD) and stroke

2.4 fold in obese women and two-fold in obese men under the age of 50 years

70% of obese women with hypertension have left ventricular hypertrophy

Obesity is a contributing factor to cardiac failure in >10% of patients

Overweight/obesity plus hypertension is associated with increased risk of ischaemic stroke

Respiratory effects

Neck circumference of >43 cm in men and >40.5 cm in women is associated with obstructive sleep apnoea, daytime somnolence and development of pulmonary hypertension

Cancers

10% of all cancer deaths among non-smokers are related to obesity (30% of endometrial cancers)

Reproductive function

6% of primary infertility in women is attributable to obesity

Impotency and infertility are frequently associated with obesity in men

Osteoarthritis (OA)

Frequent association in the elderly with increasing body weight – risk of disability attributable to OA equal to heart disease and greater than any other medical disorder of the elderly

Annex 2

Characteristics and concepts of social marketing benchmark criteria, according to the National Social Marketing Centre (NSMC) (80)

Social marketing benchmark criterion	Characteristics of the criterion as defined by NSMC	Considerations when including this criterion in a health intervention
Customer orientation	Focuses on the audience. Fully understands the lives and behaviors of an audience, along with the issues important to that audience, using a mixture of data sources and research methods	Involves the target participants, their local community, and their environment. Considers the premise that all program planning decisions must emanate from a consideration of specific participant needs
Behavior	Aims to change people's behavior	Clear, specific, measurable, and time-bound behavioral goals should be set, with baselines and key indicators established
Theory	Uses behavioral theories to understand behavior and inform the intervention	Used to inform both the understanding of the problem and the design of the program. Selecting and using behavioral theory for designing and applying an intervention involves assessing the underlying factors that could possibly influence behavior in a given situation
Insight	Identifies, using customer research on "actionable insights," pieces of understanding that will lead to intervention development	Refers to a deep understanding of what moves and motivates the participants, including who and what influences the targeted behavior
Exchange	Considers benefits and costs of adopting and maintaining a new behavior; maximizes the benefits and minimizes the costs to create an attractive offer	Considers perceived/actual costs vs perceived/actual benefits. The perceived cost (which can be social, economic, physical) does not compensate for the perceived gain. The idea is that everyone in the intervention, including intermediaries and participants, should receive valued benefits in return for their efforts
Competition	Seeks to understand what competes for the audience's time, attention,	Refers to the behavioral options that compete with public health recommendations and services.

Social marketing benchmark criterion	Characteristics of the criterion as defined by NSMC	Considerations when including this criterion in a health intervention
	and inclination to behave in a particular way	Identifies which products, behaviors, or services compete with those that the intervention is promoting, as well as how the benefits compare with those offered by competing behaviors. These behavioral options represent the difficulties and limitations that can be presented by the participants and/or the intermediaries
Segmentation	Avoids a "one size fits all" approach: identifies audience "segments," which have common characteristics, and then tailors interventions appropriately	Does not only rely on traditional demographic, geographic, or epidemiological targeting. Draws on behavioral and psychographic data. Used to identify relatively homogeneous subgroups and to develop strategies designed specifically for each group of participants who share needs, wants, lifestyles, behaviors, and values and thus are likely to respond similarly to public health interventions
Methods mix	Uses a mixture of methods to create behavioral change. Does not rely solely on raising awareness	Uses all elements of the marketing mix (product, price, place, and promotion) and/or primary intervention methods (inform, educate, support, design, and control)

Knowledge to Policy Center draws on an unparalleled breadth of synthesized evidence and context-specific knowledge to impact policy agendas and action. K2P does not restrict itself to research evidence but draws on and integrates multiple types and levels of knowledge to inform policy including grey literature, opinions and expertise of stakeholders.

Knowledge to Policy (K2P) Center
Faculty of Health Sciences
American University of Beirut
Riad El Solh, Beirut 1107 2020
Beirut, Lebanon
+961 1 350 000 ext. 2942 - 2943
www.aub.edu.lb/K2P
K2P@aub.edu.lb

Follow us
Facebook Knowledge-to-Policy-K2P-Center
Twitter @K2PCenter

Knowledge to Policy Center K2P