

SHORT COMMUNICATION

## Use of an Audit Tool to Assess Obesogenicity: Lessons Learnt from Primary School Environments in Brunei Darussalam

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### ABSTRACT

**Introduction:** Audit tools have evolved as a useful means of assessing the obesogenicity of an environment. Previously adapted audit tools have relied mainly on individual observations and recordings, and whether the findings are conveyed to the individuals involved in the audit has not been reported. We conducted an audit of the obesogenicity of five primary school environments in Brunei Darussalam, and explored the effect of using a direct-questioning approach combined with reporting the audit outcome back to the schools involved. **Methods:** A multi-site case study research design was used, using qualitative methods. We used a modified version of the PSEA tool to conduct the audit. A single researcher completed the audit via observations and direct questioning of relevant school community stakeholders. The outcome of the audit was communicated back to the individuals at the schools in the form of a simple report using visual data and a short presentation. **Results:** The use of direct questioning as part of the audit tool improved participation or discussion between the researcher and stakeholders. The feedback session proved useful, as new information emerged that enhanced data collection. Furthermore, during the feedback session, the school administration had the opportunity to moderate the information collected, and to provide any feedback they may have had. **Conclusions:** The innovative components of the audit tool used in our study resulted in enhanced data trustworthiness and community engagement, which may be applicable to other community-based research.

**Key words:** Audit tool, nutrition, obesogenic environment, primary school, physical activity

### INTRODUCTION

Childhood overweight and obesity have been increasing in prevalence in many Asian countries including Brunei Darussalam and public health experts have called for better prevention and management (Lobstein, 2015; Lobstein, Baur & Uauy, 2004; Ministry of Health 2011). Schools have been identified as a

critical area for promoting and supporting health behaviour (Van Cauwenberghe *et al.*, 2010; Williams *et al.*, 2012). The school environment provides a powerful integrated social network, via interactions with peers and other school community members (Mervis, 1998; Adams, 2010). The continuous contact and exposure to others throughout a child's life makes school an ideal venue for influencing health

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behaviour (Adams, 2010). However, school environments have components that may contribute to obesogenicity. The main components include policies on nutrition and physical activity, and the internal and neighborhood environment (Kaphingst, French & Story, 2006). The assessment of the obesogenicity of a school environment is important in supporting policy makers in making informed decisions for improvement and audit tools have evolved as a useful means of obesogenicity assessment (Adams, 2010).

Traditionally, audit tools have been used to assess the safety of the active transport environment, but are now increasingly being used by public health researchers (Fisher & Birch, 2002). Public health audit tools show similarities in data collection methods and have been developed in accordance with each other. For example, the Pedestrian Environmental Data Scan (PEDS) and the Scottish Walkability Assessment Tool (SWAT) were developed based on the Systemic Pedestrian and Cycling Environmental Scan (SPACES) (Fisher & Birch, 2002). The Irvine Minnesota Inventory (IMI) was developed for analysis of the environment for active living and, of the tools available to date, has the most comprehensive list of items (Boarnet *et al.*, 2006). However, there have been issues with this tool having too many items, some of which still require validation, thus making the use of this tool time consuming (Lee *et al.*, 2005; Boarnet *et al.*, 2006). Similarly, the SWAT tool, developed to measure walkability of streets, also proposed inclusion of 112 items, but only 18 have been found to be reliable (Millington *et al.* 2009). However, reducing the number of items too much may result in less representative measurement of the walkability features.

The main similarity between the different audit tools available is the use of simplified data collection, using scoring or check boxes, usually followed by data analysis and statistical analysis for

reliability (Dunstan *et al.*, 2005; Boarnet *et al.*, 2006; Pikora *et al.*, 2006; Millington *et al.*, 2009; Fisher Richardson & Hosler, 2010; Bethlehem *et al.*, 2014). Because data collection is simplified, data analysis is not time-consuming to complete. Many audit tools require more than one researcher to collect the data, thus requiring statistical analysis to confirm that data replicates are in agreement with each other. However, most tools rely predominantly on individual observations and recordings. Other audit tools use an electronic form of data collection using devices such as tablets, which can add to costs.

The Primary School Environmental Audit (PSEA) tool was developed at Deakin University, Australia for measuring the obesogenicity of the school environment (Carter & Swinburn, 2004). Of the tools developed to date, there have been no reports on whether findings were reported back to the relevant individuals in the audited area. Therefore, the aim of the study was to conduct an audit of the obesogenicity of five primary schools in Brunei Darussalam, and explore the effect of using a direct-questioning approach combined with reporting the outcome of the audit back to the schools in the form of visual data and a short presentation.

## METHODS

### Modified PSEA tool and data collection

Ethics approval was received from the University of Queensland Social and Behavioral Research Ethics committee. Prior to the audit, a letter of approval to conduct the research at the schools was obtained from the Department of Schools, Ministry of Education Brunei Darussalam which acted as the gatekeeper. Informed consent was also requested from the school community members including the principal, vice principal, canteen operator, and teachers involved in the audit. A multi-site case study research design was used, using qualitative methods. We used a

modified version of the PSEA tool to conduct the audit (Carter & Swinburn, 2004). The PSEA tool has been used previously for measuring the obesogenicity of primary schools in New Zealand (Lee *et al.*, 2005). The main sections of the original PSEA tool that includes school demography, internal school canteen services, nutrition and physical activity policies, and the internal and neighbourhood environment were maintained. A pilot study was conducted to test the audit tool at one of the schools; modifications were required to suit the Bruneian culture and language norms (SRA is from Brunei Darussalam).

The original version of the PSEA tool used questionnaires distributed to schools, where they were completed by the appropriate school administrators. In this study, during data collection the researcher (SRA) filled out the audit tool (which consists of the five sections described above, with each section consisting of 10–15 items) via observations and direct questioning of the relevant school community stakeholders. This direct questioning of participants was introduced as an innovation to the audit tool method. Direct questioning involved the researcher discussing and completing the sections of the audit tool with the guidance of the appropriate school community members. The outcome of the audit was communicated back to the school administration by the researcher in the form of a simple visual report and short presentation. During the feedback session, the school administration also had the opportunity to moderate the information collected by the researcher, as well as provide feedback.

The modified PSEA audit tool was pre-tested at one of the primary schools involved in the audit (School A). During the pre-test, the researcher identified the most relevant school community members to assist with the questionnaires. No changes to the questionnaires were required. However, the use of the word 'audit' on the form made the school community feel

threatened, so the title of the questionnaires was changed from 'Primary School Environmental Audit' to 'Primary School Environmental Assessment'.

Five primary schools were purposively selected as individual case studies for the audit, based on their geographical location and their environment to reflect the range of school settings in Brunei. School A is in a small village, School B is a large residential area school, School C is in an oil-producing district, School D is a remote-area school, and School E is located in *Kampong Ayer* (water village).

The steps of the audit process are shown in Figure 1. First, the day, date and time of the initial visit to the school was agreed between the researcher and the school principal or deputy principal. Then individual appointments to conduct the audit were made via telephone or email with the school principal, deputy principal, teachers and canteen operators. In addition to the completion of the audit questionnaires, photographic records were included to enhance data collection. Google Earth™ images of the areas surrounding the school were printed, and the locations of food hawkers, convenience stores and other food outlets were recorded. During data collection, random questioning or short interviews were also conducted with parents selected via convenience sampling whilst waiting for their children to finish the school day. The purpose of this approach was to collect information on children's food choices, school canteen healthiness and the safety of active travel to school.

The extra feature of the modified PSEA tool used in this study was the feedback element, where findings of the audit were conveyed to the school administration by the researcher. A rating system was prepared and included in the feedback report to ensure consistency across schools (Figure 2). The same feedback session was continued with further discussion and moderation of data (if required). Each

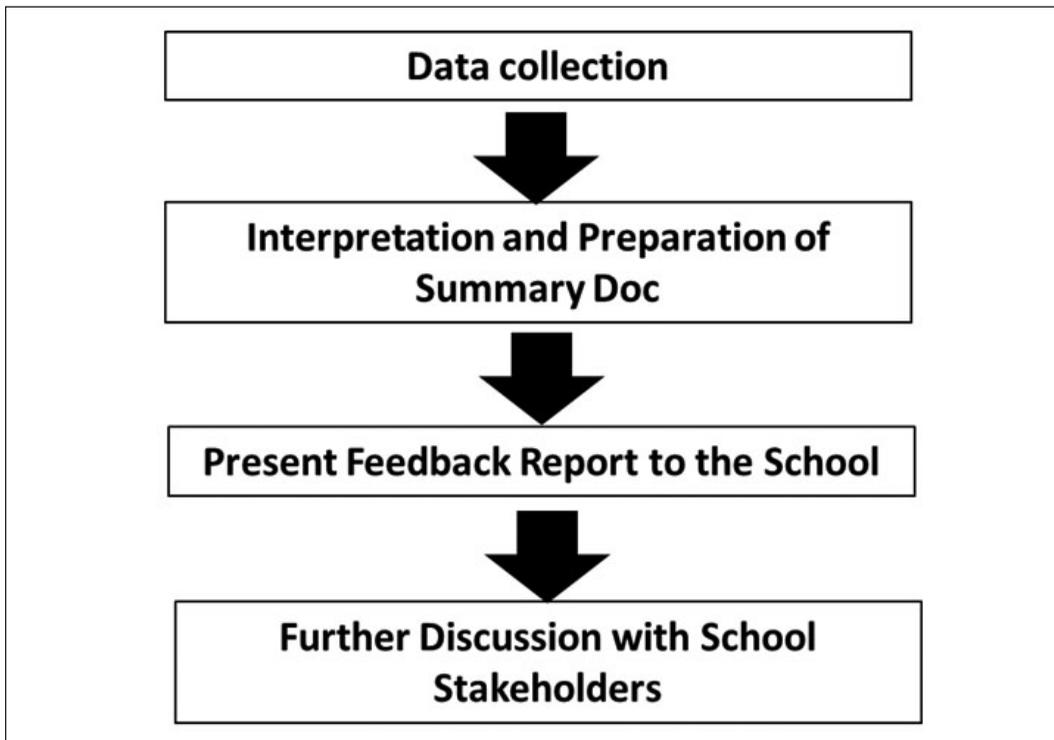


Figure 1. The flowchart of the audit approach.

primary school was treated as a single case study, followed by direct comparisons of the environment and the nutritional and physical activity policies across the five schools.

## RESULTS

### Nutrition and physical activity factors

All school administrators (school principals, vice principals, etc.) were aware of the Healthy Canteen Guidelines as produced by the Community Nutrition Division, Ministry of Health Brunei Darussalam (Ministry of Health 2011). It is the responsibility of each school to monitor and self-regulate canteen standards. All schools had school canteen committees to check that the canteens adhered to the guidelines. School A has been able to achieve full implementation of the nutrition policy with some innovations. Some of the

innovations implemented were special guidelines for parents when bringing food and drinks to school during special events, meaning that only healthy options were allowed. School A was the only school to organise daily checks at the school canteen, which were done by one appointed teacher from the committee. In the other schools, the canteens were checked sometimes once or twice per week only. In all schools, the school principals were also actively involved in checking the school canteen in all aspects including level of healthiness and cleanliness.

All schools studied had one canteen operating. All canteen operators were aware of the Healthy Canteen Guidelines. However, some canteens failed to follow aspects of these guidelines. During questioning, it was found that some information in the guidelines was

**Part 1: Nutrition written policy**

## A) Written policy implementation ☺ ☺ ☺ ☺

Key point: The school has a copy of the list of food and drinks that can be sold at the canteen. This list is updated regularly by the Community Nutrition Division, Ministry of Health of Brunei Darussalam. The school is using these guidelines to monitor the food and drinks being sold at their canteen.

**Rating system: Nutrition Policy Implementation**

☺	No written policy and has little knowledge about it with poor implementation
☺ ☺	Has written policy but little awareness by the relevant school community, thus poor implementation
☺ ☺ ☺	Has written policy but some awareness by the relevant school community, with part implementation
☺ ☺ ☺ ☺	Has written policy with lots of awareness by the relevant school community, with almost full implementation but requires some improvement
☺ ☺ ☺ ☺ ☺	Has written policy with some innovations, with lots awareness by the relevant school community, with full implementation

**Figure 2.** Sample of part of the feedback report contents (top) and the rating system (bottom).

misunderstood by the canteen operators. For example, frying (with a small amount of oil, to prevent food sticking on the hotplate) is only allowed two times per week in the guidelines. However, the term 'frying' had been interpreted as 'deep-frying' by one canteen operator. Canteen operators at School A and School E sold only healthy food and drink options. School A offered less variety of food and drinks. The menu at School E was regularly changed to allow students to enjoy a variety of food and drink options. Despite offering a wide variety of food and drinks, only slightly more than half of the options at School E were healthy. The remaining two schools (Schools B and C) only sold smaller options of unhealthy food and drinks. One of these schools was found to be selling coloured cordials every day, which is not allowed in the guidelines. School B was found to be selling sweet tea drinks, which is not allowed in the guidelines.

Many parents were well aware of the Healthy Canteen Guidelines. However, many parents still preferred their children

to bring food and drinks from home to eat during break time. They stated that what they bring to school depends on what their children like to eat in order to prevent waste.

All schools must follow the Ministry of Education's guideline on physical education classes. However, in relation to physical activity during free time such as recess, all schools reported that they had no formal guidelines or policy. The implementation of these guidelines was dependant on the creativity and willingness of the physical education teacher at each school.

In terms of the environment outside the schools, Schools A and B seemed to have more food stall vendors outside their school compound. Schools C and D had no food stall vendors, and have imposed enforcement to prevent anyone from starting such a business. In terms of walking facilities and level of safety, there seemed to be a lack of enforcement at most of the primary schools studied. However, school B had a newly painted zebra crossing near the school area.

### **Questioning of parents on healthy food choices and walking safety**

During the questioning of parents, it emerged that some at Schools A, B and C did not encourage their children to walk or cycle to school. Reasons included the distance from home to school, alongside poor safety and walking paths for their children. For example, some school areas had student crosswalks, but driving behaviour in the area was sometimes poor. Some parents in School B mentioned that they would allow their children to walk to school if they lived closer, but this also depended on the age of the children. Some parents suggested the use of more signs to warn drivers to drive slowly around the school area.

Parents in School D tended to encourage their children to walk or cycle to school every day. This was because they felt that traffic volume in this area was lower. However, parents noted that proper footpaths from the school to their home areas would be of benefit. Reasons for encouraging walking or cycling to school included savings in car fuel costs, alongside the opportunity for their children to indulge in healthy activity every day. At School E, parents encouraged their children to walk to school if they lived nearby, but suggested a wider jetty and fences to increase safety around the school areas. None of the parents allowed their children to cycle to school because of the poor condition of the jetty in some areas.

### **Outcome of the feedback report and presentation**

The feedback report and presentation aimed to disseminate the information gathered during the audit for the school community members. In addition, this session was useful for moderating data and the inclusion of possible new data that might have been missed during the audit. The outcomes of the feedback sessions between the school administration and researcher are shown in Table 1. This

part of the audit was very useful as new information emerged, which helped to enhance data collection.

## **DISCUSSION**

Issues relating to the use of multiple researchers may include variability in terms of interviewer interpretation of the audit questions or responses, and personal biases which may lead to the interviewee responding differently (Matteson & Lincoln, 2009). The audit described in the present study was conducted by a single researcher at each school, with the same researcher collecting data across all five schools. One advantage of having the same researcher throughout the process is that continuous engagement with the research participants and trustworthiness of data was ensured. This is an important aspect of community outreach that has not been described in previous audit tool development studies. In addition, the single researcher obtained an overall overview of the environment being assessed, although it is admitted that having discussions amongst multiple researchers can help to further harmonise the audit outcome (Carter & Swinburn, 2004). It was noteworthy that during the pre-test stage, the word 'audit' was found to be quite threatening among members of the school community. However, direct engagement with the students, teachers and school administration ameliorated this, and during this study, the researcher felt welcomed during visits to the school. Additionally, a single researcher undertaking the audits helps to enhance the reliability of the data and promotes successful audit tool development (Carter & Swinburn, 2004).

The direct questioning approach used in this audit increased the participation of school-level stakeholders. It has been suggested that such direct engagement or visit to the research site has been regarded as a gold standard to achieving data trustworthiness (Shenton, 2004; Kornbluh,

**Table 1.** Shows the main summary of outcomes during the feedback report presentation and further discussion with the school administration.

School	Comments pinpointed by the school administration during the feedback report presentation	Feedback from the school administration
School A	<p>'The school canteen offers less variety'</p> <p>'Opportunity to play sports and more physical activity during recess'</p>	<p>The canteen operator was actually given weekly menu suggestions; it is up to the canteen operator to follow.</p> <p>No longer possible due to brush teeth program which also takes place during recess</p>
School B	<p>'Found to be selling sweet drinks, which is not allowed under the healthy canteen regulation'</p> <p>'Lots of food stall vendors outside the school area'</p>	<p>School administration already warned the canteen operator not to sell them. He stopped selling them, but resumed selling after a couple of days.</p> <p>These food stall vendors were actually meant for the nearby religious school because they don't have internal canteen services. During school hours, children are completely prohibited from going outside to buy from these vendors. However, outside school hours is beyond their control and depends on parents.</p>
School C	'The school canteen was found to be selling coloured cordials'	The school administration might have overlooked this and will take action as soon as possible
School D	'Students brought unhealthy snacks to school'	There is no proper restriction on this matter, but the school administration does check what the students bring to school occasionally.
School E	<p>'Lots of food stall vendors selling sweet and oily snacks outside the school area'</p> <p>'When the students reach school early, they leave their bags in class and go back outside the gate to buy from the food stall vendors'</p>	<p>Municipal department has been informed. Mainly owned by parents living around the area, trying to get pocket money to support their living.</p> <p>The students are not allowed to do this, if they are seen doing this, the teachers will stop and warn them.</p>

2015). This is because such visits promote cooperative and truthful discussion, thus eliminating thoughts of the participant seeing the researcher as the 'expert' in the field (Kornbluh, 2015). During the feedback and presentation session, all school administration members involved in the audit were present, allowing more valuable information to be obtained. It was also an opportunity for the researcher and school community members to

moderate the findings from the audit tool. This session was also a good opportunity for the researcher to thank the school community, which further strengthened the relationship between the researcher and the participating schools. To our knowledge, this innovation has not been incorporated as part of previous audits (Carter & Swinburn, 2004).

Some limitations of the audit process included its time-consuming nature and

the level of planning involved, as a single researcher was responsible for completing the whole audit. It is feasible to divide the tasks between two researchers initially, as long as both researchers do not cover the same area or interview the same school community member. Interviewing the same community member twice has to be avoided so as not to take up too much of their time. The whole audit for each school took approximately 3 days to complete. Time was also needed to prepare the feedback report; therefore, immediate analysis and another appointment were required. Proper arrangements with the school community members ensured the smooth running of the audit.

The audit also required time of the school administration staff. However, most participants showed willingness to be involved in the study, and the output of the research was data-rich. Future improvements may involve the use of electronic versions of the audit tool, using tablet devices (to save time during analysis and reduce paperwork). However, this could be expensive and, furthermore, eye contact is important during the discussion. Eye contact is essential to ensure the comfort of the participant and to increase the likelihood of receiving detailed, honest responses. Having another researcher present to take notes and fill in the audit form during the discussion can help to free up the interviewer. The feedback session proved very useful as new information emerged, enhancing the data.

Our approach enhanced data trustworthiness and community engagement. The method of data collection used in this audit may be applicable to other community-based research, as it led to closer engagement with the community and allowed richer, stronger data to be obtained.

### Acknowledgements

We would like to thank the Ministry of Education, Brunei Darussalam for granting

permission to conduct this research, as well as all to the schools involved in this study.

### Conflict of interest

The authors report no conflict of interest in this work.

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