HEALTH FACT SHEETS

Hypertension among children and youth, 2007-2019

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Hypertension among children and youth, 2007-2019

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Summary

- Hypertension (high blood pressure) in children and youth can have serious health implications.
- Based on new guidelines for assessing hypertension, 3.5% of Canadians aged 6 to 17 had hypertension in 2007-2019.
- The percentage was higher in children 6-11 years old (5.6%) than youth 12-17 years old (1.6%)
- The prevalence of hypertension in children and youth has increased since 2007.
- The prevalence based the newest guidelines (3.5%) was higher than the 2004 guidelines (2.6%), but lower than the 2017 guidelines (3.8%).

Background

Hypertension, or high blood pressure, is a medical condition characterized by elevated blood pressure in the arteries. The prevalence of hypertension increases with age,[1] but it is not only an adult health concern. The prevalence of hypertension in children and youth has been on the rise worldwide since 1994, alongside increases in obesity and sedentary lifestyles among children and teenagers, suggesting a potential relationship.[1]

Other factors that might contribute to the development of hypertension include unhealthy dietary habits, lack of physical activity, genetics, and underlying medical conditions.[2] Early detection and intervention are critical to managing hypertension.[2] The consequences of hypertension in children can be severe if left untreated, leading to potential cardiovascular events such as heart attacks, heart failure or stroke later in life.[3]

The clinical guidelines used to assess if someone has hypertension are different in children and youth than adults. In Canada, the clinical guidelines for assessing hypertension in children and youth were updated in 2020.[4-6] This fact sheet provides an overview of the prevalence of hypertension in children and youth using the new guidelines.[4] It also examines how the change in guidelines impacted prevalence estimates by comparing estimates based on the older guidelines compared to estimates based on the new guidelines.

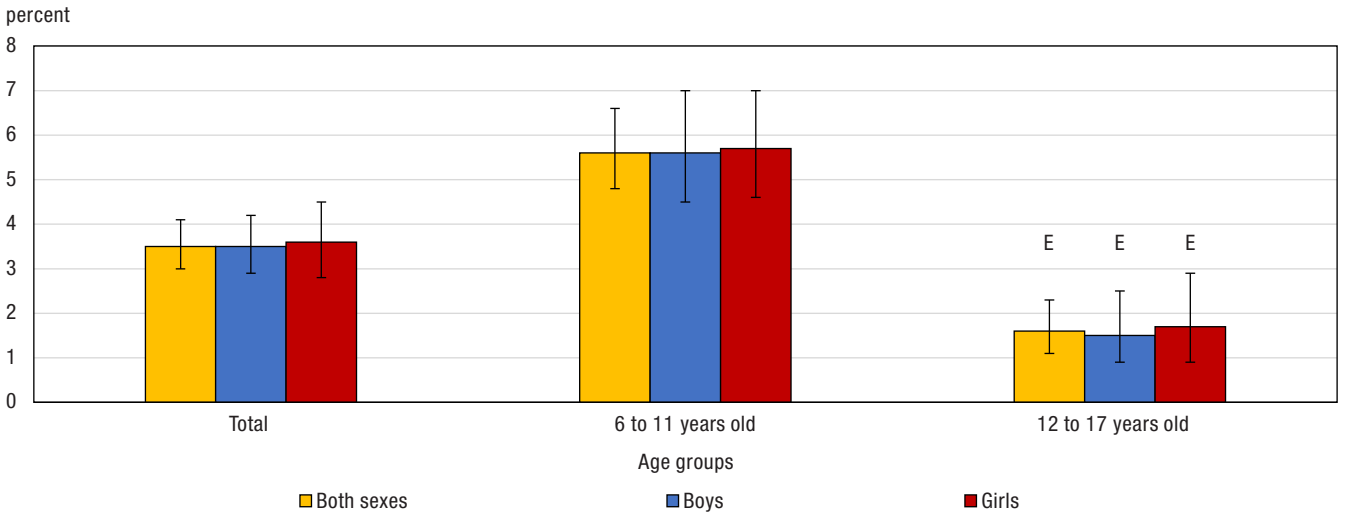
Hypertension more common in children than in youth

Results from the Canadian Health Measures Survey (CHMS) indicate that 3.5% of Canadians aged 6 to 17 had hypertension (Chart 1) between 2007 and 2019.[7]

- Boys and girls are equally affected by hypertension.
- Hypertension was higher among children aged 6 to 11 (5.6%) than youth aged 12 to 17 (1.6%).

A similar trend among children compared to youth has been reported in the US.[8] These results can be explained in large part due to the way that hypertension is assessed using age and height. Thresholds for high blood pressure consistent with hypertension are relatively lower for younger and shorter children, compared to their older and taller counter parts. For example, an 8-year-old who is average height and has a blood pressure of 106/75 mmHg is considered hypertensive whereas a 13-year-old of average height with a much higher blood pressure of 120/77 mmHg is not considered for hypertension. It should also be noted that for a true hypertension diagnosis, blood pressure measures must be repeated at a subsequent visit, which was not done in the CHMS survey. It is therefore possible that this is an overestimation of hypertension among children, since excitement, anxiety or movement during the test can affect the measurement.

Chart 1
Prevalence of hypertension in children and youth by sex, and age group, Canada, 2007-2019



[E] use with caution
Source: Canadian Health Measures Survey, Cycle 1 (2007 to 2009), Cycle 2 (2010 and 2011), Cycle 3 (2012 and 2013), Cycle 4 (2014 and 2015), Cycle 5 (2016 and 2017) and Cycle 6 (2018 and 2019).

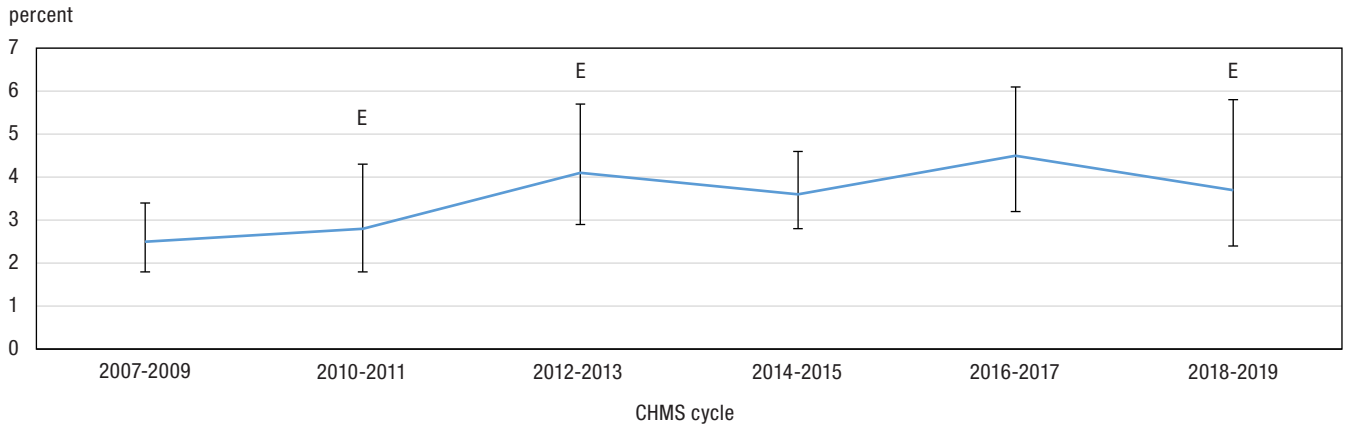
However, CHMS still provides an important lens into the population level blood pressure and this condition still needs to be closely monitored in this population, as children and youth with high blood pressure are at greater risk of suffering from hypertension into adulthood.[9]

Hypertension rates among children and youth have been stable over time

- The estimated prevalence of hypertension in young Canadians varied from 2.5% in 2007-2009 to 4.5% in 2016-2017 (Chart 2).
- Differences observed over this period are not statistically significant.

This suggests that the trend has been relatively stable since 2007-2009. While there may be a small increase over time in children (6 to 11 years old) and youth 12 to 17 years old), this is not statistically significant. A similar trend was seen across males, females, and age groups over time.[10]

Chart 2
Prevalence of hypertension in children and youth by CHMS cycle, Canada, 2007-2019



[E] use with caution
Note: CHMS - Canadian Health Measures Survey.
Source: Canadian Health Measures Survey, Cycle 1 (2007 to 2009), Cycle 2 (2010 and 2011), Cycle 3 (2012 and 2013), Cycle 4 (2014 and 2015), Cycle 5 (2016 and 2017) and Cycle 6 (2018 and 2019).

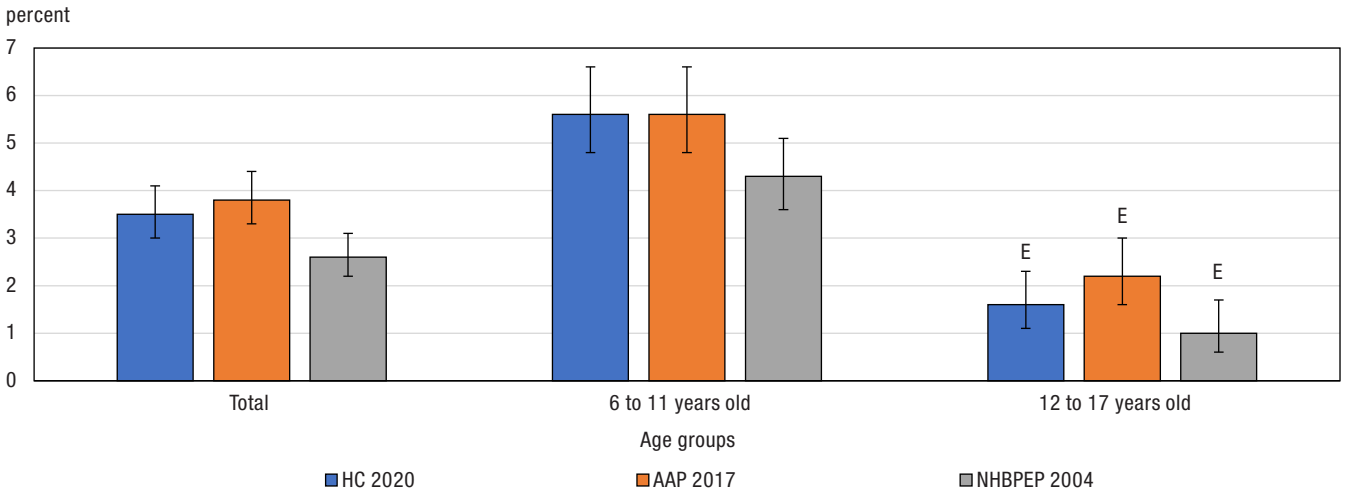
Guidelines have an impact on estimates

New clinical guidelines for assessing hypertension among children and youth in Canada were published in 2020 by Hypertension Canada. Previous Canadian clinical were from the National High Blood Pressure Education Program (NHBPEP, 2004) and then from American Academic of Pediatrics (AAP, 2017).

As shown in a 2023 study,[11] the prevalence of hypertension using the newest guidelines (3.5%) was higher than the prevalence using the 2004 guidelines (2.6%) and lower than the prevalence using the 2017 guidelines (3.8%) (Chart 3). This illustrates that, the use of different clinical definitions results in differing estimates of hypertension among children and youth in Canada.

The takeaway is that researchers, policy makers, clinicians and others interested in understanding hypertension trends among children and youth in Canada should be aware that caution should be used when comparing estimates from different sources that may not have used the same definition for hypertension.

Chart 3
Hypertension prevalence by guidelines, and age groups, Canada, 2007-2019



[E] use with caution
Notes: HC - Hypertension Canada, AAP - American Academic of Pediatrics, NHBPEP - National High Blood Pressure Education Program.
Source: Canadian Health Measures Survey, Cycle 1 (2007 to 2009), Cycle 2 (2010 and 2011), Cycle 3 (2012 and 2013), Cycle 4 (2014 and 2015), Cycle 5 (2016 and 2017) and Cycle 6 (2018 and 2019).

About blood pressure and hypertension

Blood pressure is a measure of the force that blood exerts against the walls of your arteries as it circulates through your body and is measured in millimeters of mercury (mmHg). It's typically expressed with two numbers: the top number (systolic blood pressure, or SBP) represents the pressure when the heart contracts and pumps blood, while the bottom number (diastolic blood pressure, or DBP) represents the pressure when the heart relaxes between beats. This phenomenon can be illustrated comparing the heart to a sprinkler. The more open the water flow, the greater the tap pressure. The more the hose is compressed, the greater the resistance in the hose.

For the CHMS, blood pressure measurements, including systolic blood pressure (SBP) and diastolic blood pressure (DBP), were obtained using the BPTru™ BPM-300 automated oscillometric device from BpTRU Medical Devices Ltd. (Coquitlam, British Columbia). These measurements were taken at Mobile Examination Centres. For each participant, six readings were obtained using the BPTru™ device, and the last five readings were averaged to establish SBP and DBP levels.[12]

Guidelines from Hypertension Canada (HC 2020),[4] the American Academy of Pediatrics (AAP, 2017)[5] and the National High Blood Pressure Education Program (NHBPEP, 2004)[6] were used to investigate the prevalence of hypertension in young Canadians. To categorize respondents based on their blood pressure, the measured SBP and DBP were compared with SBP and DBP percentiles that are specific to sex, age, and height. This classification placed individuals into distinct blood pressure categories.

The classification for hypertension for each of the guidelines are as follow:

Table 1
Classification of the different guidelines

Category	Hypertension Canada 2020	AAP 2017	NHBPEP 2004
Normal	N/A	6 to 12 years SBP and DBP < 90th percentile for age, sex and height 13 to 17 years <120/80 mmHg	SBP and DBP < 90th percentile for age, sex and height
Elevated	N/A	6 to 12 years SBP or DBP ≥ to the 90th percentile, but < the 95th percentile 13 to 17 years 120/<80 to 129/<80 mmHg	90th to <95th percentile or if BP exceeds 120/80 even if <90th up to <95th
Hypertension Stage 1	SBP or DBP ≥ 95th percentile to < 95th percentile + 12 mmHg	6 to 12 years ≥95th percentile to <95th percentile + 12 mmHg or 130/80-139/89 mmHg (whichever is lower) 13 to 17 years 130/80 to 139/89 mmHg	95th percentile to (99th percentile + 5 mmHg)
Hypertension Stage 2	SBP or DBP ≥ 95th percentile + 12 mmHg	6 to 12 years ≥95th percentile + 12 mmHg or ≥140/90 mmHg (whichever is lower) 13 to 17 years ≥140/≥ 90 mmHg	>99th percentile + 5 mmHg

Notes: SBP - systolic blood pressure, DBP - diastolic blood pressure.

These categories were determined for this study utilizing the childhood BP macro and its associated data files, which incorporate the updated normative pediatric BP tables provided by Dr. B. Rosner and available online at https://sites.google.com/a/channing.harvard.edu/bernardrosner/pediatric-blood-press/.

The AAP offers slightly different guidelines, with different criteria for children aged 6 to 12 and youth aged 13 to 17,[5] while NHBPEP[6] provides the following description of blood pressure norms: Category 1 (Normal); Category 2 (Normal but at the high end of the normal range); Category 3 (High); Category 4 (Very high). For this publication, young Canadians between 6 and 17 with a result above the Category 2 were classified as suffering from hypertension.

Data

The data is from cycles 1 to 6 (2007 to 2019) of the Canadian Health Measures Survey (CHMS). The sample for the analysis included children (6 to 11 years) and youth (12 to 17 years). Due to the relatively low prevalence of hypertension among children and youth, data from all cycles were combined in order to estimate hypertension by age and sex. Stage 1 and stage 2 hypertension were also combined.

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