

HEALTH OF YOUNG ABORIGINAL CHILDREN LIVING OFF RESERVE

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ABSTRACT

The health of young Aboriginal children was investigated in this study. The majority of young Aboriginal children living off reserve in Alberta were in excellent or very good health. First Nations children had poorer overall health ratings, were less likely to have been breastfed, and were more likely to have a chronic health condition compared to other Aboriginal children. The most influential determinants of good health among Aboriginal children included the absence of a chronic health condition, a healthy birth weight, and being breastfed. Young Aboriginal children living in environments where there was home ownership, homes in good repair, smaller household size, higher family income, and who had fewer moves were reported to be in better health than children not experiencing these influences. Living in a two parent household and having a female caregiver with higher education was predictive of good child health as were routines such as daily milk and vegetable consumption and age appropriate amounts of sleep. This suggests that Aboriginal children's health is influenced by many of the same factors that influence the health of all young children. Consequently strategies to support healthy pregnancies and breastfeeding, and efforts to address the environmental circumstances in which Aboriginal children live may improve the health of young Aboriginal children.

Key words: Aboriginal, First Nations, Métis, Inuit, health, birth weight, breastfeed, chronic condition, low income, housing, living arrangement, maternal education, nutrition, sleep, Alberta

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The purpose of the current report is to provide insight into the health status of Aboriginal children living off reserve in Alberta, and into the determinants of health in young Aboriginal children living off reserve in Canada. Data were obtained from the 2006 Aboriginal Children's Survey (ACS) (Statistics Canada, 2008b) and the National Longitudinal Survey of Children and Youth (NLSCY) (Statistics Canada, 2008a).

Understanding the determinants of early health is important for informing strategies for health promotion among Aboriginal children. Improving early child health is believed to reduce health disparities and improve child outcomes (World Health Organization [WHO], 2008). A number of health determinants have been shown to be important in influencing the health of children in North America. For instance, living in low income neighbourhoods (Guttmann et al., 2004; Saab and Klinger, 2010; Shields and Shooshtari, 2001), living with a single parent (Wu et al., 2010), and poor housing situations (Wu et al., 2010) are related to poorer health of children.

Higher parental education is positively related to the health of children, however the evidence is unclear as to the relative importance of maternal versus paternal education, or highest level of education achieved within the family (Cochrane et al., 1982; Dom et al., 2009; Lung et al., 2009; Dowd, 2007; Mendes et al., 2011; Nuru-Jeter et al., 2010; Wu et al., 2010). Researchers often fail to differentiate between maternal and paternal education reporting instead on the educational status of the primary caregiver (usually the mother) or on the highest education in the family (usually the father) (Lung et al., 2009; Wu et al., 2010). Maternal education may be important for child health because it

is correlated with a number of factors that benefit the child including decreased likelihood of smoking, and increased likelihood of exercising, taking vitamins during pregnancy, breastfeeding, use of car seats, and giving the child vitamins (Dowd, 2007). Researchers have found that lower maternal education was associated with young children not eating breakfast which is important for proper nutrition (Dubois and Girard, 2006). Maternal education may also benefit child health because mothers with higher education are more likely to have children with up-to-date immunizations (Racine and Joyce, 2007).

Early healthy eating is predictive of later healthy eating (Northstone and Emmett, 2008) so proper nutrition at a young age is important for health across the lifespan. Poor diet is a risk factor for obesity (Nelson et al., 2006) which is linked to health issues such as psychological problems and cardiovascular disease (Reilly et al., 2003). Early nutrition including breastfeeding (Oddy et al., 2006) and consumption of nutritious foods such as fruits, vegetables, and milk (Cullen et al., 2004; Maynard et al., 2003) are also important for child health. For instance, breastfeeding has been shown to be associated with lower rates of asthma (Oddy et al., 2004) and better developmental outcomes (Oddy et al., 2006). Fruits, vegetables, and low-fat dairy products have been demonstrated to be important for weight management (Epstein et al., 2008; Oddy et al., 2011; Roseman et al., 2007; Vanhala et al., 2011). Milk consumption is associated with higher vitamin D intake, and vitamin D intake has been found to be insufficient in some Aboriginal populations (particularly Inuit) (Hayek et al., 2010). Consumption of traditional Aboriginal foods has been shown to be positively associated with Aboriginal health particularly in northern regions (Hayek et al., 2010).

Proper sleep is associated with good health and sleep problems have been shown to be related to obesity (Seegers et al., 2011; Shi et al., 2010), less optimism (Lemola et al., 2011), depression (El-Sheikh and Arsiwalla, 2011), and behavioural problems (Bos et al., 2009; Paavonen et al., 2009; Pesonen et al., 2010). High daily amounts of screen time including watching television, using a computer, and playing videogames are associated with increased over-

weight and obesity (Dennison et al., 2002), decreased physical activity (DuRant et al., 1994; Paganì et al., 2010), and poor attention (Christakis et al., 2004).

Certain determinants of health may have a different impact for Aboriginal children than non-Aboriginal children. Aboriginal children are more likely to be born either low birth weight or high birth weight as compared to other Canadian children (Kierans et al., 2008; Trumper, 2004; Turcotte and Zhao, 2004). Certain chronic health conditions such as meningitis and rheumatic fever have also been found to be higher in Aboriginal children in Canada (Lachance et al., 2009). Finally, Aboriginal families are more likely to have poorer housing than other Canadians and Aboriginal children are more likely to live with single parents (Perera et al., 2006), both of which are associated with poorer health outcomes for children (Saab and Klinger, 2010; Wu et al., 2010). Therefore the relative impact of various health determinants of young Aboriginal children was assessed in the current study.

METHOD

The ACS was a Statistics Canada postcensal survey. A sample of approximately 17,000 children was drawn from the 2006 census, providing an estimate of the total population of Canadian Aboriginal children (135,000) less than six years of age as of 31 October 2006, who were living off reserve in urban, rural, and northern locations across the country. Excluded from the sample were children living on reserve, in Indian settlements, or in institutions. For more details on the ACS consult the concepts and methods guide (Statistics Canada, 2008b). The findings from this study are based on an estimated 135,000 young Aboriginal children (aged 0–5) living off reserve in Canada, including approximately 21,900 in Alberta.

Descriptive statistics were used to provide insight into the health status of Aboriginal children living off reserve in Alberta, and into the determinants of health in young Aboriginal children living off reserve in Canada as a whole. Comparison descriptive data for health status and chronic health conditions were obtained from NLSCY (Statistics Canada, 2008a) from an estimated 244,300 children (aged 0–5) living in Alberta in 2006. The NLSCY had

a different set of chronic health indicators as well as different populations and sampling methods. These differences prevented statistical significance testing between the ACS and NLSCY populations and comparisons between the two surveys should be interpreted with caution.

Analyses were conducted at a Statistics Canada Research Data Centre. SAS version 9.2 was used in combination with SAS callable SUDAAN version 10.0 for all statistical analyses. Estimations and regression analyses were conducted using weighted estimates and variance was computed using ACS survey bootstrapping (1000 weights). Statistical significance was defined as $p < 0.05$ for the model and 95% confidence intervals were used to calculate significance for cross-tabulations.

Percentages and adjusted odds ratios are presented in the text. For confidence intervals and coefficients of variations see Appendix A. The full logistic model can be found in Appendix B and corresponding percentages can be found in Appendix C. The following standard Statistics Canada symbols were used to indicate caution to be used with estimates:

- E: The estimate must be used carefully as it is associated with a high level of error.
- F: The estimate does not meet Statistics Canada's quality standards.

Aboriginal identity, income status, health status, birth weight, breast feeding, and chronic health conditions are described for Albertan Aboriginal children. Health determinants were assessed using the full Canadian sample.

ABORIGINAL IDENTITY

BACKGROUND: ABORIGINAL IDENTITY

Aboriginal identity was defined as the parent/guardian identifying the child as First Nations, Inuit, and/or Métis. There were not enough children identified as Inuit in the Alberta sample so Inuit children were excluded from all analyses subset to Alberta. Children whose parent or guardian reported that the child had an Aboriginal ancestry but were not identified as First Nations or Métis were grouped into an "Aboriginal ancestry" category. A small proportion of children were identified as both First

Nations and Métis; these children were counted in both categories. The proportion of Aboriginal children of each identity was assessed across area of Alberta (Edmonton, Calgary, or the rest of Alberta) and income status (LICO; families who spend 70% or greater of their before-tax income on basic household necessities).

RESULTS: ABORIGINAL IDENTITY

In the ACS, 37% of Alberta's Aboriginal children living off reserve were First Nations, 40% were Métis, and 23% had an Aboriginal ancestry (Appendix A1). Edmonton had the highest proportion of First Nations children (42%) compared to Calgary (34%) and the rest of Alberta (35%). The distribution of identity was similar across First Nations, Metis, and Aboriginal ancestry in Calgary. More Métis (43%) than First Nations (35%) or children with an Aboriginal ancestry (22%) lived in the rest of Alberta (Appendix A1). Alberta's young First Nations children were substantially more likely to be living in low income situations (43%) than Metis (28%) or children with an Aboriginal ancestry (14%; Appendix A2).

SUMMARY: ABORIGINAL IDENTITY

The area of residence and income status of Aboriginal children living off reserve in Alberta should be considered when interpreting effects across Aboriginal identity in the following health results.

HEALTH STATUS

BACKGROUND: HEALTH STATUS

Aboriginal peoples living in Canada experience more health challenges than non-Aboriginal Canadians (Lix et al., 2009; Tjepkema, 2002). The health of young Aboriginal children living off reserve has been found to be worse than non-Aboriginal children (Statistics Canada, 2004). In 2001, 83% of young Aboriginal children had excellent or very good health compared to 90% of non-Aboriginal children (Statistics Canada, 2004).

The health status of Albertan Aboriginal children (measured using the ACS) was compared with the health status of all young Albertan children (measured using the NLSCY) in the current study. General health was reported on a five point scale

and grouped into excellent/very good health and good/fair/poor health to be consistent with other Statistics Canada publications (Dewey et al., 2011; Statistics Canada, 2004).

RESULTS: HEALTH STATUS

Most of Alberta's young Aboriginal children were reported to be in excellent or very good health (88%) in the 2006 ACS. Children identified as First Nations were significantly less likely to be rated very healthy (84%) as compared to children who were identified as Métis (90%) or as having Aboriginal ancestry (91%). Aboriginal children living in low income families were also significantly less likely to be rated as being in excellent or very good health (82%) than children who were not living in low income households (91%). No regional differences in health ratings were found between Edmonton (89%), Calgary (87%), and the rest of Alberta (88%; Appendix A3).

A similar percentage (92%) of all young Albertan children were rated to be in excellent or very good health in the 2006 NLSCY.

SUMMARY: HEALTH STATUS

Young Aboriginal children living off reserve in Alberta in 2006 were generally healthy, and there appeared to be an improvement in the health of Aboriginal children from past reports (Dewey et al., 2011). Aboriginal children were also found to have similar rates of excellent or very good health as all Canadian children in 2006 (Statistics Canada, 2008b). Within the ACS, First Nations children had lower health ratings than other Aboriginal children indicating that there is room for improvement of the health of First Nations children.

BIRTH WEIGHT

BACKGROUND: BIRTH WEIGHT

A healthy birth weight is important for later health and well-being. Low birth weight (less than 2500g) has been related to motor impairments (Dewey et al., 2011), and cognitive delay (Taylor et al., 2011; Yang et al., 2011). High birth weight (more than 4000g) has also been found to be related to negative health outcomes including later overweight and obesity, and perinatal mortality (Turcotte and Zhao, 2004). Aboriginal children have been found to be more

likely to be born at a low birth weight than non-Aboriginal children (Statistics Canada, 2004). Other researchers have found that Aboriginal children have similar rates of low birth weight as non-Aboriginal children (Thommasen et al., 2005). Aboriginal populations have more consistently been shown to have higher birth weights than non-Aboriginal children, particularly in First Nations populations (Turcotte and Zhao, 2004; Willows et al., 2011).

RESULTS: BIRTH WEIGHT

Low birth weight (less than 2,500g) was reported for 7% of young Aboriginal children and 14% were reported to have a high birth weight (greater than 4,000g). No significant differences were found between First Nations, Métis, or Aboriginal ancestry in low birth weight or high birth weight. There were also no significant differences in birth weight between Edmonton, Calgary, and the rest of Alberta or across low income status (Appendix A4).

SUMMARY: BIRTH WEIGHT

Low birth weight and high birth weight remain a concern for Aboriginal infants. Birth weight has a genetic component (Dubois et al., 2007), but it is also influenced by low weight gain during pregnancy (Heaman et al., 2005), perceived stress (Heaman et al., 2005), nutrition (Scholl et al., 2006; Weiler et al., 2005), and smoking (Braun et al., 2010; Wehby et al., 2011). Improving any of these environmental factors may reduce incidence of low or high birth weight in Aboriginal children.

BREASTFEEDING

BACKGROUND: BREASTFEEDING

Breastfeeding is an important predictor of health. Exclusive breastfeeding is recommended by the World Health Organization (WHO) for the first six months of a child's life because it is the best source of nourishment for the child (WHO, 2007). Breastfeeding is associated with better motor and communication scores (WHO, 2007), better nutrition (Burnier et al., 2011; Leung and Sauve, 2005), higher intelligence (Kramer et al., 2008), lower infections (Rebhan et al., 2009), and lower obesity (Weyerman et al., 2006). In 2007, 92% of Alberta mothers had initiated breastfeeding with their in-

fants (Statistics Canada, 2011). Rates of breastfeeding among young Aboriginal children in Alberta in 2006 are described below.

RESULTS: BREASTFEEDING

Three out of four of the Aboriginal children in the ACS were reported to have been breastfed (77%). Almost a third (32%) of Aboriginal children were breastfed for over six months. Children identified as having Aboriginal ancestry (84%) were more likely to be breastfed than children identified as either First Nations (73%) or Métis (76%). Children living in Edmonton (71%) were less likely to be breastfed than children living in Calgary (81%) or the rest of Alberta (78%). No difference in breastfeeding was found by income status (Appendix A5).

Parents or guardians who rated their children to be in excellent or very good health were more likely to report that their children had been breastfed (79%) than those who rated their children to be in good (62%) or fair to poor (63%^E) health. Children who were breastfed were no less likely to have a chronic health condition or live in low income situations (Appendix A5).

SUMMARY: BREASTFEEDING

Many of the Aboriginal children living off reserve in Alberta were reported to have ever been breastfed (77%), a rate that is lower than the total Alberta rate of breastfeeding initiation (92%; Statistics Canada, 2011). First Nations and Métis children were less likely than children with Aboriginal ancestry to be breastfed, though all three groups were lower than the total Alberta rate. Almost a third (32%) of Aboriginal children in the ACS were reported to have been breastfed for over six months, which is lower than more current Canadian estimates (54%; Public Health Agency of Canada, 2009). Children were rated in better health if they were breastfed; this is consistent with previous literature (Kramer et al., 2008; Leung and Sauve, 2005; Oddy et al., 2011). An interesting finding in the ACS was that residents of Edmonton were less likely to breastfeed than Calgary or the rest of Alberta. This could be due to the distribution of First Nations children across the province (see Appendix A1) and may have implications for where to focus breastfeeding promotion for Aboriginal populations.

CHRONIC HEALTH CONDITIONS

BACKGROUND: CHRONIC HEALTH CONDITIONS
Having a chronic health condition can increase the challenges for children and their families (Gortmaker et al., 1990; Kuhlthau et al., 2004). Speech and language difficulties are one of the most prevalent conditions for young children around the world with 5–12% of children across studies reporting speech or language delay (Law et al., 2000). Rates of speech and language pathologist services have been found as high as 17% among young Indigenous children (McLeod and Harrison, 2009). A comparable estimate for speech or language problems in Canadian Aboriginal children is not available because the ACS was the first Canadian survey to collect this information (Ball, 2009).

Asthma is also a prevalent chronic condition in children and asthma rates have been shown to be lower in Canadian Aboriginal children compared to non-Aboriginal children (Gao et al., 2008). In earlier reports asthma, allergies, and bronchitis were the most common chronic health conditions in young Albertan children and other conditions including epilepsy, tuberculosis, and diabetes were too low to report (Trumper, 2004).

Chronic health conditions which were reported in the ACS are described below in comparison to chronic health conditions which were reported in the NLSCY. Caregivers could report more than one chronic health condition per child so the percentages for individual conditions do not add to the total percentage of children with any condition.

RESULTS: CHRONIC HEALTH CONDITIONS

One in five (20%) of Alberta's off-reserve Aboriginal children (aged 0–5) in 2006/07 reported at least one chronic health condition and 8% were diagnosed with an allergy or lactose intolerance. A total of 27% of Aboriginal children living in Alberta (ACS) were diagnosed with either a chronic health condition or an allergy/lactose intolerance. The most common chronic health conditions diagnosed in Aboriginal children were speech and language difficulties (8.4%) and asthma (7.2%).

Chronic health conditions were observed in 21% of all Alberta's children (aged 0–5, in 2006/07)

in the NLSCY (Statistics Canada, 2008a). Different chronic health conditions were assessed in the ACS (Table 1) and NLSCY (Table 2) so rates between the two surveys are not directly comparable. Aboriginal children appeared to have similar if not lower rates of asthma (7.2%; ACS) than all Albertan children (8.2%; NLSCY). Food/digestive allergies appeared to be diagnosed more in all Albertan children (4.3%; NLSCY) than Aboriginal Albertan children (2.9%; ACS). No other conditions were comparable across the two surveys. In addition, many conditions occurred too infrequently to report from one or both of the surveys (Table 1, Table 2).

First Nations children (25%) were more likely to have a chronic health condition excluding allergies and lactose intolerance compared to children with Aboriginal ancestry (17%). Children with a Métis identity (20%) were no more likely to have a diagnosed chronic health condition than either

Table 1. Percentage with a Diagnosed Chronic Health Condition or Allergy by Type of Condition from the ACS, Albertan Aboriginal Children Aged 0–5.

<i>Chronic Health Condition or Allergy*</i>	<i>Percentage</i>
Speech/language difficulties	8.4
Asthma	7.2
Lactose intolerance	3.8
Other allergies	3.2
Food/digestive allergies	2.9
Respiratory allergies	2.6
Visual impairment	1.9
Heart condition/disease	1.6
Iron deficiency	1.4
Fetal alcohol spectrum disorders	1.3
Attention deficit disorder	1.0
Chronic bronchitis	1.0
Kidney disease	0.8
Hearing impairment	0.7
Developmental conditions**	0.6
Other chronic health	3.5

* Anxiety, depression, epilepsy, tuberculosis, diabetes, and hypoglycemia were too low to report frequencies.

** Cerebral palsy, down syndrome, spina bifida, and autism were combined into “developmental conditions” to enable reporting of estimates

Table 2. Percentage with a Diagnosed Chronic Health Condition or Allergy from the NLSCY, all Albertan Children Aged 0–5.

<i>Chronic Health Condition or Allergy*</i>	<i>Percentage</i>
Asthma	8.2
Food/digestive allergies	4.3
Other allergies	3.8
Other chronic health	3.5

* Respiratory allergies, bronchitis, diabetes, heart condition, epilepsy, cerebral palsy, kidney disease, and mental handicap were too low to report frequencies.

First Nations or those with Aboriginal ancestry. There were no differences in diagnosed allergies found across Aboriginal identity. No difference in chronic health or allergies/lactose intolerance was found across regions of Alberta or by income level (Appendices A6 and A7).

SUMMARY: CHRONIC HEALTH CONDITIONS

One in five Aboriginal children in Alberta had at least one diagnosed chronic health condition. This rate appears to be similar to children in the general population in Alberta though more comparable indicators are needed. First Nations children were more likely to have chronic conditions than Métis or Aboriginal ancestry children, again an indication that First Nations children may be facing more health challenges than the rest of Alberta's Aboriginal children.

Speech and language difficulties were the most prevalent condition in young Aboriginal children living in Alberta, and rates were comparable to those found in other young children around the world previously (Law et al., 2000). The current results provide the first known estimate of speech and language difficulties in the young Aboriginal population from a Canadian survey (Ball, 2009).

Asthma rates for Aboriginal children were slightly lower than the Alberta average for all young children. Food allergies also appeared lower in Aboriginal children compared to all young Alberta children and other allergies were roughly the same between Aboriginal children and all young Alberta children. No other chronic health conditions could be compared to the total young Albertan population because of differences in questions between the ACS and NLSCY.

HEALTH DETERMINANTS IN YOUNG ABORIGINAL CHILDREN

BACKGROUND: HEALTH DETERMINANTS

Early childhood is a particularly important developmental period for health and well-being, so understanding the determinants of the health of young Aboriginal children living off reserve in Canada is critical. Determinants of health in the population of young Aboriginal children are not as well understood as in the total Aboriginal population (Public

Health Agency of Canada, 2009). Health can be determined by a combination of material, psychosocial, and life style factors (Li et al., 2009) so it is important to assess these together to better understand the determinants of early health in young Aboriginal children.

To assess which determinants of child health are of primary importance when other factors are taken into account a multivariable model was developed. This analysis estimated the likelihood that a child with a given characteristic would be in excellent or very good health while isolating the effects of other indicators. Age, gender, birth weight, and breastfeeding were forced into the model; other indicators significantly correlated with child health were also included. Responses of “don’t know,” “refusal,” or “not stated” were recoded as missing for all indicators before entering into the model. Demographic and health indicators were added in Step 1 of the model. Other potential indicators were then added one at a time and kept in the model if significant. Percentages and odds ratios (represented as: *adj. OR* = #) are stated in the text. The full logistic regression model can be found in Appendix B and the percentages can be found in Appendix C. The health of children in Alberta was not meaningfully different than the rest of Canada, with the exception of Saskatchewan and the Yukon, where children had worse and better health than Alberta, respectively. In addition, the Canada-wide model was more robust due to a larger sample size. For these reasons, the regression was conducted for all Canadian Aboriginal children.

INDICATORS

Demographic information about the child included their age, gender, and Aboriginal identity. Metis status was not correlated with health so was not included in the model. The following health indicators were tested in the model: birth weight (healthy 2500–4000g, low less than 2500g, and high greater than 4000g), breastfed (ever or not), and a diagnosis of one or more chronic health conditions, or a chronic allergy or lactose intolerance.

A number of census variables were attached to the ACS. Some of these were assessed in the model: income status, home in need of repair, own/rent home and urban/rural region (an urban area

is defined as a centre with a population of at least 1,000 persons, with no fewer than 400 individuals per square kilometer). Other housing/living situations were also included: household size, number of moves (average per year), regular smoke in home, and Canadian region.

Parental indicators tested in the model were gender, living arrangement (two parents including at least one biological, a single parent, or two foster parents/alternative living arrangements with relatives or other guardians) and parental education. Highest level of education was computed for female and male parent/guardians separately by combining respondent education and spouse education for each gender. No gender was provided for spouse so it was assumed to be the opposite of the respondent (e.g., male respondent, female spouse).

Child nutrition was assessed in part as daily intake of a number of food groups: fruit, vegetables, bread/pasta, milk/milk products, fish/eggs/meat, and water. Parents or guardians reported whether the child had ever gone hungry because the family ran out of money for food (yes/no) and this was used as a food insecurity indicator.

Finally, two child indicators were assessed: age appropriate sleep and daily screen time. Age appropriate sleep was a binary measure where *appropriate* was defined by daily sleep for each age range. Children less than two months having 10 or more hours sleep, children aged 2–11 months with 14–15 hours sleep, children aged 12–35 months with 12–14 hours sleep, and children aged 36–71 months with 10–12 hours daily sleep were considered to have an *appropriate* amount of sleep (Health Link Alberta, 2004). Daily screen time was a combined measure of the daily number of hours watching TV and using other media such as computers or video games. Daily hours were grouped into less than or equal to two hours, and three or more hours per day based on recommendations from the American Pediatric society for children to have no more than two hours per day of screen time (American Academy of Pediatrics [AAP], 2001; Lipnowski et al., 2012).

RESULTS: HEALTH DETERMINANTS

Birth weight, breastfeeding, chronic health condition, and chronic allergy were significantly related to excellent or very good health, age and gender were

not. Children born either normal (88%, adj. OR=1.8) or high birth weight (86%; adj. OR=1.8) were more likely to have a high health rating than low birth weight children (76%). In addition, children who were breastfed were more likely to be in excellent or very good health (89%; adj. OR=1.4) than children who were not breastfed (81%). Having a diagnosed chronic health condition was the strongest predictor of health ratings. Children who did not have a chronic health condition were substantially more likely to be in excellent/very good health (93%; adj. OR=5.1) compared to children with a chronic health condition (68%). Aboriginal children who were diagnosed with an allergy were less likely to be in excellent or very good health (71%) than children with no allergies (88%; adj. OR=2.2).

After adjusting for demographic and health indicators, living situation indicators were also found to predict child health. For instance, children living in a middle or high income household were more likely to have high health ratings (91%; adj. OR=1.4) than children living in low income situations (81%). Parents/guardians who owned their home were more likely to rate their children as being in excellent/very good health (91%; adj. OR=1.3) than parents/guardians who rented their homes (83%). In addition, high health ratings were more likely in children who lived in homes that did not need repairs (88%; adj. OR=1.3) compared to children living in homes needing major repairs (82%).

Young Aboriginal children living in a 3–4 person home were more likely to have high health ratings (89%; adj. OR=1.3) than children living in homes with 5 or more people (83%). In the regression model, which isolates all other indicators, children living in a 2 person household (83%; adj. OR=1.5) were more likely to be in excellent or very good health than children living in a home with 5 or more people (83%) though there was no meaningful difference in percentages between the two household sizes outside of the model. Children who never moved (89%; adj. OR=1.4) or rarely moved (87%; adj. OR=1.4) were more likely to be in excellent/very good health than children who had a high number of moves (81%).

Compared to living in Alberta, ratings of excellent or very good health (88%) were lower for chil-

dren living in Saskatchewan (80%; adj. OR=0.6) and higher for children living in the Yukon when analyzed in the regression model (86%; adj. OR=2.3) though little difference was observed across provinces and territories in the percentages. No other province or territory was significantly different from Alberta. Living in urban compared to rural areas of Canada was not significantly related to health status.

Aboriginal children living in a two parent home (with at least one biological parent) were slightly more likely to have high health ratings (89%; adj. OR=1.2) compared to children living with single parents (82%). There was no significant difference in health ratings between children living with foster parents or in an alternative living arrangement (72%) and children living with single parents (82%) once other indicators were accounted for in the model.

Maternal education was also important for health. Compared to Aboriginal children who had maternal caregivers with less than high school education (79%), children whose maternal caregivers had a high school (88%; adj. OR=1.3) or university education (92%; adj. OR=1.7) were more likely to be in excellent/very good health. No difference was found between females with less than high school education (79%) and those with nonuniversity post-secondary education (88%) in the model. Male education was correlated with child health but did not remain in the model once other indicators were isolated. Parent/guardian gender was also not significant in the model.

Only two of the nutrition indicators remained significant in the model. Aboriginal children who consumed milk or milk products daily were more likely to be in excellent or very good health (87%; adj. OR=1.3) than children who did not consume milk or milk products daily (81%). High health ratings were also more common for children who had eaten vegetables daily (88%; adj. OR=1.5) compared to children who ate vegetables less often (80%).

Aboriginal children who were getting age appropriate amounts of sleep were slightly more likely to be rated healthy (88%; adj. OR=1.2) compared to children with more or less daily sleep than age appropriate amounts (85%). Screen time did not stay in the model and thus was not related to health

of young children once other indicators were accounted for. Aboriginal identity was not a determinant of health once other indicators were accounted for in the model.

SUMMARY: HEALTH DETERMINANTS

Housing, parental characteristics, nutrition, and child indicators were more significant in predicting child health than Aboriginal identity. Modifiable factors could be addressed through policies and services which could lead to an improvement in the health of young Aboriginal children in Canada. Indeed, Aboriginal children have similar predictors of health as other Canadian children and adults. These are discussed in context below.

Chronic health conditions and allergies were the strongest indicators of suboptimal child health. This is not surprising because being diagnosed with a chronic health condition or a chronic allergy could influence the overall health of the child. Having a healthy birth weight and being breastfed were also associated with higher health ratings.

Low income and living situations, well known determinants of health (Saab and Klinger, 2010; Shields and Shooshtari, 2001; Wu et al., 2010), were related to health of young Aboriginal children living off reserve. For instance, children living in low income or in crowded housing had poorer health. In addition, Aboriginal children who moved often had lower health ratings than those who did not move regularly. In contrast, parents or guardians who owned their homes rated their children to be in better health than those who were renting their homes. This indicates that the living situations that are predictive of poor health in the general child population (Saab and Klinger, 2010; Shields and Shooshtari, 2001; Wu et al., 2010) are also predictive of health in young Aboriginal children. Improving the living situations of Aboriginal children could benefit their health.

Parent indicators were important for child health. Children living in a two parent household had higher health ratings than children in single parent households. Single parents have previously been shown to have higher rates of mental health problems, including stress and depression (Cairney et al., 2003; Government of Canada, 2008), which could be related to the health of their children. Health of

children was also related to maternal but not paternal education. This is consistent with previous findings where paternal education was less likely to be related to child health than maternal education (Cochrane et al., 1982; Dom et al., 2009; Lung et al., 2009). Thus children who lived in two parent families, or who had mothers with higher education, tended to be healthier.

Daily consumption of milk and vegetables was important for the health of Aboriginal children which is consistent with the known positive health effects of milk and vegetables (Hayek et al., 2010; Roseman et al., 2007; Vanhala et al., 2011). Promotion of regular consumption of milk and vegetables could improve Aboriginal child health.

Not sleeping the recommended daily amount was associated with lower health ratings in young Aboriginal children. This was expected given the importance of proper sleep on the health and well-being of children (Bos et al., 2009; Paavonen et al., 2009; Pesonen et al., 2010; Shi et al., 2010). Encouraging proper sleep habits for children may lead to improved health. The other possibility is that poor health caused poor sleep so improving health issues may also improve sleep.

Young Aboriginal children living off reserve generally experienced good health; however there are opportunities for improvement, particularly among First Nations children. Many of the determinants of health for Aboriginal children that were found in this report are modifiable suggesting that the health of these children could be improved.

LIMITATIONS

The ACS did not include Aboriginal children living on reserve or a non-Aboriginal group for statistical comparisons. Therefore, even though the predictors of health are similar to the general population, it cannot be assumed that results would be of the same magnitude or would involve the same combination of factors as for non-Aboriginal children or for Aboriginal children living on reserve.

It is possible that reporting bias occurred either as underreporting of undesirable effects or overreporting of socially desirable effects. Reporting bias could have contributed to some of the observed effects.

The NSLCY and ACS may not be directly comparable for chronic health conditions as there were some differences in disorders included as chronic health conditions in the NLSCY and ACS. For instance, speech and language difficulties were not measured in NSLCY and were the highest prevalence chronic health condition in the ACS (8.4%). In addition, the sampling, populations, and time frames were different between the two surveys. A standard set of chronic conditions is needed to better understand differences in chronic health conditions between Aboriginal and non-Aboriginal populations (Kuhlthau, 2001).

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APPENDIX A: PERCENTAGES AND COEFFICIENTS OF VARIATION

APPENDIX A1

Percentage of Aboriginal Identity by Area of Residence, Albertan Aboriginal Children Aged 0–5.

<i>Indicator</i>	<i>% in Excellent/ Very Good Health</i>	<i>95% Confidence Interval</i>	<i>Coefficient of Variation</i>
Total			
First Nations	36.9	35.3–39.4	2.8
Métis	40.3	38.4–43.0	2.9
Aboriginal ancestry	22.9	21.1–25.3	4.7
Edmonton			
First Nations	42.0	39.3–47.6	4.8
Métis	39.9	36.9–45.5	5.3
Aboriginal ancestry	18.2	15.4–22.6	9.8
Calgary			
First Nations	34.1	29.2–39.3	7.6
Métis	34.1	29.0–39.3	7.8
Aboriginal ancestry	31.9	26.7–37.7	8.8
Rest of Alberta			
First Nations	34.6	31.7–37.8	4.5
Métis	43.1	40.0–46.6	3.9
Aboriginal ancestry	22.3	19.4–25.4	6.8

APPENDIX A2

Percentage of Aboriginal Identity by Low Income Status, Albertan Aboriginal Children Aged 0–5.

<i>Indicator</i>	<i>Percentage</i>	<i>95% Confidence Interval</i>	<i>Coefficient of Variation</i>
Low income			
First Nations	43.4	39.5–47.0	4.5
Métis	27.9	24.4–31.5	6.5
Aboriginal ancestry	13.8	10.2–18.1	14.6
Not low income			
First Nations	56.6	52.6–60.2	3.4
Métis	72.1	68.4–75.5	2.5
Aboriginal ancestry	86.2	81.9–89.8	2.3

APPENDIX A3

Percentage in Excellent/Very Good Health by Aboriginal Identity, Income Status, and Are of Residence, Albertan Aboriginal Children Aged 0–5.

<i>Indicator</i>	<i>% in Excellent/ Very Good Health</i>	<i>95% Confidence Interval</i>	<i>Coefficient of Variation</i>
Total	88.1	86.5–89.6	0.9
First Nations	83.8	80.8–86.4	1.7
Métis	89.8	87.6–91.8	1.2
Aboriginal ancestry	91.1	87.5–93.7	1.7
Edmonton	89.0	86.2–91.3	1.5
Calgary	87.4	83.3–90.5	2.1
Rest of Alberta	87.9	85.6–90.0	1.3
Low income	82.1	78.5–85.2	2.1
Not low income	90.7	89.0–92.3	0.9

APPENDIX A4

Percentage with Normal, Low, or High Birth Weight by Aboriginal Identity, Area of Residence, and Income Status, Albertan Aboriginal Children Aged 0–5.

Indicator	% Birth Weight	95% Confidence Interval	Coefficient of Variation
Total			
Normal birth weight	74.3	72.2–76.3	1.4
Low birth weight	7.0	5.9–8.2	8.4
High birth weight	14.1	12.6–15.8	5.7
First Nations			
Normal birth weight	69.3	65.9–72.4	2.4
Low birth weight	8.0	6.2–10.3	12.9
High birth weight	15.7	13.2–18.5	8.7
Métis			
Normal birth weight	76.6	72.8–79.0	2.1
Low birth weight	6.5	5.0–8.5	13.3
High birth weight	14.6	12.3–17.2	8.6
Aboriginal ancestry			
Normal birth weight	79.3	74.9–83.3	2.7
Low birth weight	6.3	4.3–9.1	19.3 ^E
High birth weight	11.6	8.6–15.3	14.6
Edmonton			
Normal birth weight	73.2	68.9–76.6	2.7
Low birth weight	8.0	6.1–10.5	14.1
High birth weight	13.0	10.8–16.5	10.9
Calgary			
Normal birth weight	77.8	73.0–81.7	2.9
Low birth weight	7.8	5.5–11.2	18.0 ^E
High birth weight	11.1	8.2–15.1	15.4
Rest of Alberta			
Normal birth weight	74.2	70.9–76.8	2.0
Low birth weight	5.7	4.5–7.7	13.8
High birth weight	15.8	13.7–18.3	7.4
Low income			
Normal birth weight	72.3	72.7–77.4	1.6
Low birth weight	7.5	5.5–8.3	10.5
High birth weight	14.2	12.5–16.0	6.5
Not low income			
Normal birth weight	75.1	68.1–76.2	2.9
Low birth weight	6.8	5.6–10.1	14.9
High birth weight	14.2	11.3–17.5	11.1

E: The estimate must be used carefully as it is associated with a high level of error

APPENDIX A5

Percentage Breastfed by Aboriginal Identity, Health Status, Chronic Health Condition, Income Status and Area of Residence, Albertan Aboriginal Children Aged 0–5.

Indicator	% Breastfed	95% Confidence Interval	Coefficient of Variation
Total	76.6	74.5–78.6	1.4
First Nations	72.5	69.1–75.6	2.3
Métis	76.2	72.8–79.4	2.2
Aboriginal ancestry	84.0	79.4–87.6	2.5
Edmonton	71.2	67.2–75.1	4.4
Calgary	81.2	76.4–85.2	5.5
Rest of Alberta	78.1	75.2–80.8	2.9
Low income	72.5	68.4–76.2	4.5
Not low income	78.3	75.8–80.7	1.8
Excellent/very good	78.5	76.4–80.5	0.9
Good health	61.9	54.0–68.9	9.7
Fair/poor health	63.2	49.6–75.3	17.2 ^E
Chronic condition	71.8	67.3–76.2	5.5
No chronic	77.9	75.5–80.1	1.5

E: The estimate must be used carefully as it is associated with a high level of error.

APPENDIX A6

Percentage Diagnosed with a Chronic Health Condition Excluding Allergies/Lactose Intolerance by Aboriginal Identity, Income Status, and Area of Residence, Albertan Aboriginal Children Aged 0–5.

Indicator	% Diagnosed with a Chronic Condition	95% Confidence Interval	Coefficient of Variation
Total	20.2	18.5–22.1	4.6
First Nations	25.0	20.9–27.0	6.5
Métis	20.0	16.9–22.5	7.3
Aboriginal ancestry	16.7	12.2–20.0	12.5
Edmonton	21.0	17.9–24.5	7.9
Calgary	17.8	14.6–22.6	11.1
Rest of Alberta	20.5	18.1–23.3	6.4
Low income	22.0	18.7–25.7	8.1
Not low income	19.5	17.5–21.8	5.7

APPENDIX A7

**Percentage Diagnosed with a Chronic Allergy/
Lactose Intolerance by Aboriginal Identity, Income
Status, and Area of Residence, Albertan Aboriginal
Children Aged 0–5.**

<i>Indicator</i>	<i>% with a Diagnosed Allergy</i>	<i>95% Confidence Interval</i>	<i>Coefficient of Variation</i>
Total	7.7	6.5-9.0	8.3
First Nations	7.5	5.8-9.5	12.5
Métis	8.2	6.4-10.5	12.7
Aboriginal ancestry	7.9	5.5-11.1	17.7 ^E
Edmonton	8.0	5.8-10.2	14.3
Calgary	7.8	5.4-11.0	17.9 ^E
Rest of Alberta	7.7	6.1-9.6	11.7
Low income	7.7	5.7-10.3	15.2
Not low income	7.7	6.3-9.3	9.9

E: The estimate must be used carefully as it is associated with a high level of error.

APPENDIX B: ODDS RATIOS

Adjusted Odds Ratio for Excellent/Very Good Health, Canadian Aboriginal Children Aged 0–5.

<i>Indicator</i>	<i>Reference</i>	<i>Adjusted Odds Ratio</i>	<i>95% Wald Confidence Limit</i>
Age 2–3	Age 0–1	1.2	0.95-1.40
Age 4–6	Age 0–1	1.1	0.90-1.31
Female	Male	1.1	0.97-1.29
Normal birth weight	Low birth weight	1.8*	1.44-2.29
High birth weight		1.8*	1.35-2.37
Breastfed	Not breastfed	1.4*	1.23-1.67
No chronic condition	Chronic condition	5.1*	4.41-5.91
No allergy	Allergy	2.2*	1.84-2.73
Not low income	Low income	1.4*	1.15-1.66
Own home	Rent home	1.3*	1.11-1.57
Regular home maintenance	Major home repairs needed	1.3*	1.09-1.57
Minor home repairs needed		1.2	0.98-1.41
2 people in home	5 or more people in home	1.5*	1.09-1.57
3–4 people in home		1.3*	1.14-1.55
No moves		1.4*	1.15-1.79
0.1–0.5 moves per year	1.1 or more moves per year	1.4*	1.05-1.78
0.51–1.0 moves per year		1.1	0.87-1.43
2 parents (biological)		1.2*	1.05-1.47
2 foster or adoptive parents/alternative living arrangement	Single biological parent	0.8	1.58-1.17
Female high school		1.3*	1.07-1.59
Female nonuniversity postsecondary	Female less than high school	1.2	0.98-1.46
Female university		1.7*	1.29-2.13
Daily milk/milk products	Less than daily	1.3*	1.03-1.66
Daily vegetables		1.5*	1.23-1.75
Age appropriate sleep	More or less than age appropriate sleep	1.2*	1.08-1.43
Atlantic provinces		1.1	0.77-1.52
Quebec		1.1	0.81-1.55
Ontario		1.1	0.86-1.38
Manitoba		1	0.77-1.31
Saskatchewan	Alberta	0.6*	0.50-0.82
British Columbia		0.9	0.67-1.10
Yukon		2.3*	1.18-4.32
Northwest Territories		1.6	1.00-2.71
Nunavut		1.5	0.94-2.38

* Significantly different from the reference group.

APPENDIX C: PERCENTAGES FOR ODDS RATIOS

Percentage in Excellent/Very Good Health by Indicators (in Logistic Odds Ratio) Canadian Aboriginal Children Aged 0-5.

<i>Indicator</i>	<i>Percentage</i>	<i>Reference</i>	<i>Percentage</i>
Age 2-3	86.8	Age 0-1	88.5
Age 4-6	85.4		
Female	88.1	Male	85.3
Normal birth weight	87.8	Low birth weight	76.4
High birth weight	85.9		
Breast fed	88.7	Not breast fed	81.4
No chronic condition	92.5	Chronic condition	68.1
No allergy	88.1	Allergy	70.5
Not low income	90.5	Low income	80.9
Own home	90.9	Rent home	82.5
Regular home maintenance	88.1	Major home repairs needed	82.1
Minor home repairs needed	86.8		
2 people in home	82.8	5 or more people in home	83.4
3-4 people in home	89.1		
No moves	89.2		
0.1-0.5 moves per year	87.1	1.1 or more moves per years	80.8
0.51-1.0 moves per years	84.2		
2 parents (at least 1 biological)	89.3	Single biological parent	82.3
2 foster or adoptive parents/alternative living arrangement	72.4		
Female high school	88.3	Female less than high school	79.1
Female nonuniversity postsecondary	88.3		
Female university	92.0		
Daily milk/milk products	87.4	Less than daily	80.5
Daily vegetables	88.3	Less than daily	79.5
Age appropriate sleep	88.2	More or less than age appropriate sleep	84.6
Atlantic provinces	89.0		
Quebec	88.3		
Ontario	89.0		
Manitoba	85.9		
Saskatchewan	80.2	Alberta	88.1
British Columbia	86.5		
Yukon	86.0		
Northwest Territories	81.7		
Nunavut	76.0		

