Child & Youth Growth Index
BCMA Feasibility Study

British Columbia Medical Association

Council on Health Promotion

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BRITISH
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EXECUTIVE SUMMARY

Today obesity is a major public health concern, and despite BC's healthy reputation we are not immune. For children, the trend is especially troubling.

- *In 2004, the Canadian Community Health Survey estimated that 26% of BC children between the ages of 2 and 17 are overweight or obese.*[1]
- *Obesity is estimated to cost BC's health care system between $730 million and $830 million annually.* [2]
- *In 2003, only 58 per cent of British Columbians were physically or moderately active.*

Despite this challenge, BC actually has very little data that can be used to compare schools and districts or evaluate exercise and healthy eating programs designed to address this problem. **The BCMA is calling on the provincial government to implement a Child & Youth Growth Index (CYGI) in order to be able to monitor, measure and evaluate the current obesity epidemic in young people.** In BC, the index would track the level of childhood obesity throughout the province by anonymously measuring student body mass index (BMI) from all public schools annually. This would enable the province to compare and evaluate programs on a district and regional basis.

Why do we need this?

The existing data give a select snapshot of obesity in BC, but are insufficient to enable us to truly analyze childhood obesity in this province. The relatively small sample size of national health surveys prevents geographical comparisons of regions within BC. Many existing health surveys depend on self or parental reporting that can be biased when evaluating sensitive data such as height and weight. Additionally, no standardization exists when dependent upon self or parental data reporting. This lack of high quality data means there is no way of knowing where and how to direct efforts to tackle childhood obesity in BC. If we wanted to target programs or funding, we could not identify the regions that have the greatest need. The BCMA realizes solely measuring children will not rectify childhood obesity. This index is an important first step. Following this, programs targeting different aspects are necessary to bring about change. However, without evaluation measures, the effectiveness of programs targeting childhood obesity can never be assessed.

Where is this being done?

Several countries have successfully implemented programs such as this proposal to monitor childhood obesity using simple BMI data from height and weight measurements. In the United States, Arkansas is annually measuring the BMI of all students enrolled in public schools (425,000 children per year) at a cost of just over $2 a child. In Britain, the Department of Health is beginning to annually monitor the BMI in all 4 and 11 year olds enrolled in public schools (1.1 million children per year). In Australia, the Australian Capital Territory has plans for an ongoing childhood obesity monitoring system to enable accurate measurement of interventional results (200,000 children per year).

How would this be done in BC?

This index would anonymously measure the height and weight to determine the BMI of every child attending public school in BC using a scale and simple height measure. No calipers would be used. To ensure privacy, each child would be measured in a private space by a small team of trained health workers. The data would be anonymously collected, analyzed and stored by the BC Ministry of Health or BC Ministry of Education.

The benefit

The primary purpose of this index is to monitor the health of our children throughout the province and to be able to compare and evaluate programs on a district and regional basis. A Child & Youth Growth Index would also provide one tool to assist assessment of Premier Gordon Campbell's goal to have BC be the leader in healthy living and physical fitness for all of North America. In addition, the power of this index will grow over time as data comparisons can be made and assessments can be formulated. The real benefit will be seen down the road: with healthier children come reduced health care costs for future generations.

The cost

This feasibility study generates three cost estimates of the CYGI. The estimates range from $500,000 to $2,000,000 per year. The major factor affecting the varying cost estimates is labour. The cost per child would range between $0.75 and $3.57 per year. This is only a fraction of the overall cost already incurred by obesity related health problems in BC.

Conclusion

The CYGI is a key tool in the fight against childhood obesity. Controlling obesity among children and adults boils down to encouraging individuals to eat healthier food and to get more exercise through targeted health programs. This index will be a vital tool to accurately analyze outcomes of such programs in BC. We recognized that this index is one critical piece of a broader set of initiatives that will be needed to combat this public health challenge.

CONTENTS

CHILDHOOD OBESITY IN BC

Today in BC, we are seeing the first generation of children with life expectancies lower than those of their parents.[3] In the developed world with increasing quality of life, this fact underlines the impact of obesity. The snapshots of data surrounding our children's health suggest obesity is a very serious problem.

The following figure taken from the *Canadian Community Health Survey in 2004* outlines the overweight/obese trends in Canadian children.

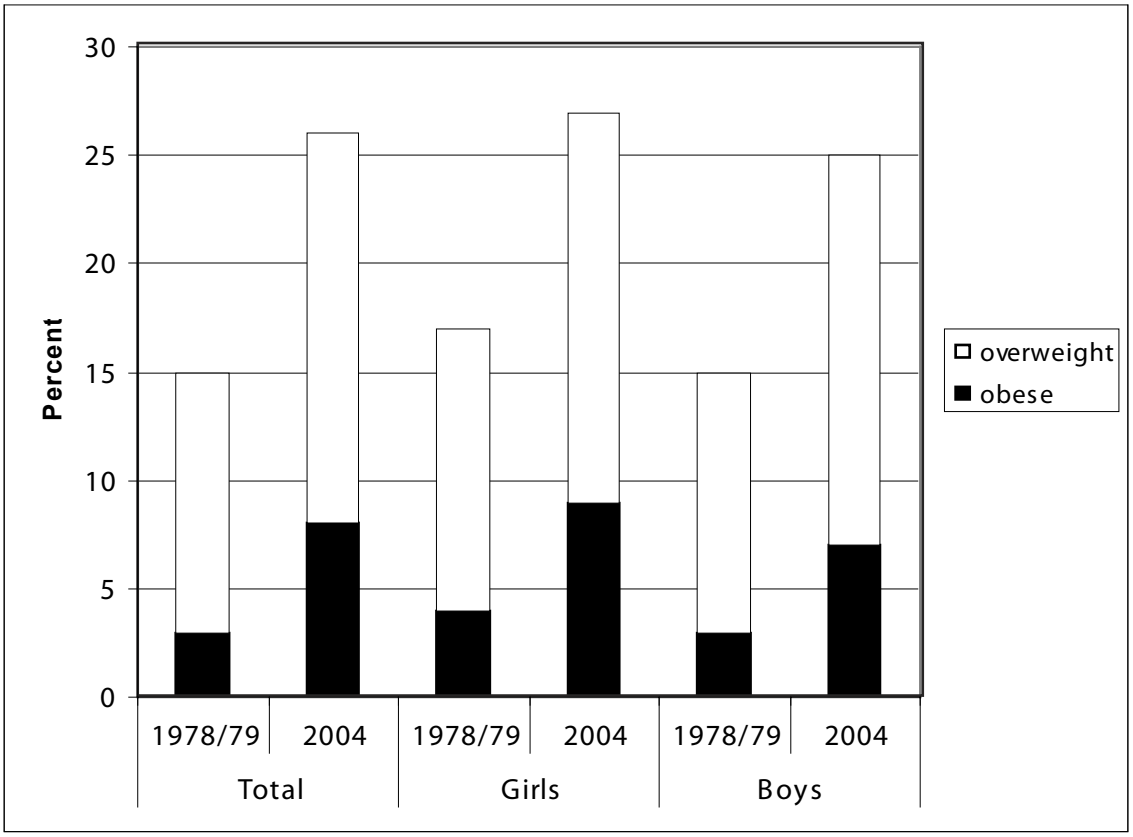

Figure 1. Overweight and obesity rates, by sex, household population aged 2-17, Canada excluding territories, 1978/79 and 2004.[1]

These overweight/obese trends in children are almost exclusively attained through interview alone. The importance of measured data instead of self-reported data is immense, as self-reported data actually tends to underreport weight values, so the problem is likely worse than reports. [4]

The cost of obesity – today and tomorrow

Currently, obesity and physical inactivity directly cost our provincial health system an estimated $380 million annually, which amounts to almost 5% of total direct health care costs in the province.[2] When you include other related obesity costs such as premature death, absenteeism and disability, the total cost of obesity to British Columbia's economy is estimated at between $730 million and $830 million a year.[2] In comparison, tobacco costs BC an estimated $1.2 billion in direct and indirect costs each year. [5] **Because smoking rates are gradually declining and obesity is increasing rapidly, it is now a real possibility that obesity-related costs will soon overtake the costs of tobacco-related illness.**

There are many consequences of childhood obesity, both medical and psychosocial. Many of these can turn into chronic conditions that require ongoing interaction with the health care system over decades. The World Health Organization suggests that obesity levels will continue to rise in the early 21st century – with severe health consequences – unless urgent action is taken now.

Complications associated with childhood obesity

Type 2 diabetes [6, 7, 8]
Cardiovascular disease [9, 10]
Orthopedic complications [11]
Psychosocial effects and stigma [12, 13]
Hypertension [14, 15]
Sleep apnea [16]
Asthma [17]

Figure 2. The medical and psychosocial complications associated with childhood obesity.

THE DATA GAP – on the obesity highway with no speedometer

The challenge for BC is that we lack comprehensive data on the current status of childhood obesity in BC. As discussed in the previous section, there are cross-sectional snapshots (such as the Canadian Community Health Survey), which use some data collected from BC; however, the sample size is small and the majority of data is self-reported. Therefore, existing childhood obesity data is limited as it:

- *Cannot identify high or low obesity levels by region, district or school*
- *Cannot identify school districts with greatest need, or successes*
- *Cannot be used to evaluate programs or compare regions*

The BC government, as part of its *2010 Legacies Now* plan, is encouraging British Columbians to be the healthiest jurisdiction to ever host the Olympics. The second of the BC Premier's five great goals for a golden decade is to lead North America in healthy living and physical fitness. These are laudable goals that the BCMA fully supports.

However, today in BC there are no mechanisms to measure whether any of these initiatives will actually make a difference to child health in the future. For example, programs such as removing junk food from school vending machines and providing physical activity opportunities in schools is worthwhile, but it is not possible to assess whether these important initiatives will provide positive and sustained benefit to currently escalating childhood levels of obesity.

Currently, Body Mass Index (BMI) is the recognized measure of children and adolescents for obesity. BMI does not directly measure body fat; however, it highly correlates with body fat measurements. This makes it a suitable indirect measurement of body fat and in children and adolescents.[18] Additionally, BMI is inexpensive and easy to undertake. For children and teens, BMI is related to age and gender.

Successful BMI monitoring in other jurisdictions

BMI monitoring for children is already successfully underway in several other countries. A prime example is the state of Arkansas in the United States. Since 2003, Arkansas has measured the BMI for all children in public schools throughout the state and has even notified guardians when the child falls into the obese and at-risk category. The levels of participation hover around 97% in measuring over 425,000 children. With the introduction of web based data collection, analysis, and storage, costs have plummeted. The resounding success in Arkansas has resulted in other states such as Pennsylvania, Tennessee and Texas to moving towards adopting statewide student BMI monitoring.

Beginning in September 2006, the United Kingdom is introducing annual BMI monitoring for all children ages 4 and 11 enrolled in public schools. Furthermore, the Australian Central Territory region is introducing ongoing child BMI monitoring in order to directly measure the performance of school based nutritional and physical activity interventions.

In Richmond BC, BMI was assessed in ten pilot schools participating in Action Schools!BC (AS!BC) - a whole school physical activity model - as part of an evaluation conducted by researchers from the University of British Columbia. The aim of this study was to determine the benefits of the AS!BC model on reducing chronic disease risk factors – including obesity. Based on these successes, BC can adapt and learn from previous experiences to make implementation in the province easier and more efficient.

Closing the data gap

British Columbia is facing a monumental challenge in childhood obesity, but lacks the basic data needed to monitor and plan strategic responses to the issue. Accurate data is fundamental to the fight against obesity in our children. If all levels of the obesity epidemic can be mapped out for the entire province, tools can be developed to tackle the problem in a targeted fashion. This is not a fad or static problem facing our youth. From what little data exists, it is evident that childhood obesity is rising at an alarming rate. This is why complete and accurate measurement of childhood heights and weights in British Columbia is necessary. Assessment will also allow interventions to be evaluated, and visible results will encourage prolonged success in creating positive outcomes for overweight and obese children.

THE PROPOSAL: THE CHILD & YOUTH GROWTH INDEX

The BCMA proposes that height and weight of all school aged children in the province of British Columbia be anonymously measured and BMI be derived. The Child & Youth Growth Index (CYGI) would provide regional and district data on BMI status of children around the province. With this information, educational and health resources can be accurately directed to areas of the province with the greatest need, something that cannot be accomplished currently.

The logistics involved in implementing the CYGI in BC's public schools will require cooperation and support from the BC Ministry of Health and Ministry of Education. The BCMA fully recognizes that this initiative is one piece of a broader strategy to address the obesity epidemic. However, the greatest need for action from the BCMA's perspective is to address the lack of data that would allow us to better understand the scope of child health in BC, as it relates to obesity.

What would be measured?

Measurements consist ONLY of recording a student's weight in kilograms (to the nearest 0.1 kg) on a standard weigh scale and height in meters (to the nearest centimeter) using a portable measurement device. Completed in private by trained staff or individuals, this non-invasive measurement is as simple as stepping onto a scale and standing against a wall with a ruler. There are no calipers involved. To calculate the BMI, the weight of each child is divided by the height squared. Based on obesity guidelines published by the BCMA in conjunction with the Ministry of Health, a child will be defined as overweight or obese with a BMI value in the 85th or 95th percentile related to their age and gender.

Who would measure and record data?

A key consideration of the proposal involves who will do the actual measuring, and there are a number of possibilities. Individual schools could allocate staff to undertake student measurements. Staff could include public health nurses, nursing students from the community, physical education teachers or school counselors. Appropriate training will be required for all measuring staff to learn both the technique of measurement and compassion when measuring. By using a variety of professionals in the school system, proper sensitivity can be ensured in dealing with

the children. As weight measurement is a very sensitive issue for children and teens, privacy and anonymity should be maintained and respected throughout the process.

The measuring stations will be simple, with only a scale to measure weight, stadiometer to measure height, laptop computer to enter the data and an enclosed area to ensure privacy when measuring the students. The area for measurement can be a private room or even a corner of a gymnasium with a temporary mobile wall. Since this is a quick, non-invasive measurement, there is very little required in terms of equipment set-up.

Informed consent

Parental consent for the anonymous BMI measurement must be obtained, and there will be opportunity for parents to opt their child out of this assessment. Proper care must be taken to ensure each child understands the anonymous nature of this measurement and that his or her privacy is truly respected. Parents will be educated as to why this is being done and provided avenues for obtaining more information. The BCMA will support initiatives that involve speaking to parents at schools to ease any health concerns.

How long would this take?

Measurement for the CYGI will be a simple process proven in other jurisdictions to be quick yet accurate. Based upon data from Arkansas, a two person team collecting height and weight data can measure approximately one child per minute.[20] If four or five teams were to completely measure the students in a school of 1,000, the process would take about five hours, or one school day. If needed, the teams could move through the district, conducting measurements in one school after another.

When would this be done?

Based on conversations with a variety of school districts, the BCMA recommends measuring of child and youth BMI annually, in early October. This allows students to have time to settle into classes, but is prior to midterm exams, limiting the disruption to studies. The length of time to complete student measurement for each district will vary according to the number of children, number of schools, and the distance between schools in the area.

Where would this data be analyzed and stored?

There are two options for data storage and analysis. The first option involves utilizing existing BC government infrastructure within the Ministry of Health or Education, such as the Provincial Health Services Authority (PHSA). The second option would be to outsource the data storage and analysis to the private sector. For example, Arkansas' BMI program uses Costech Inc, a Canadian company located in Montreal, and its web-based storage program for height and weight data. All data can be entered into this program, which houses the raw data and calculates the statistics for viewing and reference.

By utilizing the web, data can be collected efficiently and data-entry costs to process manually completed forms will be eliminated. There is essentially no limit on the amount of data that can be collected and stored in the system and all data would be password protected with limited access. Although the data collected is intended to be non-identifiable, prior to any initiative being pursued, consultation with the privacy commissioner's office concerning data records is required.

A snapshot of BC public schools [21]

School Information	**Statistics**
Number of Districts	61
Number of Schools	1734
Number of Students	599,505
Number of Students (age 4-8)	191,127
Number of Students (age 9-12)	132,450
Number of Students (age 13-18)	266,195
Largest District	**Surrey**
Number of Schools (Surrey)	127
Number of Students (Surrey)	66,100
Smallest District	**Nisga'a**
Number of Schools (Nisga'a)	4
Number of Students (Nisga'a)	628

Figure 3. British Columbia school district information.

THE COST

Given that the medical cost of obesity in BC is already significant and the trend is escalating, the cost of setting up and maintaining the CYGI is only a fraction of what obesity already costs our province. The BCMA estimates the costs of implementing the CYGI to be between $500,000 and $2,000,000 per year. The major cost – labour – is variable depending on whether someone must be paid to measure the children or whether existing staff could conduct the measurements. The following table displays three possible budgets for the CYGI.

Capital Costs	**Low Estimate**	**Mid Estimate**	**High Estimate**
Digital Scales (Tanita Corp)	$20,000	$40,000	$70,000
Stadiometers (Height)	$15,000	$30,000	$50,000
Laptop Computer (*PDA)	$0	$250,000*	$585,000
Software (**Costech Inc)	$0	$40,000**	$40,000**
Mailing (***School Distribution)	$50,000***	$350,000	$350,000
Human Resources			
Measurement Staffing†	$300,000	$635,000	$960,000
Staff Training (Includes Materials)	$25,000	$35,000	$45,000
Ongoing Analysis	$40,000	$40,000	$40,000
Total (Year 1)	**$450,000**	**$1,420,000**	**$2,140,000**
Maintenance Cost (per year)	**$415,000**	**$1,100,000**	**$1,435,000**
Cost Per Child	**$.75**	**$2.37**	**$3.57**

†Measurement Staffing Costs	**Low Estimate**	**Mid Estimate**	**High Estimate**
Number of Staff (per district)	4	8	12
Number of Hours	3000	3000	3000
Staffing ($22 per hour)	$260,000	$530,000	$790,000
Benefits (15%)	$40,000	$80,000	$120,000
Transportation	$0	$25,000	$50,000

The cost estimations in the table above are incorporated into the low, mid and high estimates for the CYGI. For instance, the digital scales are available for $40.00 each while the stadiometers are available for $30.00 each. The low estimate assumes each of BC's 61 school districts orders eight of each piece of equipment. The mid estimate assumes that 12 pieces of equipment per district are ordered, while the high estimate assumes one piece of equipment per school is ordered for each of BC's 1734 schools.

The laptop computer cost for the low estimate assumes existing computers will be used. The mid estimate assumes eight hand-held computers (such as a Personal Data Assistant) per district will be purchased for $500.00 each, and the high estimate assumes eight computers per district will

be purchased at a cost of $1200.00 each for all of BC's 61 school districts. The cost estimate for software and data archives from Costech Inc, is a yearly fee of $40,000, which includes information technology support for all users.

The cost estimate of mailing assumes one consent letter will be mailed to each guardian of all of BC's 600,000 students at a cost of $0.51 each. However, this figure can be reduced if consent forms are distributed to and collected from students in the classroom, as indicated in the low estimate, where the only cost is for the printed paper. The low estimate of the staffing cost assumes four people working $22.00 per hour for the 3,000 hours required to measure all the children in BC public schools, while the mid estimate assumes eight people and the high estimate assumes twelve people. As one staff member conducts the measurement, the other staff member will enter the data onto the laptop, which eliminates a separate staff cost for data entry.

The CYGI can be initiated at the cost of between $0.5 million to $2.0 million and can continue running for between $0.5 million and $1.5 million each year. There is also potential for annual cost reduction by utilizing the following:

- *Use of existing school staff, student nurses in the community or parent volunteers where applicable to significantly reduce labour costs*
- *Ministry of Health or Education staff to conduct data entry and analysis and storage*
- *Use of PDAs instead of laptops for data entry*
- *Distribution of consent forms directly through schools to save mailing costs.*

While these projected costs are rough estimates, they are similar to the per child costs invested by the state of Arkansas during the initiation and continuation of their annual child and adolescent BMI monitoring.

CONCLUSION

The dramatic increase in childhood obesity is the most significant public health challenge facing today's youth. The impact on our health care system and costs now and in the future are equally dramatic. Despite this, our knowledge of childhood obesity in our province is extremely limited and is based on random data snapshots of the population from select schools or regions. The Child & Youth Growth Index will provide accurate regional data on the body mass index of students in all regions. With this analysis, informed decisions regarding the health of BC children can be made, and health initiatives undertaken can be monitored to assess their outcomes.

The CYGI is one important piece in the childhood obesity issue. We recognize that much more information and downstream efforts are required, but the CYGI could be the base upon which many other efforts can build as part of their work.

Childhood obesity is well publicized in the media and is clearly on the minds of parents. The time is right for the introduction and implementation of the CYGI in British Columbia. The index will provide a quantifiable measurement of the success of the Premier's second great goal for a golden decade: to have BC lead North America in healthy living and physical fitness.

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