Institut de la statistique Québec

LONGITUDINAL STUDY OF CHILD DEVELOPMENT IN QUÉBEC (ÉLDEQ 1998-2002)

5-MONTH-OLD INFANTS

COLLECTION
Health and Well-Being

Standard of Living, Health and Development

Volume 1, Number 3

For further information on the Institut de la statistique du Québec (ISQ)
(Québec Institute of Statistics) and the statistics available in its databases, contact:

Institut de la statistique du Québec
200 chemin Sainte-Foy
Québec City, Québec
Canada G1R 5T4
Telephone: (418) 691-2401
or
Toll-free (Canada and the United States): 1 800 463-4090

Website: http://www.stat.gouv.qc.ca

This report was produced and published by the Institut de la statistique du Québec
and is distributed by Les Publications du Québec.

Les Publications du Québec
1500-D Charest Boulevard West
Sainte-Foy, Québec
Canada
G1N 2E5

National Library of Canada
Bibliothèque nationale du Québec

ISBN 2-551-19950-6
ISBN 2-551-19953-0
(édition originale) ISBN 2-551-19327-3
ISBN 2-551-19902-6

November 2001

Foreword

Similar to what has been observed in the majority of industrialized nations over the past twenty years, Québec and Canada have seen a significant increase in the costs related to maladjustment, particularly in young people. The Longitudinal Study of Child Development in Québec (*l'Étude longitudinale du développement des enfants du Québec*) (ÉLDEQ 1998-2002) being conducted by *Santé Québec* (Health Québec),[1] a division of *l'Institut de la statistique du Québec (ISQ)*[2] (Québec Institute of Statistics) in collaboration with a group of university researchers, will provide an indispensable tool for action and prevention on the part of government, professionals and practitioners in the field, who every day must face maladjustment in children.

More precisely, a major purpose of this longitudinal study of a cohort of newborns is to give Québec a means of preventing extremely costly human and social problems, such as school dropout, delinquency, suicide, drug addiction, domestic violence, etc. Similar to what is being done elsewhere (in the UK, New Zealand, the US), *Santé Québec* and a group of researchers have designed and developed a longitudinal study of children 0 to 5 years of age (2,223 children in this study and 600 twins in a related one). It will help gain a better understanding of the factors influencing child development and psychosocial adjustment.

The general goal of ÉLDEQ 1998-2002 is to learn the PRECURSORS, PATHS and EFFECTS, over the medium and long terms, of children's adjustment to school. ÉLDEQ is the logical extension of the National Longitudinal Study of Children and Youth (NLSCY, Canada). These Québec and Canada-wide longitudinal studies are both comparable and complementary. They employ distinct survey methods, and use different techniques to obtain the initial samples. Though many of the instruments are practically identical, about a third of those being used in ÉLDEQ are not the same.

This first report casts light on the enormous potential of the data generated by this study. From the descriptive analyses of the results of the first year of the study to the longitudinal analyses of subsequent years, there will be an enormous wealth of data. With updated knowledge on the development of the cohort of young children, the annual longitudinal follow-up will respond to the needs which the *ministère de la Santé et des Services Sociaux du Québec - MSSS* (Ministry of Health and Social Services), who financed the data collection, expressed in both the Report of the Working Group on Youth (*Rapport Bouchard, 1991, Un Québec fou de ses enfants* - the Bouchard Report, 1991, A Québec in Love with its Children) and the policy papers entitled *Politique de la santé et du bien-être, 1992* (Health and Well-Being) and *les Priorités nationales de santé publique 1997-2002* (Public Health Priorities 1997-2002).

Director General

Yvon Fortin

1. Certain French appellations in italics in the text do not have official English translations. The first time one of these appears, the unofficial English translation is shown immediately after it. Following this, for ease in reading, only the official French name appears in the text in italics, and it is suggested the reader refer to the Glossary for the English translation.

2. *Santé Québec* officially became a division of the *ISQ* on April 1, 1999.

The authors of Volume 1 Number 3 of ÉLDEQ 1998-2002 are:

Section I: Poverty, Health Conditions at Birth and Infant Health

Louise Séguin, Mireille Kantiébo, Qian Xu, Maria-Victoria Zunzunegui, Louise Potvin, *Groupe de recherche interdisciplinaire en santé (GRIS)* (Group for Interdisciplinary Research on Health) and *Département de médecine sociale et préventive, Université de Montréal* (Department of Social and Preventive Medicine, Université de Montréal)
Katherine L. Frohlich, *School of Public Health, University of California at Berkeley*
Claude Dumas, *Département de psychologie, Université du Québec à Montréal* (Department of Psychology, Université du Québec à Montréal)

Section II: Social Inequality and Child Development

Ginette Paquet*, Institut national de santé publique du Québec* (Québec Institute of Public Health)
Manon Girard*, Direction de la santé publique, Régie régionale des Laurentides* (Public Health Division, Laurentian Regional Office)
Lise Dubois*, Département de médecine sociale et préventive, Faculté de médecine, Université Laval* (Department of Social and Preventive Medicine, Faculty of Medicine, *Université Laval*)

With professional and technical assistance of:

Martin Boivin, Data processing and analysis editing, *Direction Santé Québec*, *ISQ* (Health Québec Division, Québec Institute of Statistics)
Nathalie Plante, Vincent Carrier, Robert Courtemanche, analysis editing, *Direction de la méthodologie et des enquêtes spéciales*, ISQ (Methodology and Special Surveys Division, *ISQ*)
Patrice Jetté, editing
Lucie Desroches and Nadia Tremblay, publications layout, *Direction Santé Québec, ISQ*

External readers

Sylvie Jutras, *Laboratoire de recherche en écologie humaine et sociale, Université du Québec à Montréal* (Human and Social Ecology Research Laboratory, Université du Québec à Montréal)
Russell Wilkins, Social and Economic Studies Division, Statistics Canada

Volume 1 of ÉLDEQ 1998-2002 was produced by:

Direction Santé Québec of the *Institut de la statistique du Québec*

Volume 1 of ÉLDEQ 1998-2002 was translated by:

Hélène Kaufman

ÉLDEQ 1998-2002 is funded by the:

Ministère de la Santé et des Services sociaux du Québec (MSSS) (Ministry of Health and Social Services of Québec)
National Health Research and Development Program of Canada (NHRDP)
Social Sciences and Humanities Research Council of Canada (SSHRC)
Conseil québécois de la recherche sociale (CQRS) (Social Research Council of Québec)
Fonds pour la formation de chercheurs et l'aide à la recherche (FCAR) (Researcher Education and Research Assistance Fund)
Fonds de la recherche en santé du Québec (FRSQ) (Health Research Fund of Québec)

ÉLDEQ 1998-2002 is supervised by:

Mireille Jetté, Coordinator
Hélène Desrosiers, Research Agent
Richard E. Tremblay, Director of ÉLDEQ 1998-2002
Josette Thibault, Research Agent

For further information on the contents of this publication, contact:

Direction Santé Québec
Institut de la statistique du Québec
1200 McGill College Avenue, Suite 1620
Montréal, Québec
Canada H3B 4J8
Telephone: (514) 873-4749 or
(toll-free): 1 877 677-2087
Fax: (514) 864-9919
Website: http://www.stat.gouv.qc.ca.

Suggested citations:

SÉGUIN, L., M. KANTIÉBO, Q. XU, M.-V. ZUNZUNEGUI, L. POTVIN, K. L. FROHLICH and C. DUMAS (2001). "Standard of Living, Health and Development, Part I – Poverty, Health Conditions at Birth and Infant Health" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 3.

PAQUET, G., M. GIRARD and L. DUBOIS (2001). "Standard of Living, Health and Development, Part II – Social Inequality and Child Development" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 3.

This analytical paper is also available in French. Ce numéro est aussi disponible en version française sous le titre :

SÉGUIN, L., M. KANTIÉBO, Q. XU, M.-V. ZUNZUNEGUI, L. POTVIN, K. L. FROHLICH et C. DUMAS (2001). « Conditions de vie, santé et développement, section I – Pauvreté, conditions de naissance et santé des nourrissons » dans *Étude longitudinale du développement des enfants du Québec (ÉLDEQ 1998-2002),* Québec, Institut de la statistique du Québec, vol. 1, n^{o} 3.

PAQUET, G., M. GIRARD et L. DUBOIS (2001). « Conditions de vie, santé et développement, section II – Inégalités sociales et devenir des enfants » dans *Étude longitudinale du développement des enfants du Québec (ÉLDEQ 1998-2002),* Québec, Institut de la statistique du Québec, vol. 1, n^{o} 3.

Caution:

Unless indicated otherwise, "n" in the tables represents data weighted to the size of the initial sample.

Because the data were rounded off, tables do not necessarily correspond to the sum of the parts.

Unless explicitly stated otherwise, all the differences presented in this report are statistically significant to a confidence level of 95%.

To facilitate readability, proportions higher than 5% were rounded off to the nearest whole unit in the text and to the nearest decimal in the tables and figures.

Weighting and the complex sample design were taken into account in calculating the results and their precision. The precision of the estimates of proportions was calculated using a mean design effect. This was also used for the chi-square tests, except in questionable cases for which the SUDAAN software program was used. In all other analyses, SUDAAN was used. Basic hypotheses, such as the normality of the data, were verified before applying the selected statistical tests.

Symbols:

..	Data non available
…	Not applicable (N/A)
–	Nil or zero
p <	Refers to the threshold of significance

Abbreviations

CV	Coefficient of variation
Not avail.	Not available
Non signif.	Not significant

Acknowledgements

Santé Québec recognizes that the development and implementation of the Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002) flows directly from the synergy of effort and professionalism of many people throughout the whole process of mounting a survey of this size. Since 1995, individuals, various groups and organizations, a survey firm and the staff of *Santé Québec* have become indispensable links in making this ambitious project a reality - the first annual longitudinal survey of Québec infants.

A major characteristic of this project is that a pretest and survey are conducted every year. To accomplish this, we must annually: 1) make two sets of instruments (pretest and survey), 2) conduct two data collections, 3) analyze two sets of data, and 4) produce two types of communications materials. The results of each pretest means fine-tuning and developing instruments for the survey, which follows 17 months later. The results are sent to the parents (highlights), published in reports, and communicated to the scientific community and the public at large. The professionals and staff involved in collecting the data, as well as those involved before and after, must put their nose to the grindstone every year. We cannot over-emphasize our profound recognition of the incredible, concerted effort they are putting into this project over an 8-YEAR period, from the first pretest in 1996 to the final report to be published in 2004!

First, it must be said that without Daniel Tremblay, Director of *Santé Québec* (now part of the *ISQ*) since 1994, Christine Colin, Assistant Deputy Minister responsible for Public Health 1993-1998, Aline Émond, Director of *Santé Québec* 1986-1993, Richard E. Tremblay, Director of the ÉLDEQ research project, and Marc Renaud, President of *le Conseil québécois de la recherche sociale - CQRS* 1991-1997. ÉLDEQ 1998-2002, also known as “In 2002...I'll Be 5 Years Old!,” would have never seen the light of day. In turn and together, they developed, defended and obtained the financing for this study. Thank you for your indefatigable tenacity.

A warm thanks to all the researchers and the support staff of their respective research groups, whose determination over the years has never wavered. Putting their research grants together every year has contributed to the development of the instruments, analysis of the data and publication of the copious results.

I would like to thank Lyne Des Groseilliers, ÉLDEQ's statistician since 1996, Robert Courtemanche, statistical advisor, and France Lapointe, ÉLDEQ's statistician 1995-1996. These three colleagues in the *Direction de la méthodologie et des enquêtes spéciales* (Methodology and Special Surveys Division) (*ISQ*) managed, with great skill, to set the signposts and navigate the somewhat winding course of this large-scale survey first.

A very special thanks to all the master designers of the National Longitudinal Study of Children and Youth (NLSCY, Canada). Without their expertise, advice and generosity, our survey would never have been accomplished. In many senses of the word “modeling,” ÉLDEQ has learnt a lot from the NLSCY.

We would also like to extend out gratitude to the staff of the *Groupe de recherche sur l’inadaptation psychosociale chez l’enfant - GRIP* (Research Unit on Children’s Pyschosocial Maladjustment) at the University of Montréal. Without their expertise, some of our survey instruments would have never been computerized to such a high level of quality.

We would like to thank the personnel in the *Service de support aux opérations de la Régie de l'assurance-maladie du Québec - RAMQ* (Operations Support Section of the Québec Health Insurance Board). Without their efficiency, fewer letters of introduction would have found their way to the correct addresses of respondents.

Our sincerest thanks go to our survey firm, *Bureau d’interviewers professionnels (BIP).* Since 1996, this polling company has been responsible for data collection in the pretests and surveys, and follow-up of families both inside and outside of Québec. Lucie Leclerc, President of *BIP*, has set the standard of quality for our

numerous and complex data collections. Assisted by Véronique Dorison, she has instilled in her interviewers a great sense of respect for the respondent families, as well as a rigorous regard for all the norms governing this first-of-a-kind survey in Québec.

A big thank-you to the directors-general, directors of professional services, and staff of the medical records departments of some 80 hospitals in the province who accepted to collaborate in our study at a time when resources were rare and time was at a premium, and when the medical records departments in many hospitals were merging or in the process of doing so. Their support was exceptional. Birthing centres also graciously accepted to participate in this first Québec longitudinal study of children. A special thanks to Julie Martineau, medical records specialist, who contributed to the analysis of indispensable medical information by ensuring very rigorous coding of the data, which often lay concealed in the medical files of the infants and their mothers.

It goes without saying that the staff of *Santé Québec* Division directly attached to ÉLDEQ 1998-2002 are the cornerstone of its success from practically every point of view. Special thanks for their ongoing contribution and constant hard work go to Hélène Desrosiers and Josette Thibault, responsible respectively for analysis of the data and creation of the measurement instruments; Martin Boivin, Rolland Gaudet and Gérald Benoît, who constantly pushed the limits of what computer software can do in terms of programming and data processing; Suzanne Bernier-Messier and Diane Lord, who give meaning to the word versatility, who must organize, code and manage incredible quantities of data to ensure the progress of the study. Not directly attached to the team but who made extremely important contributions are: France Lacoursière, France Lozeau and Thérèse Cloutier, who put the finishing touches to the *Santé Québec* "look" in the survey instruments, reports and conference publications; Lise Ménard-Godin, who conducted fruitful literature searches and advised on many aspects of the collection instruments. The hard work, constant availability, ability to adapt, and finely-honed skills of the people working on this project match the enthusiasm that all our partners have demonstrated in making this study a resounding success.

Finally, I would like to extend a very special thank-you to the 2,223 families who responded to our survey. Thank you for the trust you have shown in *Santé Québec*, our partners and collaborators. Thanks to your participation, your children have become the veritable stars of ÉLDEQ 1998-2002, and are making it possible, in the short term, to gain a better understanding of psychosocial adjustment in children. In the medium and long terms, they will likely be in large part responsible for the establishment of early detection programs, better designed prevention programs, and more effective interventions for such an important clientele - all of Québec's children.

Mirelle Jetté
Project Coordinator
Santé Québec Division, *ISQ*

Introduction to the ÉLDEQ 1998-2002

Preventing Social Maladjustment

It suffices to consider the costs engendered by behavioural problems in children - school dropout, delinquency, alcoholism, drug addiction, family violence, mental disorders and suicide - to conclude that they largely surpass what a modern society can accept, morally and economically. Faced with the enormity of these problems, the first reflex is to provide services to these people which will, ideally, make the problems disappear, or at the very least, lessen their severity. For many years we have tried to offer quality services to children and adults who suffer from antisocial disorders, alcoholism, drug addiction, depression, and physical or sexual abuse. However, in spite of enormous investment, these curative services are far from being able to respond to the demand.

Although the idea of early intervention as a preventive measure can be traced at least as far back as ancient Greece, the second half of the 20th century will certainly be recognized as the dawn of the field of social maladjustment prevention (Coie *et al.*, 1993; Mrazek & Haggerty, 1994). Numerous programs have been developed for adolescents and teenagers to prevent school dropout, delinquency, drug addiction and suicide. Scientific evaluations of these programs have been far too few in number, but they tend to demonstrate that it is extremely difficult to help those most at risk in this age group (Rosenbaum & Hanson, 1998; Rutter, Giller & Hagell, 1998; Tremblay & Craig, 1995). It is becoming increasingly clear that the factors which lead to serious adaptation problems are in place long before adolescence. Hence the idea that the prevention of social adaptation problems should start at least during childhood, and preferably right from pregnancy (Olds *et al.*, 1998; Tremblay, LeMarquand & Vitaro, 1999). These principles are clearly outlined in the objectives of the *Politique de la santé et du bien-être* (Policy on Health and Well-Being) and *les Priorités nationales de santé publique* (Priorities for Public Health) set by the government of Québec (ministère de la Santé et des Services sociaux, 1992; 1997).

The Need to Understand Early Childhood Development

If the field of maladjustment prevention appeared at the end of the 20th century, it has certainly come on the heels of child development. *"Émile,"* by Jean-Jacques Rousseau, needs to be re-read in light of recent studies to realize just to what degree it is impossible to understand the complexity of child development, and therefore the means of preventing deviant paths, simply by reflection or introspection. Although considerable knowledge has been acquired in the neurological, motor, cognitive, affective and social development of children, what really hits home is that Jean-Jacques Rousseau and his followers in education seemed to have had more certainty about the ways of educating children than we do today.

Progress in child development research has made us realize that things are not as simple as we can or would like to imagine. We have obviously all been children, and most of us have become parents, indeed, relatively well-adjusted ones. But we still do not clearly understand when, how and why adjustment problems appear, and above all, how to prevent and correct them.

Our ignorance is obvious when we examine the debates among specialists on the role of parents in the development of maladjustment problems in children. Some suggest that social maladjustment in children is largely determined by genetic factors (Bock & Goode, 1996; Rowe, 1994). Some accentuate economic factors (Duncan & Brooks-Gunn, 1997). Other researchers attribute a determining role to peer influence (Harris, 1998; Harris, 1995; Vitaro *et al.,* 1997). These larger questions lead to narrower ones which focus on particular aspects - the role of fathers in childhood maladjustment, the impact of alcohol and cigarette consumption during pregnancy, the effect of prenatal and birthing problems, the importance of breast feeding and diet; the role of sleep, cognitive development, temperament, and so on.

The majority of these questions are at the heart of the daily concerns of parents, grandparents, educators, family service providers, and legislators. What can we do to maximize the development of our children, to prevent severe psychosocial maladjustment? What should we do when problems begin to appear, when pregnant mothers or fathers themselves have a long history of disorders? The answers to these questions obviously have an effect on the policies put forth by Québec government Ministries such as *ministères de la Famille et de l'Enfance* (Family and Child Welfare), *de l'Éducation* (Education), *de la Santé et des Services sociaux*, *de la Solidarité sociale* (Social Solidarity - formerly Income Security (Welfare)), *de la Sécurité publique* (Public Security), *de la Justice* (Justice), and *le ministère de la Recherche, Science et Technologie* (Research, Science and Technology).

The Contribution of ÉLDEQ 1998-2002

The Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002) was conceived in order to contribute to our knowledge of the development of children in their first 5 years of life. The main goal is to gain a better understanding of the factors, in the years of rapid growth, which lead to success or failure upon entry into the school system. The goal of the second phase (if approved) is to better understand development in elementary school, in light of development in early childhood.

We know that this survey cannot be a definitive one on child development in Québec, but it is the first representative study of a provincial cohort of children who will be measured annually from birth to entry into the school system. It specifically aims at understanding the development of basic skills needed for educational success.

Although the effort to set up this study began in 1989, the first data collection coincided with the Québec government's implementation of its *Politique Familiale* (Policy on Families). The policy has virtually the same objectives as our study:

> "These services for children 5 years and under should give all Québec children, whatever the socioeconomic status of their parents, the chance to acquire and develop the skills that will allow them to succeed in school (1997, p. 10)."

On March 3 1999, in the speech opening the 36th session of the Québec legislature, Premier Lucien Bouchard confirmed that early childhood development was a priority for the government:

> "The theme that will dominate our actions this year, next year, and throughout our mandate, is youth... The priority...with regards to youth in Québec, begins with the family and childhood... This massive investment in early childhood... will give our children the best chance of success in the short, medium and long terms. It is our best asset against alienation and despair. It is our best preparation for personal, social and economic success."

Because of this historic coincidence, ÉLDEQ has the potential of becoming an invaluable tool for monitoring the effects of Québec's massive investment in early childhood which began in 1997. Thanks to the data collected by the federal government's National Longitudinal Study of Children and Youth (NLSCY, Canada), we will be able to compare child development in Québec with that elsewhere in Canada, before and after the implementation of Québec's new policy on the family.

However, our initial objectives are more modest. The 12 or 13 papers in this series present the results of our first annual data collection. They describe the characteristics of the families and children when the latter were 5 months old[3] They cover sociodemographic characteristics, nature of the birthing process, health and

3. To simplify the text in this report, the phrase "5-month-old infants" will be used to refer to infants whose mean age was 5 months during data collection in 1998. In section 3.1.3 (Volume 1, Number 1), we explain why the infants were not all exactly the same age. As indicated in no. 2 of this series, 52% of the infants were less than 5 months, and 3.4% were 6 months of age or over.

social adaptation of the parents, family and couple relations, parent-infant relations, and characteristics of the 5-month-old, such as sleep, diet, oral hygiene, temperament, and motor, cognitive and social development. These data will eventually be compared to those on children the same age collected by the NLSCY in 1994 and 1996.

An Interdisciplinary, Multi-University Team of Researchers

This study saw the light of day because of the collaboration of many people. In the preceding pages, Mireille Jetté thanked a number of them. I would like to take advantage of this introduction to emphasize that the survey was set up and continues forward because of the dedication and hard work of a group of researchers from a variety of disciplines and universities. I would particularly like to thank Michel Boivin, School of Psychology at *Université Laval*, and Mark Zoccolillo, Department of Psychiatry at McGill University, who have been actively involved in this project since 1992. It was in that year that we prepared out first grant application for the Social Sciences and Humanities Research Council of Canada. A second group of researchers joined the team in 1993 and 1994: Ronald G. Barr, pediatrician, Montréal Children's Hospital Research Institute, McGill University; Lise Dubois, dietitian and sociologist, *Université Laval*; Nicole Marcil-Gratton, demographer, University of Montréal and Daniel Pérusse, anthropologist, University of Montréal. Jacques Montplaisir, Department of Psychiatry, University of Montréal, joined the team in 1995. Louise Séguin, Department of Social and Preventive Medicine, University of Montréal and Ginette Veilleux, *Direction de la santé publique de la Régie régionale de la santé et des services sociaux de Montréal-Centre* (Public Health Department, Montréal-Centre Regional Health Board), joined in 1998. Three post-doctoral researchers have also made an important contribution. Raymond Baillargeon developed the task for measuring cognitive development. Christa Japel is the assistant to the scientific director for planning, analysis and presentation of the results. Heather Juby collaborates in the analysis of the data on couple and family history.

A Unique Confluence of Circumstances

A study such as this requires the coordination of many researchers over many years, enormous financial resources, and a long period of preparation. Though in the early 1990s the research team was convinced of the need for the survey, those responsible for the public purse had also to be convinced. We must therefore acknowledge the happy confluence of circumstances that allowed the players to take advantage of the opportunity at hand. When a number of civil servants in the *ministère de la Santé et des Services sociaux* understood the essential role of prevention, the creation of a committee on children and youth in 1991 led to an increased awareness of the importance of early childhood. At the same time, the president of the *CQRS*, Marc Renaud, had come to the same realization with his colleagues in the Population Health Program at the Canadian Institute for Advanced Research (CIAR). Aline Émond, the Director of *Santé Québec*, was ready to apply her formidable determination to work for the cause. For their part, Health Minister Jean Rochon and his Assistant Deputy Minister for Public Health, Christine Colin, aware of the importance and benefit of longitudinal studies on early childhood development, authorized the investment of large sums of money during a period of draconian budget cuts. This occurred at the same time as the federal government decided to create its own longitudinal study of children and youth (NLSCY). It is in this context that ÉLDEQ 1998-2002 materialized. Our survey also came to fruition because Mireille Jetté did everything in her power to make the researchers' dreams a reality, and Daniel Tremblay gave her all the support she needed by making various resources available for the project.

Richard E. Tremblay, Ph.D., M.S.R.C.
Chair of Child Development
University of Montréal

Table of Contents

List of Tables

Tables

Part I: Poverty, Health Conditions at Birth and Infant Health

Part II: Social Inequality and Child Development

List of Figures

Figures

Part I: Poverty, Health Conditions at Birth and Infant Health

Part II: Social Inequality and Child Development

Appendix

Review of the Methodology

This analytical paper is one of a series presenting cross-sectional data collected on a large sample of 5-month-old infants surveyed in 1998. It reports on the first of 5 annual data collections on 2,120 children in Québec who will be studied until they are 5 years old. In the first year of data collection, the results on 2,223 infants were retained.[4]

The target population of the survey is Québec babies, singleton births only,[5] who were 59 or 60 weeks of gestational age[6] at the beginning of each data collection period, born to mothers residing in Québec, excluding those living in the Northern Québec, Cree, and Inuit regions, and on Indian reserves, and those for whom the duration of pregnancy was unknown. Due to variations in the duration of pregnancy and the 4 or 5 weeks allotted for each data collection wave, the infants were not all exactly the same age (gestational or chronological) at the time of the survey. Therefore, the children in Year 1 (1998) of the survey had a mean gestational age of 61 weeks - about 5 chronological months.

The survey had a stratified, three-stage sampling design, with a mean design effect for the proportions estimated at 1.3. To infer the sample data to the target population, each respondent was given a weight corresponding to the number of people he/she "represented" in the population. ÉLDEQ 1998 comprised eight main collection instruments which obtained data from the person who was closest to the baby (called the Person Most Knowledgeable - PMK), the spouse (married or common-law), the infant and the absent biological parent, if applicable. Given variation in the response rates to each instrument, three series of weights had to be calculated to ensure inferences to the population were accurate. Except for the Self-Administered Questionnaire for the Absent Father (SAQFABS) and a series of questions in the Computerized Questionnaire Completed by the Interviewer (CQCI) on absent fathers - the overall or partial response rates of which were too high - the results of all the instruments could be weighted. Therefore, the data presented here have all weighted to reduce the biases.

All data that had coefficients of variation (CV) 15% or higher are shown with one or two asterisks to clearly indicate the variability of the estimate concerned. In addition, if the partial non-response rate was higher then 5%, there is a note specifying for which sub-group of the population the estimate is less accurate.

Similar to any cross-sectional population study, the Year 1 part (5-month-old infants) of ÉLDEQ 1998-2002 has certain limits. However, the vast majority of the results are valid and accurate, and provide a particularly detailed portrait, for the first time, of 5-month-old infants in Québec.

Note to the reader: For more details on the methods, see Volume 1, Number 1 in the present series. Detailed information on the sources and justification of the instruments used in Year 1 of ÉLDEQ 1998-2002, and the design of the scales and indices used in this paper, are covered in Number 12, entitled "Concepts, Definitions and Operational Aspects."

4. Though the results for 2,223 children were retained for the first year of data collection, 2,120 will be retained for the rest of the longitudinal study; the extra 103 were part of an over-sample used to measure the effects of the January 1998 ice storm.

5. Twins (twins births) and other multiple births were not targeted by the survey.

6. Gestational age is defined as the sum of the duration of gestation (pregnancy) and the age of the baby.

Standard of Living, Health and Development

Part I

Poverty, Health Conditions at Birth and Infant Health

Abstract

Objective

While many studies have shown the negative impact of poverty on the health and development of children, there are few studies on poverty and the health of Canadian and Québécois children. The study that follows fits squarely into the debate dealing with the effects of poverty and socioeconomic status on children's health. The main hypothesis of this study is that family income is associated with infant health, independently of other indicators of family socioeconomic status (such as parent's level of education). This is particularly true in the first years of a child's life, a time when he or she may be more vulnerable to the impact of shortcomings in satisfying their basic needs. Another aspect of poverty, its severity, is also analyzed. Finally, although this analysis is primarily cross-sectional, the data on the birth of the infants in the study cohort allow us to take into account the influence of health conditions at birth on their health at around the age of 5 months. The objective of the analyses presented is thus to examine the impact of parental poverty on the health of babies during the first months of life, taking into account their health status at birth and the mother's sociodemographic characteristics. The data are drawn from the first observation of ÉLDEQ 1998, when the babies were approximately 5 months old. In this text, poverty is conceptualized as inadequate family income and poor families are distinguished from very poor ones as follows: the latter have an income level 60% below the low income threshold established by Statistics Canada.

Method

The analyses were carried out based on the cross-sectional data from the 1998 ÉLDEQ survey; this data was compiled from a sample of 2,223 infants who, at the time of the interview, were an average of 61 gestational weeks old or approximately 5 months old, adjusted for gestational age. Following the "Child" section of the Computerized Questionnaire Completed by the Interviewer (CQCI), questions were asked about the baby's overall health (perception of overall health status), chronic health problems, hospitalizations and injuries since birth, as well as the baby's current height and weight. These questions were addressed to the person closest to the child called the Person Most Knowledgeable (PMK) – the mother in 99.7% of cases. The data concerning the health conditions of birth were drawn from the medical records. The two main dependent variables in the study were perception of the baby's health by the mother or by the person primarily responsible for the baby's care at 5 months and a cumulative index of health problems at 5 months that consists in the sum of the baby's health problems since birth, i.e., at least one hospitalization, the presence of growth retardation below the 10^{th} percentile, and the number of chronic health problems diagnosed during the first 5 months of the infant's life. In conformity with the procedure adopted by the *Direction Santé Québec* (Health Québec Division) of the *Institut de la statistique du Québec* (Québec Institute of Statistics) for establishing household "income sufficient levels," the families were classified according to whether they had a sufficient income for households above the low-income threshold, a moderately inadequate income level, for poor households whose income range falls between 60% and 99% of the low income threshold, or a very inadequate income, for very poor households whose income was lower than 60% of the low income threshold. The other variables studied were indicators of health at birth (prematurity, intrauterine growth retardation, and a cumulative score for neonatal risk comprised of the weighted sum of problems likely to influence the infant's health and/or development) and the mother's sociodemographic characteristics (age, level of education, union status and immigrant status). Bivariate and multivariate analyses enabled the researchers to highlight the relationship between the health status of 5-month-olds and family poverty, while controlling for health conditions at birth and certain sociodemographic characteristics of the families.

Results

According to the ÉLDEQ data, approximately 28% of Québécois families with a 5-month-old baby were living in conditions of relative or severe poverty in 1998 as defined by this study: 12% of them had a moderately inadequate income and 16%, a very inadequate income. As far as health status is concerned, close to one quarter (24%) of the mothers of 5-month olds in Québec perceived their baby's health status to be "less than excellent". A significantly larger proportion of mothers whose family income was moderately inadequate (31%) and of those whose income was very inadequate (33%), than those with an adequate income (21%) stated that their infant's health was less than excellent. A statistically significant association was also observed between the level of income sufficiency, the fact of having been hospitalized, the presence of chronic health problems and growth retardation at 5 months. The proportion of children who had two or more health problems was significantly higher among the infants from a family with a moderately inadequate income level (8%) or very inadequate level (9%) than among those whose family enjoyed a sufficient income (4%). The indicator of perceived health at 5 months is significantly associated with the mother's level of education, union and immigrant status and with the baby's sex, rank at birth and cumulative score for neonatal risk. The cumulative index of health problems at 5 months is significantly associated with the mother's age, level of education, and union status, and with the baby's sex and cumulative score for neonatal risk. When the relationship between level of income sufficiency and baby's health at the age of 5 months is stratified according to health conditions at birth, we note that the association between indicators of health and poverty remain significant, with no change in the strength of the association, regardless of the baby's health conditions at birth, i.e., prematurity, intrauterine growth retardation or the CSNR. In all of these cases, the level of family income sufficiency and the CSNR are significantly associated with the infant's health at 5 months, but no interaction was observed between health conditions at birth and poverty. The results of the logistic regression show that level of income sufficiency remains strongly associated with perception of the baby's health when we control for the characteristics of the baby's health at birth and the mother's sociodemographic characteristics. Generally speaking, when the family income is inadequate, there is a greater risk that the baby's health will be perceived as "less than excellent". Finally, even in the presence of variables dealing with the baby's health at birth and the mother's sociodemographic characteristics, we will find a significant association between level of household income sufficiency and the overall health status of infants at 5 months, as measured by the cumulative index of health problems at 5 months. Babies whose family has a moderately inadequate income run greater risks of having health problems at 5 months. There is, however, no significant association between a very inadequate income and the cumulative index of health problems at 5 months.

Conclusion

This study clearly shows that already at 5 months, infants in families with a moderately inadequate or very inadequate income have more health problems than those in families that have a sufficient income, regardless of their health conditions at birth. Moreover, this association persists even when controlling for the mother's level of education. These health problems, which are more numerous among poor children, can interfere with their future development, especially if they are cumulative and become chronic. Thus, to prevent the greater frequency of health problems in infants born to poor families, we must first ensure that their parents have sufficient income, that is an income above the low-income threshold that would thus enable them to satisfy their baby's needs. A more favourable policy for families with young children including specific financial assistance measures is required in order to ensure this outcome. In terms of health services, these results imply that it is not enough to simply prevent premature births or low birth weight or even to follow those infants presenting these health conditions at birth more closely

to ensure the good health and proper development of babies born to underprivileged families. In effect, the results of our analyses show that it is important to pay particular attention to infants in all poor families, as well as to those in which the mother has a low level of education or no partner.

Acknowledgements

This study was made possible through a research grant from the Health Research Institutes of Canada (MOP-77835-PSB-CFCA-32950). In addition, Louise Potvin earned a scholarship from the Medical Research Council of Canada (MRC H3-17299-AP007270) and Katherine L. Frohlich held a post-doctoral fellowship from the Canadian Institute for Health Research (765-2000-0054 CIHR).

1. Child poverty and health

Introduction

In spite of recent prosperity, poverty is still a reality in Canada and in Québec and it has the greatest effect on families with young children (Canadian Institute for Child Health, 2000). Moreover, children are particularly vulnerable to their environment. Having grown up in conditions of poverty could have consequences on their risks of death, their physical growth, their health and their opportunities for development (Brooks-Gunn and Duncan, 1997). In addition, recent studies show that childhood poverty and the poor health associated with it can have a major impact in adulthood on the risk of morbidity and early mortality (Kuh et al., 1997).

While numerous studies have shown the negative impact of poverty on the health and development of children, there have been few studies of poverty and the health of Canadian and Québécois children. Almost all of the information that we have on this issue comes from American or European studies. Yet, the social context of Québec is quite different from that of the United States. For example, in the United States, the problem of poverty is inextricably linked to race and urban ghettoization (House and Williams, 2000). In addition, having free access to health services could limit the effect of an inadequate income on the health of Canadian and Québécois children, which is not the case for their American counterparts. An examination of the relationship between poverty and health among Québécois children is thus particularly pertinent. The ÉLDEQ (Longitudinal Study of Child Development in Québec) is the first longitudinal study of a cohort of infants that has enabled us to study the link between poverty, evaluated more specifically from the angle of an inadequate family income, the health and development of children in Québec through their first years of life.

Extent of childhood poverty in Canada and Québec

The data from the NLSC (National Longitudinal Survey of Children) conducted by Statistics Canada show that in 1996, 21% of those under 18 were affected by poverty. In Québec this percentage rose to 22% (Canadian Institute of Child Health, 2000). The *Enquête sociale et de santé* (Social and Health Survey) reveals that in 1998 8.9% of children under the age of 14 in Québec were living in very poor families and 15%, in poor families, while the corresponding data for the general population was 7.3% and 12.1% (Chevalier and Sauvageau, 2000). Even after income redistribution through government transfer payments and tax programs, childhood poverty is higher in Canada than in many European countries such as Sweden, France, Germany and the United Kingdom. Families with the youngest children are more likely to be poor. In fact, in Canada in 1996 a frequency of poverty of 25% was observed among those under the age of 7 (Canadian Council for Social Development, 2000; Canadian Institute of Child Health, 2000).

Impact of poverty on children's health

Poverty has an effect on children's health from birth onward. Thus, the relationship between poverty or socioeconomic status and a greater proportion of premature births or low birth weight babies (under 2,500 gr.) has been observed on numerous occasions (Garrett et al., 1994; Kramer et al., 2000). In Québec we regularly find a link between the mother's level of education and the frequency of premature births or low birth weight babies (Chen et al., 1998). Wilkins et al. (1989) have also shown that in Canada, the frequency of low birth weight babies varies according to quintiles of income in urban neighbourhoods.

Being born premature or having a low birth weight is not only associated with a greater risk of mortality (more than 60% of cases of infant mortality occur among these babies), but also, for the survivors, it is associated with a greater frequency of complications, hospitalizations, handicaps, neurological sequelae, and developmental delays (McGrath et al., 2000; Saigal et al., 2000). These complications occur more frequently for children born prematurely or with low birth weight if they are growing up in conditions of poverty rather than in a family with a sufficient income. Thus, there could be a multiplier effect of poverty on the future of children born too soon or too small (Aber and Bennett, 1997).

Furthermore, whether the child is a low birth weight baby or not, living in conditions of poverty can be associated with more health problems of all types (Aber and Bennett, 1997; Newachek et al., 1994). The data from the NLSCY (National Longitudinal Survey of Children and Youth) indicate that the risk of being perceived as less healthy is close to three times higher for children from families of lower socioeconomic status (Wilkins et al., 1999). Not only are episodes of acute and chronic otitis media more frequent among poor children (Paradise et al., 1997), but chronic respiratory symptoms and asthma are also more frequently observed among them (Crain et al., 1994; Margolis et al., 1992). Iron deficiency anemia, which interferes with neurological development in infants, is one of the most prevalent health problems in underprivileged neighbourhoods in Montreal (Lehman et al., 1992; Lozoff et al., 1991; Sargent et al., 1996). Moreover, American data reveal that chronic illnesses, taken as a whole, are also more frequent among children living in low-income families (Newachek and Halfon, 1998). We also note more hospitalizations, limitations and days in bed among underprivileged children (Aber and Bennett, 1997; Brooks-Gunn and Duncan, 1997); Newachek et al., 1994). Lastly, poor children more often experience growth retardation as a result of both a greater frequency of health problems and chronic malnutrition (Aber and Bennett, 1997; Brooks-Gunn and Duncan, 1997; Lewitt and Kerrebrock, 1997).

Poverty or socioeconomic status

The mechanisms through which poverty is linked to health are still poorly understood. Several questions remain to be answered concerning, in particular, the impact of poverty, and its severity, on the health of young children and, especially, the independent effect of poverty on childhood health as compared to the influence of other indicators of socioeconomic status such as parents' level of education. The conceptual difference between poverty and socioeconomic status is important for our understanding of health and the development of children since it seems that they have distinct effects (Duncan et al., 1994; Duncan et al., 1998; McLoyd, 1998).

Poverty is a complex situation that affects every aspect of a person's life and it is difficult to measure adequately. Poverty may be defined as absolute or relative. Absolute poverty is defined as the condition of an individual whose income is inadequate to satisfy his basic needs for food, lodging and clothing (Brooks-Gunn and Duncan, 1997; Najman, 1993). Relative poverty is defined as resulting from the negative gap between an individual's income and the estimated income judged sufficient to live and function in an acceptable manner in his society (Canadian Council for Social Development, 2000); Dixon and Macarov, 1998).

The indicators used to measure a person's socioeconomic status vary depending on the various meanings attached to the concepts of social class, social status and power. Aside from income, level of education and professional status are the indicators most commonly used to establish a person's socioeconomic status. Following the meaning of the concept of social class established by Weber, these indicators represent resources and opportunities to which an individual may have access to establish his social position (Lynch and Kaplan, 2000).

Various studies have compared the explanatory power of socioeconomic status to that of poverty in relation to the health and development of children. Cooper et al. (1998) found that the association between a family's social class or socioeconomic status and the presence of chronic illness in the child was not significant, but that there was a significant link between the presence of chronic illness in the child and indicators of poverty such as inadequate family income. Another study (Brooks-Gunn et al., 1995) shows that the intelligence quotient scores of poor and borderline poor children are much lower than those of children who do not live in impoverished conditions. When these data are adjusted for other indicators of socioeconomic status, such as mother's level of education and single parenthood, the IQ averages change to a small extent, but the differences associated with income persist. These results concerning children of poor families thus contradict the data from studies of adults that show rather that a higher level of education would correct the effects of poverty on their health (Ferland and Paquet, 1995). It would thus seem that during the course of childhood, poverty or inadequate family income is more strongly associated with the health and development of children than other indicators of socioeconomic status such as that of parents' level of education.

Study objectives

The study that follows fits squarely into the debate dealing with the effects of poverty and socioeconomic status on children's health. According to the main hypothesis, sufficiency of family income is associated with the health of infants and this effect is independent of the other indicators of family socioeconomic status. This is particularly true in the first years of the child's life, a period when the child could be more vulnerable to the impact of shortcomings in satisfying their basic needs. One of the other dimensions of poverty, that is its intensity (or severity), will also be analyzed. Lastly, although this is essentially a cross-sectional analysis, the data on the birth of infants in the cohort under study will enable us to take into account the influence of health conditions at birth on their health around the age of 5 months.

The objective of the analyses presented in the first part of this issue is thus to examine the impact of parents' poverty on the health of babies in the first months of life, taking into account their health status at birth and the mother's sociodemographic characteristics. The data are drawn from the first observation year of the ÉLDEQ, when the babies were approximately 5 months old. In this text, poverty is conceptualized as inadequate family income and poor families are distinguished from very poor families, i.e. those whose income is less than 60% of the low income threshold established by Statistics Canada.

2. Methodological Aspects

2.1 Data

The analyses were conducted based on the cross-sectional data of the 1998 ÉLDEQ survey, drawn from a sample of 2,223 infants who, at the time of the interview, were an average of 61 gestational weeks or approximately 5 months of chronological age, corrected for gestational age. This sample of infants was selected from the *Fichier maître des naissances (Master Birth Register)* of the ministère de la Santé et des Services sociaux. However, premature babies born before 24 gestational weeks were excluded from the initial sample because of the high risk that a death would occur between the birth and the time of the survey. Moreover, a few babies died between birth and the interview (n=5) or were too sick to complete the interview (n=3) (Jetté and Des Groseilliers, 2000). No data was gathered about these babies who were part of the initial sample. The analyses below thus concern the link between poverty and the health of the surviving babies at 5 months and thus allow us to infer to the population having survived to this age. Although the data was weighted to correct for non-responses, there may be some bias remaining in our analyses due to the lower response rates observed among mothers with a primary level of education (43%) and among allophones, that is people whose language at home is neither French nor English (46%), given that the people presenting these characteristics are generally over-represented among poor households.[7]

Following the "Child" section of the Computerized Questionnaire Completed by the Interviewer (CQCI), questions were asked about the baby's overall health at 5 months of age (perception of overall health status), chronic health problems, hospitalizations and injuries since birth, as well as the baby's current height and weight. The questions were addressed to the person closest to the child (PMK). In the overwhelming majority of cases (99.7%) it was the biological mother who provided the answers to these questions.

Part of the information used for the analyses was drawn from medical records of birth. They deal mainly with weight and height at birth, length of gestation, cranial size, Apgar score at 1 and 5 minutes after birth, and pathological diagnoses including congenital malformations recorded according to the 9th International Classification of Illnesses (CIM-9). They also deal with the length of the hospital stay, stays in intensive care and transfer to another institution. The medical records of 2,192 children were available, that is those of 99% of the children in the 1998 ÉLDEQ survey.

2.2 Definition and measurement of indicator of poverty and health

2.2.1 Indicator of poverty

An indicator of poverty and of major poverty was created by referring to the low-income thresholds before tax established by Statistics Canada for the year 1997, based on data from the 1992 FES (Family Expenditure Survey). According to the FES, families with incomes lower than these thresholds regularly spent more than 54.7% of their income for food, lodging and clothing and, as a result, are likely to experience financial difficulties (Statistics Canada, 1998). These thresholds take into account the number of people in the household and the size of the population in the zone (urban/rural) of the household residence. In conformity with the procedure adopted by the *Direction Santé Québec* of the *Institut de la statistique du Québec* for establishing "level of income sufficiency" for households (Desrosiers et al., 2001), the families of the infants in the cohort were classified according to whether they had sufficient income for non-poor households, a moderately inadequate income, for

7. In fact, even if an adjustment for non-response (weighting of data) has been made to take into account the lower rate of response of these groups, we cannot document the postulate according to which the health status of the children in the non-participating households in these groups is similar to that of the children in the participating households. For this reason, we cannot avoid the possibility of bias in our results.

poor households whose income falls between 60% and 99% of the low-income threshold, or a very inadequate income, for very poor households whose income is lower than 60% of the low-income threshold (Appendix Table A.1).

2.2.2 Indicators of health at 5 months

Perception of baby's health

The person closest to the baby (PMK) was asked the question dealing with perception of the baby's overall health at 5 months of age as part of a face-to-face interview. The question had several response categories: excellent, very good, good, fair or poor. In the analyses below, the variable was regrouped into two categories depending on whether the baby's health was perceived as excellent or less than excellent. This breakdown is justified not only by the small numbers in certain categories, but also by the relevance of the results of the analysis that the comparison of the two groups confers.

The concept of perceived health implies an overall appreciation by an individual of his own health status and refers to his knowledge and experience of health or illness. Given the strong correlation of measures of perceived health with other phenomena representing specific dimensions of health (mortality, morbidity and use of services) established by numerous studies, health perception is considered as an important, reliable and valid indicator of the health status of populations (Levasseur, 2000). One might wonder, however, about the role of subjectivity of this indicator when it relates to perception of health status of one's child. There may be a major bias of desirability born of a parent's desire to present a good picture with regard to the care provided to their infant. In addition, the parents' level of education, as well as their ethnic origin, may introduce variation into the perception of their baby's health. Having said this, the associations observed, on the one hand, between the perception of the baby's health (by the mother, in virtually all of the cases) and the other indicators of health (Appendices Tables A.3 and A.4) and, on the other hand, between the baby's characteristics and perceived health, as we will see further on, support the constructed validity of the variable "perceived health of the baby."

Hospitalizations

This indicator deals with the baby's admissions to hospital for one or more nights. During the survey, the respondent was asked to indicate whether the baby had been admitted to the hospital for one or more nights since birth and, if yes, the number of times that he had been admitted. In the present study, hospitalization was nevertheless dealt with in only two categories, depending on whether the child had been hospitalized for at least one night. The reasons for hospitalization were listed under the following headings: respiratory illness, gastro-intestinal illness, injuries or others. However, if there was more than one episode of hospitalization, the survey did not provide the reason for each hospitalization. The lack of information on the duration and reason for each hospitalization, as well as the size of the "other" heading, where the reason is not specified (7%) in the 1998 ÉLDEQ survey limits the processing of this indicator.[8]

Chronic health problems

Following the survey, "chronic health problem" is understood to be a state that has persisted for six months or longer or that will probably last more than six months. The question seeks to establish if a health professional had diagnosed certain long-term health problems in the infant such as: allergies, bronchitis, cardiac disease, epilepsy, cerebral palsy, kidney disease, mental impairment, or other chronic conditions. The study considers the number of chronic problems diagnosed in the child.

8. It should be noted that starting in 1999, ÉLDEQ documents all the reasons for which the child was admitted to hospital for at least one night in the 12 months preceding the survey. In addition, when "other" is the reason mentioned, the PMKs are asked to specify the reason that the child was hospitalized.

Information on the frequency and length of episodes of illness was not gathered. Even though the indicator "presence of chronic health problems" enabled us to list the chronic health problems diagnosed by a health professional, this absence of precision as to the episodes tends to limit the usage or processing of this indicator of health. In addition, acute health problems such as otitis and gastroenteritis were only recorded starting in 1999, i.e. for children aged 17 months and older.

Injuries

The survey provides information allowing us to identify babies according to whether they have sustained any injury since they were born. The frequency of injuries, as well as the nature (of the most serious injury), the cause, the anatomical site, and where the injury occurred (e.g. in the house, in the street) were also documented as part of the face-to-face interview. In this study, we are interested in whether the baby sustained an injury since birth and this, regardless of the site of the injury, its nature or cause. It should be noted that here the information on injuries could be under-estimated because some parents fear being accused of abuse or negligence of their child. It should also be noted that injuries that occurred during the delivery that are recorded in the medical records (such as a fracture of the clavicle at birth) are not considered here. They are, however, taken into account in the cumulative neonatal score presented below.

Growth retardation below the 10th percentile at 5 months

In the past ten years, there has been no growth curve established for Québécois children aged 0 to 6 years. A percentile curve for weight of babies has thus been constructed according to the child's sex to classify infants in terms of their growth rate. Growth retardation under the 10th percentile is identified when the baby's weight reported by the PMK is lower than the 10th percentile of weight distribution at 5 months of the babies in ÉLDEQ study. This variable is coded in a dichotomous manner.

It is important to note that weight at 5 months was reported by the PMK for 99% of the children in the ÉLDEQ and height,[9] for 95% of them. Among the babies for whom we do not have weight measurements, we find a higher percentage who are living in a low-income family or whose mothers are immigrants. Yet, the few cases involved should not impact significantly on the results.

Cumulative index of health problems at 5 months (CIHP-5 months)

A cumulative index of health problems of infants was constructed. It consists in the sum of the problems related to the baby's health since birth: at least one hospitalization, presence of a growth retardation below the 10th percentile and the number of chronic health problems diagnosed during the infant's first 5 months of life. The choice of elements included in the CIHP-5 months reflects the infant's overall health status and was determined by the availability of the data and the reliability of the measurements in this period of the infants' lives. Because of their highly asymmetrical distribution, the CIHP-5 month scores are divided into three categories: 0, 1, 2 or more.

2.2.3 Indicators of health at birth

Low birth weight, premature birth and intrauterine growth retardation (IUGR)

Information on the length of the pregnancy, birth weight and cranial perimeter were drawn from the medical records of birth. Low birth weight is defined by a weight lower than 2,500 gr. Low birth weight babies can be premature and/or present an intrauterine growth retardation (IUGR). These two conditions have different

9. The child's height seems to be a less reliable statistic since it is reported by the PMK without one knowing the exact age of the baby being measured. We therefore did not retain this measurement.

etiologies and it is preferable to draw a distinction between them. In the present study, premature birth is defined for any infant born between 24 and 37 weeks since, as mentioned above, premature babies born earlier than 24 weeks of gestation were excluded from the study. Intrauterine growth retardation below the 10^{th} percentile is determined based on weight and length of gestation, adjusting for the infant's sex according to the most recent Canadian curve established by Arbuckel et al. (1993). These variables (low birth weight, premature birth and intrauterine growth retardation) are handled dichotomously. Moreover, in the absence of more recent data, the curve established by Usher and McLean in 1969 was used as a reference to determine cranial perimeter growth retardation in the infant. Growth below the 10^{th} percentile was retained and the variable is handled dichotomously.

Cumulative score for neonatal risk (CSNR)

A cumulative score for neonatal risk (CSNR) was constructed based on information from the medical records of birth. This score was created as a measurement reflecting the overall health condition at birth of the infants targeted by the study. A detailed description of the CSNR is presented below.

Cumulative score for neonatal risk (CSNR)

The elements that served to establish the cumulative score for neonatal risk (CSNR) were drawn from the infants' medical records at birth. This score was created as a measure that reflects the overall health condition at birth of the infants in the ÉLDEQ study. Starting with an established list of problems likely to influence the health or development of infants in both the long and short term, each problem was weighted according to the gravity and risk with regard to the baby's future health and development. The CSNR is the weighted sum of health problems presented by the infants at birth. This cumulative score for neonatal risk appears valid since it is significantly associated with other indicators of health at birth such as length of hospital stay, transfer to another hospital and mother's perception of the baby's health at birth.

It was possible to calculate the CSNR for 2,010 (91%) of the 2,223 infants who participated in the 1998 ÉLDEQ. Among the 213 infants for whom the CSNR could not be calculated, there are 172 infants for whom data on cranial perimeter, size or Apgar score at 5 minutes were not available in the medical record of birth and 31 infants for whom the consent form allowing us to consult their medical records were not returned. By comparing these 31 infants with the others, we observe that the fact of not returning the consent form is associated with the fact that the mother is under 20 or over 34, that she has a level of education lower than Secondary V and she lives in a household with a very inadequate income. In addition, in these infants we observe a significantly higher rate of growth retardation under the 10^{th} percentile when they are 5 months old than among those whose parents returned the consent form for medical records (21% vs. 8%).

The average CSNR is 0.92 (SD: 1.26) with a range from 0 to 9. Half of the infants were born without any abnormality or health problem and their score is equal to 0. A higher CSNR is observed among male infants and first children according to birth rank.

The CSNR variation is significantly associated with length of hospital stay, transfer of the infant to another institution, as well as with the mother's perception of the baby's health at birth. The average length of hospital stay for newborns is 3.2 days (SD: 4.6) for all the infants, but it rises to 7.3 days (SD: 12.45) for those who have a CSNR higher than 2. The risk of transfer of a newborn to another institution at the time of birth increases progressively from a CSNR higher than 2. The average CSNR is negatively correlated with the mother's perception of the baby's health at birth.

The variation of the CSNR is, however, not associated with level of sufficiency of household income as assessed during the interview at 5 months.

On the other hand, the fact that an infant was born with a CSNR greater than or equal to 3 is associated with a greater risk of having health problems during their first 5 months as measured by the CIHP-5 months.

Boxed text continued: Weighting of the elements of the cumulative score for neonatal risk (CSNR)

Problem at birth	Category	Weight
Birth weight	less than 2 500 g	1
Duration of gestation	less than 35 weeks	2
	35 to 36 weeks	1
Intrauterine growth retardation	under the 5th percentile	2
	5th to 9th percentile	1
Growth retardation of cranial perimeter	under the 10th percentile	1
Congenital malformation	two serious malformations	3
	one serious malformation	2
	minor malformation	1
Apgar score at 5 minutes after birth	less than 3	2
	3 to 6	1
Central nervous system problems		2
Respiratory problems		2
Heart rhythm problems		1
Newborn with a kidney problem		1
Newborn with a hemolytic disease		1
Blood system problems		1
Newborn haemorrhage		1
Neonatal anemia		1
Newborn with icterus		1
Neonatal infection		1
Newborn with a metabolic problem		1
Infant with a digestive system problem		1
Obstetrical trauma		1
Condition linked to the pregnancy and delivery		1
Minor health problems (excluding very minor problems)		1

2.3 Sociodemographic characteristics of the mothers of the infants

The variable "age of mother in the study" includes three categories: under 20, 20-34 and 35 and over. Mothers were also classified according to the highest level of education they had attained: no high school diploma; high school diploma; a vocational or trade school diploma; college (junior) or university studies, with or without a diploma. The last two levels (college or university studies) were combined after we noted that there was no significant difference in their relationship with the indicators of the baby's health. As for union status, we distinguish mothers who live with a partner from others, regardless of their marital status. As for immigrant status, the mothers were divided according to whether they are of Canadian origin (non-immigrant) or they immigrated from Europe, on the one hand, and from non-European countries, on the other hand. Finally, the babies, are categorized according to their rank at birth: 1st, 2nd, 3rd, 4th or more.

2.4 Analysis method

We first completed a descriptive analysis of the indicator of income sufficiency and of various indicators of the baby's health. Then, bivariate analyses were carried out in order to examine the relationship between level of household income sufficiency and the indicators describing the baby's health from birth to 5 months. These indicators include the following: the mother's perception of baby's health, chronic health problems, hospitalizations, injuries, growth retardation, and the cumulative index of health problems at 5 months (CIHP-5 months).

The use of data drawn from medical records then allowed the researchers to proceed with a stratification according to three conditions at birth: premature birth, intrauterine growth retardation, and cumulative score for neonatal risk. Given that we do not have data on all of the babies who died before reaching 5 months, health conditions at birth cannot be regarded as predictive variables. The stratified analysis does, however, allow for controlling for health conditions at birth in the examination of the association between income sufficiency and four indicators of health. These indicators include the mother's perception of the baby's health, admission of the infant to the hospital for at least one night, chronic health problems and the cumulative index of health problems at 5 months. A Chi-square statistical test was used as a measurement of the association between the different variables and odds ratios were also calculated within the stratifications. In addition, we tested some interactions involving health conditions at birth.

Multivariate logistic regression analyses were then conducted in order to examine the relationship between the level of income sufficiency and the two main indicators of health of 5-month-old babies (mother's perception of baby's health and the cumulative index of health problems at 5 months). Everything was done while controlling for the baby's conditions of health at birth (CSNR) and the mother's sociodemographic characteristics already presented. Since the dependent variable "perceived health" is dichotomous, a logistic regression was used in this case, while a multinomial logistic regression was used in the case of the variable "CIHP-5 months," since the latter is comprised of three categories. The baby's sex was not retained in the control variables since it is taken into account in the variables that comprise the CSNR. On the other hand, only the mother's characteristics were retained for these analyses because they present strong correlations with the father's characteristics for whom information is available, i.e. for fathers living in the household surveyed. Moreover, they appear more relevant than those for the fathers to explain the baby's health, given the greater involvement of the mother in the care of an infant (Des Rivières-Pigeon, 2000) and the high proportion of single-parent households headed by women among poor families.

Since the analysis is intended to be explanatory, the characteristics of the baby and those of the mother were considered individually and were introduced stepwise in the different logistic models, by starting with the baby's health conditions at birth and continuing either with the mother's age, her level of education, her union status or her immigrant status. This process allowed for highlighting the contribution of each of the variables in terms of the association made between poverty and the perception of baby's health at 5 months. The same procedure was adopted to analyze the relationship between poverty and the cumulative index of health problems at 5 months using a multinomial logistic regression.

3. Results

3.1 Family poverty

According to the ÉLDEQ data, in 1998 approximately 28% of Québécois families with a 5-month old baby were living in conditions of relative poverty or major poverty as we have defined it; 12% of them had a moderately inadequate income and 16%, a very inadequate income (Table 3.1).

Table 3.1
Distribution of 5-month-olds by level of sufficiency of household income, 1998

Household income	n	%
Sufficient income	1,577	72.5
Moderately inadequate income[1]	261	12.0
Very inadequate income[2]	338	15.5
Total	**2,177**	**100.0**

1. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
2. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.

Source: *Institut de la statistique du Québec, ELDEQ 1998-2002.*

3.2 Sociodemographic characteristics of mothers and babies

The vast majority of mothers (83%) of 5-month old Québécois babies are between 20 and 34, while 3.1% of them are under 20 and 14% of them are 35 or over.[10] As for their level of education, we note that 18% of them do not have a high school diploma; 11% have only a high school diploma and 11% of them hold a vocational or trade school diploma. Moreover, 30% of the mothers have started or completed post-secondary Cegep (college) studies and a similar proportion have started or completed university studies. It is also noted that 8% of the mothers of babies approximately 5 months old do not live with a partner. Finally, with regard to immigrant status, 88% of the mothers are Canadian-born (85%) or European (3%) while 12% are from non-European countries. Each of these characteristics is significantly associated with level of household income sufficiency (Appendix Table A.5).

As for the infants, 51% of them are boys; 44% of the babies are first children; while 39% are second-born; 11% are third children and 5% are either fourth or higher (data not presented).

3.3 Poverty and infant health

3.3.1 Poverty and perception of baby's health

The results in Table 3.2 reveal that the majority of the mothers[11] of Québécois babies approximately 5 months old describe their infant's health as "excellent." However, close to one quarter (24%) of them perceive their baby's health status as "less than excellent."

The fact of having inadequate income is associated with a more negative perception of the infants' health (Table 3.3). In fact, a larger proportion of mothers whose family income is moderately inadequate or very inadequate (31% and 33% respectively) report, that their infant is in less than excellent health than mothers whose income is sufficient (21%). The relationship noted between level of income sufficiency and perception of health is statistically significant.

10. This data corresponds quite well to that on live births in Québec since in 1998, there were 82.3% of mothers who were between 20 and 34; 4.8% were under 20 and 13% were 35 and over, according to the *Fichier maître des naissances* of the *ministère de la Santé et des Services sociaux*.

11. Since virtually all of the respondents to the "Child" CQCI questionnaire are the mothers, the term mother is used here and throughout the rest of the text to designate them.

Table 3.2
Distribution of infants by various indicators of health in the first 5 months, 1998

Indicators of infant health	n	%
Mother's perception of the infant's health		
Excellent	1,688	75.9
Less than excellent	535	24.1
Hospitalizations of baby since birth		
Yes	286	12.9
No	1,937	87.1
Reason for hospitalizations		
Respiratory problems	86	3.9
Gastro-intestinal problems	42	1.9*
Injuries	2	0.1**
Other	156	7.0
Chronic health problems since birth		
Presence	205	9.2
Absence	2,018	90.8
Number of chronic health problems		
0	2,018	90.8
1	193	8.7
2	11	0.5**
3	1	0.1**
Types of chronic health problems		
Allergy	87	3.9
Bronchitis	26	1.2*
Kidney disease	17	0.8**
Heart disease	14	0.7**
Épilepsy	2	0.1**
Other chronic health problems	72	3.3
Growth retardation under the 10th percentile[1]		
Yes	187	8.5
No	2,005	91.5
Injuries since birth		
Yes	31	1.4*
No	2,192	98.6
Cumulative index of health problems at 5 months (CIHP-5 months)[2]		
CIHP-5 months = 0	1,640	74.8
CIHP-5 months = 1	439	20.0
CIHP-5 months = 2	97	4.4
CIHP-5 months = 3	13	0.6**
CIHP-5 months = 4-5	3	0.2**

1. The threshold for growth retardation under the 10th percentile is defined according to the distribution of babies' weights, adjusting for the infant's sex.
2. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

Table 3.3
Four indicators of infant's health in the first 5 months by level of sufficiency of household income, 1998

	Health perceived to be less than excellent by the mother		Hospitalizations		Presence of chronic health problems		Growth retardation under the 10th percentile[1]	
	n	%	n	%	n	%	n	%
Household income								
Sufficient	329	20.9	181	11.5	124	7.9	117	7.5
Moderately inadequate[2]	81	31.2	55	21.2	30	11.3*	21	8.3*
Very inadequate[3]	112	33.2	45	13.3*	45	13.4*	42	12.9*
p		*<0.001*		*<0.001*		*<0.05*		*<0.05*
Total	**522**	**24.0**	**281**	**12.9**	**199**	**9.2**	**180**	**8.4**

1. The threshold for growth retardation under the 10th percentile is defined according to the distribution of babies' weight, adjusting for the infant's sex.
2. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
3. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.

* Coefficient of variation between 15% and 25 %; to be interpreted with caution.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

3.3.2 Poverty and hospitalizations

As far as hospital admission is concerned, the data in Table 3.2 reveal that 13% of 5-month old infants have been hospitalized for at least one night since they were born. Respiratory illnesses represent the main cause of hospitalization of babies (3.9%). Gastro-intestinal problems (1.9%) and injuries (0.1%) are also listed as a cause of hospitalization of babies. Moreover, 7% of babies have been hospitalized for a reason that has not been specified, i.e. "other."

As we look at Table 3.3, we can see that babies from families with a moderately inadequate income are hospitalized more often than those from families that enjoy a sufficient income level (21% vs. 12%) and the relationship is significant. Contrary to what had been expected, however, children from the most disadvantaged families (whose income is very inadequate) were hospitalized less often (13%) than children from families with a moderately inadequate income (21%).

3.3.3 Poverty and chronic illnesses or injuries

Among infants about 5 months old, according to their mothers, 9% present with a chronic health problem diagnosed by a health professional. Among these chronic illnesses, allergies are the most frequent, affecting 3.9% of the infants. Bronchitis was diagnosed in 1.2% of the babies; kidney disease in 0.8%; cardiac disease in 0.7% and epilepsy, in 0.1% of them. Other chronic health problems (not specified) were also reported for 3.3% of the babies (Table 3.2).

As the data presented in Table 3.3 show, a significant association between the level of income sufficiency and chronic health problems was also observed. Relatively speaking, more infants in disadvantaged families present chronic health problems more often, i.e. 11% of babies from families that have a moderately inadequate income and 13% of babies from families that have a very inadequate income. In comparison, 8% of babies living in a family that is not poor present such chronic health problems.

We see that the frequency of injuries is relatively low at 5 months. Very few parents (1.4%) reported that their infant had suffered any injuries since birth (Table 3.2). This proportion does not vary significantly in relation to level of sufficiency of household income (data not presented). However, the very low number of infants having sustained injuries since birth does not allow us to draw conclusions on the basis of the current results. This indicator will thus not be retained in the following analysis.

3.3.4 Poverty and weight gain at 5 months

As indicated in Table 3.2, 9% of 5-month olds weigh less than the 10th percentile of the distribution. There is a close association between growth retardation and the family's economic situation. The results in Table 3.3 indicate that the risk of such a lag is more frequent among infants that live in a family with a very inadequate income (13%) than among those living in a family with a sufficient or a moderately inadequate income.

3.4 Poverty and cumulative index of health problems at 5 months (CIHP-5 months)

The analysis of the overall health status of infants at 5 months according to the cumulative index of health problems at 5 months (CIHP-5 months) reveals that approximately one in five infants (20%) has a health problem and that 5% of infants have two or more problems (Table 3.2). The data presented in Table 3.4 show that the proportion of infants with two or more health problems is significantly higher among infants from a family in which the income is moderately inadequate (8%) or very inadequate (9%) than among those in which the family enjoys a sufficient income (4.1%).

Table 3.4
Distribution of infants by the cumulative index of health problems at 5 months (CIHP-5 months)[1] and level of sufficiency of household income, 1998

	CIHP-5 months score			
	0	1	2 or more	
	%	%	%	n
Household income				
Sufficient	77.4	18.6	4.1	1,563
Moderately inadequate[2]	66.4	26.1	7.5 *	256
Very inadequate[3]	70.0	21.3	8.7 *	329
p			*<0.001*	
Total	**74.9**	**20.0**	**5.2**	**2,148**

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
3. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

Source: *Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

3.5 Baby's health and certain characteristics of the mother and the baby

3.5.1 Baby's health at 5 months by the mother's sociodemographic characteristics

The data presented in Tables 3.5 and 3.6 allow for verifying the presence of significant links between the indicators of the infant's health and various of the mother's sociodemographic characteristics. The mother's age is not associated with either perception of the baby's health or presence of chronic health problems in the baby. However, a higher proportion of infants whose mother is younger than 20 were admitted to the hospital since their birth. There is a tendency for relatively more of these babies to present a growth retardation (Table 3.5).

Table 3.5
Four indicators of the infant's health in the first 5 months by mother's sociodemographic characteristics, 1998

	Health perceived as less than excellent by the mother		Hospitalizations		Presence of chronic health problems		Growth retardation below the 10th percentile[1]	
	n	%	n	%	n	%	n	%
Mother's age								
Younger than 20	20	27.2*	19	26.2*	11	15.5**	11	15.2**
20 to 34	441	24.0	236	12.8	165	9.0*	141	7.8
35 or over	74	23.8	30	9.9*	28	9.2*	35	11.4*
p		*Not signif.*		*<0.01*		*Not signif.*		*<0.05*
Mother's education								
No high school diploma	129	32.4	80	20.1	48	12.0*	45	11.3*
High school diploma	67	26.7	35	14.1*	29	11.4*	24	9.7*
Vocational or trade school diploma	59	24.8	28	11.6*	23	9.8*	15	6.4**
College (junior) or university studies	277	20.8	143	10.8	105	7.9	103	7.9
p		*<0.001*		*<0.001*		*Not signif.*		*Not signif.*
Union status								
Lives with a partner	477	23.5	239	11.8	171	8.4	163	8.1
Does not live with a partner	58	31.3	45	24.3*	32	17.3*	22	12.2*
p		*<0.05*		*<0.001*		*<0.001*		*Not signif.*
Immigrant status								
Non-immigrant or European immigrant	440	22.6	257	13.2	186	9.5	154	8.0
Non-European immigrant	95	34.9	29	10.8*	19	7.0**	33	12.9*
p		*<0.001*		*Not signif.*		*Not signif.*		*<0.05*
Total	535	24.1	286	12.9	205	9.2	187	8.5

1. The threshold for growth retardation under the 10th percentile is defined according to the distribution of babies' weights, adjusting for the infant's sex.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

A significant link is observed between the mother's level of education and perception of the infant's health. The higher the mother's level of education, the smaller the proportion of babies whose health is perceived as less than excellent. A significant relation is also observed between the mother's level of education and overnight stays in hospital. Here, however, the demarcation is more between infants whose mother did not obtain a high school diploma and the others, the former being proportionally more numerous to have been hospitalized at least one night since their birth. The results do not show, however, a significant relationship between the mother's level of education and chronic health problems or growth retardation.

As for the mother's union status, we note that babies whose mother is living without a partner are more likely to present health problems. In fact, a greater proportion of them were admitted to hospital for one night or more, present at least one chronic health problem or are perceived as being in less than excellent health. Union status does not prove to be associated with growth retardation.

The mother's immigrant status is also linked to certain indicators of an infant's health. Compared to others, relatively more non-European immigrant mothers consider their baby's health status to be less than excellent. Problems of growth retardation are also more frequent among this group. On the other hand, there is no significant relationship between the mother's status as an immigrant and the frequency of hospitalizations or the frequency of chronic health problems in the infants.

Finally, the data in Table 3.6 allow us to note that the mother's sociodemographic characteristics such as age, level of education, and union status at the time of the survey are significantly linked to the CIHP-5 months. Thus, babies whose mothers are under 20, have no high school diploma or do not live with a partner are at a greater risk of having an elevated CIHP-5 months (2 or more). It has been shown, however, that there is no association between the CIHP-5 months and the mother's status as an immigrant.

3.5.2 Baby's health at 5 months and baby's characteristics

As far as the baby's characteristics are concerned, the results shown in Table 3.7 reveal first that the infant's health is associated with the sex of the baby. Male babies are perceived more often as being in less than excellent health. A higher proportion of them have been hospitalized between birth and 5 months or present with a problem of growth retardation. The frequency of chronic health problems, however, does not differ significantly according to the baby's sex.

Birth rank also proves to be linked to the mother's perception of the baby's health. Babies who are fourth children or more are more likely to be perceived as not being in excellent health (34% vs. 24% for all babies). However, birth rank does not seem to be associated significantly with hospitalization, presence of chronic health problems or growth retardation.

The infant's health status is also linked to the cumulative score for neonatal risk (CSNR). Thus, babies with a CSNR of 3 or more are always more likely to show a poor health profile during the first months of life, regardless of the indicator considered (perceived health at 5 months, chronic health problems and growth retardation).

Finally, the cumulative index of health problems at 5 months is linked as much to the infant's sex as to the CSNR. In each category of the CIHP-5 months over 0, we observe a higher proportion of boys as well as of babies with a high CSNR. On the other hand, the baby's birth rank does not seem to be associated with it (Table 3.8).

Table 3.6
Distribution of infants by their score on the cumulative index of health problems at 5 months (CIHP-5 months)[1] and mother's sociodemographic characteristics, 1998

		CIHP-5 months score			
		0	1	2 or more	
		%	%	%	n
Mother's age					
Younger than 20		56.8	31.0*	12.2**	72
20 to 34		75.7	19.2	5.1	1,814
35 or over		73.4	22.7	3.9**	305
	p			*<0.05*	
Mother's education					
No high school diploma		66.0	24.7	9.2*	393
High school diploma		69.5	25.9	4.6**	251
Vocational or trade school diploma		75.8	21.4	2.8**	233
College (junior) or university studies		78.2	17.3	4.4	1,311
	p			*<0.001*	
Union status					
Lives with a partner		76.2	19.3	4.5	2,003
Does not live with a partner		61.2	26.2	12.6*	183
	p			*<0.001*	
Immigrant status					
Non-immigrant/European immigrant		74.8	20.2	5.0	1,933
Non-European immigrant		75.2	19.0*	5.8**	257
	p			*Not signif.*	
Total		**74.8**	**20.0**	**5.2**	**2,192**

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

Table 3.7
Four indicators of the infant's health in the first 5 months by baby's characteristics, 1998

	Health perceived as less than excellent by the mother		Hospitalizations		Presence of chronic health problems		Growth retardation below the 10th percentile[1]	
	n	%	n	%	n	%	n	%
Baby's sex								
Female	228	21.0	117	10.8	92	8.5	74	6.9
Male	307	27.0	169	14.9	113	9.9	113	10.1
p		*<0.01*		*<0.05*		*Not signif.*		*<0.05*
Birth rank								
1st	186	19.1	123	12.6	85	8.8	81	8.4
2nd	237	27.1	118	13.5	82	9.4	67	7.8
3rd	70	27.8	35	13.7*	28	11.0*	25	10.0*
4th or higher	42	34.4	11	8.7**	9	7.8**	14	11.9**
p		*<0.001*		*Not signif.*		*Not signif.*		*Not signif.*
Cumulative score for neonatal risk (CSNR)[2]								
CSNR = 0	214	21.2	111	11.0	99	9.8	62	6.3
CSNR = 1-2	176	23.0	101	13.2	58	7.6	60	8.0
CSNR = 3 or more	75	32.1	53	22.4	34	14.5*	37	16.1*
p		*<0.01*		*<0.001*		*<0.05*		*<0.001*
Total	**535**	**24.1**	**286**	**12.9**	**205**	**9.2**	**187**	**8.5**

1. The threshold for growth retardation under the 10th percentile is defined according to the distribution of babies' weights, adjusting for the infant's sex.
2. The CSNR is the weighted sum of an infant's health problems at birth.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

Table 3.8
Distribution of infants by the score on the cumulative index of health problems at 5 months (CIHP-5 months)[1] and baby's characteristics, 1998

		CIHP-5 months score			
		0	1	2 or more	
		%	%	%	n
Baby's sex					
Female		78.0	18.1	3.9 *	1,071
Male		71.8	21.9	6.3	1,121
	p			*<0.01*	
Birth rank					
1st		75.0	20.7	4.3 *	965
2nd		74.5	20.3	5.2 *	862
3rd		74.1	17.4	8.4 *	247
4th or higher		77.3	18.0 *	4.7 **	118
	p			*Not signif.*	
Cumulative score for neonatal risk (CSNR)					
CSNR = 0		77.7	17.8	4.6 *	993
CSNR = 1-2		76.0	19.4	4.6 *	755
CSNR = 3 or more		59.7	30.0	10.3 *	233
	P			*<0.001*	
Total		**74.9**	**20.0**	**5.1**	**2,192**

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. The CSNR is the weighted sum of an infant's health problems at birth.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.
** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

3.6 Poverty and baby's health at 5 months by health conditions at birth

To control for the potentially confounding effect of poor health condition at birth in the relationship between poverty and the health of infants at 5 months, analyses were conducted between the level of adequacy of household income and four indicators of the infant's health (mother's perception of the baby's health, hospitalization, chronic health problems, and cumulative index of health problems), stratifying for the following variables: premature birth, intrauterine growth retardation, and cumulative score for neonatal risk (CSNR). Moreover, to find out if poor health at birth has more consequences for the future health of babies born to poor families, interactions between level of income sufficiency, health conditions at birth, and these same indicators (perceived health, hospitalization, chronic health problems and CIHP-5 months) were examined.

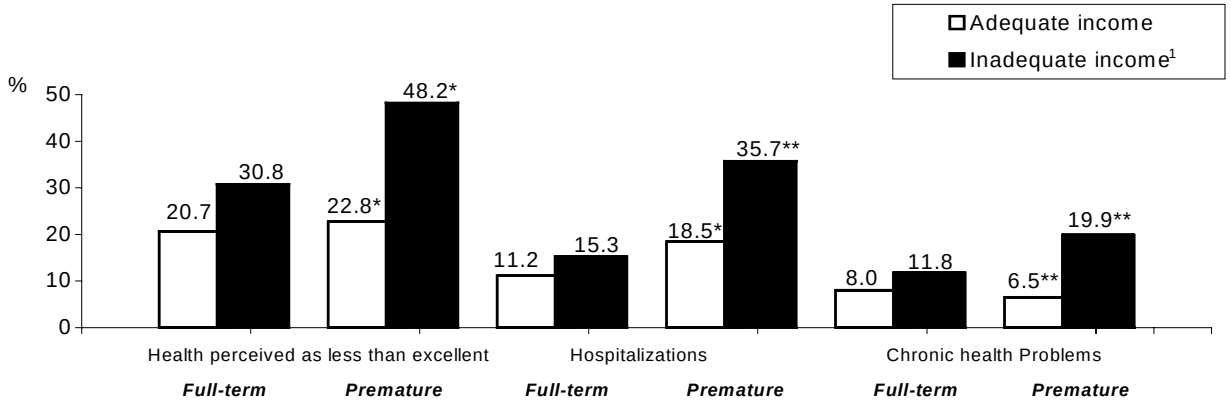
When one stratifies the relationship between level of income sufficiency and the baby's health at 5 months according to health conditions at birth, we see that the association between indicators of health and poverty remain significant with no change in the strength of the association, and this holds true regardless of the baby's health conditions at birth (premature, intrauterine growth retardation, and CSNR). In all of these cases, the family's level of income sufficiency and health conditions at birth considered are significantly associated with the infant's health. No interaction was detected between health conditions at birth and poverty for the four indicators of health retained (data not presented).

Figures 1 to 6 illustrate the results of the stratifications while the odds ratios calculated within these stratifications are presented in the text.

3.6.1 Poverty, perception of health, hospitalizations and chronic health problems by premature birth

The results of the analyses stratified according to premature birth reveal that mothers of families with moderately inadequate or very inadequate income are more likely to perceive their baby's health as less than excellent as compared to those who have an adequate income, and this is true whether or not the baby is born premature (relation of the adjusted OR = 1.8 and a 95% confidence interval (CI) = 1.45-2.21). Similarly, infants from families with inadequate or very inadequate income levels are at a higher risk of being admitted to hospital (adjusted OR = 1.5; 95% CI = 1.16-1.97) or of suffering from chronic health problems (adjusted OR = 1.6; 95% CI = 1.21-2.22) regardless of whether or not they are born at term or are premature (Figure 3.1).

Figure 3.1 Three indicators of the infant's health in the first 5 months by level of sufficiency of household income and premature birth, 1998 (n=2,147)



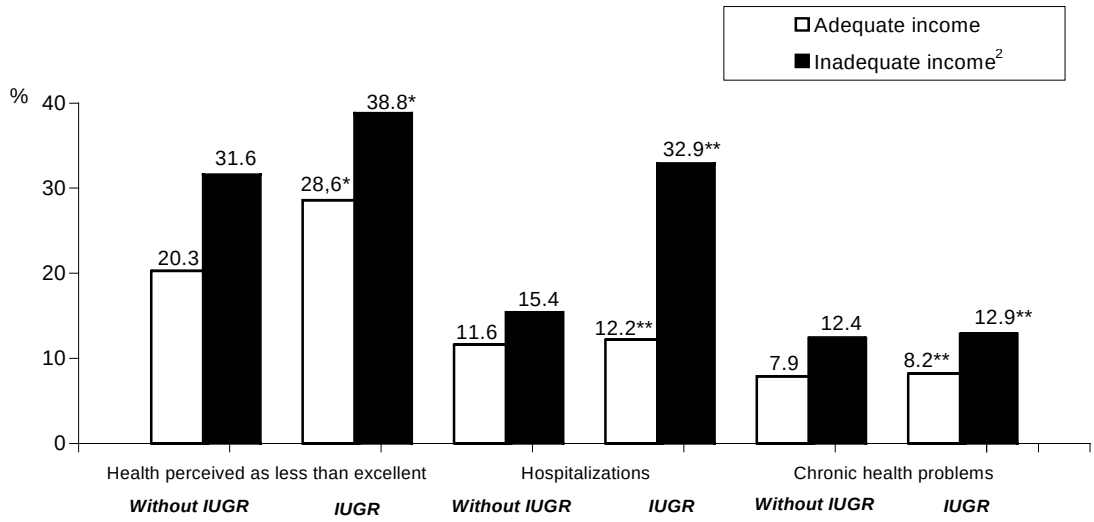
1. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.
* Coefficient of variation between 15% and 25%; to be interpreted with caution.
** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3.6.2 Poverty, perception of health, hospitalizations and chronic health problems by intrauterine growth retardation (IUGR)

The relationship between poverty, perception of the baby's health, hospitalizations and chronic health problems is significant and is not modified by intrauterine growth retardation. Infants in families with inadequate or very inadequate income are most often perceived as being in less than excellent health (adjusted OR = 1.8; 95% CI = 1.45-2.22). They are more likely to have been admitted to the hospital since their birth (adjusted OR = 1.5; 95% CI = 1.18-2.00) or to present chronic health problems (adjusted OR = 1.6; 95% CI = 1.21-2.23) regardless of whether their intrauterine growth was adequate or not (Figure 3.2).

Figure 3.2 Three indicators of the infant's health in the first 5 months by level of sufficiency of household income and intrauterine growth retardation (IUGR)[1], 1998 (n=2,148)



1. IUGR below the 10th percentile: intrauterine growth retardation is based on weight and gestational age at birth, adjusting for the newborn's sex according to the most recent Canadian growth curve and established by Arbuckle and Sherman (1993).
2. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

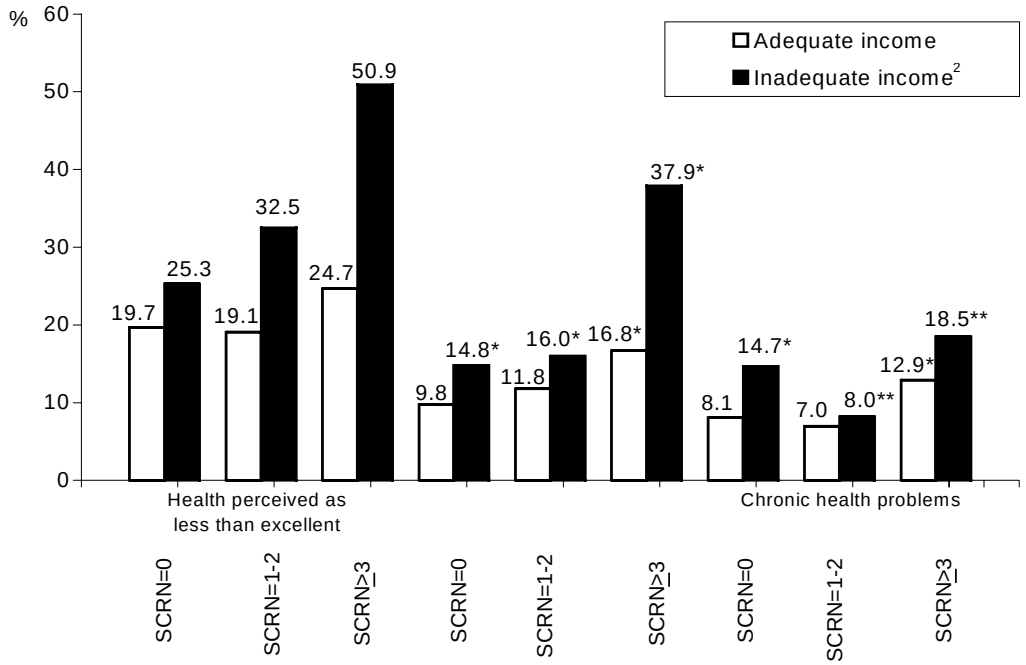
Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3.6.3 Poverty, perception of health, hospitalizations and chronic health problems by the cumulative score for neonatal risk (CSNR)

The state of the infant's health as perceived by the mother is associated with inadequate household income for both babies born with health problems (CSNR = 1.2 or 3 and over) and for babies born with no health problems (CSNR = 0). In other words, children from poor or very poor families are more often perceived to be in less than excellent health, regardless of whether their CSNR is high or not (adjusted OR = 1.8; 95% CI = 1.44-2.26).

As far as hospitalizations are concerned, regardless of their cumulative score for neonatal risk, infants who live in a family with a moderately inadequate or very inadequate income are more frequently hospitalized during the first 5 months of their lives than infants in families with sufficient income (adjusted OR = 1.7; 95% CI = 1.30-2.25). The association between poverty and chronic health problems is also present (adjusted OR = 1.6; 95% CI = 1.17-2.22) regardless of whether the cumulative score for neonatal risk is high or not (Figure 3.3).

Figure 3.3 Three indicators of the infant's health in the first 5 months by level of sufficiency of household income and cumulative score for neonatal risk (CSNR)[1], 1998 (n=1,974)



1. The CSNR is the weighted sum of an infant's health problems at birth.
2. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

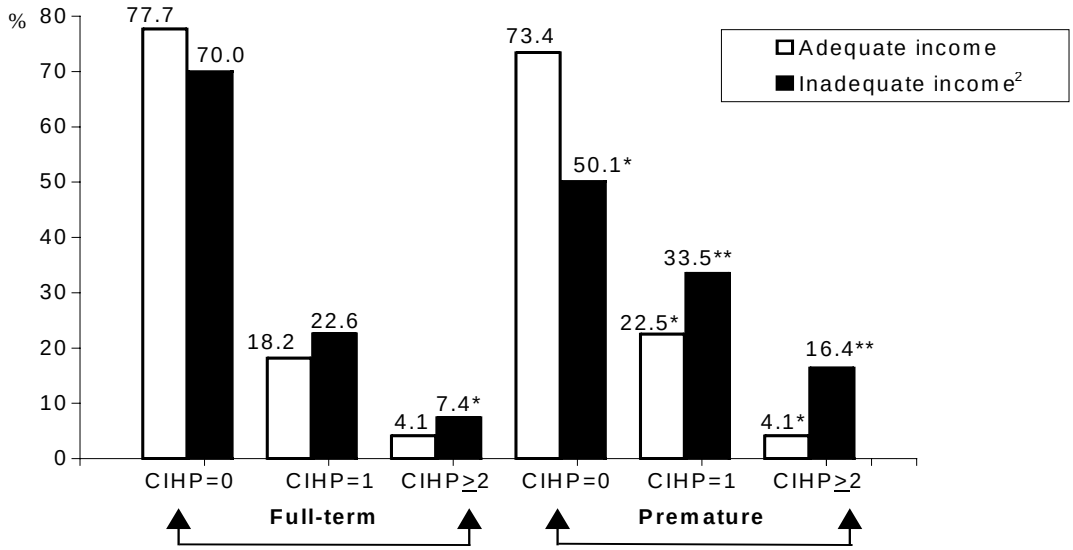
** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3.6.4 Poverty and cumulative index of health problems at 5 months (CIHP-5 months) by premature birth and intrauterine growth retardation (IUGR)

Figures 3.4 and 3.5 illustrate the relationship between level of sufficiency of household income and the cumulative index of health problems at 5 months by each of the conditions of health at birth. The association between poverty and the cumulative index of health at 5 months is strong and statistically significant for both an index of 1 and for an index of 2 or more, regardless of the conditions at birth. For premature babies, full-term babies (adjusted OR = 2.2; 95% CI = 1.49-3.27 for an index of 2 or more), babies presenting intrauterine growth retardation and for those whose intrauterine growth was normal (adjusted OR = 2.2; 95% CI = 1.50-3.30 for an index of 2 or more), living in a family whose income is moderately inadequate or very inadequate increases the probability of having a higher cumulative index of health problems at 5 months (Figures 3.4 and 3.5).

Figure 3.4 Cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income and premature birth, 1998 (n=2,120)



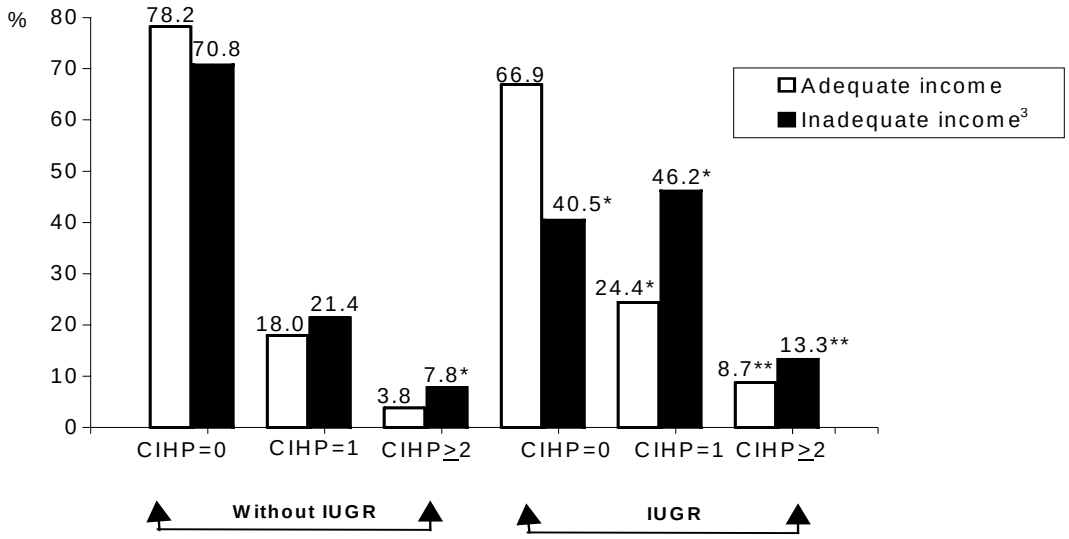
1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Figure 3.5 Cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income and intrauterine growth retardation (IUGR)[2], 1998 (n=2,121)



1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. IUGR below the 10th percentile: intrauterine growth retardation is based on weight and gestional age at birth, adjusting for the newborn's sex according to the most recent Canadian growth curve and established by Arbuckle and Sherman (1993).
3. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

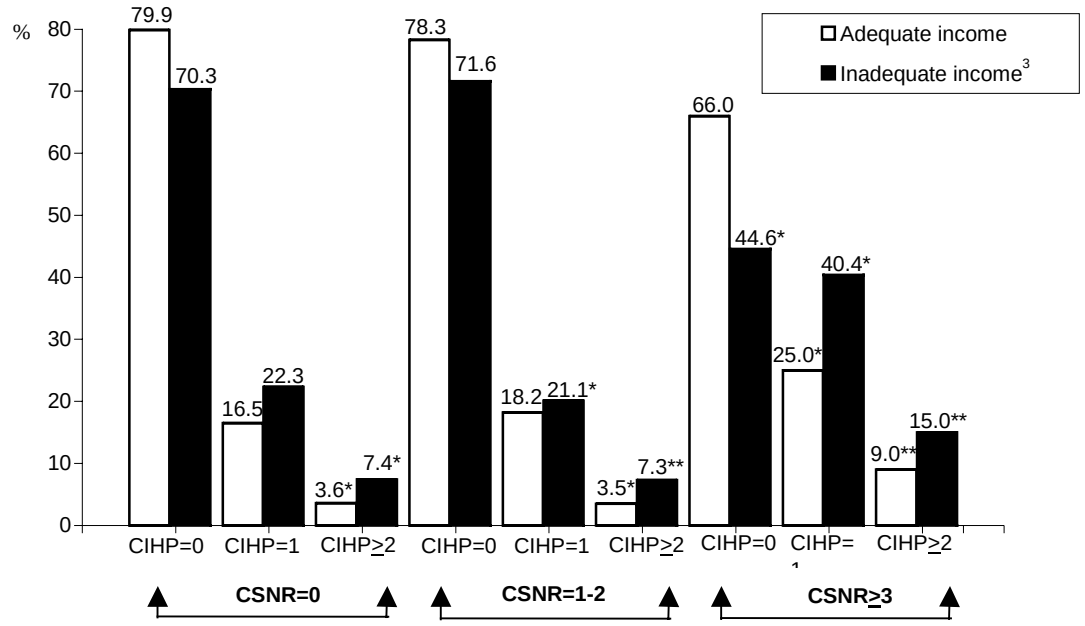
** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3.6.5 Poverty and cumulative index of health problems at 5 months (CIHP-5 months) by the cumulative score for neonatal risk (CSNR)

The significant association between poverty and an elevated CIHP-5 months persists when we stratify by the cumulative score for neonatal risk (CSNR). Among the infants born in good health, i.e. with a CSNR of 0, those living in a family with a moderately inadequate or very inadequate income present twice as high a risk of having a CIHP-5 months greater than or equal to 2 (7% vs. 3.6%), and almost 1.5 times higher of having a CIHP-5 months equal to 1 (22% vs. 17%) as compared to infants whose family has an adequate income (Figure 3.6). The risk that infants from families with a moderately inadequate or very inadequate income have a high CIHP-5 months also remains higher for those with a cumulative score for neonatal risk of 1 or 2 or even 3 or more (adjusted OR = 2.3; 95% CI = 1.51-3.44 for the CIHP-5 months of 2 or more).

Figure 3.6 Cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income and cumulative score for neonatal risk (CSNR)[2], 1998 (n=1,948)



1. The CIHP-5 months is the sum of the following indicators:at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. The CSNR is the weighted sum of an infant's health problems at birth.
3. Inadequate income includes "moderately inadequate" and "very inadequate" incomes.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

As we can see in Figure 3.6, among the infants presenting several health problems at birth (CSNR of 3 or more), those from a poor family are clearly more likely than the others to have at least one health problem at 5 months: this is the case for 55% of them as compared with only 34% of infants whose family enjoys an adequate income. However, the test of multiplicative interaction between the level of income sufficiency, the CSNR and the cumulative index of health problems-5 months is not significant (data not presented).

3.7 Results of the multivariate analysis

3.7.1 Poverty and mother's perception of baby's health at 5 months

The results of the logistic regression show that the level of income sufficiency remains strongly associated with perception of the baby's health when we control for the characteristics of the baby's health at birth and the mother's sociodemographic characteristics.[12]

Generally speaking, when the family income is inadequate, the risk that the baby will be perceived to be in less than excellent health is higher, families whose income is very inadequate are those most likely to have an infant whose health is perceived as less than excellent, regardless of the control variables introduced in the model (Table 3.9).

Moreover, infants who present a high cumulative score for neonatal risk (CSNR), i.e. 3 or higher, are more likely to be perceived as not being in excellent health. The introduction of the CSNR in the model barely modifies the odds ratios scores associated with level of income sufficiency and thus does not appreciably modify the relationship between level of income inadequacy and perception of the infant's health. In other words, the association between poverty and perception of the baby's health at 5 months is distinct from the effect of the infant's health conditions at birth.

12. It should be noted that the analysis deals with a number of subjects reduced by approximately 10%, i.e. the proportion of infants for whom the CSNR could not be calculated (see box). The comparison of different models, regardless of whether they integrate these cases, reveals that this does not change the meaning and the conclusions to be drawn from the results.

Table 3.9
Odds ratios (OR) adjusted by step and 95% confidence intervals (CI) of health perceived as less than excellent at 5 months by the mother by level of sufficiency of household income, 1998

	OR (95% CI)	OR (95% CI)	OR (95% CI)
Steps	(1)	(2)	(3)
Household income			
Sufficient	1	1	1
Moderately inadequate[1]	1.6 (1.17-2.19) †	1.6 (1.17-2.18) †	1.5 (1.09-2.06) †
Very inadequate[2]	2.0 (1.53-2.63) ‡	2.0 (1.53-2.64) ‡	1.8 (1.30-2.35) ‡
Cumulative score for neonatal risk (CSNR)[3]			
CSNR = 0		1	1
CSNR = 1-2		1.1 (0.86-1.36)	1.0 (0.83-1.32)
CSNR =3 or more		1.7 (1.27-2.41) †	1.7 (1,25-2.38) ‡
Mother's education			
College (junior) or university studies			1
Vocational or trade school diploma			1.2 (0.86-1.70)
High school diploma			1.1 (0.81-1.61)
No high school diploma			1.5 (1.09-1.97) †

1. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
2. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.
3. The CSNR is the weighted sum of an infant's health problems at birth.

† $p < 0.05$
‡ $p < 0.001$

Source: *Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

As far as the mother's education is concerned, we note that only infants whose mother has not completed high school are at a greater risk of being perceived as being in less than excellent health than those whose mother has a college or university level of education. The introduction of mother's education in the model slightly lowers the odds ratios associated with level of income sufficiency, but the relationship between income sufficiency and perception of the infant's health remains significant for all of the levels of income sufficiency. We can thus consider that the family's relative poverty and the mother's education each has its own effect on the perception of the baby's health.

Furthermore, the effect of other sociodemographic characteristics of the mother such as age, immigrant status and union status was considered separately for each of these variables, but also for all of these characteristics in the analyses. These variables did not appear to be significantly associated with the perception of the baby's health in the model and did not contribute to modifying the relationship between level of income sufficiency and perception of the baby's health (see Appendix Table A.6).

3.7.2 Poverty and cumulative index of health problems at 5 months (CIHP-5 months)

Finally, the analyses presented in Tables 3.10a and 3.10b indicate that, even in the presence of variables dealing with the infants' health condition at birth (CSNR) and the mother's sociodemographic characteristics, we still see a significant association between the level of household income sufficiency and the overall health status of infants at 5 months as measured by the cumulative index of health problems at 5 months. Babies whose family has a moderately inadequate income have a greater probability of having health problems according to the CIHP-5 months. This time, however, no significant association was observed between a very inadequate income and the cumulative index of health problems at 5 months, once the mother's characteristics are taken into account (Table 3.10b). In fact, the comparison of models 2 to 4 in Table 3.10b reveals that the inclusion in the model of the mother's education and union status negates the effect associated with a very inadequate income. This result is probably attributable to the high proportion of mothers with little education and without partner among the most economically disadvantaged households.

Model 4 in Table 3.10b also indicates that a CSNR greater than or equal to 3, the fact that the mothers had not completed high school and a mother's single-parent status each exert a net effect on the probability of having a high CIHP-5 score.

In conclusion, the effect of all of the mother's sociodemographic characteristics was also verified. Aside from education and union status, the other characteristics (age and immigrant status) did not prove to be associated significantly with the CIHP-5 months, once the other variables are taken into account. In addition, their inclusion in the model did not modify the relationship between level of income sufficiency and the CIHP-5 months (Appendix Table A.7).

Table 3.10a

Odds ratios (OR) adjusted by step and 95% confidence intervals (CI) of the score 1 versus 0 on the cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income, 1998

	Score 1 versus 0 on the CIHP-5 months			
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Steps	(1)	(2)	(3)	(4)
Household income				
Sufficient	1	1	1	1
Moderately inadequate[2]	1.7 (1.22-2.37)†	1.7 (1.22-2.37)†	1.6 (1.13-2.22)†	1.5 (1.07-2.12)†
Very inadequate[3]	1.3 (0.98-1.82)	1.3 (0.98-1.84)	1.2 (0.84-1.64)	1.0 (0.71-1.48)
Cumulative score for neonatal risk (CSNR)[4]				
CSNR = 0		1	1	1
CSNR = 1-2		1.1 (0.85-1.40)	1.1 (0.82-1.36)	1.1 (0.82-1.35)
CSNR =3 or more		2.1 (1.52-2.99)‡	2.1 (1.47-2.91)‡	2.0 (1.45-2.87)‡
Mother's education				
College (junior) or university studies			1	1
Vocational or trade school diploma			1.2 (0.81-1.68)	1.2 (0.81-1.69)
High school diploma			1.4 (1.00-2.02)	1.4 (0.99-2.01)
No high school diploma			1.5 (1.05-2.02)†	1.4 (1.04-1.99)†
Union status				
Lives with a partner				1
Does not live with a partner				1.5 (0.97-2.30)

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
3. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.
4. The CSNR is the weighted sum of an infant's health problems at birth.

† $p < 0,05$

‡ $p < 0,001$

Source: *Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

Table 3.10b

Odds ratios (OR) adjusted by step and 95% confidence intervals (CI) of the score 2 versus 0 on the cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income, 1998

	Score 2 versus 0 on the CIHP-5 months			
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Steps	(1)	(2)	(3)	(4)
Household income				
Sufficient	1	1	1	1
Moderately inadequate[2]	2.4 (1.40-4.12)†	2.4 (1.38-4.10)†	2.3 (1.29-3.97)†	2.0 (1.12-3.52)†
Very inadequate[3]	2.2 (1.33-3.57)†	2.2 (1.35-3.64)†	1.7 (0.97-2.92)	1.2 (0.63-2.22)
Cumulative score for neonatal riks (CSNR)[4]				
CSNR = 0		1	1	1
CSNR = 1-2		1.0 (0.62-1.56)	0.9 (0.58-1.47)	0.9 (0.57-1.46)
SCRN = 3 or more		3.0 (1.74-5.03)‡	3.1 (1.82-5.32)‡	3.0 (1.75-5.16)‡
Mother's education				
College (junior) or university studies			1	1
Vocational or trade school diploma			0.5 (0.24-1.27)	0.6 (0.24-1.30)
High school diploma			0.6 (0.26-1.29)	0.6 (0.25-1.25)
No high school diploma			1.8 (1.10-3.07)†	1.8 (1.06-2.98)†
Union status				
Lives with a partner				1
Does not live with a partner				2.5 (1.32-4.62) †

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year of 1997.
3. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year of 1997.
4. The CSNR is the weighted sum of an infant's health problems at birth.

† $p < 0,05$

‡ $p < 0,001$

Source*: Institut de la statistique du Québec*, *ÉLDEQ 1998-2002*.

4. Discussion and conclusion

The data from the first ÉLDEQ survey reveal that a relatively high percentage of Québécois infants (28% of them) aged approximately 5 months in 1998 lived their first months of life in conditions of poverty. In that year, more than one in ten (12%) were living in a family with a moderately inadequate income and approximately one in 6 (16%), in a family whose income was very inadequate. These babies born to poor families were sick more often than babies born to families whose income was above the low-income threshold. In fact, the results of our analyses clearly show that a moderately inadequate or very inadequate family income is strongly associated with poor health of infants for the majority of indicators of health in the study. In addition, infants born to poor families are also more likely to accumulate several health problems as shown in the cumulative index of health problems at 5 months. Only the fact of having suffered an injury, which happened in 1% of the cases, did not prove to be associated with the level of sufficiency of the household income.

The relationship between poverty and the infant's health remains significant when we take into account the infant's health at birth. Thus, whether the infant is full term or premature, with or without intrauterine growth retardation (IUGR) and whether he has a high cumulative score for neonatal risk (CSNR), he is in poorer health if his parents have an income considered to be inadequate, meaning an income below the low-income threshold or a very inadequate income. While those infants who are born prematurely or with an intrauterine growth retardation or those with a high CSNR are more likely to present health problems at 5 months, there was no confounding effect or interaction observed between their health at birth and their family's level of poverty with regard to their health status at 5 months. This result may be the consequence of the small numbers on which the analysis is based. This being said, it should be borne in mind that a few babies died between birth and 5 months or were too sick to participate in the study. Moreover, those who were born earlier than 24 weeks were excluded from the population studied. It is possible that these babies, among the sickest, were often from the poorest families. In addition, the birth records for which there was no consent were also those of babies from the most disadvantaged families and who presented the greatest element of risk. It should, however, be pointed out that the proportion of cases excluded in this manner remains relatively low.

The multivariate analysis did underscore the robust nature of the results observed concerning the importance of parents' poverty for the health of the infants targeted by the ÉLDEQ, since the effect of inadequate income persists even when the mother's level of education and the baby's health at birth is taken into account. However, having a mother who did not complete high school or who does not live with a spouse represents additional risk factors for the infant, as indicated by the analysis of the mother's perception of the baby's health and that dealing with the cumulative index of health problems at 5 months. On the other hand, neither the mother's age nor her immigrant status is associated with the infant's health once level of sufficiency of household income has been taken into account. Thus, the family's poverty appears to be a determining element for the infant's health beyond these characteristics of the mother.

The effect on the health of the babies in the study of a very inadequate income did not appear to be greater than that of a moderately inadequate income, except in the case of growth retardation which is also associated with the parents' immigrant status. In the bivariate analyses, we even see that there are relatively fewer babies born to families with very inadequate income who had been hospitalized for at least one night since their birth than those born to families with a moderately inadequate income. This result, contrary to expectations, could be explained by a different use of health services

according to levels of poverty, where very poor people generally resort less often to health services. This result could also reflect, at least in part, the absence of the relation observed between severity of poverty and the CIHP-5 month, given that this index includes hospitalizations among its elements.

In our opinion, however, the results obtained may be partially explained as well by the low rate of responses among the least educated mothers and those who speak neither French nor English at home and that this is true in spite of the adjustment made for non-response in the present study (see issue 1 in this collection). In fact, the infants in the non-respondent households belonging to these groups may present a different health profile than that observed in the respondent households. Moreover, it should be borne in mind that the data on acute health problems (colds, ear infections, gastro-enteritis), that are more frequent in poor children, will be available only beginning with the 1999 ÉLDEQ survey. Access to this data as of 1998 could have led to painting a somewhat different health profile for infants according to poverty level.

In spite of these limits, it appears that already at 5 months, among the infants targeted by the study, those born to families that are economically disadvantaged have more health problems than other infants, regardless of their health conditions at birth. Thus, in addition to having an influence on the health of babies at birth, family poverty also affects them during the months that follow. Moreover, this association between family poverty and the infant's health persists even when controlling for the mother's level of education and union status. These health problems can interfere with their future development, especially if they accumulate and if they become chronic, which seems to be the case for poor children.

This analysis, however, does not indicate to us what are the mechanisms through which low income is associated with poor health in babies. The data from the subsequent years of ÉLDEQ will allow us to define the economic mobility of families and to analyze the links between duration of poverty and infant health. The information gathered on infant diet, housing, child care services, or that obtained on the parents' physical and mental health and on family functioning will help to shed light on some of the mechanisms related to the associations observed.

Already the data from the 1998 ÉLDEQ survey has enabled us to identify some avenues for intervention. Thus, to prevent the greater frequency of health problems among poor infants, it is important to ensure that their parents have a sufficient family income that will enable them to satisfy their babies' needs, that is an income above the low-income threshold. To achieve this goal, we need a policy that would be more favourable to families with young children, including financial assistance measures.

As far as health services are concerned, the results of our analyses imply that it is not enough to prevent premature births or low birth weights, nor to follow infants presenting these difficult conditions at birth closely to ensure the good health and proper development of babies born to disadvantaged families. In fact, it is important to pay particular attention to infants from all poor families, as well as from those in which the mother has little education or lives on her own.

Standard of Living, Health and Development

Part II

Social Inequality and Child Development

1. Introduction

The analysis provided in the following pages will try to identify factors likely to protect infants from health problems linked to low socio-economic status, thereby laying the groundwork for the development of preventive measures. Three objectives have been used as guides. First, we need to establish the social position of Québec families with infants in order to produce a valid measure of this basic determinant. Second, we will confirm the existence or absence of a socioeconomic gradient in infant health, while describing the principal factors affecting this relationship. Third, we hope to begin to understand the differences between the family and community influences on infant health.

Several studies have revealed the influence of living conditions in childhood on the health status in adulthood. (Bartley *et al.,* 1997; Forsdahl, 1977, 1978; Kaplan & Salonen, 1990; Lynch *et al.,* 1994; McCain & Mustard, 1999; Power *et al.,* 1991, 1998; Wadsworth, 1991). These studies have shown that adults are more likely to experience health problems if they were socially and economically disadvantaged as children. This link applies in the case of heart disease, being overweight, short stature and higher rates of mortality and morbidity in adults.

The relationship between a poor health status and belonging to the lowest socioeconomic classes has been under study for some time. Differences in health across socio-economic groups have been reported on a regular basis since the beginning of the last century (Power *et al.,* 1991). The first reports dealt with mortality rates, and similar results were obtained for morbidity. Data from several countries show gradients that are tied to socioeconomic status (Curtis *et al.,* 1989; Feinstein, 1993; Marmot & Wilkinson, 1999; Wadsworth, 1991; Wilkinson, 1986). The gaps are particularly marked during the perinatal period, in early childhood and in adulthood (between 35 and 55 years of age) (Davey-Smith *et al.,* 1990; Feinstein, 1993; House, 1990; Marmot *et al.,* 1987; Marmot & Wilkinson, 1999; Morris, 1959).

The relationship between health and socioeconomic status does not appear to be attributable solely to extreme deprivation at the lower reaches of the social scale (ICRA, 1991; Marmot *et al.,* 1987; Marmot & Wilkinson, 1999). In fact, we observe progressive and uninterrupted differences in health levels across social classes in every country where researchers have been able to measure them. We can therefore speak of health in terms of a social gradient. Overall, an individual in a higher social stratum will be in better health than someone in the next lower level, even if the latter enjoys better health than the rest of the population having still less income and lower socioeconomic status. In other words, most measures of mortality and morbidity are tied directly to the socioeconomic status of the individuals surveyed. This gradient has been observed in all industrialized countries, although varying in amplitude (Ferland & Paquet, 1995; ICRA, 1991; Marmot *et al.,* 1987; Marmot & Theorell, 1988; Marmot & Wilkinson, 1999; Renaud & Bouchard, 1995; Syme, 1998).

The persistence of this socioeconomic health gradient suggests that, for the most part, illness can be, to a large extent, attributed to the social, economic and cultural environment. In addition, several studies show that being in good health is not just a function of lifestyle (smoking, diet, etc.), even though these factors also follow the gradient of socioeconomic status. If all members of society adopted a healthy lifestyle, the overall life expectancy would necessarily increase, but the gradient of health status tied to social class would remain (ICRA, 1991; Marmot *et al.,* 1987; Marmot & Theorell, 1988; Marmot & Wilkinson, 1999; Renaud & Bouchard, 1994; Syme, 1998). The degree to which quality of life can be controlled is fundamental to achieving better health (Antonovsky, 1987; Bosma *et al.,* 1997; Sapolsky, 1992). How can this sense of control be developed or reinforced? The available data suggest two main priorities for intervention: first, to begin during infancy, and second, to strengthen the fabric of society, which encourages a sense of control over one's destiny and the destiny of the community as a whole (Marmot, 1998; Marmot & Wilkinson, 1999; McCain & Mustard, 1999; Syme, 1998).

It is worth noting that in spite of the abundance of studies dealing with the relationship between infant mortality and socioeconomic status, few surveys have looked at the role of socioeconomic status on rates of child morbidity. This is explained in part by the methodological demands of such studies, which require very large samples, because the great majority of children are in good health. In addition, measuring morbidity poses certain problems. These factors probably explain the rarity of relevant, official statistics on the health of children. It should be noted, however, that the creation of three large British cohorts has generated more interest in this field of study. They are made up of children born during three specific periods: a week in March of 1946, another in March 1958 and one in April 1970. In addition, the National Study of Health and Growth, established in Great Britain in 1972, followed children through primary school. Overall, these studies have shown that the lower social classes demonstrate, on average, a high level of physical and mental health problems, more illness and symptoms of obesity, a poor perception of their health status, as well as shorter stature. Varying levels of health are also tied to social indicators; in particular, type of housing (property owner or tenant), profession, and income and education levels (Power, 1992; Power *et al.,* 1991, 1998, 1999; Wadsworth, 1991; West *et al.,* 1990, Wilkins *et al.,* 1999).

Another longitudinal study, the Mater-University of Queensland Study of Pregnancy (MUQSP), conducted in Australia, provides data on the impact of socioeconomic status on children's health (Bor *et al.,* 1993). The initial sample consisted of 8,556 pregnant women. Among their babies, 70% were successfully followed to 5 years of age. The results provide a consistent model, in which the child living with an underprivileged mother suffers from poorer health. Children living in underprivileged families also make greater use of the health services system, have the highest rate of chronic illness and suffer the worst dental health.

We are beginning to have a better understanding of the fundamental relationships between standards of living during childhood and learning, social maladjustment and vulnerability to health problems in adulthood (Keating & Mustard, 1993; Lundberg, 1993; McCain & Mustard, 1999; Menahem, 1994; Paquet, 1998; Power *et al.,* 1991 and 1992; Serbin *et al.,* 1998). Level of education is thus closely linked to the social and affective experience of childhood, and these two factors explain a good deal of the social and health problems experienced in adult life. This suggests a cumulative effect, for which we are now beginning to identify predictive factors. There is thus a greater understanding of the crucial role that prevention plays in encouraging equal social and economic opportunity as well as improved health (Eming Young, 1995; Keating & Mustard, 1993; McCain & Mustard, 1999; Paquet, 1998; Syme, 1998).

2. Methodological Considerations

As mentioned above, the analysis that follows aims to identify factors that protect infants from health problems linked to low socioeconomic status. In order to reach this objective, ÉLDEQ data collected in 1998 on 2,223 infants[13] have been used in three important parts of the study.

2.1 Determining the social position (socioeconomic status) of each family

We do not have a standard definition of a family's social position, but it would necessarily be characterized by the resources that the family has access to, the deprivation they suffer or their material, social and cultural opportunities (Bertaux, 1977; Bourdieu, 1980). Social position is not defined by a single criterion, but rather by the interaction of a series of accumulated resources and handicaps (Chauvel, 2000). The observation of income alone does not allow us to tease apart more sensitive categories, adding to the problems, nor does it provide a definition of the social power of certain individuals or families within social structures. "Each researcher is therefore obliged to make a determination of an individual's social position, expressed not on a single scale but in multi-dimensional space." (Chauvel, 2000).

In order to take into account the many dimensions of a family's social position (this being the study's main independent variable), we have used an index of the family's socioeconomic status (SES). The index was developed by *Direction Santé Québec* according to a method refined by Willms for the National Longitudinal Survey of Children and Youth (NLSCY) (Willms & Shields, 1996). The index captures five dimensions: gross household income, level of education of the person closest to the child (PMK) and their partner (where applicable), as well as the prestige associated with the profession of each. In the 1998 ÉLDEQ survey, the index varied continuously from –2.8 (very low SES) to 3.7 (very high SES) (Desrosiers *et al.,* 2001). For the purposes of our analysis, the SES values were aggregated into quintiles. This index proved to be very useful in analyses of NLSCY data concerning the relationship between a family's social position, health and child development (Paquet, 2001; Tremblay *et al.,* 1996).

13. For more information on the target population or the data collection instruments used in the 1998 ÉLDEQ survey, see the methodological review at the beginning of this document.

2.2. Confirming the existence of a socioeconomic gradient in children's health

The study set out to confirm the existence of an association, in the form of a gradient, in the health of Québec children at the age of 5 months. At the same time, it would identify the main factors that modulate the relationship between a family's social position and the health of its children.

Theoretical considerations from the field of health and social services, preliminary work from other ÉLDEQ research teams and the availability of ÉLDEQ variables and indicators laid the groundwork for the selection of dependent and control variables (see also below). For example, many studies have already shown that the declared health status is a very good predictor of morbidity and mortality, and that it is associated with the use of health care services. As concerns the selection of potential explanatory variables or confounders, this has for the most part been based on the work of other ÉLDEQ research teams (see the various issues in Volume I of the ÉLDEQ 1998-2002 collection), which has allowed previously observed, statistically significant associations with level of education, parental income or various indicators of child health to be used as points of departure.

Five indicators of the health of 5-month olds were selected for analysis:

- The perception of a child's health by the PMK (rated as excellent, very good, good, fair or poor);
- The PMK's rating of the child's health during the months preceding the survey (rated as being in good health almost all the time, often, about half the time, sometimes or almost never);
- A health indicator combining the previous two variables; whether or not the child has been perceived by the PMK as being in excellent or good health almost all the time;
- The child's admission to a hospital for at least one night at any time since his or her birth;
- A cumulative index of health problems at the age of 5 months, CIHP-5 months).

The five indicators were developed from information provided in the section "Child" included in the Computerized Questionnaire Completed by the Interviewer (CQCI), used in the 1998 edition of the ÉLDEQ. The CIHP-5 months was developed by Séguin *et al.* (see the first section of this issue). Briefly, this includes health problems in the first 5 months of life: hospitalization, growth retardation and many chronic health problems.

We have also selected the following protection or risk factors. They are control variables that could be confounders or explain the link between socioeconomic status and the health of children[14]:

- Family type: single-parent family or other (Desrosiers, 2000);
- Family functioning: dysfunctional or functional (Japel *et al.,* 2000b);
- Feeding practices at birth (breastfed or not, irrespective of the duration) (Dubois *et al.,* 2000);
- The duration of breastfeeding (having been breastfed for at least 4 months) (Dubois *et al.,* 2000);
- The mother's tobacco use at the time the child is 5 months old (Japel *et al.,* 2000a).

Since it is common to find significant differences in child health between the sexes (boys do not fare as well as girls), the analysis has also taken the sex of the child into consideration.

Bivariate analyses (chi-square tests) were first carried out in order to confirm if family social position (SES) is associated with indicators of health of 5-month olds.

Since child health is not exclusively a function of socioeconomic status, a second series of bivariate analyses describes links between family social position and the chosen risk or protection factors. The latter tend to act as confounders *vis-à-vis* the link between family social position and infant health.

Multivariate analyses were then used to control this effect. More specifically, five logistic regression models were developed in order to determine the net contribution of the SES to the health of 5-month olds, once all the above risk and protection factors had been taken into account.

14. This is not an exhaustive list, because including all the factors linked to one or another of the elements of socio-economic status (the parents' level of education, socio-professional category of the parents or household income) would have led to using factors that are strongly correlated. For example, a correlation between parent exhibiting symptoms of depression and problems in family functioning. We have therefore included variables that would be the most useful, given our objectives and literature from the field of health and social services.

2.3 Comparing family and community influences on infant health

Health differences among social classes raise questions about the role of place of residence (the neighbourhood, the region, etc.) in child health. Do variations indicate only differences among inhabitants characteristics of the various neighbourhoods under study? A recent study based on NLSCY data suggests that, at least for disadvantaged communities, one's family setting has more influence over health than one's community (Boyle *et al.,* 1998).

In order to reach a better understanding of the impact of socioeconomic conditions on child health, individual factors (composition) and geographic factors (context) should be disentangled. Preliminary analyses were conducted in order to qualify socioeconomic aspects of geographical areas inhabited by the children in the survey. More specifically, an index was developed to describe how underprivileged each household in the target population was, based on specific attributes of their area of residence (for example, the percentage of single-parent families, the presence of parents with limited education, etc.) (Pampalon & Raymond, 2000). This index was then cross-tabulated with indicators of infant health.

3. Results

3.1 Health of 5-month olds and their family's social position

Indicators of the health of babies around the age of 5 months vary positively with the socioeconomic status of their parents. As indicated in Table 3.1, the higher the family's social position, the better the infant's health (as measured by the indicators). In addition, the indicator for the perception of child health appears to follow, almost in step, the social position of the parents. All differences between SES quintiles are admittedly not statistically significant, but the trend nevertheless appears at this very young age.

Among infants of about 5 months of age living in families with a socioeconomic status in the three lowest quintiles[15] of the index, the health of about 10% was perceived by the PMK as not excellent, compared to only 4.2% in the two higher quintiles. Again according to their PMK's, 5-month old babies living in socially and materially deprived families (quintiles 1 and 2) are proportionally more likely to have not been in good health most of the time since birth. This applies to about 18% of this group, as compared to less than one in ten (9%) among less deprived families (quintiles 3, 4 and 5).

[15] 15. In order to simplify the presentation of results, and taking into account the small samples in some categories, some quintiles were regrouped. These data are not presented in the tables and figures. In all cases, the groups formed by the reorganization of some quintiles differ significantly at a threshold of 0.05.

Table 3.1
Various indicators of the health of 5-month old infants by family socioeconomic status, 1998[1]

	Socioeconomic status					
	Quintile 1 (low)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (high)	Total
	%					
Perceived health: less than excellent	13.2	9.3 *	6.8*	4.0*	4.4*	7.6
Health perceived as good during the months preceding the survey: other than almost all the time	17.9	18.4	10.1*	7.5*	8.5*	12.5
Combined perceived health (the two previous variables combined)	22.1	19.9	13.1	8.9*	10.3	14.9
At least one overnight hospitalization since birth	18.1	17.6	9.0*	9.3	9.3	12.7
CIHP at 5 months[2]: 1 problem or more since birth	32.0	30.0	22.7	20.3	20.3*	25.0

1. All the Chi-square tests (χ^2) are significant to a threshold of 0.001.
2. A cumulative index of health problems at 5 months (Séguin *et al.,* 2001; see the first section of this issue).

* Coefficient of variation between 15% and 25%; to be interpreted with caution.
** Coefficient of variation greater than 25%; rough estimate provided only as a guide.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

By combining the last two indicators (health as perceived by the PMK), we find that the health of 21% of infants in underprivileged families (quintiles 1, 2) has not been excellent or good, whereas the result is 11% in wealthier environments (quintiles 3, 4 and 5). We also find significant differences in overnight hospitalization: only about 9% of children from better-off families (quintiles 3, 4 and 5) have already spent at least one night in a hospital, compared to 18% among underprivileged families (quintiles 1 and 2). The cumulative index of health problems at 5 months of age, developed by Séguin *et al* (see Section 1 of this issue), reveals similar social discrepancies: about 31% of children from the most socially deprived families (quintiles 1 and 2) suffered at least one health problem since birth, as compared to only 21% in families enjoying a higher social position (quintiles 3, 4 and 5).

3.2 Looking for risk and protection factors likely to influence links between the health of 5-Month olds and family social position

The results obtained from bivariate analysis of factors likely to modulate the relationship between family social position and health indicators of babies about 5 months old are presented below.

The analysis brought out statistically significant relationships that confirmed results from the literature: the lower the family's social position, the more likely it was to be a single-parent or dysfunctional family; the less likely the child was to have been breastfed at all or the breastfeeding lasted less than 4 months; and the more likely the mother had engaged in tobacco use. These factors appear to follow, almost in step, the socioeconomic level of the families.

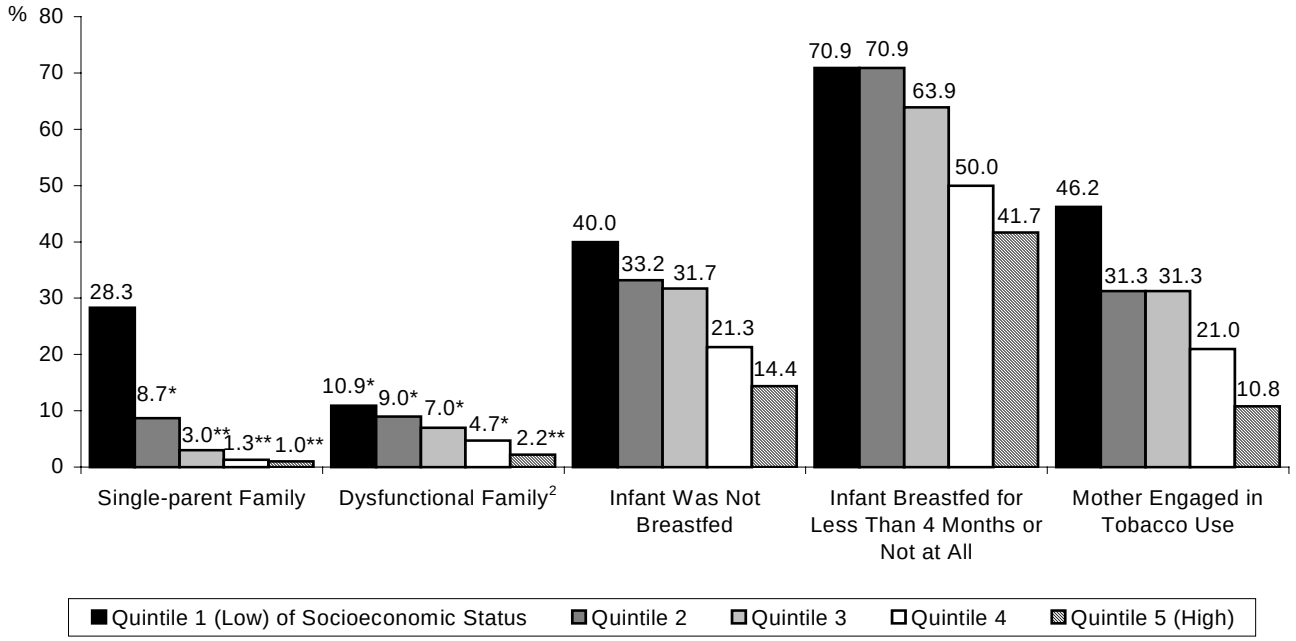
The differences between the SES quintiles are not, however, statistically significant for 5-month old babies. It will be interesting to see if this phenomenon will be confirmed in future studies (Figure 3.1).

We therefore find that among babies in the category of greatest deprivation (quintile 1), about 28% live in single-parent families, while the rate is much lower (6 %) in quintiles 2 and 3,[16] and barely 1% in the top two quintiles combined. The proportion of dysfunctional families is also higher (9%) in the lower socioeconomic categories (quintiles 1, 2 and 3) than in the higher groups (3% in quintiles 4 and 5). Children are more likely to have gone without any breastfeeding, or to have been breastfed less than 4 months, in families in the lower socioeconomic groups. In the lower categories (quintiles 1, 2 and 3), 35% have never been breastfed and 69% were breastfed less than 4 months, compared to only 18% and 46%, respectively, in higher categories (quintiles 4 and 5). Finally, relatively speaking, babies whose mothers engaged in tobacco use when they were 5 months old[17] were clearly more numerous in families in the lower SES quintile than in families of less deprived quintiles.

16. In order to simplify the presentation of the results, and taking into account the small samples in some categories, some quintiles were reorganized. These data are not presented in the tables and figures. In all cases, the groups formed by by the reorganization of some quintiles differ significantly at a threshold of 0.05.

17. Eighty percent of these mothers smoked during the pregnancy.

Figure 3.1 Characteristics of infants and their families by quintile of socioeconomic status, 1998[1]



1. All the Chi-square (χ^2) are significant to a threshold of 0.001.
2. For information on the construction of this variable, see issue 9 in this collection (Japel *et al*., 2000b).

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

** Coefficient of variation greater than 25%; rough estimation provided only as a guide.

Source : *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3.3 Multivariate analysis of relationships between the health of 5-month olds and family social position

The multivariate analyses presented here provide an opportunity to reconsider the links between family social position and health indicators for infants of about 5 months of age. Five logistic regression models were developed in order to identify those factors that were likely to mitigate the associations observed between family social position and 5-month old infant health. As we have seen in the preceding results, specific factors must be controlled, since they could be explanatory factors or confounders of social health differences. These include living in a dysfunctional or single-parent family, not being breastfed (or having been breastfed for less than 4 months) or having a mother engaging in tobacco use.

Logistic regression models were used to determine if health differences among 5-month old infants can be entirely or partially attributed to these factors, rather than to the influence of social position. In other words, if all social classes had the same proportion of 5-month old infants who have been breastfed for 4 months, the same proportion who were living in single-parent or dysfunctional families or a similar proportion whose mothers engaged in tobacco use, would health indicators still be associated with social position? Finally, since it is generally recognized that girls enjoy better health than

boys, the infant's gender also merits consideration as an explanatory variable (rather than as a confounder) in the analyses.

The results of the regression analyses have been presented as odds ratios. A factor was considered a confounder if it altered the relationship between 5-month old baby health and family social position, whether or not the relationship remained significant. It should be noted that when this data, which is cross-sectional in the first survey, shows a relationship between variables, this does not demonstrate causality, even if we have controlled for demographic, risk or protection factors.

The first multivariate analysis deals with links between a PMK's perception of the health of their 5-month old infant and the family's social position, taking into account the model's six control factors. This type of analysis allows a closer examination of the variation of the probability that an infant's health be perceived as less than excellent as a function of family social position, while controlling for the six factors. The results show that social position remains positively associated with perceived infant health. As indicated in Table 3.2, the results show that a lower family social position is associated with greater likelihood that the infant's perceived health is less than excellent (good to poor), even when we control for the six risk, protection and demographic factors. In addition, the gaps between different levels of socioeconomic status remain approximately the same, whether or not we take these factors into account.

A second analytical model was developed to examine links between infant health reported by the PMK as good in the months preceding the survey and the family's social position (taking into account the control factors). The results show a statistically significant relationship, as we expected. Infants from lower socioeconomic status families have a clearly higher probability (odds ratios of 2.2 and 2.3 for the lower quintiles) of not having been in good health since birth (as perceived by the PMK). The third model looks at the relationship between a health indicator combining the two previous variables and the family's social position. The results again show a significant relationship, as expected, even when the effects of the six control variables are included. The analysis shows that the more likely it is that an infant is not perceived by the PMK to be in excellent or good health almost all the time, the lower the family's social position. It is significant that for all three indicators of perceived health, the probability of not being in good health is significantly higher for children living in dysfunctional families. We will return to this point further on.

The fourth model analyzes the relationship between an infant having been kept overnight in a hospital since birth and family social position. Again, the results indicate a statistically significant relationship, as expected, even when the effects of control variables are included. A lower social position is associated with a higher probability of at least one overnight hospital stay since birth. It should nevertheless be noted that the gap between lower and higher socioeconomic levels is less when we control for single-parent families and for whether or not the infant was breastfed for the first four months of life. Children in quintiles 1 and 2 remain, however, disadvantaged as compared to those from quintiles 4 and 5.

Table 3.2
Explanatory Factors Relating Family Social Position to 5-Month Old Infant Health (Estimated Odds Ratios), 1998

		(1) Perceived Health: Less than Excellent		(2) Good Perceived Health During the Months Preceding the Survey: Other than All the Time		(3) Combined Perceived Health (1 or 2)		(4) At Least One Overnight Hospital Stay Since Birth		(5) CIHP at 5 months[1] One or More Problems Since Birth	
Variable[2]	**Category**	**OR**	**Confidence Intervals (95%)**	**OR**	**Confidence Intervals (95%)**	**OR**	**Confidence Intervals (95%)**	**OR**	**Confidence Intervals (95%)**	**OR**	**Confidence Intervals (95%)**
SES	1 (low)	3.07	(1.70 ; 5.54)	2.17	(1.40 ; 3.37)	2.28	(1.51 ; 3.44)	1.58	(0.97 ; 2.56)	1.43	(0.99 ; 2.06)
(5: high)	2	2.13	(1.20 ; 3.79)	2.31	(1.48 ; 3.61)	2.05	(1.35 ; 3.12)	1.77	(1.13 ; 2.78)	1.51	(1.07 ; 2.13)
	3	1.51	(0.82 ; 2.78)	1.19	(0.73 ; 1.92)	1.26	(0.81 ; 1.95)	0.85	(0.53 ; 1.36)	1.07	(0.76 ; 1.50)
	4	0.89	(0.46 ; 1.75)	0.82	(0.49 ; 1.34)	0.80	(0.50 ; 1.26)	0.95	(0.60 ; 1.48)	0.96	(0.69 ; 1.34)
Sex	Male			1.37	(1.03 ; 1.82)	1.41	(1.07 ; 1.86)	1.44	(1.06 ; 1.96)	1.41	(1.14 ; 1.75)
(Female)											
Family Type	Single-parent							1.57+[3]	(0.96 ; 2.58)	1.58+	(1.06 ; 2.35)
(Nuclear)											
Family functioning	Dysfunctional	2.01	(1.16 ; 3.49)	1.80	(1.11 ; 2.91)	1.88	(1.21 ; 2.94)				
(Functional)											
Duration of breastfeeding	Less than 4 months							1.64+	(1.22 ; 2.22)	1.29+	(1.03 ; 1.60)
(At least 4 months)											
Breastfeeding	Not at all										
Mother's tobacco usage	Tobacco use										
(No tobacco use)											

Note: Only odds ratios associated with significant variables (one or more parameters differ from 1; a reference category) at a threshold of 0.05, and those associated with confounders are provided. The '+' symbol signifies a confounder (for more information, see the body of the text).

1. Cumulative index of health problems at 5 months of age (Séguin *et al.,* 2001; Section 1 of this issue).
2. The reference category for each variable is given in parentheses.
3. A parameter that is not significantly different from 1 (reference category) at a threshold of 0.05.

Source : Institut de la statistique du Québec, ÉLDEQ 1998-2002.

The fifth and last model looks at the relationship between the cumulative index of health at 5 months and family social position. As indicated in Table 3.2, children in quintiles 1 and 2 are more likely to have had health problems in the first few months of life. Again, the results show that this link is altered by two factors: the type of family (nuclear, single-parent or other) and a child who was breastfed for at least 4 months.

The results of the multivariate analysis therefore show a persistent relationship between the health of 5-month olds and family social position, even when the family type, family functioning, breastfeeding practices and tobacco use of the mother are taken into account.

Finally, it should be noted that in all models, boys show a higher probability of being perceived by the PMK as being less healthy, having been kept overnight in a hospital or having been diagnosed with a health problem (CIHP-5 months). This observation holds across all socioeconomic groups. On the other hand, a mother's tobacco use and the type of feeding (having been breastfed or not, independent of how long) do not appear to be significant in any of the models integrating socioeconomic status. This is undoubtedly a result of direct relationships between behaviour and social position.

As a complement to these analyses, we have run tests for interactions between demographic, risk and protection factors and socioeconomic status. The relationship between health variables and SES was tested to see if it is the same for dysfunctional and functional families, for children who were breastfed and those who were not, etc.[18] A significant interaction ($p = 0.02$) was found between family functioning and SES for the indicator of perceived health during the months preceding the survey. This interaction suggests that the relationship between SES and perceived health holds for functional families but was not observed in dysfunctional families. The probabilities of not being in good health are nevertheless higher in this group than in functional families, independent of the family's social position. The same trend is observed for the combined indicator of perceived health, even if the interaction is not statistically significant ($p = 0.06$). Finally, it was not possible to derive reliable estimates of interaction parameters for the first indicator of perceived health, because there were very few families considered functional in the fifth (highest) quintile. An examination of observed proportions of functional and dysfunctional families taken separately nevertheless leads to the same observation; social position does not appear to play a role among dysfunctional families. This result clearly merits further study.

3.4 Community characteristics and child health

Preliminary attempts to distinguish the effect of individual or family variables on child health from those of residential area have not led to conclusive results, so the data have not been provided[19] In part, this result can be attributed to the small number of respondents and the low rate of health problems among 5-month old infants. Contrary to older demographic groups, children in general, and infants in particular, enjoy lower rates of health problems. We have nevertheless prepared the way for subsequent studies, in which morbidity rates will presumably rise and become more diversified. We expect that the maturation of the ÉLDEQ children will provide an increasingly useful data stream, providing direction for future research and the development of policies for preventive intervention.

18. It should be noted that the interaction between family type and SES was not studied, because there were too few children in these categories to produce a reliable estimate of the interaction.

19. The authors can provide details on this analysis on request.

4. Conclusion

Our analysis of the ÉLDEQ data shows a positive association between the health of 5-month olds and family socioeconomic status. The higher the social position of the family, the better the perceived state of the infant's health. This indicator moves almost in step with the social position of the family. For a cohort of 5-month olds, none of the differences between quintiles of socioeconomic status are statistically significant. It will be interesting to see if this continues to hold true later in life. Other indicators confirm that infant health is worse in families of lower social position, particularly in the two lowest quintiles.

Relationships also persist between family social position and health indicators for 5-month old infants, even when other effects are taken into account, such as the mother's tobacco use, breastfeeding practices, family functioning and family type. In other words, the observed health differences can be explained by another distribution of these factors within the various socioeconomic categories. Even taking these factors into account, being a member of a family with a higher social position is related to better health for 5-month old babies. For the indicator of an overnight stay in hospital and the cumulative health index, only four months of breastfeeding and family type (nuclear, single-parent, etc.) appear to explain some of the differences observed between socioeconomic categories. Breastfeeding for at least four months and living in family of type other than single-parent are likely to constitute protective factors for infants in underprivileged families. This results should be of interest to public health professionals.

With respect to perceived health, it should be noted that babies living in families that cannot be considered functional appear to fare less well than others, no matter what social position the family enjoys. This result would certainly merit more study with data from future ÉLDEQ surveys.

We cannot speak of causal links with the cross-sectional data, but the longitudinal data will provide opportunities to see how these different factors interact and influence the health and development of children. As the cohort matures, we will be able to study how family social position is associated with the other aspects of health and child development, in particular with cognitive and social development. The longitudinal ÉLDEQ data will also provide an opportunity to compare family and community influence when children grow up socially disadvantaged.

In the coming years, the ÉLDEQ will truly contribute to the development of preventive intervention initiatives that will encourage equal opportunities for success, both in health and in socioeconomic opportunities. We should be able to identify factors that are likely to protect children from problems linked to low socioeconomic status. But until we have more answers to these questions, we can only conclude that, at five months of age, the odds of being in good health are not the same for all Québecers.

Appendix

Table A.1
Low-income thresholds (1992 base) established by Statistics Canada for the reference year 1997

Size of household (Number of people in the household)	**Size of population in urban regions**				**Rural regions**
	500,000 inhab. and over	**100,000 to 499,999 inhab.**	**30,000 to 99,999 inhab.**	**Less than 30,000 inhab.**	
	$	$	$	$	$
1	17,409	14,931	14,827	13,796	12,030
2	21,760	18,664	18,534	17,245	15,038
3	27,063	23,213	23,050	21,448	18,703
4	32,759	28,098	27,903	25,964	22,639
5	36,618	31,409	31,191	29,023	25,307
6	40,479	34,720	34,478	32,081	27,975
7 or more	44,339	38,032	37,766	35,140	30,643

Source: Statistics Canada, 1998.

Table A.2
Very inadequate income thresholds (60% of the low-income threshold [1992 base] established by Statistics Canada for the reference year 1997)

Size of household (Number of people in the household)	**Size of population in urban regions**				**Rural regions**
	500,000 inhab. and over	**100,000 to 499,999 inhab.**	**30,000 to 99,999 inhab.**	**Less than 30,000 inhab.**	
	$	$	$	$	$
1	10,445	8,959	8,896	8,278	7,218
2	13,056	11,198	11,120	10,347	9,023
3	16,238	13,928	13,830	12,869	11,222
4	19,655	16,859	16,742	15,578	13,583
5	21,971	18,845	18,715	17,414	15,184
6	24,287	20,832	20,687	19,249	16,785
7 or more	26,603	22,819	22,660	21,084	18,386

Source: Calculations done by the authors from Statistics Canada data (1998) presented in Table A.1

Table A.3
Three indicators of the infant's health in the first 5 months by mother's perception of the baby's health, 1998

	Hospitalizations		Presence of chronic health problems		Growth retardation under the 10th percentile[1]	
	n	%	n	%	n	%
Mother's perception of the baby's health						
Excellent	152	9.0	100	5.9	122	7.3
Less than excellent	134	25.1	105	19.6	65	12.3
p		*<0.001*		*<0.001*		*<0.01*
Total	**286**	**12.9**	**205**	**9.2**	**187**	**8.5**

1. The threshold for growth retardation under the 10th percentile is defined according to the distribution of weights of babies, adjusting for sex.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

Table A.4
Distribution of infants according to the cumulative index of health problems at 5 months (CIHIP-5 months)[1] and mother's perception of baby's health,1998

	CIHP-5 months score			
	0	1	2 or more	
	%	%	%	n
Mother's perception of baby's health				
Excellent	80.1	17.5	2.4 *	1,666
Less than excellent	58.1	27.9	13.9	526
p			*<0.001*	
Total	**74.8**	**20.0**	**5.1**	**2,192**

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

Source*: Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

Table A.5
Distribution of infants according to level of sufficiency of household income and mother's characteristics, 1998

	Household income				
	Sufficient	**Moderately inadequate[1]**	**Very inadequate[2]**	n	%
	%	%	%		
Mother's age					
Younger than 20	21.7 *	27.0 *	51.3	68	3.1
20 to 34	74.6	11.4	14.0	1,802	82.9
35 or over	71.3	12.2 *	16.5 *	304	14.0
p			*<0.001*		
Mother's level of education					
No high school diploma	42.2	16.3	41.5	387	17.8
High school diploma	66.1	16.1 *	17.8 *	240	11.1
Vocational or trade school diploma	74.4	15.8 *	9.8 *	234	10.8
College (junior) or university studies	82.3	9.1	8.6	1,310	60.3
p			*<0.001*		
Union status					
Lives with a partner	77.7	11.1	11.2	1,994	91.9
Does not live with a partner	14.0 *	20.9 *	65.1	176	8.1
p			*<0.001*		
Immigrant status					
Non-immigrant/European immigrant	78.2	10.6	11.2	1,914	88.0
Non European immigrant	30.4	21.9	47.7	261	12.0
p			*<0.001*		
Total	72.5	12.0	15.5	2,176	100.0

1. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year 1997.
2. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year 1997

* Coefficient of variation between 15% and 25%; to be interpreted with caution.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*.

Table A.6
Adjusted odds ratios (OR) and 95% confidence intervals (CI) of baby's health at 5 months perceived as less than excellent by the mother by level of sufficiency of household income, 1998

	OR (95% CI)
Household income	
Sufficient	1
Moderately inadequate[1]	1.5 (1.07-2.07)†
Very inadequate[2]	1.7 (1.21-2.43)†
Mother's age	
20 to 34	1
Younger than 20	0.7 (0.39-1.34)
35 or over	1.0 (0.72-1.34)
Mother's level of education	
College (junior) or university studies	1
Vocational or trade school diploma	1.2 (0.85-1.68)
High school diploma	1.2 (0.82-1.63)
No high school diploma	1.5 (1.14-2.08)†
Union status	
Lives with a partner	1
Does not live with a partner	1.0 (0.64-1.43)
Mother's immigrant status	
Non-immigrant/European immigrant	1
Non-European immigrant	1.2 (0.82-1.64)
Cumulative score for neonatal risk (CSNR)[3]	
CSNR = 0	1
CSNR =1-2	1.1 (0.84-1.33)
CSNR =3 or more	1.7 (1.25-2.39)†

1. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year 1997.
2. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year 1997.
3. The CSNR is the weighted sum of an infant's health problems at birth.

† $p < 0,05$

Source: *Institut de la Statistique du Québec, ÉLDEQ 1998-2002*.

Table A.7

Adjusted odds ratios (OR) and 95% confidence intervals (CI) of the cumulative index of health problems at 5 months (CIHP-5 months)[1] by level of sufficiency of household income, 1998

	Cumulative Index of Health Problems at 5 Months	
	Score 1 versus 0	**Score 2 versus 0**
	OR (95% CI)	OR (95% CI)
Household income		
Sufficient	1	1
Moderately sufficient[2]	1.5 (1.07-2.17) †	1.9 (1.08-3.48) †
Very inadequate[3]	1.1 (0.71-1.59)	1.2 (0.60-2.30)
Mother's age		
20 to 34	1	1
Younger than 20	1.2 (0.64-2.31)	1.5 (0.63-3.64)
35 or over	1.1 (0.76-1.45)	0.5 (0.26-1.11)
Mother's level of education		
College (junior) or university studies	1	1
Vocational or trade school diploma	1.2 (0.82-1.71)	0.6 (0.24-1.30)
High school diploma	1.4 (0.98-1.99)	0.6 (0.26-1.32)
No high school diploma	1.4 (1.0-1.95) †	1.7 (0.98-2.86)
Union status		
Lives with a partner	1	1
Does not live with a partner	1.5 (0.94-2.25)	2.5 (1.30-4.64) †
Mother's immigrant status		
Non-immigrant/European immigrant	1	1
Non European immigrant	0.9 (0.59-1.32)	1.0 (0.52-2.03)
Cumulative score for neonatal risk (CSNR)[4]		
CSNR = 0	1	1
CSNR = 1-2	1.1 (0.82-1.35)	0.9 (0.57-1.45)
CSNR =3 or more	2.0 (1.45-2.87) ‡	3.1 (1.78-5.26) ‡

1. The CIHP-5 months is the sum of the following indicators: at least one hospitalization, presence of growth retardation under the 10th percentile of babies and number of chronic health problems from birth to 5 months.
2. Moderately inadequate income falls between 60% and 99% of the low-income threshold established by Statistics Canada for the reference year 1997.
3. Very inadequate income falls below 60% of the low-income threshold established by Statistics Canada for the reference year 1997.
4. The CSNR is the weighted sum of an infant's health problems at birth.

† $p < 0,05$

‡ $p < 0,001$

Source: *Institut de la Statistique du Québec, ÉLDEQ 1998-2002*.

References

ABER, J. L., and N. G. BENNETT (1997). "The effects of poverty on child health and development", *Annual Review of Public Health*, vol. 18, p. 463-483.

ANTONOVSKY, A. (1987). "Unraveling the Mystery of Healh"*, How People Manage Stress and Stay Well,* San Francisco, London, Jossey- Bass Publishers.

ARBUCKLE, T. E., R. WILKINS and G. J. SHERMAN (1993). "Birth weight percentiles by gestational age in Canada", *Obstetrics & Gynecology*, vol. 81, p. 39-48.

BARTLEY, M., D. BLANE and S. MONTGOMERY (1997). "Socioeconomic determinants of health. Health and the life course: why safety nets matter", *British Medical Journal*, vol. 314, p. 1194-1196.

BERTAUX, D. (1977). *Destins personnels et structure de classe*, Paris, PUF.

BOR, W., J-M. NAJMAN, M. ANDERSEN, J. MORRISON and G. WILLIAMS (1993). "Socioeconomic Disadvantage and Child Morbidity: an Australian Longitudinal Study", *Social Science and Medicine*, vol. 36, n° 8, p. 1053-1061.

BOSMA, H., M. G. MARMOT, H. HEMINGWAY, A. C. NICHOLSON, E. BRUNNER and S. A. STANSFELD (1997). "Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study", *British Medical Journal,* vol. 314, n° 22, p. 558-565.

BOURDIEU, P. (1980). *Le sens pratique*, Paris, Éditions Minuit.

BOYLE, M. H., and E. LIPMAN (1998). *Do places* m*atter? A Multilevel Analysis of Geographic Variations in Child Behaviour in Canada*, communication dans le cadre de la conférence *Investir dans nos enfants : une conférence nationale sur la recherche* organisée par Développement des ressources humaines Canada (Direction de la recherche appliquée), Ottawa, W-98-16E, 27-29 octobre.

BROOKS-GUNN, J., and G. J. DUNCAN (1997). "The effects of poverty on children",*The Future of Children. Children and Poverty*, vol. 7, p. 55-71.

BROOKS-GUNN, J., P. KLEBANOY, F.-R. LIAW and G. DUNCAN (1995). "Toward an understanding of the effects of poverty upon children", in Fitzgerald, H. E., B. LESTER et B. S. ZUCKERMAN (eds.), *Children of poverty: Research on health and policy issues*, New York, Garland Publishing Inc., p. 3-37.

CANADIAN COUNCIL FOR SOCIAL DEVELOPMENT (2000). *Données de base sur la pauvreté au Canada-2000*, Ottawa.

CANADIAN INSTITUTE OF CHILD HEALTH (2000). *La santé des enfants au Canada*, Ottawa.

CHAUVEL, L. (2000). "Entre les riches et les pauvres, les classes moyennes", dans *Mesurer les inégalités. De la construction des indicateurs aux débats sur les interprétations*, Paris, DRESS (Collection Mire), Mission recherche, Ministère de l'Emploi et de la Solidarité.

CHEN, J., M. FAIR, R. WILKINS, M. CYR *et al.* (1998). "Niveau de scolarité et mortalité fœtale et infantile au Québec", *Rapports sur la santé*, vol. 10, p. 57-70.

CHEVALIER, S., and Y. SAUVAGEAU (2000). "Caractéristiques de la population" dans *Enquête sociale et de santé 1998*, Québec, Institut de la statistique du Québec, chapitre 2.

COOPER, H., S. ARBER and C. SMAJE (1998). "Social class or deprivation? Structural factors and children's limiting longstanding illness in the 1990s", *Sociology of Health and Illness*, vol. 20, p. 289-311.

CRAIN, E. F., K. B. WEISS, P. E. BIJUR, M. HERSH, L. WESTBROOK and R. E. K. STEIN (1994). "An estimate of the prevalence of asthma and wheezing among inner-city children", *Pediatrics*, vol. 94, p. 356-362.

CURTIS, S.E., A. TAKET, R. PROKHORSKAS, M. A. SHABANAH and M. C. THURIAUX (1989). "Vers la santé pour tous dans la région européenne de l'OMS. Surveillance des progrès accomplis. II. Conditions préalables, bilan démographique et sanitaire", *Revue d'épidémiologie et de santé publique*, vol. 37, p. 295-317.

DAVEY-SMITH, G., M. BARTLEY and D. BLANE (1990). "The Black Report on Socioeconomic Inequalities on Health Ten Years On", *British Medical Journal*, vol. 301, p. 373-377.

DES RIVIERES-PIGEON, C. (2000). *Replacer le travail des mères dans son contexte : une exploration des liens unissant le rapport à l'emploi et la symptomatologie dépressive six mois après la naissance d'un enfant*, Thèse de doctorat, Montréal, Université de Montréal.

DESROSIERS, H. (2000). "Family, Child Care and Neighourhood characteristics", in *Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002*), Québec, Institut de la statistique du Québec, vol. 1, n° 2.

DESROSIERS, H., M. BOIVIN and L. DES GROSEILLIERS (2000). "Concepts, Definitions and Operational Aspects, Part II – Data and Variables" in *Longitudinal Study of Child Developement in Québec (ÉLDEQ 1998-2002)*, Québec, Institut de la statistique du Québec, vol. 1, n° 12.

DIXON, J., and D. MACAROV (1998). *Poverty, A persistent global reality*, London, Routledge.

DUBOIS, L., B. BÉDARD, M. GIRARD and É. BEAUCHESNE (2000). "Diet", in *Longitudinal Study of Child Developement in Québec (ÉLDEQ 1998-2002*), Québec, Institut de la statistique du Québec, vol. 1, n° 5.

DUNCAN, G. J., J. BROOKS-GUNN and P. K. KLEBANOV (1994). "Economic deprivation and early childhood development", *Child Development*, vol. 65, p. 296-318.

DUNCAN, G. J., W. J. YEUNG, J. BROOKS-GUNN and J. R. SMITH (1998). "How much does childhood poverty affect the life chances of children", *American Sociological Review*, vol. 63, p. 406-423.

EMING YOUNG, M. (1995*). Investing in young Children,* Washington, D.C. (World Bank Discussion Papers).

FEINSTEIN, J. S. (1993). "The relationship between Socioeconomic Status and Health: A review of the Literature", *The Milbank Quarterly*, vol. 71, n° 2, p. 279-322.

FERLAND, M., and G. PAQUET (1995). "Liens entre le statut socioéconomique et la santé", dans SANTÉ QUÉBEC, Lavallée, C., C. Bellerose, J. Camirand et P. Caris (under the direction of), *Aspects sociaux reliés à la santé, Rapport de l'enquête sociale et de santé 1992-1993*, Montréal, Ministère de la Santé et des Services sociaux, Gouvernement du Québec, vol. 2, p. 119-168.

FORSDAHL, A. (1977). "Are poor living conditions in childhood and adolescence an important risk factor for arteriosclerotic heart disease?", *British Journal Prevention Social Medicine*, vol. 31, p. 91-95.

FORSDAHL, A. (1978). "Living conditions in childhood and subsequent development of risk factors for arteriosclerotic heart disease", *Journal* of *Epidemiology and Community Health*, vol. 31, n° 1, p. 34-37.

GARRETT, P., N. NG'ANDU and J. FERRON (1994). "Poverty experience of young children and the quality of their home environments", *Child Development*, vol. 65, n° 2, p. 331-345.

HOUSE, J. S. (1990). "Age, Socioeconomic Status and Health", *Milbank Quarterly*, vol. 68, n° 3, p. 384-411.

HOUSE, J. S., and D. R. WILLIAMS (2000). "Understanding and reducing (Eds.), *Promoting health. Intervention strategies from social and behavioral research socioeconomic and racial/ethnic disparities in health*", in B. D. Smedley and S. L. Syme (eds.), Washington DC, National Academy Press, p. 81-124.

INSTITUT CANADIEN DE RECHERCHES AVANCÉES (ICRA) (1991). *Les déterminants de la santé,* Toronto, n° 5.

JAPEL, C., R. E. TREMBLAY and P. McDUFF (2000a). "Parent's Health and Social Adjustment, Part I, –Lifestyle Habits and Health Status", in *Longitudinal Study of Child Developement in Québec (ÉLDEQ 1998-2002*), Québec, Institut de la statistique du Québec, vol. 1, n° 9.

JAPEL, C., R. E. TREMBLAY and P. McDUFF (2000b). "Parenting and Family Relations, Part II – Family Environment", in *Longitudinal Study of Child Developement in Québec (ÉLDEQ 1998-2002*), Québec, Institut de la statistique du Québec, vol. 1, n° 10.

JETTÉ, M., and L. DES GROSEILLIERS (2000). "Survey: Description and Methodology", in *Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002)*, Québec, Institut de la statistique du Québec, vol. 1, n° 1.

KAPLAN, G., and J. T. SALONEN (1990). "Socioeconomic conditions in childhood and ischaemic heart disease during middle age", *British Medical Journal*, vol. 301, p. 1121-1123.

KEATING, D. P., and J. F. MUSTARD (1993). "Facteurs socioéconomiques et développement humain", *La sécurité des familles en période d'insécurité*, Forum national sur la sécurité des familles, Ottawa, p. 101-123.

KRAMER, M. S., L. SÉGUIN, J. LYDON and L. GOULET (2000). "Socio-economic disparities in pregnancy outcomes: why do the poor fare so poorly", *Paediatric and Perinatal Epidemiology*, vol. 14, p.194-211.

KUH, D., C. POWER, D. BLANE and M. BARTLEY (1997). "Social pathways between childhood and adult health", dans D. Kuh, et Y. Ben-Shlomo (eds), *A life-course approach to chronic disease epidemiology,* Oxford, Oxford University Press.

LEHMAN, F., K. GRAY-DONALD, M. MONGEON and S. DI TOMMASO (1992). "Iron deficiency anemia in 1-year old children of disadvantaged families in Montreal", *Canadian Medical Association Journal*, vol. 146, p. 1571-1577.

LEVASSEUR, M. (2000). "Perception de l'état de santé", in *Enquête sociale et de santé 1998*, Québec, Institut de la statistique du Québec, chapitre 12.

LEWITT, E. M., and N. KERREBROCK (1997). "Population-based growth stunting", *The Future of Children, Children and Poverty*, vol. 7, p. 149-156.

LOZOFF, B., E. JIMENEZ and A. W. WOLF (1991). "Long-term development outcome of infants with iron deficiency", *New England Journal of Medicine*, vol. 325, p. 686-694.

LUNDBERG, O. (1993). "The impact of childhood living conditions on illness and mortality in adulthood", *Social Science and Medicine*, vol. 36, n° 8, p. 1047-1052.

LYNCH, J., and G. KAPLAN (2000). "Socioeconomic position", in L. Berkmans and I. Kawachi (eds), *Social Epidemiology*, New York, Oxford University Press, chap. 2.

LYNCH, J. W., G. A. KAPLAN, R. D. COHEN, J. KAUHANEN, T. W. WILSON, N. L. SMITH and J. T. SLONEN (1994). "Childhood and adult socioeconomic status as predictors of mortality in Finland", *The Lancet*, vol. 343, p. 524-527.

MARGOLIS P. A., R. A. GREENBERG, L. M. LAVANGE, R. S. CHAPMAN, F. W. DENNY, K. E. BAUMAN and B.W. BOAT (1992). "Lower respiratory illness in infants and low socioeconomic status", *American Journal of Public Health*, vol. 82, p. 1119-1126.

MARMOT, M. G. (1998). "Improvement of social environment to improve health", *The Lancet*, vol. 351, p. 57-60.

MARMOT, M. G. and T. THEORELL (1988). "Social Class and Cardiovascular Disease: The Contribution of Work", *International Journal of Health Sciences,* vol. 18, n° 4, p. 659-674.

MARMOT, M., and R. G. WILKINSON (dir.) (1999). *Social Determinants of Health,* Oxford**,** Oxford University Press.

MARMOT, M.G, M. A. KOGEVINAS and M. ELSTON (1987). "Social/Economic Status and Disease", *Annual Review of Public Health*, vol. 8, p. 11-35.

McCAIN, M. N., and J. F. MUSTARD (1999). *Inverser la véritable fuite des cerveaux. Étude sur la petite enfance*, rapport final, Publications Ontario.

MCGRATH, M. M., M. C. SULLIVAN, B. M. LESTER and W. OH (2000). "Longitudinal neurologic follow-up in neonatal intensive care unit survivors with various neonatal morbidities", *Pediatrics*, vol. 106, p. 1397-1405.

MCLOYD, V. C. (1998). "Socioeconomic disadvantage and child development", *American Psychologist*, vol. 53, p. 185-204.

MENAHEM, G. (1994). *Problèmes de l'enfance, statut social et santé des adultes*, Rapport de recherche, Paris, Centre de recherche d'étude et documentation en économie de la santé (CREDES).

MORRIS, J. N. (1959). "Health and Social Class", *The Lancet*, vol. 1, n° 7067, February 7, p. 303-305.

NAJMAN, J. M. (1993). "Health and poverty: Past, present and prospects for the future", *Social Science and Medicine*, vol. 36, p. 157-166.

NEWACHEK P. W., and N. HALFON (1998). "Prevalence and impact of chronic conditions in childhood", *American Journal of Public Health*, vol. 88, p. 610-617.

NEWACHEK, P. W., J. JAMESON and N. HALFON (1994). "Health status and income: the impact of poverty on child health", *Journal of School Health*, vol. 64, p. 229-233.

PAMPALON, R., and G. RAYMOND (2000). "Un indice de défavorisation pour la planification de la santé et du bien-être au Québec", *Maladies chroniques au Canada*, vol. 21, n° 3, p. 113-122.

PAQUET, G. (1998). "Pour aller au-delà des croyances quant à l'égalité des chances de réussite : un bilan de la recherche sur l'intervention préscolaire en milieu défavorisé", *Revue canadienne de psycho-éducation*, vol. 27, n° 1, p. 49-83.

PAQUET, G. (à paraître). *Facteurs protecteurs de la petite enfance : une étude stratégique*. Thèse de doctorat, Sociologie de la santé, Université de Montréal.

PARADISE, J. L., H. E. ROCKETTE, K. COLBORN, B. S. BERNARD, C. G. SMITH, M. KURK-LARSKY and J. E. JANOSKY (1997). "Otitis media in 2553 Pittsburgh-area infants: prevalence and risk factors during the first two years of life", *Pediatrics*, vol. 99, p. 318-333.

POWER, C. (1992). "A review of Child Health in the 1958 Birth Cohort: National Child Development Study, Cohort Study Review", *Pediatric and Perinatal Epidemiology*, vol. 6, p. 81-110.

POWER, C., O. MANOR and J. FOX (1991). *Health and class: The early years*, London, Chapman and Hall.

POWER, C., O. MANOR and S. MATTHEWS (1999). "The Duration and Timing of Exposure: Effects of Socioeconomic Environment on Adult Health", *American Journal of Public Health*, vol. 89, n° 7, p. 1059-1065.

POWER, C., S. MATTHEWS and O. MANOR (1998). "Inequalities in self-rated health: explanations from different stages of life", *The Lancet*, vol. 351, p. 1009-1014.

RENAUD, M., and L. BOUCHARD (1994). "Expliquer l'inexpliqué : l'environnement social comme facteur clé de la santé", *Interface*, vol. 15, n° 2, p. 15-25.

SAÏGAL, S., L. A. HOULT, D. L. STEINER, B. L. STOSKKOPF and P. L. ROSENBAUM (2000). "School difficulties at adolescence in a regional cohort of children who were extremely low birth weight", *Pediatrics*, vol. 105, n° 2, p. 325-331.

SAPOLSKY, R. M. (1992). *Stress, the Aging Brain, and the Mechanisms of Neuron Death,* Cambridge, The MIT Press.

SARGENT, J. D., T. A. STUKEL, M. A. DALTON, J. L. FREEMAN and M. J. BROWN (1996). "Iron deficiency in Massachusetts communities: socioeconomic and demographic risk factors among children", *American Journal of Public Health*, vol. 86, p. 544-550.

SERBIN, L. A., J. M. COOPERMAN, P. L. PETERS, P. M. LEHOUX, D. M. STACK and A. E. SCHWARTZMAN (1998). "Intergenerational transfer of psychosocial risk in women with childhood histories of aggression, withdrawal, or aggression and withdrawal", *Developemental Psychology*, vol. 34, n° 6, p. 1246-1262.

STATISTIQUE CANADA (1998). *Seuils de faible revenu*, Ottawa, Ministère de l'Industrie, n° 13-551-X1B au catalogue.

SYME, S. L. (1998). "Social and Economic Disparities in Health: Thoughts about Intervention", *The Milbank Quarterly*, vol. 76, n° 3, p. 493-505.

TREMBLAY, R. E., B. BOULERICE, P. W. HARDEN, P. MCDUFF, P. PÉRUSSE, R. O. PIHL and M. ZOCCOLILLO (1996). "Les enfants du Canada deviennent-ils plus agressifs à l'approche de l'adolescence?", dans Statistique Canada et Développement des ressources humaines Canada, *Grandir au Canada*, Ottawa, Ministre de l'Industrie, n° 89-550-mpf au catalogue (Enquête nationale longitudinale sur les enfants et les jeunes [Canada]), 1205-6855, n°1, p. 145-157.

USHER, R., and F. MCLEAN (1969). "Intrauterine growth of live-born caucasian infants at sea levels: standards obtained from measurements in 7 dimensions of infants born between 25 and 44 weeks of gestation", *Journal of Pediatric*, vol. 74, p. 901-910.

WADSWORTH, M. E. J. (1991). *The imprint of time. Childhood, history, and adult life,* Oxford, Clarendon Press.

WEST, P., S. MACINTYRE, E. ANNANDAL and K. HUNTSOCIAL (1990). "Class and Health in Youth: Findings from the West of Scotland twenty-07 study", *Social Science and Medicine*, vol. 30, n° 6, p. 665-673.

WILKINS, R., O. ADAMS and A. BRANCKER (1989). "Changes in mortality by income in urban Canada from 1971 to 1986", *Health Reports*, vol. 1, p.137.

WILKINS, R., C. HOULE, J. M. BERTHELOT and N. ROSS (1999). "L'état de santé des enfants", *Rapports sur la santé*, vol. 11, n° 3, p. 27-38.

WILKINSON, R.G. (1986) (dir.). *Class and health, Research and Longitudinal Data,* London and New York, Tavistock Publications.

WILLMS, D. J., et M. SHIELDS (1996). *A mesure of socioeconomic status for the National Longitudinal Survey of Children and Youth,* Atlantic Center for Policy Research in Education, Université du Nouveau-Brunswick et Statistique Canada.

List of Papers in Volume 1 of this Series

This paper is one of a series comprising Volume 1 of: JETTÉ, M., H. DESROSIERS, R. E. TREMBLAY and J. THIBAULT (2000). Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1.

The following is a list of all the analytical papers in Volume 1 available or planned as of this date:

JETTÉ, M., and L. DES GROSEILLIERS (2000). "Survey Description and Methodology" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 1.

DESROSIERS, H. (2000). "Family, Child Care and Neighbourhood Characteristics" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 2.

SÉGUIN, L., M. KANTIÉBO, Q. XU, M.-V. ZUNZUNEGUI, L. POTVIN, K. L. FROHLICH and C. DUMAS (2001). "Standard of Living, Health and Development, Part I - Poverty, Health Conditions at Birth and Infant Health" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 3.

PAQUET, G., M. GIRARD and L. DUBOIS (2001). "Standard of Living, Health and Development, Part II - Social Inequality and Child Development" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 3.

PETIT, D., C. SIMARD, J. PAQUET and J. MONTPLAISIR (2000). "Sleep" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 4.

DUBOIS, L., B. BÉDARD, M. GIRARD and É. BEAUCHESNE (2000). "Diet" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 5.

VEILLEUX, G., M. OLIVIER, J. DUROCHER, M. GÉNÉREUX and M. LÉVY (2000). "Habits Related to Oral and Dental Health" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 6.

JAPEL, C., R. E. TREMBLAY, P. McDUFF and M. BOIVIN (2000). "Temperament" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 7.

JAPEL, C., R. E. TREMBLAY and P. McDUFF (2001). "Motor, Social and Cognitive Development, Part I - Motor and Social Development" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 8.

BAILLARGEON, R. H., J. BROUSSEAU, D. LAPLANTE, H.-X. WU, C. JAPEL, P. McDUFF and A. GIRARD (2001). "Motor, Social and Cognitive Development, Part II - Cognitive Development" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 8.

JAPEL, C., R. E. TREMBLAY and P. McDUFF (2000). "Parents' Health and Social Adjustment, Part I - Lifestyle Habits and Health Status" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 9.

ZOCCOLILLO, M. (2000). "Parents' Health and Social Adjustment, Part II - Social Adjustment" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 9.

BOIVIN, M., D. PÉRUSSE, V. SAYSSET, N. TREMBLAY and R. E. TREMBLAY (2000). "Parenting and Family Relations, Part I - Parenting Perceptions and Behaviours" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 10.

JAPEL, C., R. E. TREMBLAY and P. McDUFF (2000). "Parenting and Family Relations, Part II - Family Environment" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 10.

MARCIL-GRATTON, N., and H. JUBY (2000). "Conjugal Life of the Parents, Part I - The Parents' Conjugal History" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 11.

DESROSIERS, H., M. BOIVIN and V. SAYSSET (2000). "Conjugal Life of the Parents, Part II - Spousal/Partner Support" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 11.

THIBAULT, J., M. JETTÉ and H. DESROSIERS (2001). "Concepts, Definitions and Operational Aspects, Part I - Design of Phase I of ÉLDEQ, Instruments and Procedures" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 12.

DESROSIERS, H., M. BOIVIN and L. DES GROSEILLIERS (2001). "Concepts, Definitions and Operational Aspects, Part II - Data and Variables" in Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 12.

Glossary

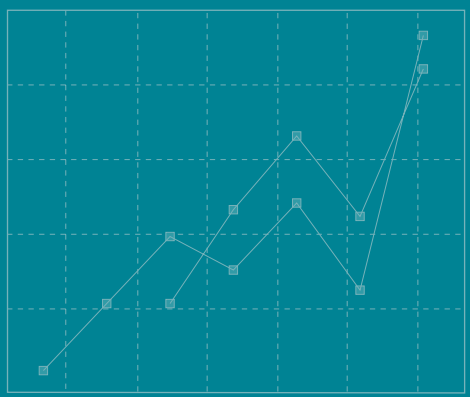
Centre de la petite enfance	Child-care centre
Commission d'accès à l'information du Québec – CAI	Québec Access to Information Commission
Conseil québécois de la recherche sociale (CQRS)	Social Research Council of Québec
Direction de la méthodologie et des enquêtes spéciales, ISQ	Methodology and Special Surveys Division, ISQ
Direction de la santé publique de la Régie régionale de la santé et des services sociaux de Montréal-Centre	Public Health Department, Montréal-Centre, Régional Health Board
Direction de la technologie et des opérations statistiques, ISQ	Technology and Statistical Operations Division, ISQ
Direction des normes et de l'information, ISQ	Standards and Information Division, ISQ
Direction Santé Québec, ISQ	Health Québec Division, ISQ
Étude des jumeaux nouveaux-nés au Québec – ÉJNQ	Québec Study of Newborn Twins
Fichier maître des naissances	Master Birth Register
Fonds de la recherche en santé du Québec (FRSQ)	Health Research Fund of Québec
Fonds pour la formation de chercheurs et l'aide à la recherche (FCAR)	Researcher Education and Research Assistance Fund
Groupe de recherche sur l'inadaptation psychosociale chez l'enfant – GRIP	Research Unit on Children's Psychological Maladjustment
Institut de la statistique du Québec	Québec Institute of Statistics
La Politique Familiale	Policy on Families
Le Rapport Bouchard (1991) « Un Québec fou de ses enfants »	The Bouchard Report, 1991: A Québec In Love with its Children
Les Priorités nationales de santé publique	Priorities for Public Health
ministère de l'éducation	Ministry of Education
ministère de la Famille et de l'Enfance	Ministry of Family and Child Welfare
ministère de la Justice	Ministry of Justice
ministère de la Recherche, Science et Technologie	Ministry of Research, Science and Technology
ministère de la Santé et des Services sociaux du Québec (MSSS)	Ministry of Health and Social Services of Québec
ministère de la Sécurité publique	Ministry of Public Security
ministère de la Solidarité sociale	Ministry of Social Solidarity – formerly Income Security (Welfare)
Personne qui connaît le mieux l'enfant (PCM)	Person Most Knowledgeable (PMK)
Politique de la santé et du bien-être	Policy on Health and Well-Being
Service la recherche	Research services
Service de support aux opérations de la Régie de l'assurance-maladie du Québec – RAMQ	Operations Support Section of the Québec Health Insurance Board

"The mission of the Institut is to provide reliable and objective statistical information on the situation of Québec as regards all aspects of Québec society for which such information is pertinent. The Institut shall be the central authority for the production and dissemination of statistical information for the government departments and bodies, except information produced for administrative purposes. The Institut shall be responsible for the carrying out of statistical surveys of general interest."

Act respecting the Institut de la statistique du Québec (R.S.Q., c. I-13.011), passed by the National Assembly of Québec on 19 June 1998.

In the first text in this issue, the authors examine the relationship between household poverty and the health of 5-month-old babies, taking into account their health status at birth and the mother's sociodemographic characteristics. The data from the first phase of the ÉLDEQ reveal that in 1998, approximately 28% of infants were living in families with inadequate income. These babies born to poor families are sick more often and accumulate more health problems. This relationship remains significant when taking into account the infant's health profile at birth (premature birth, intrauterine growth retardation and cumulative score for neonatal risk) and the mother's level of education and marital status.

The second text focuses on the family's social position, and explores factors likely to protect children from the adversity associated with low socioeconomic status. Three objectives are pursued. First, to establish the social position of each family in Québec in which infants were living in 1998. Second, to examine the link between the health of 5-month-old and their family's social position, while attempting to characterize the main factors affecting this relationship. Third, to begin to understand the differences between the family and community influences on infant health. Overall, the results point to a close link between social belonging and the state of health of babies, regardless of the other factors considered.



ISBN : 2-551-19953-0

$ 7,95
Website : www.stat.gouv.qc.ca
Printed in Québec, Canada

Institut de la statistique Québec