

Good practices for childhood obesity prevention in kindergartens and primary schools in Malta

Jason Attard, Martina Portelli, Charmaine Gauci

Background

Obesity is a worldwide and chronic disease with significant morbidity and mortality which often begins in childhood. Kindergartens and schools are unique settings that may contribute towards the prevention of childhood obesity through ensuring a safe and supportive environment and the development of personal life skills. The aim of this study was to identify good practices, as defined by the Joint Action across Europe on Nutrition and Physical Activity (JANPA), that are effective and sustainable for childhood obesity prevention in kindergarten and primary schools in Malta.

Methods

This descriptive study design involved the development of an online questionnaire using the nine core criteria of the JANPA toolbox. An operational definition of fulfilling six core criteria was used to qualify an initiative as a good practice. The questionnaire was sent to the Heads of School of all kindergartens and primary schools in Malta. Two researchers independently of each other reviewed the replies for each initiative and assigned one point for each fulfilled core criteria. The total sum of points produced a JANPA core criteria score for that initiative.

Results

The response rate for this study was 21.9%. 24 out of a total of 39 initiatives achieved the operational JANPA core criteria score of 6. Initiatives were grouped into nutrition only, physical activity only, and combined nutrition and physical activity good practices and were described.

Conclusion

This study identified several good practices that can be extended to other schools across Malta. The survey tool can also be used when designing and implementing new initiatives.

Dr Jason Attard
MD, MSc

Office of the Superintendence of
Public Health
Pieta', Malta

Ms Martina Portelli
BPsy, BSc Nursing

Health Promotion and Disease
Prevention Directorate
Gwardamanga, Malta

Prof Charmaine Gauci
MD, MSc, PhD

Office of the Superintendence of
Public Health
Pieta', Malta

Obesity is a worldwide and chronic disease, with significant morbidity and mortality from cardiovascular, neurological, and oncological sequelae. Obesity often begins in childhood and is an important predictor for adult obesity.¹ Obesity in childhood may result in difficulty in breathing, increased risk of bone fractures, the emergence of the metabolic syndrome, and psychological sequelae.² Prevalence data for 7–9-year-old children in 2015–2017 shows that 29% of boys and 27% of girls were overweight or obese. The prevalence of obesity was 13% in boys and 9% in girls.³ Prevalence data in 2018 for 11-, 13-, and 15-year-old children showed that one in five adolescents were found to be overweight or obese.⁴

In 2015/6, a National study on childhood's Body Mass Index (BMI) approximately 40% of school-aged children in Malta were either overweight or obese.⁵ In a recent WHO report, the age-standardised prevalence of overweight and obesity among 5–9-year-old school-aged children (2016) in Malta was 43.3% in boys and 36.4% in girls. The prevalence of obesity stood at 19.7% in boys and 14.2% in girls. The age-standardised prevalence of overweight and obesity among 10–19-year-old adolescents (2016) in Malta was 37.8% in boys and 32.5% in girls. The prevalence of obesity in this age cohort was 13.9% in boys and 9.6% in girls.⁶

The latest WHO report states that a life course approach is critical in reversing the obesity epidemic.⁶ Children spend several years in kindergartens and schools. They are unique settings that may contribute towards the prevention of childhood obesity through ensuring a safe and supportive environment and the development of personal life skills.⁷ Several Maltese national policies, strategies and action plans capitalise on this, describing school-based action measures that promote healthy eating and physical activity.^{8–}

¹¹ These include measures encouraging fruit and vegetable consumption such as the School Fruit Scheme, promotion of healthy eating in schools through clear guidance on the age-appropriate content of lunchboxes, the introduction of healthy breakfast clubs, restricting sale of unhealthy food from school canteens, promotion of plain water consumption, and measures that promote physical activity.

According to Joint Action across Europe on Nutrition and Physical Activity (JANPA), a good practice is an initiative that has been proven to work well (i.e., process evaluation) and produce good results (i.e., output and outcome evaluation), and is therefore recommended as a model. It is a sustainable and

efficient experience, with clear objectives and clearly defined target groups that is aimed to be empowered. Its activities use existing structures, and it has a broad support among the target population, thus deserves to be shared so that a greater number of people can adopt it. A prime example of a best practice that was developed in Malta is 'The Schools on the Move' project. This peer-led, participatory action initiative led to increased physical activity during recess in secondary schools.¹² Furthermore, in an EU Joint Action Chrodix Plus project (2017–2020), the Health Promotion and Disease Prevention Directorate (HPDP) within the Ministry for Health showcased the ToyBox Programme. ToyBox is a multi-component kindergarten-based family-involved intervention focusing on drinking, eating, snacking, physical activity, sedentary behaviour, and oral health, which was implemented in church and independent schools in Malta and Gozo.¹³

The aim of this study is to identify good practices that are effective and sustainable for childhood obesity prevention that were carried out or are currently being carried out in year groups K2–Y6 in Maltese kindergarten and primary schools.

METHODOLOGY

A questionnaire was developed aiming at identifying effective and sustainable school-based initiatives for preventing childhood obesity that were carried out in schools. The questionnaire was developed using the JANPA framework of good practice criteria spanning across three categories, namely intervention characteristics, implementation, and monitoring and evaluation. The JANPA toolbox consists of 48 criteria, nine of which are considered core criteria needed to be fulfilled to qualify an initiative as good practice. Only these nine core criteria were used to develop the questions for the tool.¹⁴

The tool consisted of a quantitative-qualitative questionnaire which was validated using a face validation method. The tool was discussed with the Lead of the Health Promotion Unit within the Health Promotion and Disease Prevention Directorate, the Lead of the Strategy Development and Implementation Unit within the Office of the Superintendent of Public Health, and senior manager within the Directorate for Research, Lifelong Learning and Employability. Questions were checked for clarity, simplicity, and adequacy. Feedback was used to amend the tool (see [Table 1](#)). Whilst there are nine core criteria that need to be fulfilled to qualify a programme or policy as good practice, an operational definition of six core criteria was used for this study.

Table 1 JANPA good practice core criteria

JANPA	Good Practice Core Criteria	Modified Good Practice Core Criteria
<p>1. Programme characteristics</p>	<p>Are the objectives of the programme SMART (Specific, Measurable, Achievable, Realistic and Time-bound) and clear?</p> <p>Is the target group clearly defined (including age, gender and socio-economic status)?</p> <p>Is the approach you use proven to be successful and effective in practice (has had a positive impact on individuals and/or communities)?</p>	<p><i>Are the objectives of the initiative SMART (Specific, Measurable, Achievable, Realistic and Time-bound)?</i></p> <p><i>Is the target group clearly defined? (including age, sex, general education students, students with a statement of needs, etc.)</i></p> <p><i>Is this intervention proven to have a positive impact on individuals and/or communities? (From evidence-based research in the literature, good practices from other countries, first-hand evaluation of the initiative, etc.)</i></p>
<p>2. Implementation</p>	<p>Is the aim to empower the target group by enhancing its knowledge, skills and competences so that its members can make decisions independently?</p> <p>Are the activities using/integrating existing structures?</p> <p>Is there a broad support for the intervention amongst the intended target populations?</p> <p>Are the financial and human resources in place for evaluation?</p>	<p><i>Is the aim of the initiative to empower the target group by enhancing its knowledge, skills and competencies so that its members can make decisions independently?</i></p> <p><i>Are the activities using/integrating existing structures? (Curriculum, PE lessons, human resources such as an on-site home economics teacher, home economics labs, parent-teacher associations, formal inter-ministerial collaborations, etc.)</i></p> <p><i>Is there a broad support for the intervention amongst the intended target populations? (Do the students/teachers/parents like the intervention?)</i></p> <p><i>Does the school have the human and financial resources to evaluate this initiative?</i></p>
<p>3. Monitoring and evaluation</p>	<p>Have the planned activities been performed and have most of the objectives been reached?</p> <p>Has the outcome or impact evaluation showed significant contribution to the target behaviour or its determinants?</p>	<p><i>Are the objectives of the initiative being reached?</i></p> <p><i>Has the outcome or impact evaluation shown significant contribution to the targets knowledge, attitudes, or practices? (Has the intervention shown an improvement in healthy eating and physical activity?)</i></p>

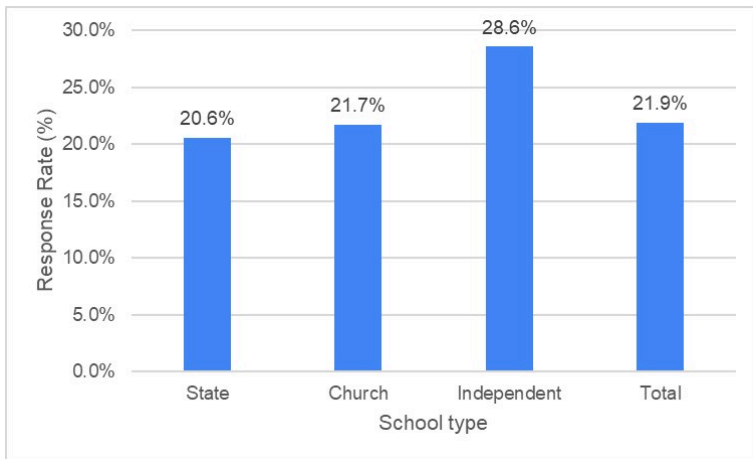


Figure 1 Response rates by school type

The online questionnaire was sent to the Heads of School of all kindergartens and primary schools in Malta who were invited to participate in the study in July 2021; reminders were sent in December 2021 and January 2022. The Head of School or their delegate were requested to provide information about one to three initiatives that were carried out in their school that they felt are most effective and sustainable for childhood obesity prevention. It was made clear that participation in the study was entirely voluntary and that they were under no obligation to participate. Submitting the online questionnaire was considered as acceptance to participate in the study. For each initiative, the Head of School or their delegate was asked several questions including nine yes or no questions related to the nine core criteria. For each yes answer, the Head of School or their delegate was asked to provide a brief explanation. The results of the report were anonymised with the data accessible only to the

research team. The data collection phase closed in February 2022.

Two researchers independently of each other reviewed the replies to the questions for each initiative in March 2022. Each fulfilled core criteria were given one point. The total sum of points given for the nine core criteria for each initiative produced a JANPA core criteria score with a minimum of 0 and a maximum of 9. Discrepancies were resolved by discussion. An operational definition of six core criteria was used to decide which initiatives would be considered good practices and included in the results of this study.

Permission to administer questionnaires to Heads of School or their equivalent was approved by the MEDS Research Ethics Committee. The research project always abided the General Data Protection Regulations.

RESULTS

A total of 128 (68 State, 46 Church and 14 Independent) schools were invited to participate in this study. This study resulted in responses from 28 schools with an overall response rate of 21.9%. **Figure 1** illustrates the differing response rates across school types. The response rates were Independent>Church>State schools.

A total of 39 initiatives were submitted by 28 schools. Just over one half of initiatives (56.4%) were submitted by State schools. Many initiatives either had a nutrition only focus.¹⁷ or a combined nutrition and physical activity focus.¹⁵ **Figure 2** shows the number of initiatives by intervention focus and school type.

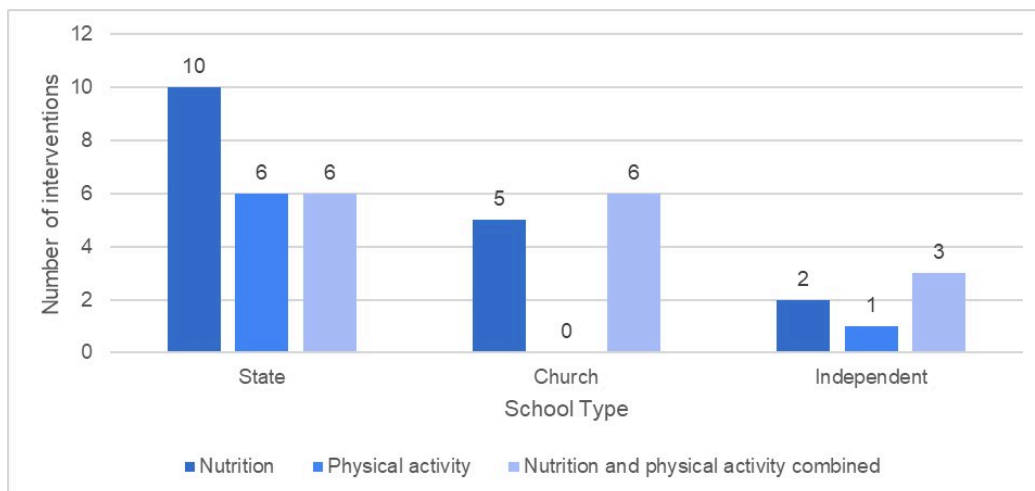


Figure 2 Number of initiatives by intervention focus and school type

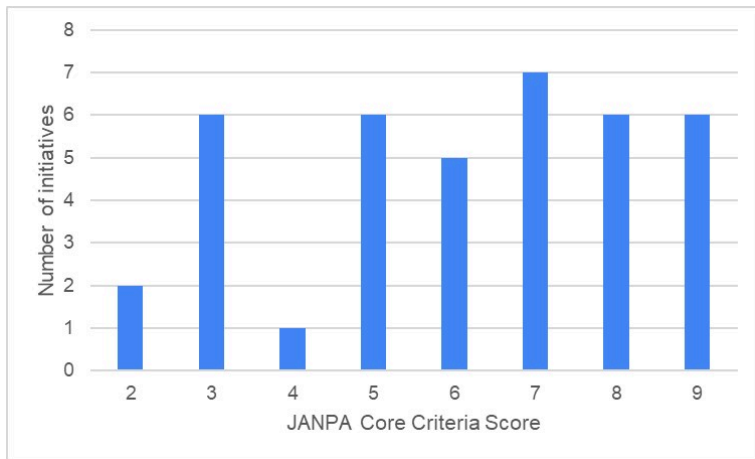


Figure 3 Number of initiatives by JANPA Core Criteria Score

The average JANPA core criteria score across all initiatives was 6.1, with a median score of 6.0. The distribution of the number of initiatives by JANPA core criteria score is depicted in **Figure 3**.

A total of 24 initiatives achieved the operational JANPA core criteria score of 6 or more. Some of these good practices were common or very similar across schools and were grouped together. These good practices are described below.

Nutrition Only

Healthy Eating Policy

Seven schools stated that they are following a healthy eating policy. Some schools stated that parents are given a set of policies at the beginning of the scholastic year included a booklet on healthy lunches and permissible foods including plain drinking water. One school stated that they have a reverse osmosis system so that fresh water was always available on demand and that a water fountain for the whole school was also installed. Some schools stated that the rationale for the healthy eating policy is explained to the students through a variety of educational fora.

Fruit/Vegetable Break

Two schools stated that they actively encouraged students every day to eat one fruit or vegetable during the school lunch break by promoting intake through curricular approaches such as through lessons such as social studies, English, mathematics, Physical Education, and the Home Economics Centre and monitoring by the teachers and the senior management team. This was carried out, and monitoring. One of these two schools rewarded a compliant student with small tokens. One school stated that they observed an increase in fruit

consumption from 55% to 83% increase after their intervention.

Food Lab: Healthy Recipes

One school stated that they have an initiative where classes cook a healthy recipe at least once a month.

Book: "Ikkel Frisk mill-Iskola" (Fresh Food from School)

One school stated that they produced a recipe book with healthy recipes as part of their Ekoskola activities. The recipe book required the use of fresh local produce promoting sustainable buying of local products. The recipe book was targeted to both children and their parents. The recipes were prepared and photographed by the school, and then published. The proceeds from the book sales went to a charity fund.

Training in food and nutrition for Primary school educators: a hands-on approach

One school held a professional development session done in collaboration with the Home Economics Seminar Centre, within the Directorate for Learning and Assessment Programmes. The aim was to support Primary School educators in planning and facilitating interactive food and nutrition related activities such as basic cooking skills, by improving their theoretical and practical knowledge and skills.

Online Nutrition Programmes

One school had two online nutrition programmes: one for Year 3 students and another for Year 5 students. The online programmes for the Year 3 and 5 students were facilitated through a 40-minute session by support teachers from the Home Economics Seminar Centre on a class basis. The sessions were held five times to meet all classes. The Year 3 programme focused on the importance of having a daily healthy breakfast. The Year 5 programme encouraged positive attitudes towards the consumption of vegetables and fruit.

Physical Activity Only

Daily Mile

Three schools stated that they carry out the Daily Mile initiative in their school. The daily mile is an initiative that involves students either walking or jogging for up to 30 minutes daily. The Daily Mile was considered quite simple and not resource intense to implement. One school stated that a physical education teacher supervises the run-a-mile initiative just after assembly. Another school stated that the Daily Mile gave space for the students to take a break from their class. Two schools stated that the Daily

Mile initiative could not be implemented during the COVID-19 pandemic as to maintain class bubbles.

Active Fridays

Two schools stated that they organise Active Fridays. One school stated that they organised games whilst another school stated that they organised Fun Fit Football Sessions in collaboration with the Malta Football Association and the National Literacy Agency Sports and Literacy Leaders. The Active Friday's initiative was very well received by both children and parents. Educators felt that students practiced various games during the rest of the week.

Activity Days

One school stated that they organise Activity Days. Activity Days were held two or three times per scholastic year and varied according to the year group of the students. Generally, one or two of the Activity Days were carried out on-site at the school and one of the Activity Days was carried out off-site. Activity Days consisted of different planned cross curricular activities including informative treasure hunts on flora and fauna, keep fit sessions, and the science of movement. The on-site Activity Days engaged the parents, various educators including peripatetic teachers, and collaborations with the local governance. The school stated that the Activity Days had very strong support from students, parents, and educators and its' absence during the COVID-19 pandemic was felt.

Combined Nutrition And Physical Activity

The Outside Classroom

One school stated that they have an Outside Classroom initiative. This is a cross-curricular activity that involves the active participation of students, particularly those in kindergarten, in school gardening such as planting seeds, watering plants, and study of insects.

Healthy Lifestyle Week

Two schools stated that they carry out Healthy Lifestyle Weeks. Healthy Lifestyle Weeks incorporate various cross-curricular activities such as student visits to the Home Economics Centre for talks and doing their own breakfast, talks to the whole school including parents, information sessions about the healthy food plate, balanced diet and nutrition, distinguishing between healthy food and fast foods, trying out different foods, the fruit basket initiative where students take a fresh fruit out of a basket placed in a central place in the school entrance, and daily exercises and sports.

Let's Move

One school stated that they participated in an EU funded Erasmus+ programme to promote health lifestyle. This project included a conglomerate of initiatives including staff training, having a fruit break every morning, online seminars and nutrition sessions with parents and pupils, and physical activities.

Integrated Learning about Health Living

Two schools stated that they integrated learning about healthy living, such as the importance of healthy food choices and exercise, throughout various subjects. One school did this through the Personal, Social and Career Development, Physical Exercise and Science subjects. The other school did this through a dedicated topic on healthy living.

DISCUSSION

The most quoted initiative by respondents was the Healthy Eating Policy. The school food environment is an important contributor to childhood obesity. Evidence from a recent meta-analysis shows that restriction of sugar sweetened beverages and unhealthy snacks reduced their intake by 0.18 servings per day and 0.17 servings per day, respectively ¹⁵ Whilst school meal standards increased fruit intake by 0.76 servings per day, it did not statistically significantly increase vegetable and fruit and vegetable intake.¹⁵

Several innovative teaching approaches were described such as the online nutrition education programmes, experiential learning, and cross-curricular approaches such as the Food Lab and Outside Classroom, parental involvement, and contingent reinforcement through token economy. According to a systematic review and meta-analysis of the literature (2015), the most effective approach to reduce food consumption and energy intake and improve nutritional knowledge, and to a lesser degree, fruit and vegetable consumption or preference in primary school students, was through experiential learning. Other, albeit less effective, approaches include cross-curricular approaches and enhanced curriculum interventions.¹⁶

School-based physical activity initiatives in primary school-aged children can either be integrated into the average school week (Daily Mile and Active Fridays) or carried out occasionally throughout the scholastic year (Activity Days and Healthy Lifestyle Week). Some initiatives are very easy to implement (Daily Mile) whereas others require more effort

(Active Fridays, Activity Days and Healthy Lifestyle Week) or may require additional funding (Let's Move). Some of the described initiatives have an established evidence base. For example, the Daily Mile is a simple, easy to implement, physical activity initiative that has been shown to be effective at promoting physical activity, reducing physical inactivity, and at improving fitness and body composition.¹⁷ Irrespectively, long-term school-based physical activity interventions have been shown to improve body composition among primary school students in a recent meta-analysis.¹⁸ and should be consistently implemented in schools. The education sector also stands to benefit from increasing physical activity in schools as classroom-based physical activity, in-turn, may lead to positive academic outcomes including classroom behaviours, cognitive function and academic achievements¹⁹

This study is not without limitations. An important limitation that needs to be taken in consideration when interpreting the results of this study is that it was carried out during the COVID-19 pandemic. This could have influenced the response rate and possibly the responses themselves in view of the school restrictions in place at the time, such as the mandatory quarantine of both staff and students. Another limitation of this study was in the quality and depth of the responses from the respondents. Respondents sometimes did not focus on a single initiative or did not provide strong evidence supporting their affirmative replies to the core criteria. This required significant interpretation on behalf of the two researchers when reviewing the replies to the questions for each initiative. This issue could have been averted through follow-up face-to-face interviews with the respondents. However, this could not be done as it was not taken into consideration when obtaining permission to administer the questionnaires to Heads of School or their equivalent by the MEDS Research Ethics Committee. This methodological choice was partly influenced by the full deployment of the main researcher to the National Maltese COVID-19 Public Health Response Team. Therefore, the results of this study cannot provide definite good practices using the previously described definition and core criteria.

This study serves as a good starting point on what practical actions can be implemented. Firstly, some of the less resource intense initiatives can be easily taken up by other schools. Secondly, it is highly recommended that an audit of the Whole School Approach to Healthy Lifestyle: Healthy Eating and Physical Activity Policy and Healthy Eating Lifestyle Plan is carried out. Thirdly, the JANPA toolbox core

SUMMARY BOX

What is already known about this subject:

- The prevalence rates of school-aged children in Malta who are either overweight or obese are among the highest in the WHO European Region.
- Kindergartens and schools are unique settings that may contribute towards the prevention of childhood obesity.

What are the new findings:

- Many of the less resource intense good practices can be easily extended to other schools across Malta.
- The validated survey tool can be used when designing and implementing new initiatives.

criteria should be central to the design and implementation of effective future interventions. This validated tool can be disseminated to schools through information sessions and workshops. Importantly is critical to convey the message that thorough documentation is needed for an initiative, including a description of the initiative itself and evidence for all core criteria, especially when it comes to monitoring and evaluation, to assess if an initiative is a good practice. Further research is needed to be able to qualify those initiatives as good practices more strongly and to identify more initiatives that are being carried out in Maltese kindergartens and primary schools.

CONCLUSION

This study describes good practices that are effective and sustainable for childhood obesity prevention in Maltese kindergartens and primary schools. The good practice with the most support relates to food restrictions in the school food environment. Its' implementation in other schools across Malta could be assessed in the future through an audit. Other good practices that address nutrition and or physical activity were also briefly described. These can be extended to other Maltese kindergarten and primary schools. The validated survey tool can also be used when designing and implementing new initiatives.

ACKNOWLEDGEMENTS

We would like to acknowledge Dr Mariella Borg Buontempo, Lead of the Health Promotion Unit within the Health Promotion and Disease Prevention Directorate, Dr Maya Podesta, the Lead of the Strategy Development and Implementation Unit within the Office of the Superintendent of Public Health, and Ms Jeannine Vassallo Senior Manager within the Directorate for Research, Lifelong Learning and Employability, for their feedback on the questionnaire.

REFERENCES

1. Llewellyn A, Simmonds M, Owen CG, Woolacott N Childhood obesity as a predictor of morbidity in adulthood: A systematic review and meta-analysis. *Obes Rev.* 2016;17:(1)56–67
2. WHO Obesity and overweight. 2021 [cited 2022 May 16]. Available from: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
3. WHO European Childhood Obesity Surveillance Initiative (COSI): report on the fourth round of data collection, 2015-2017. Copenhagen: WHO Regional Office for Europe; 2021 [cited 2022 Mar 30]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/341189/WHO-EURO-2021-2495-42251-58349-eng.pdf>
4. Inchley J, Currie D, Budisavljevic S, Torsheim T, Jåstad A, Cosma A, et al Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. International report. Volume 1. Key findings. *Health Behaviour in School-aged Children.* Copenhagen: WHO Regional Office for Europe: HBSC; 2020 [cited 2022 Mar 30]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/332091/9789289055000-eng.pdf>
5. Grech V, Aquilina S, Camilleri E, Spiteri K, Busuttill ML, Sant'Angelo VF, et al The Malta Childhood National Body Mass Index Study: A Population Study. *J Pediatr Gastroenterol Nutr.* 2017;65:(3)327–31
6. WHO European Regional Obesity Report 2022. Copenhagen: WHO Regional Office for Europe; 2022 [cited 2022 May 16]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/353747/9789289057738-eng.pdf>
7. World Health Organization. The Ottawa Charter for Health Promotion. Geneva, Switzerland; 1986 [cited 2022 Apr 22]. Available from: <https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference/actions>
8. A Strategy for the Prevention and Control of Noncommunicable Disease in Malta. Department of Health Promotion and Disease Prevention Public Health Regulation Division Ministry for Health, the Elderly and Community Care; 2010. Available from: https://deputyprimeminister.gov.mt/en/strategy-development-and-implementation-unit/Documents/Strategies_and_Policies/Noncommunicable_Disease_Control_Strategy_2010.pdf
9. A Healthy Weight for Life: A National Strategy for Malta (2012-2020). Superintendence of Public Health, Ministry for Health, the Elderly and Community Care; 2012. Available from: https://deputyprimeminister.gov.mt/en/strategy-development-and-implementation-unit/Documents/Strategies_and_Policies/A_Healthy_Weight_for_Life_a_National_Strategy_for_Malta.pdf

10. Food and Nutrition Policy and Action Plan for Malta (2015-2020). Health Promotion and Disease Prevention Directorate, Parliamentary Secretariat for Health, Malta; 2014. Available from: https://deputyprimeminister.gov.mt/en/strategy-development-and-implementation-unit/Documents/Strategies_and_Policies/Food_and_Nutrition_Policy_and_Action_Plan_for_Malta.pdf
11. A Whole School Approach to a Healthy Lifestyle: Healthy Eating and Physical Activity Policy. The Ministry for Education and Employment; 2015. Available from: https://education.gov.mt/en/resources/News/Documents/Healthy_Eating_and_Physical_Activity_Policy.pdf
12. Schools on the Move. Public Health Best Practice Portal. 2016 [cited 2022 May 16]. Available from: <https://webgate.ec.europa.eu/dyna/bp-portal/practice.cfm?id=258>
13. Joint Action Chrodis +. 2021 [cited 2022 Apr 25]. Available from: <https://deputyprimeminister.gov.mt/en/health-promotion/Pages/EU-Projects/joint-action-chrodis.aspx>
14. Kovacs VA, Sarkadi-Nagy E, Sandu P, Duleva V, Spinelli A, Kaposvari C, et al Good practice criteria for childhood obesity prevention in kindergartens and schools—elaboration, content and use. *Eur J Public Health*. 2018 Dec 1;28:(6)1029–34
15. Micha R, Karageorgou D, Bakogianni I, Trichia E, Whitsel LP, Story M, et al Effectiveness of school food environment policies on children’s dietary behaviors: A systematic review and meta-analysis. *PLoS One*. 2018 Mar 1;13:(3)e0194555
16. Dudley DA, Cotton WG, Peralta LR Teaching approaches and strategies that promote healthy eating in primary school children: A systematic review and meta-analysis. *Int J Behav Nutr Phys Act*. 2015 Feb 25;12:(1)1–26
17. Chesham RA, Booth JN, Sweeney EL, Ryde GC, Gorely T, Brooks NE, et al The Daily Mile makes primary school children more active, less sedentary and improves their fitness and body composition: A quasi-experimental pilot study. *BMC Med*. 2018 May 10;16:(1)1–13
18. 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 Mar 1;16:(1)1–12
19. Watson A, Timperio A, Brown H, Best K, Hesketh KD Effect of classroom-based physical activity interventions on academic and physical activity outcomes: A systematic review and meta-analysis. *Int J Behav Nutr Phys Act*. 2017;14:(1)1–24