Tracking Exposure to Child Poverty During the First 10 Years of Life in a Quebec Birth Cohort

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ABSTRACT

Objectives: Early childhood poverty is associated with adult chronic diseases. The objectives of this study were to examine patterns of exposure to poverty during the first 10 years of life in the Quebec Longitudinal Study of Child Development (QLSCD) cohort according to three measures of poverty and to explore family characteristics associated with different poverty exposures.

Method: Data from 1,334 participants from the QLSCD were collected annually at home from ages 5 months through 10 years. Household income (previous 12 months) and sources of income were recorded at each data round. Poverty status was operationalized as 1) living below the low income cut-off of Statistics Canada, 2) receiving social welfare and 3) being in the lowest quintile of socio-economic status. We plotted trends in the prevalence of child poverty over time. We used latent class growth modelling to identify subgroups with similar poverty trajectories. Duration of poverty according to each measure was computed separately for early childhood, middle childhood, and the entire 10 years of life.

Results: Four trajectories of poverty were identified: stable poor, decreasing likelihood, increasing likelihood, and never poor. The three measures of poverty do not cover the same population, yet the characteristics of those identified as poor are similar. Children of non-European, immigrant mothers were most likely to be poor, and there was a higher likelihood of children from single-parent families to live in chronic poverty during the first 10 years.

Conclusion: A large proportion of children are exposed to poverty before 10 years of age. More effective public policies could reduce child poverty.

Key words: Child poverty; child low SES; child health; longitudinal study; birth cohort; trajectories

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2012;103(4):e270-e276.

Children growing up in poverty are at increased risk of suffering from diverse health problems, including asthma attacks, acute respiratory infections, growth delay, overweight and obesity as well as mental and behavioural disorders.¹⁻⁵ Moreover, exposure to poverty during early childhood has been associated with higher risk of almost every adult chronic disease,⁶⁻¹⁰ including cardiovascular diseases (CVD)^{6-8,11,12} and Alzheimer's disease,¹³⁻¹⁷ independent of current deprivation status.^{6,7,13} Yet, we do not understand the processes underlying these relationships.⁶ Childhood poverty also compromises children's future life opportunities and well-being by increasing the risk of underachievement in cognitive development, social skills, and educational attainment.^{10,16,17} Given that data on childhood poverty are usually aggregated for all children under 18 years,¹⁸⁻²¹ we know little about trajectories of exposure to poverty during early childhood.

Relative poverty involves a lack of minimal resources needed to live according to a society's norms.^{3,18,22-25} No single measure can capture all dimensions of a poverty experience.²⁴⁻²⁷ Some multi-dimensional measures of poverty are available but are difficult to interpret and remain under discussion.^{25,28-31} Most poverty measures currently used are based on income either alone,^{3,23,27,32,33} as in the Low Income Cut-off (LICO) from Statistics Canada, or in combination with level of education and/or employment status to yield an indicator of socio-economic status (SES).³⁴ Poverty is not only about lack of material resources, yet having a low income is the basis of choice limitations that lead to poverty and social exclu-

sion, thus limiting access to healthy foods, quality clothes, good housing, healthy neighbourhoods, and quality schools. In Quebec, receiving social welfare (SW) is an indicator of extreme poverty since this allowance represents an income below the LICO. It is unclear whether these different measures of poverty (below LICO, SW, and SES) operationalize the same poverty reality.²⁶

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Acknowledgements of support: This study was funded by the Canadian Institutes of Health Research (CIHR) Grant Number 00309MOP-123079. Data were collected by the Institut de la Statistique du Québec, Direction Santé Québec. The IRSPUM and CRCHUM received infrastructure funding from the Fonds de la Recherche en Santé du Québec. LG holds a CIHR/CRPO Applied Public Health Chair on Neighbourhoods, Lifestyle, and Healthy Body Weight. GP holds a CIHR Applied Public Health Research Chair. MTT is funded by a postdoctoral CIHR fellowship (CIHR #181755) and by a Young Investigator Award from the Brain and Behavior Research Foundation. These funding agencies were not involved in the study design, data analyses, data interpretation or manuscript writing and submission processes.

Conflict of Interest: None to declare.

To our knowledge, there are no Canadian data on patterns and trajectories of early childhood poverty. Given that children's vulnerability to the deleterious effects of poverty varies according to timing and duration of exposure,^{6,13} it appears important to study the experience of child poverty at different ages. The aim of this article is to describe exposure to poverty of participants in a Quebec birth cohort during the first 10 years of life according to different measures of poverty. We also explore family characteristics associated with different trajectories of poverty.

METHOD

Sample

The Quebec Longitudinal Study of Child Development (QLSCD) is a birth cohort of a representative sample of Quebec singleton live births in the period 1997-1998. The sampling methodology has been described elsewhere.^{2,35} From 2,817 selected births, 2,675 families were contacted and 2,120 gave their consent to participate. Subjects' baseline data were collected at 5 months of age and home interviews were conducted annually up to the age of 8 years and every two years thereafter, provided that subjects still resided in the Province of Quebec.^{35,36} This analysis covers data from baseline to 2008 when participants were aged 10-11 years. The study was approved by the ethics review boards of the Institut de la statistique du Québec, the Centre Hospitalier Universitaire (CHU) Sainte-Justine, and the Faculty of Medicine of Université de Montréal. All participants provided signed informed consent at each round.

Definition of variables

Three indicators of poverty were examined: living in a household with low income (below LICO), receiving social welfare (SW), and being of low SES. Trained interviewers recorded previous 12-month household income at each data collection occasion.³⁶⁻³⁸ Respondents, most often the mother, were invited to recall the sources of their past 12-month household income. They were then asked to give their "best estimate of the total income before taxes and deductions of all household members from all sources".³⁶

Poverty as Low Income

Low-income poverty status was defined according to the LICO computed each year by Statistics Canada.³⁹ The Canadian LICO represents an income threshold at which "families are expected to spend 20% more [of their income] than the average family on food, shelter, and clothing."⁴⁰ Children were classified as poor at each data collection if they lived in a household with an annual income before taxes below the LICO. LICO was not available for children when they were 4 years of age because the prior data collection procedure had occurred less than 12 months previously.⁴¹ The Canadian LICOs take into account size of family unit and of residential area.⁴⁰ We note that "Although Statistics Canada does not refer to the LICO as a measure of poverty, most academics and interested organisations regard it as precisely that".⁴²

Poverty as Living on Social Welfare

At each survey, respondents reported on their main source of income during the previous 12 months by choosing from the following options: salary, self-employment, employment insurance, social welfare (SW), or other. The number of persons in the family

Figure 1. Proportions (95% confidence intervals) of children living in families with low income or on social welfare from birth to 10 years of age, Quebec Longitudinal Study of Child Development, 1998-2008

Figure 2. Trajectories of low income from birth to 10 years of age (N=1167), Quebec Longitudinal Study of Child Development, 1998-2008

Figure 3. Duration of exposure to low income, social welfare and low SES over the first 10 years of life, among 1121 children who participated in all study rounds, QLSCD, 1998-2008

is taken into account when determining eligibility for and allowances provided by social welfare. A dichotomous variable was computed to contrast families receiving SW rather than other sources of income.

Table 1. Duration of Exposure to Low Income (Below LICO†), Social Welfare and Low SES During Early and Middle Childhood, Among 1,121 Children Who Participated in All Study Rounds of the Quebec Longitudinal Study of Child Development, 1998-2008

		Low Income n %	Social Welfare n %	Lowest SES Quintile n %
Number of study periods spent in low economic or social position				
During early childhood (before 5 years of age)	0	735 (65.5)	952 (84.9)	705 (62.9)
	1-2	175 (15.6)	74 (6.6)	152 (13.6)
	3-4	179 (15.9)	86 (7.7)	252 (22.5)
	Missing	34 (3.0)	10 (0.9)	12 (1.1)
During middle childhood (5-10 years of age)	0	760 (67.8)	1032 (92.1)	696 (62.1)
	1-2	162 (14.5)	35 (3.1)	155 (13.8)
	3-5	179 (15.9)	49 (4.4)	258 (23.0)
	Missing	20 (1.8)	5 (0.5)	12 (1.1)

† LICO = Low Income Cut-offs from Statistics Canada.

Poverty as Being in the Lowest Socio-economic Quintile

SES was estimated at baseline and at each follow-up visit (except at 4 years) using Willm's index of SES, which is a composite of household income, parental educational attainment, and employment prestige.^{34,43} In two-parent families, the parent with the higher level of income, education or occupation was used. In single-parent families, the highest level of education or occupational status of the responding parent was used. For each study round, the three variables were standardized and subjected to factor analysis, which allowed for the extraction of a single factor explaining approximately 72% of the total variance. Factor loadings were used to compute continuous scores of SES, truncated to range from -3 to +3.⁴⁶ For each study round, a dichotomous indicator of low SES was computed as being ranked in the lowest SES quintile versus other quintiles.

Duration of poverty was expressed as the number of follow-up periods or episodes spent in a low-income family, receiving SW, or being of low SES. Chronic poverty was defined as 3-4 episodes of poverty during early childhood (<5 years), 3-5 episodes during middle childhood (between 5 and 10 years), or 6-9 episodes over the entire 10 years of life.

Family Characteristics

Since there are too many missing data for fathers, we examined only maternal characteristics at baseline: maternal educational attainment, type of family, immigration status. European immigrant mothers were combined with Canadian-born mothers because their characteristics are very similar to Canadian mothers and they were too few to make a specific category.^{35,36}

Analysis

We estimated the prevalence of child poverty for each year by dividing the number of children living in low-income households or in families on SW during the time period of interest by the total number of participants during the same time period. We plotted trends in the prevalence of two poverty indicators – below LICO and SW – since the low SES indicator always represents the lowest 20% of the population.

Children's exposure to poverty was assessed in several ways. First, latent growth analyses were carried out among children followed from 5 months to 10 years to identify different poverty trajectories. The model that best fit the data was selected based on the lowest BIC (Bayesian information criterion) value, higher entropy (>0.90), and plausibility of interpretation.

Second, we computed the duration of poverty measured with the LICO, receiving SW, or being of low SES during early childhood

(<5 years), during middle childhood (5-10 years), or over the entire 10 years of life. Sampling weights were applied for cross-sectional analyses of poverty whereas longitudinal weights were applied for longitudinal estimations to account for attrition.

Finally, we examined family characteristics associated with different trajectories of child poverty. Multilevel logistic regressions for repeated measures were used to model change in the chances of experiencing low income during the first 10 years of life as a function of growing up in a single-parent family, the level of maternal education, mother's immigration status, and residing in a rural or urban area. We also examined how trajectories and duration of exposure to low income (below LICO), SW, or low SES varied with these family characteristics. Here, the statistical significance of between-category differences in poverty was evaluated based on the Chi-square statistics.

RESULTS

Of the 2,120 families who provided consent in 1998, 1,334 (63%) participated in the tenth survey in 2008 when children were aged 10-11 years. Participation in data collection declined from 96.5% at the second to 63% at the tenth visit. Compared to those who were still participating at age 10 years, children lost to follow-up were more frequently living in single-parent, low-income, or SW households and their mothers were less educated or non-European immigrants at baseline.

Trends in poverty

Figure 1 shows that almost one quarter (24.4%) of five-month-old participating children were living in families with low income and 11.5% of families received SW payments at that time. The prevalence of poverty during childhood, whether measured by low income or by receipt of SW, decreased over time and, among our participants at 10 years, 14.6% lived in a low-income family and 2.7% were on social welfare. However, the two curves are not parallel and at the ages of 5 and 8 years, there was a reduction of families on SW while the number of families with a low income was larger.

Cumulative exposure to poverty

Latent class analysis identified four plausible classes of poverty trajectories (Figure 2): a group who always had sufficient income (75.9%), a group with increasing likelihood of poverty (9.1%), a group with decreasing likelihood of poverty (7.7%), and a group who always had a low income (7.3%).

Table 1 shows there were 15.9% of children who lived chronically in a low-income family during early childhood (<5 years) and

Table 2. Changes in Exposure to Low Income (Below LICO†) During the First 10 Years of Life According to Maternal Characteristics at Baseline, Quebec Longitudinal Study of Child Development, 1998-2008

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)
Intercept	0.14 (0.12-0.18)	0.10 (0.08-0.12)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Time	0.90 (0.89-0.92)	0.87 (0.85-0.88)	0.87 (0.85-0.88)	0.94 (0.87-1.00)
Family type, past 12 months				
Two-parent family		1.00	1.00	1.00
Single-parent family		11.26 (9.34-13.57)	12.47 (10.34-15.04)	12.56 (10.38-15.20)
Maternal immigration status				
Canadian-born or European immigrant			1.00	1.00
Non-European immigrant			18.34 (10.96-30.69)	29.25 (17.24-49.62)
Maternal education at baseline				
University			1.00	1.00
High school, vocational and trade school			4.54 (3.03-6.82)	2.92 (1.90-4.49)
< high school			28.00 (18.32-42.80)	20.33 (12.94-31.95)
Immigration status * time				0.88 (0.84-0.94)
High school education * time				1.13 (1.09-1.17)
< high school education * time				1.09 (1.05-1.14)

† LICO = Low Income Cut-offs from Statistics Canada.

Table 3. Trajectories of Low Income (Below LICO†) According to Maternal Characteristics at Baseline, Quebec Longitudinal Study of Child Development, 1998-2008

	Maternal Immigration Status		Maternal Education Level at Baseline		Type of Family at Baseline	
	Canadian-born/ European Immigrant n (%)	Non-European Immigrant n (%)	At Least High School n (%)	No High School Diploma n (%)	Two-parent n (%)	Single-parent n (%)
Classes of poverty trajectory						
Stable non-poor	722 (70.5)	43 (44.1)	705 (74.9)	60 (33.4)	750 (73.0)	13 (14.9)
Decreasing likelihood of poverty	99 (9.7)	25 (26.0)	87 (9.3)	37 (20.6)	106 (10.3)	17 (18.8)
Increasing likelihood of poverty	85 (8.3)	5 (4.8)	65 (6.9)	24 (13.6)	84 (8.2)	3 (3.7)
Stable poor	94 (9.2)	20 (20.4)	63 (6.7)	51 (28.4)	72 (7.0)	41 (46.7)
Missing	24 (2.3)	4 (4.6)	21 (2.2)	7 (4.0)	15 (1.5)	14 (15.8)

* p<0.001.

† LICO = Low Income Cut-offs from Statistics Canada.

15.9% during middle childhood (5-10 years). About 8% of families received SW chronically during early childhood and 4.4% during middle childhood. The low SES indicator covers a larger proportion of families in chronic poverty: 22.5% of families were chronically in the lowest quintile of the SES score during early childhood and 23.0% during middle childhood. Over their entire 10 years of life (Figure 3), 12.2% of children lived chronically in a low-income family, 4.6% in families receiving SW chronically and 20.1% in families chronically in the lowest SES quintile.

Family characteristics

Children more likely to be exposed to low income (Table 2) were those with non-European immigrant mothers (OR=29.3, 95% CI 17.2-49.6), with mothers with less than a high school education (OR=20.3, 95% CI 12.9-31.9), or from single-parent families (OR=12.5, 95% CI 10.4-15.2). There is a statistically significant interaction between education and duration of follow-up, indicating that the chances of falling into low-income categories vary with these covariates.

However, trajectories of exposure to low income (Table 3) show that children from chronically poor families were more likely to come from single-parent rather than two-parent families (46.7% versus 7.0%), to have mothers with less than a high school diploma (28.4% versus 6.7%), and to have non-European immigrant mothers (20.4% versus 9.2%).

DISCUSSION

We examined exposure to poverty of children from the QLSCD birth cohort from birth to 10 years old using three measures of

poverty: the low income cut-off from Statistics Canada (LICO), social welfare (SW), and SES quintiles. We also explored family characteristics according to different duration and trajectories of poverty. From birth until 10 years of age, there was a reduction in the proportion of children in a family living under LICO, except at 5, 6 and 8 years of age when it increased. This reduction was more important for families receiving SW. Almost a quarter of children in the study experienced some periods of poverty during those years, with 7.3% experiencing chronic poverty. Although many families (7.7%) exited poverty during these years, there were even more (9.1%) who entered into poverty. Given the well-known, long-term impact of early poverty, the health of these children could be jeopardized for the rest of their lives from this early exposure to the deleterious living conditions associated with poverty.^{6,7,13,15,45-48}

Although there was a general reduction in child poverty in the province of Quebec from 2002 to 2006,^{27,32,33,49,50} we did not see a corresponding reduction for QLSCD children during this period. In 2003, 2004 and 2006 (i.e., at 5, 6 and 8 years of age), there was an increasing proportion of children from this cohort who lived in a poor family. Comparing our data with those from Quebec overall is difficult since the latter are for children less than 18 years whereas our data examined each age separately. Only for the year 2008, when the children were 10 years of age, did we observe a greater reduction in the level of child poverty, as shown in Figure 1. This reduction of the proportion of children living in poverty might result from attrition given that each year the participants who left the study were more likely to be the poorest. However, the weighing of data should reduce this problem.

The three measures of poverty that we examined demonstrated similar patterns of exposure to child poverty and showed that a high proportion of children are exposed to poverty very early on. Many are exposed to chronic poverty. The low SES index appears to identify a larger proportion of chronically poor families than the LICO or the SW poverty indicators. Interestingly, few poor families are dependent on SW, a last-resort source of income, which implies that poverty affects a high proportion of working families. That a higher proportion of families stopped receiving SW compared to those coming out of a low-income status when their child was 4 to 8 years old (Figure 1) might be due to the return to work of mothers when their child began school. This would mean that their income from their work was not sufficient to lift them out of poverty. The greater reduction in the number of families with children on SW might also result from a lower participation of these families in the study. Again, the weighting of data should limit this effect, and it should be noted that this greater reduction was seen only during specific years.

Regardless of the poverty indicator examined, family characteristics are quite similar and it appears that children of non-European immigrant and of single-parent households are the most susceptible to growing up in poverty conditions. A low level of maternal education is also strongly associated with living in poverty. These are characteristics usually observed in other studies of family poverty.^{5,15,18,51-55} Being a single parent or a newcomer in a foreign country involves much stress, and living in poverty significantly increases the experience of stress, which can affect parental abilities.⁵⁶⁻⁵⁹ Poor children can also experience stress themselves, which can be detrimental to their health and development.^{4,18,56,58-67}

During the study period (1998-2008), diverse family policies were implemented at the Quebec and federal levels, such as a subsidized day care program, longer parental leaves, and a child benefit program.^{27,50} However, these programs cannot explain completely the decreasing prevalence of QLSCD child poverty. Given that children from the QLSCD were born in 1997-98, they might not have benefited from these new programs as these were developed later and were oriented mostly toward preschool children. Yet these programs probably contributed to reducing the percentage of children living in poverty in the province.^{27,32,33,50} Other countries, such as the Scandinavian countries, have been more successful in reducing their proportion of poor children. Through different fiscal and social policies, their child poverty rates ranged from 3-5% in 2007, while in Canada and Quebec in that same year, there were still 13% of households with children under 18 years living in poverty.^{5,18,68}

Strengths and limitations

This is the first study to follow over 10 years a large group of children from a representative sample of Quebec single births, which allowed for defining poverty trajectories. The participation rate was very high for the first 5 years and remained higher than or equal to other longitudinal studies of children.^{69,70} One limitation of this study is that annual household income and its sources are self-reported. Moreover, family income does not provide information on other potential financial resources. Another limitation is that each year, participants leaving the study were mainly the poorest, least educated, and immigrants, although the weighting of data should reduce this problem. However, despite this weighting of data, these longitudinal data are not representative of Quebec children for this age.

CONCLUSIONS

Our study provides a unique opportunity to examine exposure to poverty at different ages during childhood. Although it is well known that poverty, especially during the preschool period, is associated with higher risk of chronic diseases during adulthood,^{6-11,13} this early period of life is still affected by poverty for many children. According to the OECD (Organisation for Economic Co-operation and Development), a higher percentage of American and Canadian children live in poverty compared to other age groups of the population.⁶⁸ Poverty is costly and reducing poverty among our children must be seen as an investment in our future.^{20,21,71} Policies that focus on young children are needed to attenuate these inequities. Future research must examine pathways and mechanisms on how "poverty gets under the skin". There should also be more evaluative research on effective programs and policies to reduce child poverty permanently. To ensure the future of our children, programs and policies that efficiently end child poverty are required.

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Received: January 10, 2012

Accepted: April 26, 2012

RÉSUMÉ

Objectifs : La pauvreté durant l'enfance est associée aux maladies chroniques des adultes. Les objectifs de l'étude étaient d'examiner l'exposition à la pauvreté durant les 10 premières années de vie dans l'Étude Longitudinale du Développement des Enfants du Québec (ÉLDEQ) selon trois mesures de pauvreté et d'explorer les caractéristiques familiales associées.

Méthode : Les données de 1 334 participants à l'ÉLDEQ ont été recueillies annuellement à la maison de 5 mois à 10 ans. Le revenu annuel du ménage et ses sources ont été documentés à chaque entrevue. Le statut de pauvreté a été opérationnalisé ainsi : 1) sous le seuil de faible revenu de Statistiques Canada, 2) recevoir du Bien-être social, 3) faire partie du plus bas quintile de statut socioéconomique. Nous avons estimé la prévalence de la pauvreté des enfants à chaque âge. La modélisation par classes latentes de croissance a permis d'identifier des sous-groupes ayant des trajectoires de pauvreté semblables. La durée de pauvreté selon

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chaque mesure a été calculée pour la petite enfance, l'âge scolaire et les 10 premières années de vie.

Résultats : Quatre trajectoires de pauvreté ont été identifiées : pauvreté stable, probabilité décroissante, probabilité croissante et jamais pauvre. Les trois mesures de pauvreté ne regroupent pas les mêmes populations, cependant leurs caractéristiques sont semblables. Les enfants de mères immigrantes non-Européennes sont les plus à risque d'être exposés à la pauvreté alors qu'un plus grand nombre d'enfants de familles monoparentales a vécu chroniquement pauvre durant leurs 10 premières années.

Conclusion : Un grand nombre d'enfants est exposé à la pauvreté avant 10 ans. Des politiques plus efficaces pourraient réduire la pauvreté des enfants.

Mots clés : santé des enfants; pauvreté des enfants; faible SSE des enfants; étude longitudinale; cohorte de naissance; trajectoires