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# Data Resource Profile: The Health of Canadian children in Foster Homes (CanFos)

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## Abstract

### Introduction
Despite the established evidence that children in foster homes will face a high burden of health challenges, data on their long-term health is often not accessible due to a lack of centralised data systems, cost of longitudinal studies, and lost to follow-up. We present the CANadian children in FOSter homes (CanFos) cohorts with linked longitudinal health data to enable population-level studies on the health of children in foster homes across Canada.

### Methods
CanFos holds multiple national Census-based cohorts at 5-year cycles on children in foster homes, along with all other Canadian children as a comparison population, linked to health administrative data to enable ongoing follow-up of outcomes. Socio-demographic and economic information is available at the individual and household level. Data linkage is renewed routinely with data currently available from 2000 until 2024.

### Results
To date, linked data includes weighted N= 31 595, N= 24 125, N=22 595 children less than 18 years of age living in foster homes in 2011, 2016, and 2021 compared to over 5 million other Canadian children. Rates of living in private dwelling foster homes was 5.9 per 1 000 children (2011); 4.4 per 1 000 children (2016); 4.0 per 1 000 children (2021). For those who lived in foster homes, at twelve years of follow-up the number of hospitalisations was 345 per 1 000 persons and the crude counts of mortality was 22 per 1 000 (vs 211 hospitalisations per 1 000 persons, and 4 deaths per 1 000 persons for other Canadians).

### Conclusion
CanFos is a comprehensive data linkage resource that can ask multiple research questions about the patterns of health care use, health outcomes, and mortality of children in foster homes. Ultimately, the evidence has the potential to lead to policies and health programs that safeguard the health of children in foster care.

### Keywords
foster care, children looked after, children in care, administrative data, Canada, longitudinal studies, population-based

### Key features

- Canadian Children in Foster Homes (CanFos) comprises multiple Census-based cohorts on children in foster homes and a comparator group of all other children at 5-years cycles with data linked to longitudinal health databases.
- Health data are available from 2000 onwards, with multiple health and mortality datasets providing a valuable opportunity to investigate the outcomes of children with foster home experience to a breadth of health services outcomes (emergency department, hospitalisation), health outcomes (physical, pregnancy, mental health, substance abuse), and mortality.
- CanFos is has a repeated cross-sectional design of cohorts at 5 year cycles, which allows observations to be compared across time periods of 2011, 2016, 2021 and future Census years.
- Comprehensive population-level data, and a comparator group of all other children, provides the sample size to investigate a wide range of health outcomes across jurisdictions (Canadian provinces and territories) and demographic groups.
- Data can be accessed through secure access to microdata at Statistics Canada.

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# Background

It is estimated that 4-7% of Canadian children have been removed from their parents and placed in an alternative, out-of-home care placement [1–3]. One type of out-of-home care placement is family-based foster care, where a child is placed in a foster home with caregivers who are not related to them. Children are typically placed in foster care when child welfare authorities determine that it is unsafe for them to remain with their parents or caregivers, which can be due to abuse, neglect, or other serious concerns. These situations may occur alongside or be amplified by challenges such as poverty, mental health difficulties, or family violence [3–5]. As such, children who are placed in a foster home have typically been exposed to high levels of social risk and adversity. These childhood adversities can lead to biologic changes through exposure to chronic and/or repeated toxic stress [6]. Such biological disturbances may lead directly to physical, developmental or mental health diagnoses [7–9]. In addition, adversities that often accompany foster home exposure, such as caregiver disruption and social disadvantage may put youth at additional risk for poor health outcomes [10]. For example, due to competing priorities (mental health, school, or safe shelter) delaying a doctor's appointment for an assessment of a chest infection or not taking prescription antibiotics as recommended can lead to the need for hospitalisation.

Given the potential for adverse outcomes for children and youth who have been fostered, it is critical to document their health. Previous research from Australia [11, 12], New Zealand [13], and the USA [14] has shown that children who have experienced foster care often face elevated risks of adverse health (e.g., chronic illness and medical complications) and mental health outcomes (e.g., suicide attempts and substance use disorders). Higher rates of mortality among foster children in the United States have also been documented [15, 16]. Although research in certain regions of Canada have documented certain health outcomes of children in out-of-home care [17], there are no systematic Canadian data documenting a full breadth of health and mental health outcomes of Canadian children and youth in foster care.

In Canada, due to colonisation and systemic racism, Indigenous children make up 53.8% of children in foster care, but only 7.7% of the population [18], and parents of Black children are investigated at twice the rate of White families [19]. This overrepresentation is similar to countries such as Australia which documents overrepresentation of Aboriginal children in out-of-home care though where little is known about health outcomes especially across equity-seeking groups [20]. It is critical to understand the health and mental health outcomes of children with experience in foster care to inform equitable health policies.

This paper describes the multiple cohorts in the CanFos project, which are rich data sources, due to detailed demographic information, in-depth longitudinal health data, and the inclusion of a comparator group of all other Canadian children. We provide cohort characteristics, data sources, methodology, counts and rates of acute hospital encounters and mortality. This provides the basis for collaborations, research priority setting, and future analyses related to protective and risk factors of specific physical and mental health, and mortality outcomes. Altogether, CanFos aims to answer important questions in health services and health outcomes for this vulnerable population that faced significant childhood adversity.

# Methods

## Setting

All non-institutionalised children under 18 years of age on Census Day in Canada are included in CanFos. National data that includes Quebec is available for socio-demographic data and death data. For this data resource, we present data on all children with the exception of Quebec as this represents the demographics of most currently linked data. Institutional collective dwellings such as hospitals, nursing homes or prisons, are not captured by all Census Files, therefore are not included in CanFos cohorts. All First Nations reserves outside of Quebec were included, except for approximately 36 (out of more than 3,000) on any given Census Day due to natural disasters or due to permission not being granted.

## Population

The population of interest are children identified as a "foster child" by the Census survey respondent. The survey respondent is any adult member of the household. The Census question is "For each person usually living here, describe his or her relationship" where "foster child" is an option [21]. Children in foster homes outside of Census Days are not captured. Each cohort captures a snapshot of children in foster care on that day. As such, children in the same foster home on more than one Census Day are represented in more than one cohort.

## Comparison Group

All other children under the age of 18 years on Census Day in Canada are in CanFos, and can be used as a comparator group.

## Relevant Dates, Follow-Up and Data Collection

CanFos currently includes three population-based Canadian cohorts which have entry dates on Census Day in 2011, 2016, and 2021 where health outcomes for each cohort are followed up to 13 years. CanFos leverages linkage between the Canadian Census and health administrative data in the Canadian Census Health and Environments Cohort (CanCHEC) at Statistics Canada. CanCHEC cohorts are repeated at 5-year cycles (cohort entry is the Canadian Census distributed every 5 years) therefore CanFos has repeated cross-sectional waves at 5-year cycles, and linkage to longitudinal health administrative data is updated at regular intervals to update outcome data. CanFos contains distinct cohorts on Canadian children in foster homes as well as a comparator group of all other Canadian children. CanFos integrates and harmonises data from multiple cohorts of Census data so that it can be used combined or parsed as needed for analysis. The structure of CanFos data allows identification of children who are in multiple Censuses, or who share certain characteristics specific to children in foster care. Variables within CanFos are also cleaned, defined, and

categorised with understanding of the data definitions and data quality issues that are unique to children in foster homes.

On Census Day, descriptive baseline data were collected on a long-form of the Canadian Census (herein called Census Files). The long-form Censuses collect additional detail than the standard mandatory short-form Census; including demographic, educational, and economic information at both the individual and household levels. Methodological differences exist between Censuses, therefore weighting and calibration procedures have been implemented by Statistics Canada to support comparability across survey cycles. Specifically, in 2011, the long-form Census was called the National Household Survey (NHS) which was voluntary. In contrast, the long-form Censuses in 2016 and 2021 were mandatory resulting in differences in proportion of the Canadian population sampled. In 2011, unlike the 2016 and 2021 long-form Censuses, sampled 30% of the population and had a response rate of 68.6% [22, 23]. Statistics Canada calculated bias indicators to interrogate the integrity of the 2011 population estimates, including linkage between 2006 to 2011 long-form Censuses to analyse non-responders and responders. These technical assessments showed that the Census count and the 2011 long-form Census estimates for the population were practically identical [22, 24]. Weights are applied to all Census Files to adjust for response bias and allow the results to reflect the Canadian population [25]. Survey weights are applied to all Census Files to adjust for response bias and allow the results to reflect the Canadian population [25]. Survey weights are designed based on the probability of being selected for the long-form Census sample, and accounts for factors such as overall non-response rates, calibrated for response rates in sampling units and factors determined through a sub-sample of non-respondents. Indicators of non-response bias, weighting techniques, and the overall estimation methodology for Census Files are reported in detail in Statistics Canada Technical documents [24, 26, 27].

Outcomes of the children identified on Census Day were followed for three categories: (1) Hospitalisations (2) Emergency Department (ED) Visits and (3) deaths. Hospitalisations are captured through the Canadian Institute of Health Information Discharge Abstract Database (DAD), ED Visits from the National Ambulatory Care Reporting System (NACRS) database, and deaths are captured in the Vital Statistics database. Each of these databases are linked to Census Files and because they are managed separately the end dates for follow-up differ depending on the availability and timing of data updates. Follow-up periods are extended as health administrative data are regularly updated at Statistics Canada, with these updates reported publicly [23]. Figure 1 illustrates the key study dates for all cohorts.

Currently, hospitalisation data are available from 2000 to 2024, emergency department data from 2002 to 2024, and mortality follow-up extends to 2023. Census dates are May 10, 2011, May 10$^{th}$ 2016 and May 11$^{th}$ 2021 for the 2011, 2016 and 2021 Census respectively. All cohort entry dates and follow-up periods presented are accurate as of this publication, and are updated at regular intervals.

Using CanFos, data from multiple cohorts can be harmonised so that data from more than one cohort can be combined to conduct longitudinal analyses. As such, it is possible to identify children whose data is included in more than one cohort (i.e., children who were in foster homes on both 2011 and 2016 Census Days).

## Community Involvement Statement

CanFos was conceptualised with community members, people with lived and living experience in child welfare or foster care, provincial and national organisations. These people and agencies are involved in all aspects of our work. We work with a First Nations, Métis and Inuit Advisory Circle to guide data governance, access, and management. We uphold First Nations, Métis, Inuit, and principles of data sovereignty when it comes to access and management of data pertaining to distinct populations. This includes principles of ownership, control, access, and possession (OCAP®) written by First Nations in Canada (fnigc.ca). Data definitions (e.g. variable household/child discordance of Indigeneity) and how to present proportions according to Indigeneity have been guided by community members and Indigenous organisations. We uphold Engagement, governance, Access, and Protection (EGAP) framework, and work with Black researchers and communities. Researchers, graduate students, and Canadian First Nations, Métis, Inuit, Black communities or agencies interested in this data can visit the following website for more information: www.canfos.ca.

## Data Collected

Characteristics of the individuals and households in the cohorts, on cohort entry date are obtained from the Census Files for 2011, 2016, 2021. Survey questions are publicly available [28]. See Table 1 for a list of variables that can be reported with CanFos. Demographic characteristics are reported using Statistic Canada categories for categorical variables, where all characteristics are available for the individual 'foster child' as well as each member in that household, and all characteristics are reported by the survey respondent [29]. Indigeneity categories are First Nations, Métis, Inuit, or other (including multiple). "Indian" Status is status under the Indian Act in Canada, applicable, in general, only to First Nations. Indian status provides access to certain federal benefits including health benefits. Race is described by categories defined by Statistics Canada such as White, South Asian, Chinese, Black, Filipino, etc. Immigrant is defined as being a landed immigrant or permanent resident (persons granted the right to live in Canada permanently by immigration authorities) or non-permanent resident (persons from another country who have a work or study permit or claimed refugee status). Additional characteristics are available on the date of arrival and country of origin for landed immigrants. Individual education attainment, employment and income is available for children 15 to less than 18 years of age only. Household characteristics includes all characteristics above for all other members of the household, as well as household income, dwelling type (apartment, house), household crowding, and household suitability (if there is a bedroom shortfall based on the National Occupancy Standard) [28]. Additional geographic information is available at the neighbourhood or municipality level and province/Territory. Race and Indigeneity discordance with household members will be defined as instances where a child is identified by the Census

Figure 1: Study Design Schematic Key Cohort Time Periods in CanFos

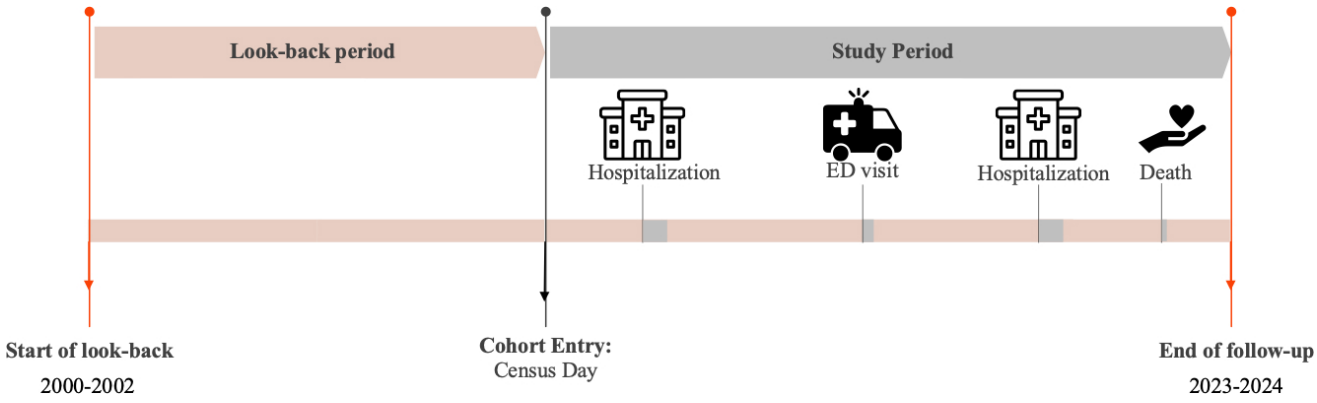


Table 1: Databases and Variables in CanFos

| Outcome/Database | Province/Territories | Variables |
|---|---|---|
| **Descriptive Data**<br><br>**Census Files:** National Household Survey (NHS) (2011) and Long-Form Census (2016, 2021) | All | **Exposure:** Identification by the respondent as 'foster child'<br>**Covariates:** Age, sex, "Indian" status (Y/N), on or off First Nations reserve, Indigeneity, race, landed immigrant (Y/N), employment, income, education, Not in Education Employment or Training (NEET) (Y/N), relocated (last 1 year) (Y/N), relocated (last 5 years) (Y/N), discordance between race or Indigeneity between foster child and foster household (Y/N), household income, household dwelling structure, more than 1 person per room in house (Y/N), not suitable housing. Additional (not reported- geographic location (neighbourhood or municipality, province or territory). |
| **(1) Hospitalisations**<br><br>DAD: Canadian Institute for Health Information Discharge Abstract Database | All (except QC) | **Primary Outcome:** Hospitalisation<br>**Secondary Outcomes:** Reason for hospitalisation, length of stay |
| **(2) Emergency Department (ED) visits**<br><br>**NACRS:** National Ambulatory Care Reporting System | AB, ON, BC | **Primary Outcome:** ED visits<br>**Secondary Outcomes:** Discharge Diagnosis, acuity level, length of stay |
| **(3) Death Data**<br><br>Canadian Vital Statistics-Death Database | All | **Primary Outcome:** Death<br>**Secondary Outcome:** Reason for death |
| **CanFos** | All | **Covariates:** Cohort overlap (if subject is present in two cohorts (2011 and 2016, 2011 and 2021, 2016 and 2021), or three cohorts (2011,2016 and 2021). |

*Data will be available nationally.
ON = Ontario, AB = Alberta, BC = British Columbia, QC = Quebec.

respondent as having a different race or Indigeneity than any other member of the household (other than another foster child), based on distinct categories (e.g., Black, First Nations, Métis, Inuit).

(1) *Hospitalisation data* from the DAD database includes encounters to any inpatient facility across Canada (except for Quebec). The province of Quebec does not share health administrative data with Statistics Canada. Examples of important outcomes for future analytic work are reasons for hospitalisation using diagnostic and procedural codes and length of stay.

(2) *ED visit data* from the NACRS database includes all encounters in the emergency room database in Ontario, Alberta, and British Columbia, during the outcome period. Unlike hospitalisation data, ED visit data in CanFos is only complete for these three large provinces

in Canada. Secondary outcomes of ED visits will include the Canadian Triage and Acuity Scale (CTAS), a five-level system used to triage patients based on the urgency of their condition, length of stay.

(3) *Death data* from the Vital Statistics database includes the date of death (outside of hospital or in hospital) and a secondary outcome of the immediate cause for death in the death database. Linkage of this database in CanFos will be available for all of Canada, but to allow results of this outcome to be compared to hospitalisation data, we exclude Quebec when reporting counts of death in this data resource.

All data are adjusted using survey weights that are specific to each database version, ensuring the results accurately represent the Canadian population. To protect confidentiality, all reported data are rounded to the nearest randomly selected multiple of five, in accordance with Statistics Canada's guidelines for sensitive statistical information.

## Results

We present the number of children who were living in foster homes on the Canadian Census (except Quebec) as it represents the current linked cohorts in CanFos. The number of children less than 18 years was weighted N= 31,595 in 2011; weighted N= 24,125 in 2016; weighted N=22,595 in 2021. This represents cross-sectional rates of living in private dwelling foster homes of 5.9 per 1,000 children (2011); 4.4 per 1,000 children (2016); 4.0 per 1,000 children (2021). Cohort sample sizes and descriptive characteristics for the 2011, 2016 and 2021 cohorts are shown in Table 2.

Across the decade, mismatches between foster children's Indigenous identity and that of their household declined, although they remained substantial (59% in 2011, 57% in 2016, and 52% in 2021). Placement instability also improved, with fewer children moving in the previous year by 2021 (30% in 2011, 28% in 2016 and 23% in 2021). Although older youth in foster care were far more likely to be out of school or work in 2011, this gap narrowed considerably by 2016 and 2021, approaching national levels (17% vs 9% in 2011, 9% vs 6% in 2016 and 9% vs 6% in 2021).

Although the annual household incomes increased over the three cohorts, when looking at income quintiles, more children in foster homes compared to other children in Canada lived in a household in the lowest quintile (35% vs 20% in 2011, 36% vs 20% in 2016; and 38% vs 20% in 2021). More foster homes were unsuitable due to a bedroom shortfall, compared to the houses of all other Canadian children (24% vs 16% in 2011; 18% vs 15% in 2016, and 20% vs 16% in 2021).

The main outcomes for children identified on Census Day are presented in three categories: (1) hospitalisations (Table 3), (2) ED visits (Table 4), and (3) deaths (Table 5). Outcomes are reported for all individuals who lived in a foster home compared to those who did not, as of Census Day. For this data resource, results are shown using the maximum available follow-up period for each cohort, which varies depending on the year. As a result, counts and rates of outcomes cannot be directly compared across cohorts. For example, the 2011 CanFos cohort includes 13 years of follow-up for hospitalisations, allowing children and youth with foster home experience on Census Day to be tracked up to age 31. In contrast, the 2016 cohort follows participants up to age 26, and the 2021 cohort up to age 21.

We found the cumulative incidence rates of hospitalisation per 1 000 persons was higher for individuals with foster home experience compared with those without known foster home experience, across all three cohorts (Table 3). The number of emergency department visits however were similar between individuals with known foster home experience and those without (Table 4). A higher proportion of individuals with foster home experience had more than 3 hospitalisations or ED visits, compared to those without foster home experience.

Weighted numbers of death and crude mortality rates per 1 000 persons for the different follow-up time periods in each cohort are shown in Table 5 and show that mortality rates are substantially higher for those with lived experience in a foster home, compared to other individuals.

## Discussion

The CanFos cohorts aim to explore the relationship between placement in foster home, as a marker of exposure to significant adverse childhood events, and subsequent health outcomes. Data are continuously updated, and currently there are 3 cohorts of children in foster homes spanning a decade with up to twelve years of longitudinal health data to date. The rates of living in foster homes in CanFos are similar to the limited data captured in periodic surveys or compiled publicly available aggregate data [1, 30]. We have enumerated in this data resource higher counts of healthcare use across emergency department visits and hospitalisations, and higher numbers of deaths per 1 000 persons for those children in foster homes compared to the rest of the population. These data lay the foundation for future research questions on health and mortality outcomes. The availability of the data according to population demographics and availability of geographic data (neighbourhood and province/territory) lends itself to inform child welfare and health policy across relevant populations and jurisdictions. Canada has similar rates of private foster home placement to Australia and jurisdictions in the United States where rates are influenced by overrepresentation of Indigenous children in care [31, 32]. Canada's rates of foster home placement are higher than countries such as Sweden, Denmark [33]. As racial and Indigenous identity is challenging to include in data that includes health and wellbeing measures such as in Australia [12], CanFos can uniquely contribute to international literature. The number of children in foster homes is reducing in Canada, partially due to the institution of alternative out-of-home placements. This includes the institution of kinship placement where a child is placed with relatives [1], improving access to permanency options (adoption, reunification), and child welfare models that improve discrimination between high risk and low risk families in need of support services [30].

Initial work with CanFos data from the 2011 cohort illustrates the relative proportion of Indigenous and racialised groups living in foster homes and overall rates and reasons for hospitalisation across health conditions. In 2011, Indigenous First Nations children were 15 times more likely to be living in

Table 2: Characteristics of Children Less than 18 Years of Age and Their Households across Canada (Excluding the Province of Quebec) in CanFos 2011, 2016, and 2021 Cohorts, Comparing Children in Private Dwelling Foster Homes to those not in Foster Homes

| | 2011 | | 2016 | | 2021 | |
|---|---|---|---|---|---|---|
| | **In foster homes** | **Not in foster homes** | **In foster homes** | **Not in Foster Homes** | **In foster homes** | **Not in Foster homes** |
| **Sample size** | 5 795 | 1 062 695 | 6 795 | 1 339 700 | 6 050 | 1 342 105 |
| **Weighted number** | 31 595 | 5 317 345 | 24 125 | 5 403 280 | 22 595 | 5 529 810 |
| **Child Characteristics** | | | | | | |
| **Median Age, years (IQR)** | 10 (5, 15) | 9 (5, 14) | 10 (6,14) | 9 (5,14) | 10 (5,14) | 9 (5,14) |
| **Age, years** | | | | | | |
| Less than 1 | 1 330 (4) | 278 080 (5) | 450 (2) | 285 115 (5) | 820 (4) | 260 530 (5) |
| 1 to 4 | 6 105 (19) | 1 144 730 (22) | 4 165 (17) | 1 161 810 (22) | 4 420 (20) | 1 139 780 (21) |
| 5 to 10 | 9 345 (30) | 1 681 720 (32) | 8 590 (36) | 1 834 460 (34) | 7 295 (32) | 1 882 295 (34) |
| 11 to 14 | 7 465 (23) | 1 206 090 (24) | 5 885 (24) | 1 185 410 (22) | 5 795 (26) | 1 299 420 (24) |
| 15 to $<$ 18 | 7 350 (23) | 1 006 730 (19) | 5 040 (21) | 936 485 (17) | 4 275 (19) | 947 785 (17) |
| **Male Sex** | 16 375 (52) | 2 737 640 (51) | 12 365 (51) | 2 775 255 (51) | 11 695 (52) | 2 844 195 (51) |
| **Immigrant**[1] | 820 (3) | 464 870 (9) | 520 (2) | 457 560 (9) | 735 (2) | 513 620 (9) |
| **Rural** | 12 025 (38) | 1 014 880 (19) | 8 550 (35) | 992 935 (18) | 7 940 (35) | 973 340 (18) |
| **Moved**[2] **in the last 1 year** | 9 515 (30) | 623 915 (12) | 6 750 (28) | 696 110 (13) | 5 220 (23) | 626 785 (11) |
| **Moved in the last 5 years** | 16 215 (51) | 1 577 585 (30) | 12 415 (52) | 1 628 395 (30) | 11 315 (50) | 1 687 090 (31) |
| **Child Characteristics (Children 15 to $<$ 18 years of age)** | | | | | | |
| **Not in employment, education, training**[3] | 1 255 (17) | 88 385 (9) | 430 (9) | 56 105 (6) | 380 (9) | 60 075 (6) |
| **Annual income ($)** | | | | | | |
| No income | 5 150 (70) | 611 425 (61) | 3 605 (72) | 582 655 (62) | 2 595 (61) | 537 040 (57) |
| 1-999 | 685 (9) | 86 030 (9) | 355 (7) | 68 665 (7) | 760 (18) | 81 220 (9) |
| 1 000-2 499 | 625 (9) | 88 705 (9) | 395 (8) | 73 955 (8) | 240 (6) | 62 250 (7) |
| 2 500-4 999 | 355 (5) | 93 900 (9) | 340 (7) | 100 195 (11) | 245 (7) | 89 535 (10) |
| 5 000 and over | 530 (7) | 126 670 (13) | 340 (7) | 111 010 (12) | 425 (10) | 177 740 (19) |
| **Household/Child Discordance of Indigeneity**[4] | 10 305 (59) | | 8 260 (57) | | 7 790 (52) | |
| **Household Characteristics** | | | | | | |
| **Total income (CND)** | | | | | | |
| Less than 10 000 | 2 225 (7) | 105 590 (2) | 1 390 (6) | 75 570 (1) | 745 (3) | 43 330 (1) |
| 10 000-29 999 | 4 660 (15) | 516 010 (10) | 3 005 (12) | 347 380 (6) | 1 700 (8) | 125 215 (2) |
| 30 000-69 999 | 11 980 (38) | 1 493 520 (28) | 8 255 (34) | 1 312 425 (24) | 6 265 (28) | 949 830 (17) |
| 70 000-99 999 | 6 140 (19) | 1 080 955 (20) | 4 850 (20) | 1 001 710 (19) | 4 835 (21) | 1 008 585 (18) |
| 100 000 and over | 6 590 (21) | 2 121 270 (40) | 6 620 (27) | 2 666 190 (49) | 9 055 (40) | 3 402 855 (62) |
| **Income quintile** | | | | | | |
| 1 (Lowest) | 10 970 (35) | 1 063 520 (20) | 8 655 (36) | 1 080 680 (20) | 8 640 (38) | 1 105 970 (20) |
| 2 | 7 985 (25) | 1 063 425 (20) | 6 285 (26) | 1 080 640 (20) | 5 315 (24) | 1 105 965 (20) |
| 3 | 6 035 (19) | 1 063 490 (20) | 4 495 (19) | 1 080 675 (20) | 3 865 (17) | 1 105 970 (20) |
| 4 | 4 095 (13) | 1 063 445 (20) | 3 090 (13) | 1 080 630 (20) | 3 085 (14) | 1 105 945 (20) |
| 5 (Highest) | 2 510 (8) | 1 063 465 (20) | 1 600 (7) | 1 080 650 (20) | 1 695 (8) | 1 105 955 (20) |

Continued

Table 2: Continued

| | 2011 | | 2016 | | 2021 | |
|---|---|---|---|---|---|---|
| | **In foster homes** | **Not in foster homes** | **In foster homes** | **Not in Foster Homes** | **In foster homes** | **Not in Foster homes** |
| **Home dwelling structure** | | | | | | |
| Single-detached | 25 985 (82) | 3 660 465 (69) | 19 410 (80) | 3 610 065 (67) | 18 670 (83) | 3 654 865 (66) |
| Apartment | 2 525 (8) | 804 075 (15) | 1 890 (8) | 872 185 (16) | 1 535 (7) | 912 540 (17) |
| Other dwelling | 55 (0) | 6 135 (0) | 40 (0) | 6 620 (0) | 30 (0) | 6 350 (0) |
| Semi-detached/row | 2 410 (8) | 780 970 (15) | 2 130 (9) | 853 145 (16) | 1 905 (8) | 898 545 (16) |
| Movable dwelling | 625 (2) | 65 705 (1) | 650 (3) | 61 265 (1) | 460 (2) | 57 515 (1) |
| **$>$ 1 person per room**[5] | 4 265 (14) | 450 905 (8) | 2 625 (11) | 514 400 (10) | 3 195 (14) | 635 840 (12) |
| **Not Suitable Housing**[6] | 7 615 (24) | 843 830 (16) | 4 260 (18) | 787 910 (15) | 4 545 (20) | 881 905 (16) |
| **Major Repairs needed**[7] | 3 975 (13) | 448 795 (8) | 2 905 (12) | 404 835 (8) | 2 560 (11) | 375 480 (7) |

All data are number (percentage) unless otherwise indicated.
[1]Immigrant is defined as being a landed immigrant or permanent resident (persons granted the right to live in Canada permanently by immigration authorities) or non-permanent resident (persons from another country who have a work or study permit or claimed refugee status).
[2]A move is defined at the individual level, where the child has lived in another address, including another First Nations reserve, or outside of Canada.
[3]Not in education, employment, or training is defined as a youth between the age of 15 to $<$ 18 years of age who has not attended school since September of the school year, nor is employed, nor is attending trade school.
[4]Household and child discordance of Indigeneity is defined as a child not having the same Indigeneity (First Nations, Métis, Inuit or 'other' Indigenous children) as any of the other non-fostered household members.
[5]Where a room includes enclosed areas such as kitchens, bedrooms, finished rooms in basement or attic. Does not include bathrooms or vestibules.
[6]Unsuitable housing is defined as a house with over one bedroom shortfall as defined by breach of one of: a maximum of two persons per bedroom, children over 5 years of the opposite sex not sharing a bedroom, adults greater than 18 years of age having a separate bedroom unless they are a spouse or common law.
[7]Major repairs examples are defective plumbing or electrical wiring, structural repairs to walls, floors or ceilings.

a foster home compared to White children [34]. For female children and youth with foster home exposure the most common reason for hospitalisation were conditions related to pregnancy and childbirth at 4 times the rates of females without foster home exposure [34]. For males with foster home exposure, the most common reason for hospitalisation was mental health and behavioural disorders, also at 4 times the rates of males without exposure to foster homes [34]. Future research plans include questions within the themes of mental health, reproductive health, chronic disease, and premature mortality. Research questions can also evaluate patterns of health service utilisation, such as recurrent hospital visits, preventable visits, and hospital patient health and safety indicators.

## Strengths and Limitations

The overall strengths of these cohorts are that they capture a large population across Canada and have unique linkage to longitudinal health and mortality data. However, the use of Census, administrative data, and the cohort design poses limitations. As there is no category on the Census for other placements outside of the home, such as kinship (placement with family) or customary care (placement in a community), our study partially captures these placements (e.g. a grandparent may identify a kinship placed child as 'foster child', or not). However the counts and rates of living in foster home are reflective of other data on foster care placement in select provinces and across Canada indicating our estimates are likely representative of the private dwelling foster care population [1, 2]. Children who have lived in collective dwellings (e.g., group homes) are not included as they are represented in a separate, and at this time, unlinked Census File. Due to the cross-sectional nature of our exposure, CanFos data likely slightly overrepresent children who lived in one foster home for longer periods of time (stable placements). Our linked hospitalisation and emergency room data does not include the population of Quebec, therefore some caution should be applied when generalising these results to this province. We acknowledge that not all First Nations, Métis, Inuit and Black or racialised families will feel represented by Census respondent identified race or Indigenous identity, and that these data when explored distinctly in the future will be interpreted with communities

Table 3: Counts of Hospitalisations Visits in CanFos 2011, 2016, and 2021 for Individuals With Known Foster Home Experience and for Individuals Without Known Foster Home Experience

| Follow-up Period | 2011 | | 2016 | | 2021 | |
|---|---|---|---|---|---|---|
| | 11.9 Years | | 7.9 Years | | 2.9 Years | |
| | May 10, 2011 to March 31, 2023 | | May 10, 2016 to March 31, 2024 | | May 10, 2021 to March 31, 2024 | |
| | Foster Experience N = 31 595 | No Foster Experience N = 5 317 345 | Foster Experience N = 24 125 | No Foster Experience N = 5 403 275 | Foster Experience N = 22 595 | No Foster Experience N = 5 529 810 |
| **Individuals Hospitalised** | | | | | | |
| Weighted Number | 10 885 | 1 120 025 | 5 640 | 704 210 | 1 915 | 286 385 |
| Weighted Number per 1 000 persons | 345 | 211 | 234 | 130 | 85 | 52 |
| **Hospitalisation Visits** | | | | | | |
| Weighted Number | 31 470 | 2 229 140 | 14 200 | 1 218 665 | 3 535 | 416 805 |
| Percentage of hospitalisations from individuals with > 3 hospitalisations | 70% | 49% | 64% | 40% | 46% | 27% |
| Weighted Number of Hospitalisations per 1 000 Persons | 996 | 419 | 589 | 226 | 156 | 75 |

All provinces and territories in Canada except Quebec. All numbers are weighted number (percentage) unless otherwise specified.

Table 4: Counts of Emergency Department Visits (British Columbia, Alberta, Ontario) in CanFos 2011, 2016 and 2021 Cohorts for Individuals with Known Foster Home Experience and for Individuals Without Known Foster Home Experience

| Follow-up (years) Time Period | 2011 | | 2016 | | 2021 | |
|---|---|---|---|---|---|---|
| | 11.9 Years | | 7.9 Years | | 2.9 Years | |
| | May 10, 2011 to March 31, 2023 | | May 10, 2016 to March 31, 2024 | | May 11, 2021 to March 31, 2024 | |
| | Foster Experience N = 20 745 | No Foster Experience N = 4 342 955 | Foster Experience N = 14 940 | No Foster Experience N = 4 421 905 | Foster Experience N = 12 950 | No Foster Experience N = 4 536 970 |
| Weighted Number | 8 185 | 1 779 100 | 4 970 | 1 543 975 | 2 105 | 955 750 |
| Visits per 1 000 Persons | 395 | 410 | 333 | 349 | 163 | 211 |
| Individuals with > 3 ED Visits | 5 215 (64%) | 837 920 (47%) | 2 780 (56%) | 604 835 (39%) | 705 (33%) | 223 110 (23%) |

All numbers are weighted number (percentage) unless otherwise specified.
ED = Emergency Department.

and agencies that represent these populations. The definition of a foster home in our study is consistent between provinces and territories which is a strength (as child welfare placement definitions vary, many available data sources have different definitions between jurisdictions). As CanFos cohorts identify children who are living in a foster home on Census Day only the duration of exposure to foster care is not captured. CanFos data cannot interrogate the association of health care use or health outcomes with characteristics of the foster placement (duration, reason for placement, foster caregiver characteristics). However, this work presents a major advancement that addresses a large data deficit in Canada and internationally. The future work of CanFos can report on the adverse health service use, health and mortality outcomes in a population that faced significant childhood adversity.

## Data Access

The datasets from this study are held securely in coded form at Statistics Canada. Access to data for research purposes is available under a wide range of access solutions outlined at: www.statcan.gc.ca/en/microdata. The full statistical analysis plan and underlying analytic code are available from the authors upon request.

## Conclusions

The CanFos cohorts provide a comprehensive data resource that includes longitudinal health data on Canadian children in foster homes. Children in foster homes and their population controls are identified at 5-year cycles and health data are available starting in the year 2000 with ongoing data updates.

Table 5: Counts of Death in CanFos 2011, 2016, and 2021 for Individuals With Known Foster Home Experience and for Individuals Without Known Foster Home Experience

| Follow-up Period | 2011 | | 2016 | | 2021 | |
|---|---|---|---|---|---|---|
| | 11.6 Years May 11, 2011 to Dec. 31, 2022 | | 7.6 Years May 11, 2016 to Dec. 31, 2023 | | 2.6 Years May 11, 2021 to Dec. 31, 2023 | |
| | Foster Experience N = 31 595 | No Foster Experience N = 5 317 345 | Foster Experience N = 24 120 | No Foster Experience N = 5 403 275 | Foster Experience N = 22 595 | No Foster Experience N = 5 529 810 |
| Number of Deaths (weighted) | 695 | 19 495 | 285 | 9 855 | 60 | 2 545 |
| Number of Deaths per 1 000 Persons | 22 | 4 | 12 | 2 | 3 | 1 |

All provinces and territories in Canada with the exception of Quebec. All numbers are weighted number (percentage) unless otherwise specified.

The in-depth demographic and geographic data spanning over a decade present an opportunity to generate evidence for health policy. Overall, CanFos has the potential to facilitate research that documents healthcare disparities to better inform policies, guidelines, health care delivery, and coordination between child welfare and healthcare systems to ultimately safeguard the health and wellbeing of children in care.

## Author Contributions

A.E. and A.Q. conceptualised the cohort. A.E. and N.R, drafted the first version of the article. J.P. and V.B. were responsible for data curation. C.B., N.T., N.S., K A.-B., M.U., D.M., B.F., T.E., J.F., made substantial contributions to the creation of the cohort and have made critical revision of the manuscript and important intellectual contributions. All authors have reviewed and approved the final manuscript.

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## Conflict of Interest

Cindy Blackstock is the Executive Director of the First Nations Child and Family Caring Society which has filed a non-compliance motion on Jordan's Principle at the Human Rights Tribunal of Canada. Jordan's Principle is a Canadian legal principle that aims to ensure First Nations children receive the services they need when they need them.

## Ethics Statement

Ethics was reviewed and approved as exempt by the University of Ottawa's Research Ethics Board (#10397).

## Publication Consent

The authors confirm all required consent to publish and openly share data in this article.

## AI Disclosure Statement

The authors declare that no generative AI tools were used in the preparation of this manuscript.

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## Data Availability Statement

The datasets from this study are held securely in coded form at Statistics Canada. Access to data for research purposes is available under a wide range of access solutions outlined at: www.statcan.gc.ca/en/microdata. The full statistical analysis plan and underlying analytic code are available from the corresponding author Andrea Evans upon request. CanFos was conceptualised with community members, people with lived and living experience in child welfare or foster care, provincial and national organisations. These people and agencies are involved in all aspects of our work. We work with a First Nations, Métis and Inuit Advisory Circle to guide data governance, access, and management. We uphold First Nations, Métis, Inuit, and Black principles of data sovereignty when it comes to access and management of data pertaining to distinct populations. This includes principles of ownership, control, access, and possession (OCAP®) written by First Nations in Canada (fnigc.ca). Researchers, graduate students, and Canadian First Nations, Métis, Inuit, Black communities

or agencies interested in this data can visit the following website for more information: www.canfos.ca.

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## Abbreviations

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| CanFos: | Canadian Children in Foster Homes |
| NACRS: | National Ambulatory Care Reporting System |
| DAD: | Canadian Institute of Health Information Discharge Abstract Database |
| OCAP®: | principles of Ownership, Control, Access, and Possession |
| IQR: | Interquartile Range |
| CND: | Canadian Dollars |
| ED: | Emergency Department |