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Title	An observational study of the prevalence of toddler, child and adolescent overweight and obesity derived from primary care electronic medical records
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Reviewer 1	Dr. Celia Rodd
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General comments (author response in bold)	General comments 1. One of my major concerns focuses on how the authors classified OW and OB using the WHO definitions. Given my own work and published North American experience, I am surprised that 30% of children under 5 y are OW/OB. Since the authors don't explicitly state which criteria they use to define overweight and obesity, it would be helpful if they could define this clearly in the method section. There have certainly been previous instances in the literature where investigators have failed to recognize that WHO definitions are quite different for those under 5y, where they no longer use the standard criteria of the 85th centile as OW and 97th centile as obese. Unlike older children, OW is defined as the 97th centile and OB is the 99.9th for those under 5y (for details see the policy statement by the Dietitians of Canada (DOC) -PROMOTING OPTIMAL MONITORING OF CHILD GROWTH IN CANADA) Using the New WHO Growth Charts. COLLABORATIVE PUBLIC POLICY STATEMENT, 2010.). At the very least, the methods section needs more details describing which percentile cut-offs were used. It is unclear in Table 1 if 'OW' is the 85 to 97th centile or 85th and beyond the 97th centile. **Response: Thank you for these critical suggestions to strengthen this paper. We have repeated our original analysis and changed our age groups to correspond to the different growth status indicators for different age groups (weight for length for toddlers less than 2 years of age and BMI-for-age for children and adolescents 2 to 19 years of age). In addition, growth status indicator cut-off points have been described and reported in the methods and results sections.** 2. Additionally, DOC guidelines cited above use 'wasted' as the official terminology rather than 'thinness'. I prefer to use standard terminology. **Response: We have changed the terminology to include "wasted" as opposed to "thinness" classification.** 3. The authors did not address the issue that many health care providers will not calculate BMIs for children less than 2 y of age in Canada. European investigators follow WHO guidelines more closely that we do, and BMI is consequently used more often even in infants. In Canada, we usually use 'weight for length' norms below two years of age. In fact the Canadian guidelines cited above argue that. **Response: We agree with this comment and we repeated our analysis to report weight-for-length as opposed to BMI for toddlers less than 2 years of age. Commentary about the challenge measuring supine has been added to the limitations section.** 4. "Accurate measurement of length in infants is challenging because, despite use of standardized techniques and equipment (24, 25), infants often resist full extension of their legs and rarely lie still during the measuring process. Since length/height is squared, and appears in the denominator, inaccurate lengths can result in significant errors in BMI. " **Response: We agree with this comment and repeated our analysis to report weight-for-length as opposed to BMI for toddlers less than 2 years of age. Commentary about the challenge measuring supine has been added to the limitations section.** 5. Another concern with its use below 2 years of age is that it doesn't track very well or predict future risk. While I am fine with the use of BMI, it is not standard and should be commented on. **Response: We agree with this comment and have repeated the analysis using weight-forlength and BMI-for-age growth status indicators appropriate to the different age groups.** 6. Additionally, please note that children under 2y are rarely measured standing (height), as we usually measure them supine (length), with a difference of several cm when they transition to standing. It should therefore be specified how the children were measured, with 'length' reported for those < 2y; I would assume anyone under 2y had length measured. **Response: Agree. Changes (as per comment #3 and #4 above) have been incorporated.** 7. Another fairly significant concern that I have with this manuscript is that the authors do not discuss whether how they prepared their EMR data prior to analysis. As a clinician scientist, I know how easily transcriptions errors happen in these records (e.g height transposed for weight, English instead of metric units, last value carried forward etc.). Increasingly, those analyzing EMR data will both visualize the data for outliers and look for common transcription errors algorithmically. It is quite possible that some of the high percentages may reflect misclassification of the data.

Response: Additional data has been added to the methods section regarding the CPCSSN cleaning algorithm process: each height and weight value is converted into a standard unit (Kg, Cm) to minimise transcription errors. Where data does not include enough information to standardise, the data point is excluded. A flow chart has been added to show the various steps for the data sample creation process.

8. The authors did provide a detailed limitations section, which I read with some interest. One thing that they did could have mentioned in a bit more detail is that many measurements (especially height and length) may be done poorly and without using standardized methods, which sets them apart from both national surveys like CCHS or CHMS and primary research studies. I agree that there is no place for using 'self-reported' data.

Response: Additional content has been added to the limitations section to reflect the difficulty measuring length and heights.

9. I was also a bit surprised that the authors did not use the full dataset of children from 2004 to 2013; this was rich indeed, with ~15 measurements per child. It would be very interesting to analyze these data to assess tracking over time and prediction of future obesity risk. Why did they only select 2013?

Response: We agree with your point and we hope to continue our research to explore longitudinal trends for child growth status indicators, however, it is beyond the scope and space limitations of the current manuscript. As a primary care data repository, CPCSSN draws patient information from electronic medical records. 2013 data for height (length) and weight for children and adolescents was the most comprehensive and complete year of data for the original analysis.

10. Moreover, the data stems from several centres and I thought that perhaps the authors might have wished to address inter-center differences in measurement methods, measurement reliability, or patient characteristics. While socioeconomic status is not routinely included in the EMR record, postal codes provide a validated means of assessing (neighbourhood) socioeconomic status.

Response: We agree with your point. Socioeconomic status is also of primary interest to the authors and we have done considerable work to link census data through postal code with the CPCSSN. The research has been published elsewhere, but again, we have tried to limit the scope of the current study to report growth status for children and adolescents. Due to space limitations we have limited our commentary related to measurement variability. It may be found in the limitations section.

11. My last major comment focuses on how representative this sample really is compared to the Canadian population. Some efforts were made to mention that it not all visits involved healthy children, with specific mention of 'unwell child' diagnostic codes. As they mention, this may mean that children were taking medications that might increase their weight or lead to other selection biases.

Response: The representativeness of the CPCSSN is an important consideration in making the suggestion, as we have, regarding the ability of CPCSSN's primary care data for healthy weight surveillance. As an observational study, our research explored a defined population sample (patient medical records from primary care sites located in Ontario) to describe child growth status prevalences. In order to meet methodological criteria for quality research, it is necessary for our study sample to be representative of the population under study, but not the greater population of Ontario or Canada. To that end, we have included related commentary in the limitations section of the manuscript as follows: "our study population was limited to patients who visit their primary care providers. In a study investigating the representativeness of patients in CPCSSN, network patients were reasonably representative of patients in Canadian primary care practices and only somewhat representative of the Canadian general population (35). Ontario had the highest proportion of patients in CPCSSN; provincial level comparison was reasonable (35)." We have removed sentences related to increased weight gain in children who take medications.

Specific comments
There are a few sentences that are not clear
1. Page 3- line 1- ' The proportion of children with a matched encounter...... was 64%
Response: Thank you, the wording has been clarified as : "matched physician visit date for height (length) and weight records."

2. Page 5 line 24—the sentence' Though the number of primary care...' I think that there is at least 1 word missing there.
I do not understand these sentences
Response: Parentheses have been added to make this sentence more clear: Though the number of primary care physicians using EMRs in Canada(77.6%) has more than doubled since 2006, there may be practice differences between providers who use or don't use EMRs (36,37).

3. I would recommend clearly delineating the 18mo participants as toddlers vs. the other children (data in Table 1). Sometimes it is not clear when the word 'children' is used, which population is

	being described--- see line 25 page 2--- 'sentence starting 'Because….''
	Response: We have used the words "toddler", "preschool aged", "children" and "adolescents to improve that clarity and distinction across age groups.
	4. There are a small number of typographical errors.
	Response: We have sought to correct these in the paper.
Reviewer 2	Dr. Kathleen Chaput
Institution	University of Calgary, Paediatrics, Alberta Children's Hospital Research Institute, Calgary, Alta.
General comments (author response in bold)	I did not receive a strobe checklist. Completing and submitting the checklist might be helpful for ameliorating the manuscript.
	Response: A STROBE checklist is attached.
	1. The abstract would be strengthened if the sample size was identified in the results section, rather than the interpretation.
	Response: We agree. The sample size has moved to the results section.
	2. The reference in the abstract to well-baby visit billing codes requires more explanation or lead-in – it is unclear to what it refers, and what purpose the billing codes had in the study.
	Response: additional wording has been added to the abstract to clarify that the 18-month well baby visit is a "known well child visit".
	3. The reference in the abstract to "the national survey sample" it would be helpful to clarify which national survey sample is being referenced.
	Response: we agree. However, with the word restriction and the necessity of using long form titles as opposed to acronyms when writing the abstract, we have chosen to include this information in the body of the paper instead.
	4. While the rationale for the study is clearly based on the lack of high quality population level data on pediatric BMI, the implications of the study results in Canadian clinical practice are not well connected. For example, what information does this study provide to direct interventions for children of various age groups?
	Response: As a cross-sectional observational study, this research was conducted simply to highlight the utility of electronic medical records to provide objectively measured height (length) and weight data for children birth to 19 years of age. It is beyond the scope of this paper to provide direction for interventions for children of various age groups. Instead, we have included sentences in the interpretation section about how the availability of this data, and its potential use toward the development of a child healthy weight surveillance system, might inform a whole system population health approach to obesity prevention.
	5. In the methods section, it is difficult to follow the sampling strategy and the final sample sizes. The final sample size (i.e. number of individuals) used to generate the results is unclear and had to be ascertained from the tables. It might be helpful to have a flow diagram that explains sources and the number of records, individuals, billing codes etc. at each stage.
	Response: additional wording has been added to the methods section to clarify the study sample selection process. Also, a flow diagram has been added to show step wise exclusions.
	6. There is no mention of the method used for dealing with missing values
	Response: Patients with missing values were excluded from the study cohorts.
	7. Statistical testing, alpha levels etc, are not presented in the methods.
	Response: Differences between groups (sexes, age groups) were compared using chi square tests. Additional wording has been added to the methods section to make this clear.
	8. Methods section lines 25-30: how exactly the data were cross referenced, or validated against the well-baby visit data could benefit from further explanation. Exactly what was done?
	Response: This is a good point. Due to the space limitations in this paper we do not explore whether there were differences between the group of patents with the fee code and the group of patients without the fee code with respect to age and sex. Instead, we simply report the findings as an observational study.
	9. Some additional information about the CPCSSN database, such as what data ae collected and how they are obtained, how many practices are contributing (i.e. all ON primary care providers? If not, who and how are they selected etc.)
	Response: Additional description of the CPCSSN has been added: "The Canadian Primary Care Sentinel Surveillance Network (CPCSSN) database contains standardized, de-identified electronic medical record (EMR) data from multiple EMR platforms, from ten primary care practice-based research networks across Canada." The space limitations restrict us from including additional information about CPCSSN, however the citation provides a link to the CPCSSN website.
	10. The results section would benefit from greater description of the sample (i.e. how many boys and

girls in each age group etc.)

Response: Additional wording has been added: "In 2013, there was a total of 5310 school aged children, 5 to 19 years of age, with BMI-for-age calculated from height and weight measurements that were collected on the same date. There was a total of 1842 preschool aged children, 2-5 years of age with BMI-for-age and a total of 1127 toddlers (0-2 years of age) with a weight-for length calculated from length and weight measurements that were collected on the same date in 2013. This represents a total of 8279 children, birth to 19 years of age, with a growth status indicator derived from objectively measured height (length) and weights." Sex differences are discussed in more detail in the results section as well.

11. Results section, line 8 onward states that the last measurements entered for subjects in the year 2013 were used for BMI calculations. This decision should be noted and justified in the methods section.

Response: We agree. Additional wording has been added to the methods section, specifically the setting and sources of data section.

12. Line 9 page 3 refers to rates of overweight and obesity, when technically prevalences are being reported.

Response: Thank you. This has been corrected.

13. There are several p-values reported throughout the results section that do not clearly identify what is being compared (see lines 17, 18, 32, and 39). The proportions being compared or the difference should be reported as well. It should be made clear what exactly is being compared (i.e. lines 37-39 refers to significantly more boys/girls in a category... more than other categories? Or more than the opposite sex? More than in previous studies?...) More clarity on the statistical testing might be achieved by expanding the tables to include the comparisons, confidence intervals and p-values for tests.

Response: We agree. Additional wording has been added to the methods section: chi square tests were conducted to detect if there was as significant difference between groups. We have repeated the analyses, added 95% confidence intervals and provided clarity related to the statistical testing in the tables.

14. The authors note in the interpretation section that their prevalence estimates for obesity are higher than previous studies have reported. It is then attributed to the measures coming from a greater number of "unwell" visits in this study, and medication-related weight gain. I would expect that children would more often be lighter in "unwell" visits to primary care physicians due to dehydration and loss of appetite with viral and bacterial infections etc. It also provides increases in the prescription of second generation antipsychotic medications as an example. It concerns me that the authors do not explore the possibility that the higher prevalence of overweight and obesity may actually reflect true changes in the population trends in BMI over time (i.e. 2004 vs. 2013), or differences in measurement (i.e. clinic vs. self- or parent-report). The proportion of children receiving antipsychotic medications is still very small. Have the authors considered health behaviors and diet as potential avenues of context for their findings?

Response: We have removed the content related to increased weights associated with medications. We repeated the analysis using different cut-points for growth status indicators and observed that the prevalence estimates for overweight and obesity are lower than prevalences reported in the CHMS. We suspect your explanation could be a reason.

15. In the weaknesses section the missing data discussion should be expanded/clarified (i.e. to what platforms are the authors referring? What biases might be introduced as a result of the differences in reporting across regions/practices? Have any strategies or inquiries been made to minimize these potential biases, or to estimate the magnitude of their effects?)

Response: additional wording has been added in the limitations section that addresses potential bias introduced through height (length) and weight measurement variability and error.
If a patient was missing any data points then they were excluded from the study. This would introduce some information bias. Children that are sicker are more likely to see their primary care provider and are thus more likely to have their height and weight measured and have more complete data within the EMR. It is unclear if this misclassificaiton is differential or non-differetial in terms of thinness/obesity. Are children who are thin more likely to be sick and thus more likely to have their height and weight measured? This would lead to a underestimation of the rates of obesity. This is likely the biggest bias that we are dealing with in this study and we tried to assess this by evaluating how many of the children had an 18month billing code to indicate whether it was a routine visit rather than a 'sick' visit.

16. In line 15 on page 5, what is meant by "somewhat representative"? This should be clarified.
Response: Additional wording has been added to the interpretations section to clarify this: "the CPCSSN patient population was older and had significantly fewer men than the Canadian population"

17. The conclusion could be strengthened by more specific examples of how these findings in particular, can inform prevention and intervention in practice.

	Response: This study highlights how data sourced from primary health care can support a whole system population health approach to obesity prevention. This wording in the paper describes this: "Our study demonstrates the first steps toward improving our knowledge so that collectively, clinical and community partners know how, when and where to focus and scale successful health promotion programming and policies."