

Whole School Mapping to Investigate the School Environment's Potential to Promote a Healthy Diet and Physical Activity in Malaysia

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ABSTRACT

Introduction: The school is a vital part in the development of children's dietary practices as children consume a substantial proportion of their daily intake at school. The school environment offers an ideal location for health education and intervention against physical inactivity and poor nutritional intake. **Methods:** A mapping tool was developed to map the school environment on four levels: physical, economic, political, and socio-cultural that can potentially affect healthy eating and physical activity. The mapping was piloted and completed by interviewing twelve teachers (responsible for student affairs and the school curriculum), followed by observation at twelve randomly selected schools (six urban, six rural) in Terengganu, Eastern Peninsular Malaysia. **Results:** For physical environment, 55.0% of the criteria were met and while all schools taught nutrition and physical activity, this was not backed up with actual facilities for practising physical activity or food preparation. For economic environment, 17.7% of the criteria were met and eleven out of twelve schools had mobile caterers outside their front gates selling energy-dense food/drink. For political environment, 52.1% of the criteria were met and all teachers were aware of the existence of the national catering and nutrition guidelines, but they reported a lack of resources for implementation and monitoring. For socio-cultural environment, 59.2% of the criteria were met and all schools used sweet foods and drinks as rewards at large events. **Conclusion:** The findings suggest potential avenues exist for intervention in schools to provide a supportive environment that promotes healthier eating and physical activity to prevent obesity.

Key words: Healthy eating, nutrition, physical activity, school environment, whole school mapping

INTRODUCTION

Schools are more than teaching centres; they are places where children and

their families come into contact with society (Briefel *et al.*, 2009). The school environment is also an important setting

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for the development of children's dietary practices as children consume a substantial proportion of their daily intake at school (Ogden, Carroll & Flegal, 2008) and the school environment offers an ideal location for health education, intervention against inactivity and poor nutritional intake, and monitoring of BMI. Therefore, the school environment has been recognised as having an important influence on educating and modelling children's eating behaviours.

Factors that lead to obesity among children are dietary intake, sedentary lifestyles and the environment (Han, Lawlor & Kimm, 2010). The increasing number of overweight and obesity cases among children has been one of the concerns related to the school environment. Over the last few decades, the escalating prevalence of obesity and overweight has become an important concern among children in Malaysia. A study by WHO (2007) indicated that 30.9% of children in Malaysia were overweight, while 3.3% were obese. When compared to adults, overweight children may have more serious lifetime health problems (Ajau *et al.*, 2014). In addition, the effects of hypertension among obese children has increased by 50% (Chong, Soo & Rahmah, 2012) compared to normal children.

In Malaysia, since school is the place where many students consume breakfast and lunch, it has been recommended that the school environment supports the development of healthy eating patterns by serving food in the school canteen that is healthy and nutritious, and meets food-based dietary guidelines (Moy, Gan & Zaleha, 2006). The authors propose that students and teachers be encouraged to serve as role models in the school canteen by eating healthily. These steps help to expose students who consume breakfast and lunch in school to an environment that supports healthy eating. This is in agreement with a review that has provided some evidence on the importance of nutrition guidelines and environmental changes in school-

based nutrition interventions (Jaime & Lock, 2009). Thus, research on the school nutrition environment that focuses mainly on food availability and policies (Masse & de Niet, 2013) needs to be carried out.

Schools are also one of the places where children spend most of their time socialising and playing with friends. This is supported by Nurul (2010) who found that children do prefer the outdoor environment of the learning institutions. This is consistent with the finding that suggests the classroom environment influences children's play behaviour (Abbas, Othman, & Rahman 2010). Story, Nanney & Schwartz (2009) suggest that students with good health are more likely to excel in their studies. Outdoor activities will also enhance students' cognitive skills and their social health (Nor Fadzilla & Ismail 2011). Therefore, it is vital for the school to employ experts in teaching and physical training to successfully convey the necessary information about health to gain the maximum benefit.

According to Kok *et al.* (2004), more studies that integrate potential determinants at the environmental and individual levels are required to study the relative importance of motivation, abilities and opportunities as mediators of nutrition and physical activity behaviours. Interventions that target the environment may be more efficient and potentially more effective than targeting individuals alone because they are designed to change the context in which people live and work and to create conditions that are more supportive for healthy behavioural choices (Kok *et al.*, 2004).

This study, therefore, mapped school environments on criteria that can potentially impact on children's healthy eating habits and physical activity. In response to recommendations of Swinburn, Egger & Raza (1999), four components of the environment within schools were considered: what is available (physical), what are the costs (economic), what are

the rules (political) and what is the social and cultural environment (socio-norm). To our knowledge, this is the first study in Malaysia that undertook an in-depth investigation into the school environment using this whole school mapping approach.

METHODS

Settings and participants

This study was conducted in Kuala Terengganu, Terengganu, Malaysia. Terengganu is located in eastern Peninsular Malaysia and is divided into seven administrative districts (Kuala Terengganu, Besut, Dungun, Kemaman, Hulu Terengganu, Marang and Setiu). Among the seven districts of Terengganu, Kuala Terengganu was chosen as a specific study location as it is the capital city of Terengganu state, which represents urban and rural areas which are similar in socio-demographic terms to other districts. In addition, in Malaysia, most studies to-date have been concentrated in the southern, central and northern regions (Ismail *et al.*, 2002; Ismail *et al.*, 2008) and there has been less research on the eastern region. Furthermore, it is also for pragmatic reasons as it was more practical and convenient to access these schools for the researcher; it also allowed utilisation of professional contacts when developing the study.

This research was conducted in six rural and six urban primary schools selected at random from a list of all schools in rural and urban areas of Kuala Terengganu. According to the Department of Statistics in Malaysia (DOSM), an area of 1km square with a population of >10,000 is classified as urban and <10,000 for rural (DOSM, 2001). The aim was to recruit a broad range of schools in order to make recommendations for subsequent interventions as effective and relevant as possible. Ethical approval was obtained from the Research Committee, University of Nottingham United Kingdom, Ministry

of Higher Education (MoHE) Malaysia, The Economic Planning Unit of the Prime Minister's Department (EPRD) and Ministry of Education (MoE) Malaysia.

Procedures

This study was conducted by designing a whole school mapping questionnaire, which was then administered by face-to-face interviews with a school teacher (a teacher who is responsible for student affairs and the school curriculum) at each site and direct observation of the school environment. The questionnaire was designed based on the ANGELO Framework (Analysis Grid for Environments Linked to Obesity) developed by Swinburn, Egger & Raza, (1999) and from the ideas of the School Food Action Group (SFAG, 2003), which described an ideal whole school policy, and identified potential areas where schools could provide a supportive environment. The questionnaire assessed criteria that a school would need to meet to offer a healthy and supportive environment for physical activity and healthy eating in four domains: Section A: Physical Environment (what is available) with 35 questions (Table 1), Section B: Economic (what are the costs), with 8 questions (Table 2), Section C: Political (what are the rules) with 8 questions (Table 3) and Section D: Socio-cultural environment (what are the attitudes and beliefs) with 10 questions (Table 4). The development process of the questionnaire for this study went through a rigorous piloting process to assess face-to-face validity and content validity.

These questions were prepared in two languages (Malay/English) to account for language preferences of the interviewees. The interviews were conducted during the morning session on a school day. All of the questions were asked using an initial closed question (yes = 1, no = 0) followed up with an open question when the criteria was not met, providing information about the constraints of implementing

the criteria. These responses were written by the interviewer onto the questionnaire during the interviews.

Data analysis

Quantitative data were analysed using Statistical Package for the Social Sciences (SPSS) version 18. Summative scores for each of the four domains were calculated so that possible scores ranged between 0-35 for Physical Environment, 0-8 for Economic Environment, 0-8 for Political Environment and 0-10 for Socio-cultural Environment, with a higher score indicating a more supportive environment. In addition, to enable comparisons of scores between domains, a 'criteria achievement rate' score was calculated using the formula $(\text{Total score} / \text{Total possible score}) * 100$. Total score refers to the number of schools that meet the identified criteria, while the total possible score refers to the number of criteria X the number of schools. A higher total score means that a larger number of schools complied with the criteria. Additional data from the interviews reported manually on the semi-structured questionnaire identifying reasons why some criteria were difficult to implement were synthesised as emerging themes and issues with the aim being to identify how the obstacles to implement some of the criteria could be overcome in schools.

RESULTS

The data obtained for the four environments of physical, economic, political and socio-cultural, are presented in Tables 1 to 4. For the physical environment, out of 35 criteria, schools met 13 criteria (e.g. health education for healthy eating and organising annual sport event), and they did not meet 16 criteria (e.g. using available education resources systematically and having appropriate sport facility, such as gymnasium or specific sport centre for playing more games such as badminton and netball). For economic environment,

schools met one criteria of having a tuck shop, while for the rest of the criteria, schools did not meet the criteria (e.g. all had mobile caterers outside the school compound who sold high calorie foods, e.g. nuggets and burgers) and there was no policy to monitor mobile caterers). For political environment, schools met 4 criteria (e.g. have a national nutritional guideline and at the same time have a policy for health education), and did not meet 4 other criteria (e.g. guideline for enforcement and having a specific policy for physical activity for primary schools). For socio-cultural environment, schools met 5 criteria (e.g. training teachers to become a role model and organising activities involving the public and family), but did not meet 5 other criteria, (e.g. growing food at school and inviting celebrities to promote a healthy lifestyle).

On average, 46.0% of the criteria that a school would need to meet to be a healthy, supportive environment for physical activity and healthy eating were met (Table 5). For physical environment 55.0% of the criteria were met (Table 1) and whilst all schools taught nutrition and physical activity, this was not backed up with actual facilities for practising physical activity or food preparation. For economic environment, 17.7% of the criteria were met (Table 2) and 11 out of 12 schools had mobile caterers outside their front gates selling energy-dense food/drink. For political environment 52.1% of the criteria were met (Table 3) and all teachers were aware of the existence of national catering nutrition guidelines (Ministry of Education, 2008) but they reported a lack of resources for implementation and monitoring. For socio-cultural environment, 59.2% of the criteria were met (Table 4) and all schools used sweet foods and drinks as rewards at large events.

The interviews revealed some significant barriers to implementing healthy eating and physical activity

Table 1. Number of schools meeting the criteria for physical environment

<i>Curriculum and education resources</i>	<i>Urban n=6 schools</i>	<i>Rural n=6 schools</i>	<i>Total number of schools meeting criteria</i>
1 Health and nutrition are taught in the curriculum	6	6	12
2 Physical education and activity are taught in the curriculum	6	6	12
3 Education Resources : Food pyramid, food models, etc.	6	6	12
4 Using educational resources (e.g.: Food pyramid & food models, systematically % of criteria met	0	0	0 (36)75.0%
Health, nutrition and physical activity programme			
5 Health professional involvement (Doctor or nurse visits)	6	6	12
6 Programme involving health professionals. (e.g. nutritionist & dietitian) Motivation /promoting healthy eating and physically active	6	6	12
7 Young Doctor programme-to empower students with health knowledge and skills in order to improve their own health and also that of their peers	6	2	8
8 Health education for healthy eating (promotion, information and programme conducted by school teachers)	6	6	12
9 Health education for physical activity (promotion, information and programme conducted by school teachers)	6	6	12
10 Visit to sports centre	4	0	4
11 Visit to farm or food factory	4	0	4
12 Annual Sports event	6	6	12
13 Simple exercise (stretching / warm-up) available before class	3	3	6
14 Walking / riding bicycle to school encouraged	0	4	4
15 Cycling at playtime	0	0	0
16 Information along the corridor about a healthy lifestyle.	6	6	12
17 Food calorie guidelines or other leaflets / books to students % of criteria met	0	0	0 (98)62.8%
Facilities at school			
18 Equipment/toys to encourage physical activity (balls, skipping ropes, badminton etc)	6	6	12

Continued next page

Table 1. Continued

<i>Curriculum and education resources</i>		<i>Urban n=6 schools</i>	<i>Rural n=6 schools</i>	<i>Total number of schools meeting criteria</i>
19	Indoor hall (use for any programme at school, indoor game like badminton, etc)	6	0	6
20	Sport centre (specific place for playing game/sport at school e.g. : badminton court and netball space instead of using assembly hall.)	0	0	0
21	Gymnasium	0	0	0
22	Leisure room- specific for health promotion % of criteria met	1	0 (19)31.7%	1
Break time, canteen environment and menu provision				
23	Break time available at schools for eating	6	6	12
24	Sufficient break time for children	0	0	0
25	Pleasant, calm, relaxing, attractive and cheerful canteen	4	6	10
26	Clean canteen	4	6	10
27	Healthy eating information displayed	3	3	6
28	'No' energy dense savoury foods sold (nuggets, sausage, etc.)	0	2	2
29	'No' energy-dense sweet foods sold (sweets, chocolate etc.)	0	2	2
30	No' high calorie drinks sold (fizzy etc.)	2	6	8
31	Fruit sold	2	2	4
32	Healthy food choices positioned attractively at the front of the serving counter	0	0	0
33	Free drinking water (Water cooler machine etc.)	6	6	12
34	Free fruit and vegetable to all pupils Notes: Free only for Supplementary Feeding Scheme to pupils from low income family	0	0	0
35	Free food or drink during extracurricular activities in the evening to all pupils % of criteria met	6	6	12 (78)50.0%
% of criteria met for physical environment, overall				231/420 = 55.0%

Table 2. Number of schools meeting the criteria for economic environment

<i>Criteria for economic environment</i>	<i>Urban n=6 schools</i>	<i>Rural n=6 schools</i>	<i>Total number of schools meeting criteria</i>
1 No mobile caterers near schools	0	1	1
2 Rules / policy to monitor food sold outside the school gates	0	0	0
3 No high calorie foods sold (nuggets, burger) at mobile caterer	0	0	0
4 No high calorie drinks (fizzy) at mobile caterer	0	0	0
5 Fruit sold	2	2	4
6 Tuck shop available at schools	6	6	12
7 Specific rules /policy to monitor tuck shop at school	0	0	0
8 Promotion leaflets for healthy eating/physical activity at tuck shop	0	0	0
% of criteria met for economic environment, overall			17/96=17.7%

Table 3. Number of schools meeting the criteria for political environment

<i>Criteria for political environment</i>	<i>Urban n=6 schools</i>	<i>Rural n=6 schools</i>	<i>Total number of schools meeting criteria</i>
1 National nutrition guidelines and Food policy use for school canteen guideline and others related to food	6	6	12
2 Awareness of national nutrition guidelines by teachers	6	6	12
3 Awareness of national nutrition guidelines by canteen handlers	6	6	12
4 Adherence to national nutrition guidelines by canteen handler	0	2	2
5 Sufficient manpower to enforce national nutrition guidelines	0	0	0
6 Rules and information to families to prepare healthy meals at home and lunch box	0	0	0
7 Policy for nutrition education	6	6	12
8 Policy for physical activity (Specific)			
<i>Note:</i> No specific policy but have the rules and physical activity guideline	0	0	0
% of criteria met for political environment, overall			50/96=52.1%

Table 4. Number of schools meeting the criteria for socio-cultural environment

<i>Criteria for socio-cultural environment</i>	<i>Urban n=6 schools</i>	<i>Rural n=6 schools</i>	<i>Total number of schools meeting criteria</i>
1 Food not used as a reward	0	0	0
2 Leading by example (training teacher as a role model)	6	6	12
3 Implementation (healthy eating rules) from teachers and canteen handler who attended the training	3	4	7
4 Celebrities invited for promoting healthy lifestyle	0	0	0
5 Growing food at school	0	4	4
6 Collaboration with the private sector on diet/ physical activity	6	6	12
7 Activities involving public, family and community	6	6	12
8 Network with other schools to promote healthy eating and physical activity	6	6	12
9 Committee / working group for school health promotion	6	6	12
10 Articles about healthy lifestyle for the school newsletter/website	0	0	0
% of criteria met for socio-cultural environment overall			71/120 = 59.2%

environments at schools particularly in relation to the physical environment, e.g. lack of facilities, time constraints and an unhealthy menu with less healthy menu options at school canteens, tuck shops, and mobile caterers outside school. A recurrent barrier that emerged in the different environments was a lack of resources in promoting healthy eating and physical activity amongst children, the lack of consistency in enforcing healthy eating practices, the challenge of maintaining an environment that promotes healthy eating and physical activity at school. In addition, health concerns appeared to be a low priority for schools compared with the need for academic achievement, and teachers also mention the limited financial resources allocated to health programmes. It was also observed that there was limited information, knowledge, and resources available on health, nutrition, and physical

activity which was in tandem with inadequate rules and effective guidelines to support health promotion in schools.

Opportunities for improvement that emerged from interviews with teachers about healthy eating suggested an overwhelming need for more financial support, specifically to promote healthy eating habits and physical activity. They also need more information or modules on healthy eating and physical activity to improve implementation in schools. However, in order to make this succeed, teachers also identified the need for more resources (human) to assist in developing a healthy environment at schools and advocacy within city councils to prevent the presence of mobile caterers outside schools that sell unhealthy food and drink. They also suggested launching a 'fruit and vegetables' day once a week, to promote healthy eating habits.

Table 5. Proportion of schools meeting the criteria for the different components of the environment

<i>Whole school mapping</i>	<i>Number of criteria</i>	<i>Total possible score^a</i>	<i>Total score^b</i>	<i>% criteria achievement^c</i>
Physical environment	35	420	231	55.0
Economic environment	8	96	17	17.7
Political environment	8	96	50	52.1
Socio-cultural environment	10	120	71	59.2
Average	15.3	183	92.3	46

^a Total Possible Score = Number of Criteria x 12 schools

^b Total Score = Taken from Table 1 to Table 4

^c Criteria achievement rate= Total score / Total Possible Score x 100%

DISCUSSION

A diversity of programmes and policies in schools has been designed to offer opportunities for pupils to eat a balanced diet and to be physically active (DHHS, 2001). However, even with recommended nutrition and physical activity programmes and policies in place, barriers within the school environment inhibit pupils from taking advantage of these opportunities. This can be seen from the findings of this study using a whole school mapping approach that identified a number of contradictory pressures within school environments that could suggest some room for improvement in the future.

Some positive measures have been taken in Malaysia, such as the introduction of health programmes and the promotion of a healthy school environment by the Ministry of Health, Ministry of Education and professional bodies (e.g. Nutrition Society, and Dietetic Association). However, most teachers in this study stated obstacles, including a lack of ideas, skills, time, and human resource to plan more programmes to promote a healthy environment. As such, the Nutritional guidelines and administration for school canteen guidance (Ministry of Education, 2008) need to be revised.

This study has summarised how the schools did not meet the criteria in the

different environments (i.e. physical, economic, political and sociocultural) that help in preventing childhood obesity. These findings regarding the influence of the school environment in Malaysia helps to fill the gap between studies of the individual and environment in preventing childhood obesity.

For physical environment, some schools did not meet the criteria because of certain barriers. Findings showed that only a limited amount of time and space are allocated for health, nutrition and physical activity in the school curriculum. In addition, health outcomes were generally perceived by school staff to have a lower priority than educational achievements. Barriers to participating in extracurricular sports were mainly due to a limited availability of coaches, playing space, and sports equipment as well as other problems such as teasing, bullying, and inferiority complex among some children resulting in reduced participation. Further, some schools that reported insufficient facilities to support healthy environments (e.g. a specific leisure room for health education, hall and specific sports centre) should be given priority assistance. Currently schools tend to use the assembly hall (which is intended for use for school occasions) for games such as badminton and netball. A specific sports centre that

can be used any time by students without a need for sharing the facility with other competing uses could help make it easier for schools to offer sporting events

At the school canteen, some schools did not meet the criteria because they provide a poor choice of healthy food, unpalatable healthy dishes and a lack of health information on high calorie foods (e.g. nuggets and fried burgers) that use deep frying methods. Lyn *et al.* (2011) reported that some schools in Georgia tend to sell energy dense food and non-nutritious foods. This is also supported by Baur *et al.* (2004) who found easy access to non-nutritious snack foods in the school cafeteria, combined with unpalatable and insufficient time to finish eating a full lunch, leading pupils to select non-nutritious snacks instead of the provided lunch.

For the economic environment, observations on mobile caterers at school gates have given an insight to a relatively new problem. Nowadays, children are more likely to have food outside school, which in most cases is unhealthy (crisps, sweets, chocolate etc.). A serious problem arises as teachers do not have any authority to stop street vendor foods as they are controlled by the city council, and this should be considered for immediate action. Otherwise, children may continue to engage in unhealthy eating behaviour. It may be worth suggesting a meeting with city councils to solve the presence of 'mobile caterers' outside schools who sell non-nutritious food and drink. The mobile caterers may need to be educated on healthy food choices and required to sell them if they want to continue their sales.

Most tuck shops are run by schools according to government rules; most also sell stationary but a few also sell sweets, chocolate and sweet drinks, which is against national regulations. To date, schools only refer to Nutritional Guidelines and Administration for the school canteen (Ministry of Education

2008). This indicates that strict guidelines need to be implemented specifically for tuck shop at schools. If schools want to sell food at tuck shops, they should ensure that all food and drink sold in tuck shops adhere to a whole-school food approach. One example that they can refer to is the UK's Nutritional and Practical Guidelines for School Meals that place restrictions on food and beverages that are high in fat, sugar and salt to promote a healthy environment (The Caroline Walker Trust, 2005). Another possible reference is the Nutrition Standards for Foods in Schools: Leading the Way toward Healthier Youth that proposed a standard for food that should be sold to children inside and outside school compounds (Stallings & Yaktine, 2007). Hence, additional and specific guidelines may be helpful to advise schools on selling the right things in the school's tuck shop.

For the political environment, most of the schools had inadequate rules compounded by ineffective implementation of guidelines to support a healthy environment. Even though there are standard nutritional guidelines, some of the canteen handlers were still not adhering to the menu guidelines. Some canteen handlers said that they had insufficient idea when preparing nutritious dishes, suggesting the need for a further revision of the guidelines with some options for healthy recipes as well as training the caterers. Apart from that, there were also suggestions from teachers regarding the addition of new regulations about selling healthy food by tender that must be followed by all canteen handlers. This would guide them to be cautious and follow the contract strictly, as otherwise they run the risk of the contract being withdrawn. This may secure the implementation of healthy food service to children at the school canteen, which can help in preventing childhood obesity. The nutrition policy must be monitored to make sure that the policies are not only limited

to food accessibility and availability, but also encompass food preparation and the hygienic conditions of the school canteen (Martins, Hogg, & Otero 2012).

For the socio-cultural environment, many schools were found to give food as a reward, very often in the form of creamy biscuits, chocolate and sweets drinks in large events. This need to be scrutinised as this may mediate unhealthy eating amongst children. New guidelines need to be developed on choosing and preparing healthy food as a reward amongst children at a special school event, or for schools to choose some other appropriate reward as substitution. These rewards, which also originate from sponsorship by outsiders (e.g. companies, corporates and parents) during the event, need to be controlled, in terms of adherence guidelines. Ideas from teachers, such as inviting celebrities/professionals to motivate children, should be taken into account. More information about selected celebrities or professionals should be discussed in detail according to budget and time for implementation at schools. This could motivate children to practise a healthy lifestyle by referring to a positive role model. The idea of introducing school gardens was seen as unfeasible by teachers, due to the potential of burglaries and time constraints. This idea therefore needs further investigation in order for it to be implemented effectively

In order to achieve the target of encouraging children to eat healthy and promote a healthier school environment, cooperation and contribution from everyone (public sector, private sector, parents and other schools) is vital (De Bourdeaudhuij *et al.*, 2011). Understanding the physical environment that can be achieved through collaboration and activities is important to ensure a favourable learning environment (Nur Hidayatuljamilah *et al.*, 2014). The planning of both the interior and exterior learning environment should be taken into account to create a conducive learning environment (Shuhana, Hanim & Norsiah

2012), as the environment can affect one's life internally and externally.

This study has provided suggestions for some improvements in the future. One of the greatest concerns to be considered as a policy document is the lack of human resources to implement a whole-school approach in all environments (physical, economic, political and socio-cultural). A nutritionist is required at the Department of Education in every district or state to monitor health programmes at schools. Hence, it is hoped that health barriers can be overcome by a nutritionist who could work together with teachers or other collaborators (e.g. Department of Education and Health) in promoting healthy eating at school, which in turn can reduce childhood obesity.

Some other important recommendations that can be adapted as policies are the revision of nutritional canteen guidelines including healthy food services in canteen handler tenders, healthy recipe books that meet children's nutritional requirements, packed lunch guidelines for parents (Evans & Cade, 2007), handy books on healthy eating options and physical activity for children and parents, revising the guidelines for nutrition and physical activity at school, specific guidelines for tuck shops, forming a new scheme to provide free fruit or healthy snacks at school, and increasing the budget allocation for promoting healthy eating and physical activity at school. Teachers at schools suggested a 'fruit and vegetables day' once a week, but there is no specific guidelines to guide its implementation in order to gain the maximum benefit from the programme. Financial support for facilities and for implementing programmes should be policy driven and be given priority for schools. A policy with the regulations clearly listed for mobile caterers should be drawn up by the city council. By implementing a strict policy with respect to mobile caterers outside schools, the environment can be

significantly improved. In conjunction with this, enforcement of the policies and rules also has to be strictly adhered to.

For interventions, it is crucial that the Ministry of Health liaises with other ministries, especially the Ministry of Education to address some of the key barriers to implementation of a healthy food policy. In summary, ideas for preventing childhood obesity that combines all of the suggestions in this study would help improve children's behaviour in terms of diet and physical activity. School programmes and policies represent significant spheres of influence on children's nutrition and physical activity in the school environment.

STRENGTHS AND LIMITATIONS OF STUDY

This is a preliminary study investigating the whole school environment. One limitation of this study is that it was only conducted in one geographical area (Terengganu), which means that the findings cannot be generalised to represent a larger population (Malaysia). However it does provide a view on how the school environment may contribute to preventing childhood obesity by providing an environment that supports physical activity and healthy eating.

CONCLUSION

Overall, schools met the minimum criteria associated with economic environment compared to the physical, political and socio-cultural environments. Some of the drivers for this relatively poor achievement for economic environment criteria were the unhealthy food sold by mobile caterers outside the school compound together with lack of enforcement against these mobile caterers. Action is needed to counter this problem. However, a holistic approach which also includes improving the physical, political and socio-cultural environments is required if schools in

Malaysia are to maximise their potential for promoting healthy eating and physical activity and to play their part in preventing childhood obesity in Malaysia. For future research, it is suggested that schools across the other states of Malaysia be mapped to assess the extent to which schools meet the criteria for a supportive environment.

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