Institut de la statistique du Québec

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

5-MONTH-OLD INFANTS

Survey Description and Methodology

COLLECTION
Health and Well-Being

Volume 1, Number 1

Québec

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This report was produced and published by *l'Institut de la statistique du Québec*, and is distributed by *Les Publications du Québec*.

Les Publications du Québec
1500-D Charest Boulevard West
Ste -Foy (Québec)
G1N 2E5

National Library of Canada
Bibliothèque nationale du Québec

ISBN 2-551-19950-6
ISBN 2-551-19951-4
(édition originale) ISBN 2-551-19327-3
ISBN 2-551-19900-X

May 2000

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.

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Volume 1 of ÉLDEQ 1998-2002 was produced by:

la Direction Santé Québec de l'Institut de la statistique du Québec

Volume 1 of ÉLDEQ 1998-2002 was translated by:

James Lawler

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)

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Suggested citation:

JETTÉ, M., and DES GROSEILLIERS, L. (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.

This analytical paper is also available in French. (Ce numéro et aussi disponible en version française sous le titre « L'enquête : description et méthodologie » dans *Étude longitudinale du développement des enfants du Québec (ÉLDEQ 1998-2002)*, Québec, Institut de la statistique du Québec, vol. 1, n^{o} 1).

Caution:

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

Because the data were rounded off, totals 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

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

Abbreviations

CV	Coefficient of variation
Not avail.	Not available

Acknowledgments

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* (*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.

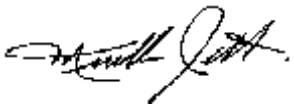
We would like to thank the personnel in the *Service de support aux opérations de la Régie de l'assurance-maladie du Québec - RAMQ* (Operations Support section of the Québec Health Insurance Board). Without their efficiency, fewer letters of introduction would have found their way to the correct addresses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



Mireille Jetté
Project Coordinator
Santé Québec Division, *ISQ*

Introduction of 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 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

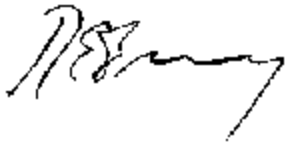
This study saw the light of day because of the collaboration of many people. In the preceding pages, Mireille Jetté thanked a number of them. I would like to take advantage of this introduction to emphasize that the survey was set up and continues forward because of the dedication and hard work of a group of researchers from a variety of disciplines and universities. I would particularly like

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.

to thank Michel Boivin, School of Psychology at Laval University, 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, Laval University; 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, Public Health Department of Montréal-Centre, 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
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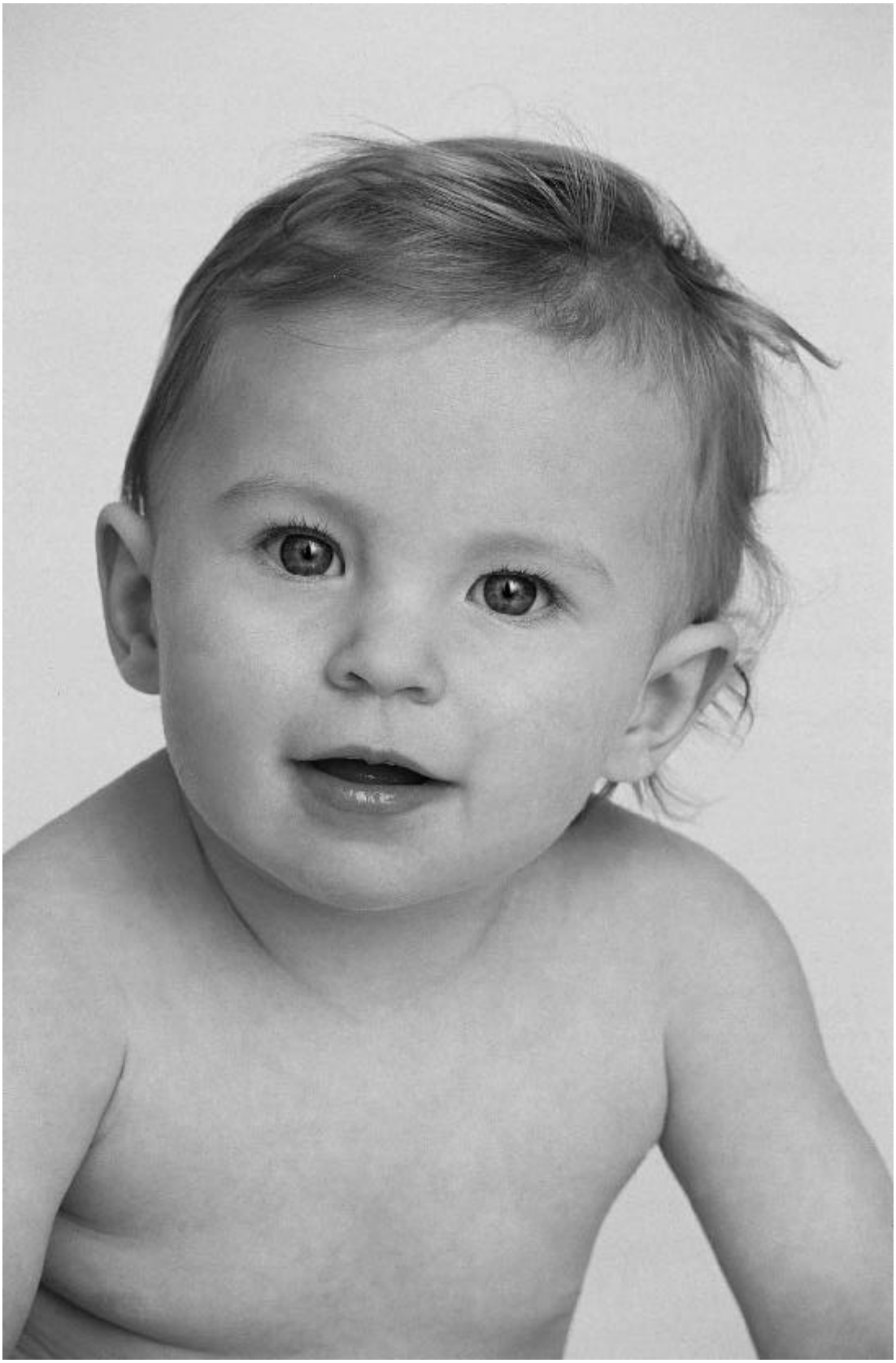
Table of Contents

List of Tables

Survey Description and Methodology



1. Overview of the Study

The longitudinal survey[4] described in detail in the pages that follow is conducted annually, and in the first year of data collection, is representative of all infants approximately 5 months of age born singletons in Québec. It was decided to do the first data collection when the children were 5 months old because at this age most would be sufficiently developed to provide information which was considered central to fulfilling the aims of the study. Each annual data collection covers a period of 6 months, and each collection month is called a "wave." The first three waves are from March to June, the last three from September to December. The waves are usually conducted separately, and each lasts about 4 or 5 weeks. Therefore, except for very rare exceptions, the children are studied when they are all approximately the same age. The "eligibility period" of the child is very important, given the rapid pace of development in early childhood. Twelve months separates the annual data collections. To ensure accurate and valid data, it was decided to use a relatively large sample, distributed across Québec. Constraints related to collection time, annual data processing, creation of instruments and the costs of such a large undertaking resulted in certain decisions being made such as concentrating the data collection in a 6-month period rather than stretching it out over the entire year, and meeting with families once a year during the course of the 5 years.

Each year of the survey is called a "*volet*" (part or section). The results published this year are therefore called the "1998 Volet," 1998 designating the year in which the children were 5 months old. And if indeed as planned, the survey continues until the children enter elementary school, we will embark on the second "Phase" of ÉLDEQ 1998-2002, Phase 1 having consisted of five annual data collections dedicated to studying early childhood development.

1.1 Progress Report on the Study

This volume, published in the form of a series of analytical papers, covers the cross-sectional data collected on a large sample of infants approximately 5 months of age in 1998. It describes the first in a series of five annual collections of data on 2,120[5] Québec children who will be studied until they are 5 years old. The Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002) began in 1996 and will end with the publication of the third and final volume in 2004. As of the publication of Volume 1, four out of the five pretests on children aged 5, 17, 29 and 41 months, and the first two actual surveys on children aged 5 and 17 months have been conducted (See Table 1.1). In 2000, children 29 months old and their families are being interviewed, and preparations for the pretest on 53-month-olds are close to completion. Volumes 2 and 3 should be published in 2002 and 2004 respectively.

4. The survey is also called "In 2002...I'll Be 5 Years Old!" This appears on our newsletters and other communications materials developed for the parents and partners of *Santé Québec*. The years 1998-2002 which accompany the ÉLDEQ acronym refer to the years of data collection (constituting the first in what it is hoped will be a series of phases).

5. In the first year of data collection, the results on 2,223 children have been retained. In the longitudinal study, 2,120 children will be included, the 103 removed being part of an over-sample used to measure the effects of the ice-storm which occurred in January 1998.

Table 1.1
Overview of Survey Structure and Publications, by Year

Year	Pretest	Survey	Publication
1996	Infants 5 months of age	...	...
1997	Children 17 months of age	...	...
1998	Children 29 months of age	Infants 5 months of age	Preliminary Report[6] Pretest 5 months of age
1999	Children 41 months of age	Children 17 months of age	...
2000	Children 53 months of age	Children 29 months of age	Cross-Sectional Report (Vol. 1) Survey 5 months of age
2001	...	Children 41 months of age	...
2002	...	Children 53 months of age	First Longitudinal Report (Vol. 2) 5, 17, 29 months of age
2003	...	...	...
2004	...	...	Second Longitudinal Report (Vol. 3) 5 to 53 months of age

6. Santé Québec, Jetté,M., H. Desrosiers & R. E. Tremblay, 1997.

2. Description of the Survey of 5-Month-Old Infants

This first analytical paper in Volume 1 describes in detail various aspects of the methodology used in "In 2002... I'll Be 5 Years Old!" It constitutes an INDISPENSABLE GUIDE to understanding the data presented in all the papers of Volume 1. The pages that follow will assist the reader in interpreting the results by placing them in the order of their generation. First, the survey instruments - their function, contents and logistical aspects - will be delineated. Second, data collection and participation rates in the main instruments will be described. Third, major characteristics of the statistics will be presented such as the sample frame, sample design, sample size, response rates, standards to which the results were subjected, and the scope and limits of the data.

2.1 Survey and Data Collection Instruments

The first phase of this 5-year study involves 14 instruments which are used for data collection and longitudinal monitoring of the families. Since the objective of this first paper is to facilitate comprehension of the survey as a whole, more detailed information on the origins and justifications for the questions, development of derivative variables, scales and indices, and changes made to the original questions, is relegated to the last paper[7] in this series, to be published in December of 2000. The actual instruments themselves are available for consultation at any time at *Santé Québec*.

To provide a better understanding of the objectives of the instruments, they will be presented in the order in which they were used to collect data.

Instruments #1 and #2: Letter of Introduction and General Brochure

The children were selected from the *Fichier maître des naissances* (Master Birth Register) of the *ministère de la Santé et des Services sociaux* (MSSS). Since details on the sample frame, sample design and data collection will be presented later, suffice it to say here that the letter of introduction and the descriptive brochure were sent to the target families of the survey based on the addresses selected from the birth register.

The LETTER and BROCHURE arrived at the families' homes at least two weeks before they were telephoned by the survey firm. These two instruments had several purposes: describe the general and specific goals of the survey, introduce *Santé Québec* and its partners, the MSSS, health and social services network and researchers associated with the project; explain the important role parents would have in the project; define the particular nature of a longitudinal survey; clearly describe the time involved in the interviews and the token of appreciation the parents would receive; assure parents the data collected would be kept strictly confidential; state that the address had been obtained from the Ministry with the prior approval of the *Commission d'accès à l'information du Québec - CAI* (Québec Access to Information Commission); and inform the parents that *BIP*, the survey firm, would be telephoning them to arrange a face-to-face interview.

Instrument #3: Souvenir Folder of "In 2002... I'll Be 5 Years Old!"

A souvenir folder with the logo of the survey is given to the parents on the first of the five annual visits so they can keep all the documents they receive from *Santé Québec* in the same place.

Instrument #4: Consent Form

Approved by *le Comité d'éthique de la Direction Santé Québec* (Ethics Committee of *Santé Québec* Division), this form must be signed annually by one or both parents of the child. It is not a prerequisite for participation in the study, but the parents are asked to sign it every year. It describes the partnership with the researchers, acknowledges that the survey has been clearly explained to them, reiterates the confidentiality and anonymity that governs the survey, and assures them that they have the right to refuse or withdraw from the survey without prejudice at any time. Two copies are given to each household. The forms are signed and dated by the parent(s) and countersigned by the interviewer.[8]

7. This last paper of Volume 1 will present the sources and justification for each question, and scales used in studying the 5-month-old infants. It will also describe the instruments that were specifically designed for this first "volet" of the survey.

8. All the interviewers in this survey were women.

The parents keep the original in their folder, and the interviewer brings the other copy back to BIP.

Instrument #5: Computerized Questionnaire Completed by the Interviewer (CQCI)

The prime instrument used by ÉLDEQ 1998-2002 is drawn almost in its entirety from the National Longitudinal Study of Children and Youth (NLSCY), conducted by Statistics Canada since 1994 on more than 20,000 children originally between 0 and 11 years of age. The CQCI collects information on the members of the household in which the 5-month-old infant lives. It is administered by an interviewer. Responses to the questions are obtained from the person who best knows the child, the PMK (Person Most Knowledgeable), who in virtually every case so far, has been the biological mother. Every year the questionnaire contains about 600 variables and takes approximately 50 to 60 minutes to fill out. A wide variety of topics are covered: sociodemographic and socioeconomic data on the members of the household, living arrangements and conditions, lifestyle habits and health status of the parents as well as the mother during the pregnancy, temperament and motor and social development of the infant, family functioning, parenting behaviours, family history and custody of the child, daycare and baby-sitting, neighbourhood safety. An overview of the topics covered in the whole survey and main collection instruments in which they are found is presented in Table 2.1 at the end of Section 2.1.

One of the particularities of ÉLDEQ 1998-2002 is that it focuses on both biological parents, whether they are present in the household or not. If the biological father or biological mother is absent (BFA and BMA respectively), a short questionnaire is used to gather information on his/her age, education, work, and frequency of contact with the target child. In addition, the interviewer asks the PMK for the address and telephone number of the absent biological parent so that the survey firm can send a self-administered questionnaire to be filled out and returned by mail.

A section of the CQCI is devoted to reference people. It asks for the addresses and phone numbers of at least two people whom the PMK will notify in case of a change of address or telephone number. Therefore, when the survey company cannot reach a household in a given year, they can contact one or more of these reference people to obtain the new address or phone number of the family, or to learn the reason why the family cannot be reached.

Instrument#6: Paper Questionnaire Completed by the Interviewer (PQCI)

This rounds out and complements the CQCI (face-to-face interview with the PMK). The 72 variables measured in this questionnaire cover the following: maternal and paternal relatives of the infant, perception of the household's socioeconomic situation, the infant's diet, attitudes of the family towards breast feeding, vitamin and mineral consumption, and behaviours related to oral hygiene.

Instrument #7: Authorization Form to Access Mother's and Infant's Medical Records

It is obligatory for the biological mother of the infant to sign this for *Santé Québec* to proceed with obtaining certain information. It is counter-signed by the interviewer as a witness, and has a legal duration of 90 days from the date it was signed by the mother. It gives permission to obtain the following information from the hospitals or birthing centres where the mother gave birth: the complete obstetrical file of the mother, the anatomy/ pathology report on the placenta, the mother's short-term hospital admission form, summary of the infant's complete medical file including the short-term hospital admission form, physical examination of the newborn, and results of the blood test done on the umbilical cord. Approximately 50 variables on the mother and baby are studied, such as type of birth, perinatal complications, specialized care given the infant, etc. These will be discussed in an analytical paper to be published in 2001.

Instrument #8: 1, 2, 3 Hands Game

This variation on the Imitation Sorting Task (IST), initially developed for infants 10-12 months of age, had to be adapted to the capabilities of a 5-month-old. The new instrument, with two levels of difficulty, provides the first measure of the attention capacity of the child. In the first level of difficulty, the child must use eye-hand coordination by looking at an object shown to him and grasp it, having previously opened his hands. In the second level of difficulty, we increase the number of elements the infant must take into account. An object is placed in each hand, and a third is presented to him. The infant has to drop one of the objects to pick

up the third. This is the first "objective" measure conducted directly on the child, and it requires about 5 minutes of his attention.

Instrument #9: Self-Administered Questionnaire for the Mother (SAQM)

As its name indicates, this questionnaire is filled out by the mother, usually without assistance, unless she requests it of the interviewer because of a reading, writing or other limitation. It comprises 88 variables that measure more sensitive information such as previous pregnancies, problems that may have occurred in adolescence or adulthood (e.g. truancy, running away from home), and support provided by the spouse. It also collects information on mother/child relations and sleep. If the biological father is absent, the mother is asked to fill out a supplementary section on the frequency of his visits, financial support he provides, and problems he may have had as a teenager or adult (same as those asked of the mother). As are those in the PQCI, questions in the SAQM are either taken from other surveys, reworked to meet the goals of ÉLDEQ 1998-2002, or are not part of the NLSCY. It takes approximately 20 minutes to fill out this questionnaire, as it does for the SAQF, the description of which follows.

Instrument #10: Self-Administered Questionnaire for the Father (father present - SAQF, biological father absent - SAQFABS)

As is the SAQM, the SAQF is usually filled out without the assistance of the interviewer, unless requested otherwise. The counterpart of the SAQM and parts of the CQCI, it contains 74 variables on topics such as the temperament of the infant, father/child relations, mental health, and certain problems the father may have had in his youth or as an adult.

In addition to being an original questionnaire designed for this survey, another unique characteristic is that it can be filled out by the absent biological father (SAQFABS) and by the new spouse/partner of the mother. This also applies to the SAQM with regards to the biological mother and the father's new spouse/partner. Therefore, the same infant could be covered by a SAQF (or SAQM) and a SAQFABS (or SAQMABS). Thus pertinent information can be collected from or about the absent biological parent in spite of the arrival of a new spouse or partner in the child's life. However, it should be noted that only absent biological parents who maintain contact with the child at least once a month, and whose whereabouts are therefore known, are eligible to receive a SAQMABS or SAQFABS.

Instrument #11: Baby Diary

With precise 5-minute entry spaces, this agenda-style logbook covers an observation period of 48 hours. It can be filled out by the PMK or anyone who takes care of the baby. Its objective is to measure the frequency and duration of certain behaviours of the child such as sleep, time awake and content, awake and fussy, awake and crying, crying and cannot be soothed, and feeding (breast or bottle). It provides a means of recording the frequency and duration of time adults responsible for the infant devote to basic care such as bathing, diaper changing, dressing, and to physical contact, such as time spent holding him/her. The time continuum is represented by ruler-like scales divided into five-minute increments. Four time rulers must be filled out per observation day, therefore eight rulers in all. Each six-hour ruler is divided into two sections, the upper one for recording the infant's behaviours, the lower for adult ones. This permits separate but concomitant analysis of the behaviours (see Annex 1). It takes, on average, 30 minutes a day to record the observations.

Instrument #12: Observations of Family Life **(OFL)**

The only questionnaire filled out by the interviewer not in the presence of the parents, it comprises approximately 40 variables. It is used to record observations made during the interview with regards to mother/child interactions, physical layout of the child's environment, and certain behaviours of the mother and the baby.

Instrument #13: Questionnaire on the Ice Storm of January 1998

This questionnaire was added *in extremis* to the ÉLDEQ 1998-2002 instruments to determine the impact of the January 1998 ice storm and its potential effects on the survey results. A short instrument containing about 10 questions, it is filled out by the interviewer (in person) with the PMK in all the survey households. It provides a means of ascertaining the proportion of the sample that was affected by this phenomenon of nature, and estimating the degree to which it affected their lives.

Diverse variables were cross-checked following data collection. It was likely that some could have been affected by the ice storm and its effects, whereas others, at first glance, should not have. Preliminary analyses did not reveal any potential bias attributable to this freak of nature. Therefore, the stress experienced by the children and parents did not seem to have had any detectable direct or indirect effects on the dimensions of child development being measured, regardless of the age of the child - babies in the 2nd or 3rd trimester of pregnancy, or the first three months of life.[9] Given the absence of any significant results, none from this instrument will be published in this volume. Even though they seem to attest to the quality of the overall results produced in the first year of the cohort, they remain available in the event that longitudinal analyses raise any questions.

Instrument #14: Birthday Card for the Child

Each year, *Santé Québec* sends a birthday card to the household in the days preceding the child's birthday. The envelope also includes a change-of-address card if any information such as address and telephone numbers needs to be updated.

In concluding this section on the survey instruments, we would like to indicate that the families receive an update on the cohort every six months in the form of a newsletter entitled “In 2002... I'll Be 5 Years Old!” This newsletter keeps the parents informed of the progress of the study and provides answers to common questions they put in the “Comments” section of the SAQM, SAQF and Baby Diary. But it also provides an opportunity to remind parents of the importance of participating in the study and to notify us of any change of address.

9. Later in this paper (Section 3.1.3), we see that in January 1998 the infants in the cohort were not all the same age, given that the annual data collection stretches over six months - mid-March to mid-June, and early September to early December of the same year.

Table 2.1
Summary of Themes Studied in the Survey of 5-Month-Old Infants (ÉLDEQ 1998-2002), by Data Collection Instrument, 1998

Themes of ÉLDEQ 1998-2002 1998: 5-month-old infants	CQCI Inst. 5[a]	PQCI Inst. 6	SAQM Inst. 9	SAQF[b] Inst. 10	Med. Rec. Inst. 7	Baby Diary Inst. 11	1,2,3 Hands Game Inst. 8	OFL Inst. 12
PARENTS (MOTHER AND FATHER/SPOUSE)								
Sociodemographic information	/							
Education	/							
Occupation/work	/							
Physical health (gen. status and chr. dis.)	/							
Lifestyle habits (smoking, alcohol, drugs)	/							
Mental health (depression) PMK	/ (PCM)			/				
Certain antisocial behaviours			/	/				
Spousal support			/					
Leisure activities			/	/				
BIOLOGICAL MOTHER								
Lifestyle habits (during pregnancy)								
smoking	/							
alcohol	/							
medications	/							
drugs	/							
Postnatal depression	/							
Hospitalization and specialized medical care (after giving birth)	/							
Pregnancies/fertility			/		/			
Work after the birth	/							
Other perinatal data					/			
ABSENT BIOLOGICAL FATHER								
Frequency of visits to the child and financial support	/		/[c]					
Education	/							
Occupation/work	/							
Certain antisocial behaviours			/[c]					

(table continues on next page)

a. Refers to the instrument numbers as indicated in Section 2.1.
b. The SAQF is designed for fathers/spouses in the household and absent biological fathers (see Section 2.1, instrument #10).
c. Information on absent biological fathers is collected by obtaining it from the biological mothers.

Themes of ÉLDEQ 1998-2002 1998: 5-month-old infants	CQCI Inst. 5[a]	PQCI Inst. 6	SAQM Inst. 9	SAQF[b] Inst. 10	Med. Rec. Inst. 7	Baby Diary Inst. 11	1,2,3 Hands Game Inst. 8	OFL Inst. 12
5-MONTH-OLD INFANT								
Sociodemographic information	/							
Physical health:								
general status	/							
height and weight	/							
birth weight	/							
injuries	/							
chronic diseases	/							
medical visits	/							
hospitalization	/							
other perinatal data					/			
oral hygiene		/						
Diet								
feeding method		/						
vitamins and minerals		/						
introduction of solid foods		/						
attitudes on breast feeding		/						
Sleep			/					
Temperament	/			/				
Behaviours of the infant						/		/
Motor and social development	/							
Cognitive development							/	
Activities	/							
Daycare/baby-sitting arrangements	/							
PARENT/CHILD RELATIONS								
Parenting practices	/							/
Reading to the child	/							
Cuddling/physical contact with the infant						/		
Mother/child relations			/					/
Father/child relations				/				
FAMILY AND HOUSEHOLD								
Members of the household	/							
Family history of the parents (maternal and paternal)		/						
Family history and legal guardianship of the child	/							
Family functioning	/							
Household income	/	/						
Perception of financial situation		/						
Physical environment								
living conditions	/							/
neighbourhood safety	/							

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

2.2 Data Collection

After the sample was selected for each collection wave[10] by the Methodology Division of the *ISQ* (see Section 3 and after), the data were forwarded to the *Service du support aux opérations, Régie de l'assurance maladie du Québec - RAMQ*. Then two sets of data on the selected children were matched,[11] one from the Birth Register and one from the *RAMQ*. This served to update the addresses in the former, which were approximately five months old, with those of the latter, which were more recent for 3% of the names. This is how the reliability of the data in the "evolving" sample frame was improved. After the matching process, a total of 172 families selected could not be reached because of incorrect information (address, telephone number), meaning that the sample frame remained imprecise for slightly less than 6% of the sample.

Following this matching process, the *RAMQ* sent *Santé Québec* the data from each of the six collection waves. The letters of introduction and brochures were sent by mail using the addresses drawn from these data. Following the six mailings, the survey firm received the list of addresses and telephone numbers of potential respondents for each wave. In all, 2,940 households were selected (see Table 2.2), and many attempts were made to contact each one. If the household could not be reached by telephone using the information available, telephone directories were used or the domicile was actually visited if the person could not be located. When the telephone number could not be found or no one answered the door, next-door neighbours were asked for help in finding the families. Only after all these steps were taken was the household and/or the child designated as impossible to reach.

Table 2.2
Initial Sample of ÉLDEQ 1998-2002 and Cooperation Rate, 1998

	Infant	
	n	%
Initial sample	2,940	100.0
Families not found (incorrect address/tel. no.)	172	5.9
Families excluded	93	3.2
Families and infants possible to contact	2,675	90.1
Families and infants not reached (after many tries)	14	0.5
Families who refused	438	16.4
Total refusals + not reached	452	16.9
Cooperation rate	**2,223**[a]	**83.1**

a. Of the 2,223 infants surveyed in 1998, only 2,120 were retained for the longitudinal study.

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

Even though telephone contact had been made, a total of 93 infants and their families could not be included for various reasons - death of the baby (5); the family was already participating in a longitudinal study (5), such as the NLSCY, ÉLDEQ 1998-2002 pretest or the *Étude des jumeaux nouveaux-nés au Québec - ÉJNQ* (Québec Study of Newborn Twins) - so *Santé Québec* didn't want to over-burden them; families who spoke neither French nor English (81), for whom *Santé Québec* had not adapted the instruments; and, infants (2) who could not be surveyed because the instruments were not designed to adequately measure the development of children with severe physical or mental handicaps (Table 2.2). Therefore, 3.2% of families were excluded from the study, either because of the guidelines set, or the limitations of the collection instruments in terms of measuring development in children with certain characteristics.

In the end, the survey firm obtained a cooperation rate of 83%, which can also be interpreted as the participation rate of families who were recruited (Table 2.2). In the sections of this paper devoted to the statistical methodology used in the survey, the response rates will be presented and explained. Unlike cooperation rates, the intention of which are to provide a portrait of the survey as it unfolds in the field, response rates are used for the

10. As seen earlier, a "collection wave" comprises a 4-week period in which the families of the infants must be interviewed, this occurring annually. This means six waves a year, the first three in the spring, the last three in the autumn, as was done in 1998.

11. This matching operation had been previously approved by the *Commission d'accès à l'information du Québec - CAI* (Québec Access to Information Commission).

complex statistical operations such as weighting for non-response (for each respondent).

After indicating the total number of respondents to the survey, namely the overall cooperation rate, it is important to know the cooperation rates of the actual instruments themselves (Table 2.3). If a CQCI was not filled out for a household, none of the other instruments could be administered. This is why the CQCI was the denominator used to calculate the participation rates of the other instruments.

Table 2.3
List of Collection Instruments, by Number of Respondents, and Cooperation Rates, 1998

	n	%
CQCI (inst. #5)	2,223	100.0
PQCI (inst. #6)	2,223	100.0
Authorization to access medical file (inst. #7)	2,184	98.2
1, 2, 3 Hands Game (inst. #8))	2,120	95.4
SAQM (inst. #9)	2,146	96.5
SAQF (present) (SAQFABS - father absent) (inst. #10)	1,900	85.5
Baby Diary (inst. #11)	1,782	80.2
OFL (inst. #12)	2,221	99.9

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

Given the large number of instruments and the time involved for each, the cooperation rates are particularly satisfying. Rare are the annual longitudinal population surveys that use as many instruments. Although on the whole the rates were good, some, as indicated in Table 2.3, merit closer attention.

The "1, 2, 3 Hands Game" was designed for a 5-month-old. Very strict rules governed the procedure involved, and had to be followed to the letter by the interviewers, even if it meant a lower participation rate. An infant who was sleeping was not to be awakened to perform the task. In any event, his performance would have been influenced by his drowsiness. In addition, an infant who was sick (flu, vaccination, etc.) was not induced to play. In all, 2,120 infants, more than 95%, participated in this instrument. Even while playing the game, however, the primary concern of the interviewer was the well-being of the child. This may explain in part why 269 infants (12.7%) did not finish the game (data not shown). In the paper devoted to motor, social and cognitive development, this high incompletion rate will be discussed in more detail. However, the fact remains that by putting the golden rule of the child's welfare before any other consideration such as research or participation rate, the *Santé Québec* Division was ready to accept the impact this decision would have on the quantity of data gathered.

Even though the cooperation rate of the fathers in filling out the self-administered questionnaires (SAQF) was 10% lower than that of the mothers, it remains relatively high, given that in general, fewer men tend to participate in surveys (Groves, 1989; Drew *et al.*, 1988). By closely monitoring the telephone calls made to the households, it seems that the "protective" presence of the fathers during the interviews may explain, at least in part, why they let their youngest child and the mother of this child be recruited, and an interviewer, whom they did not know, come into their home. It seems reasonable to assume that the fact of their having been present during the 90-minute interview likely increased their interest in the project and in participating themselves. To our knowledge there are few, if any, large-scale surveys that have studied fathers, indeed fathers of such young children. Since other well-known longitudinal studies such as the Cambridge Study in Delinquent Development in the UK, the Oregon Youth Study and the National Longitudinal Survey of Youth in the US, the Christchurch Health and Development Study and the Dunedin Multidisciplinary Health and Development Study in New Zealand, and the NLSCY in Canada did not specifically target fathers, their participation in ÉLDEQ 1998-2002 is difficult to place in a larger context (for the purposes of comparison), and is perhaps unique.

Although the participation rate in the Baby Diary appears to be somewhat low (80.2%), it is still 6% higher than that obtained in the pretest of 5-month-old infants (Santé Québec, Jetté, M., H. Desrosiers & R.E. Tremblay, 1997). As indicated in Section 2.1, this instrument requires the involvement of all the adults who take care of the baby. This, combined with the period of observation involved - 48 hours - and the fact that the adults have to use a graphic method of recording observations rather than simply writing them down, are some of the factors which could account for the lower participation rate.

2.3 Data Processing

The validation of the survey data is an important, if not decisive process for the statistical processing that is done at a later stage. Right from the entry of the first questionnaires at the survey firm, a portion of the data must be captured. Double data entry is done, then validated. Secondly at the firm, the paper questionnaires are validated - ineligible codes are rejected, filters validated, etc.

With regards to the CQCI, *Santé Québec* conducts the basic validation. *Santé Québec* also ensures, in the 3rd stage of validation, that all variables are examined one by one, and cross-tabulated with others to detect, eliminate or correct possible aberrant values. After having validated the data with complementary variables, *Santé Québec* conducts an inter-instrument validation that, by more sophisticated cross-checking, detects illogical errors that could have slipped in at any time during the data collection process.

Creation of derivative variables, such as socioeconomic status indicator, perception of the neighbourhood, family functioning, infant temperament, etc. provides another opportunity to verify the quality of the data. This is done by examining the frequency distribution of the discreet variables or the graphs of the continuous variables.

Finally, the researchers must notify *Santé Québec* of any aberrant data they spot during analysis, so final corrections can be made before the database is made available to other users.

This ends the general introduction to ÉLDEQ 1998-2002. The next section covers the statistical methodology that was used. Some new aspects of the survey will be presented and some topics previously discussed will receive a second examination, but from a purely statistical point of view. The survey and statistical methodology employed constitute the alpha and the omega of any large-scale study. A perspective on these is indispensable for anyone who wants to understand, use, even reproduce, in whole or in part, the results of this longitudinal study on child development.

3. Description of the Statistical Methodology of ÉLDEQ 1998-2002 (5-Month-Old Infants)

As mentioned earlier, the primary goal of this survey is to obtain longitudinal data. They can be used to conduct studies on the evolution of certain variables over time. A second goal is to produce cross-sectional estimates, namely results that are representative of the population at a given time. However, these results (or estimates) do not take into account changes in the population over time. To produce cross-sectional estimates every year, it would have been necessary to annually add new arrivals to the longitudinal sample such as immigrant children. Financial considerations and the desire to create a Québec cohort which was not only comparable but also complementary to that of the NLSCY (the master survey), led *Santé Québec* and the researchers of ÉLDEQ 1998-2002 to opt for another survey model.

In the sections that follow, the principal methodological aspects of the first year of ÉLDEQ 1998-2002 are described. Section 3.1 details the methodology used to accomplish the project. The target populations, samples, sampling frame, stratification, sample size and distribution are discussed. In Section 3.2, the fine-tuning and application of the methodology is presented - the 1996 pretest, 1998 collection process and adjustments made to the 1998 data. The statistical evaluation of the survey is presented in Section 3.3. Section 3.4 closes this paper with a discussion of the cross-sectional methods of analyses used.

3.1 Methodology

3.1.1 Populations and Sampling Frame

The target population of the survey is the babies, singleton births only,[12] who were 59 or 60 weeks of gestational age[13] at the beginning of each collection period, born to mothers residing in Québec, excluding those living in the following regions *(régions sociosanitaires* , administrative regions of the health ministry, of which there are 16 in the province, hereinafter referred to as "regions" in the text, and two so-called "territories," where aboriginal peoples live): Northern Québec (10), Cree "territory" (17), Inuit "territory" (18), and Indian reserves. According to the Master Birth Register for 1997-1998, these exclusions represented 2.1% of all live births to mothers residing in Québec. Babies were also excluded if the duration of the pregnancy was not indicated in the birth record (1.3%). At this step in the process, the target population represented approximately 96.6% of the total population.

The *Fichier maître des naissances* of the *MSSS* contains records of all birth certificates by calendar year. These records indicate the name, date of birth, mother tongue of the mother and father, address, language used at home, educational level of the mother, duration of the pregnancy and certain other information on the baby. Data capture and updating is done daily. The closing date of the register is usually in August of the year immediately following the calendar year.

Given that data collection in 1998 took place throughout the calendar year, the sampling was done on a constantly changing sampling frame. In fact, the register's data are subject to certain variations. There may be delays in receiving or coding the forms. Therefore, some babies who might have fulfilled the selection criteria may not have been listed yet in the registry at the time of selection. According to the complete register of births 1997-1998, this under-coverage was of the order of 4.7% of the target population. However, 50% of the unregistered babies came from mothers living in the Hull region *(région sociosanitaire de l'Outaouais)* who had given birth in the province of Ontario.[14]

12. Twins and other multiple births were not targeted by the survey.

13. Gestational age is defined as the sum of the duration of gestation (pregnancy) and the age of the baby. Due to variations in the duration of pregnancy and the four to five weeks allotted for each collection wave, the infants were not exactly all the same age at the time of collection.

14. Ontario forwards information on births to Québec sporadically and often with a long delay.

Appropriate poststratification reduced the potential bias caused by this under-coverage.[15]

Certain premature babies could not be retained, namely those who had had a gestation period of less than 24 weeks, because they had a higher risk of mortality between entry in the register and the conducting of the survey. Similarly, births occurring after 42 weeks of gestation had to be excluded because the delay in selection would have meant waiting until they became available for the sampling frame. These two *a priori* exclusions represented approximately 0.1% of registered births as of the date of data collection. Babies for whom sex was not indicated (0.1%) were also excluded. Slight under-coverage (0.6%) due to variability in the durations of pregnancy eligible for each data collection wave is discussed in Section 3.1.3

Therefore, the final population sampled for ÉLDEQ 1998-2002 is estimated to represent 94.5% of the target population.

3.1.2 Sample Design and Stratification

The survey used a stratified three-stage sampling design. The territory covered by the survey was first divided into primary sampling units (PSUs) *(unités primaires d'échantillonnage - UPE)* composed of regions. The PSUs were then divided into two groups, "remote" and "non-remote."[16]

In the first stage, two out of four "remote" regions were sampled. The 11 "non-remote" regions were automatically chosen. The objective was to obtain the best return on the financial investment in data collection by limiting the territory to cover to produce a quality population survey. Since the "remote" regions represented only 6.8% of the target population, the impact of this strategy on the overall results should be considered minimal.

In the second stage, the selected regions were divided into second-stage units (SSUs) *(unités secondaires d'échantillonnage - USE)* composed of one or two county regional municipalities (CRMs) *(municipalités régionales de comté - MRC).* In each region, the SSUs were divided in two groups according to the number of births registered in 1996.[17] The first contained the SSUs with a low number of births. From these, a fixed number was selected with a probability proportional to the number of target births in the area covered by the SSU. The second group comprised SSUs with a high number of births - all of these were selected in the sample. From among SSUs with a low number of births, we chose to simultaneously: 1) set the selection of the SSUs for the six collection waves in eight regions, and 2) vary the selection of the SSUs in each wave among four regions - Saguenay-Lac-Saint-Jean, Estrie, Chaudière-Appalaches, and Montérégie. The fact of not having definitively chosen all the SSUs for a wave controlled the overall design effect, while only marginally affecting the costs of data collection.

In the third and final stage, a final number of infants, third-stage units (TSUs) *(unités tertiaires d'échantillonnage - UTE)*, was selected from the SSUs.

Table 3.1 presents the distribution of the target population of newborns by region and sex. It shows the size and distribution of the sample, both of which are investigated in the next section.

15. In this poststratification, we hypothesize that the newborns excluded from the survey are similar to those covered by the survey.

16. It is only for the purposes of the survey that the four regions, Bas-Saint-Laurent, Abitibi-Témiscamingue, Côte-Nord and Gaspésie-Îles-de-la-Madeleine, were designated as "remote." Distances between population centres, large geographic area, and a very low population density were the criteria used to group them under the same rubric.

17. The 1996 Master Birth Registry was the only one closed and complete at the time of sampling, so it was used to determine the size of the sample by region.

Table 3.1
Distribution of the Target Population and Sample of Newborns, by Region and Sex, 1998

Region *(région sociosanitaire)*	%	Sex		Target population[a]	Sex		Sample	%
		M	F		M	F	n	
*Bas-Saint-Laurent	2.0	91	97	188	n. sél.	n. sél.	n. sél.	n. sél.
Saguenay **S** Lac-Saint-Jean	3.6	173	163	336	53	49	102	3.5
Québec	7.2	325	342	667	110	118	228	7.8
Mauricie	6.0	287	265	552	85	83	168	5.7
Estrie	4.0	190	174	364	59	55	114	3.9
Montréal	27.8	1,329	1,236	2,565	397	365	762	25.9
Outaouais	4.4	209	199	408	61	53	114	3.9
*Abitibi-Témiscamingue	2.3	105	109	214	64	62	126	4.3
*Côte-Nord	1.4	62	69	131	n. sél.	n. sél.	n. sél.	n. sél.
*Gaspésie **S** Îles-de-la-Madeleine	1.1	47	50	97	34	32	66	2.2
Chaudière-Appalaches	5.1	232	241	473	76	74	150	5.1
Laval	4.9	243	209	452	77	61	138	4.7
Lanaudière	5.7	282	243	525	94	74	168	5.7
Laurentides	6.4	298	295	593	92	88	180	6.1
Montérégie	18.1	848	828	1,676	316	308	624	21.2
Newborns	**100.0**	**4,721**	**4,520**	**9,241**	**1,518**	**1,422**	**2,940**	**100.0**

a. The target population on January 29, 1999. As of this date, the annual closure of the 1998 Master Birth Register had not occurred, and was to take place in August 1999.

* Regions designated as "remote."

"N. sel." indicates the two "remote" regions that were not selected for the sample.

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

3.1.3 Determining Sample Size and Distribution

The size of the sample was set to take into account two major imperatives related to this large-scale study: 1) obtain reliable longitudinal statistics over five years, and 2) do so within the limits of the budget. Initially, a sample of 2,800 newborns was planned.[18] Given the results of the pretest (Santé Québec, Jetté, M., H. Desrosiers & R. E. Tremblay, 1997, p. 13), a response rate of 72% and a design effect of 1.3[19] was anticipated. However, in the third and subsequent waves, an over-sampling of the Montérégie region was necessary to measure the impact of the January 1998 ice storm on the most important variables of the cohort. To do this, the initial sample was increased to 2,940 newborns.

As we have seen, this sample is divided annually into six waves that represent separate collection periods. In the beginning, we had intended to equally distribute the sample among the waves so the interviewers' work would be roughly the same for each wave. However, the 1998 ice storm paralyzed the Greater Montréal and Montérégie regions for periods of up to four weeks. This resulted in a 50% reduction in the sample size in Montérégie in the first wave. To compensate, the samples in subsequent waves conducted in this region were slightly increased.[20]

18. This sample would ensure a 1.5% margin of error for a proportion of the order of 10%, with a level of confidence of 95% for statistics applicable to the whole of Québec.

19. The design effect is the variance of the estimate obtained from the survey sample divided by the variance of the estimate assuming a simple random sampling of equal size (discussed later in the text).

20. An increase of approximately 10% of households for each wave, resulting in a complete recuperation of the 50% omitted in the first wave.

It was important in each sampling to verify whether all the babies selected had been born after October 1, 1997. This restriction ensured that all the infants chosen would enter the education system during the same school year. To fulfill this requirement, we had to make the eligible duration of pregnancy for mothers to take part in the survey slightly different for each collection wave:

- Wave 1 — Eligible duration of pregnancy could vary between 37 and 42 weeks
- Wave 2 — Eligible duration of pregnancy could vary between 33 and 42 weeks
- Wave 3 — Eligible duration of pregnancy could vary between 29 and 42 weeks
- Waves 4-6 — Eligible duration of pregnancy could vary between 24and 42 weeks

Therefore, there was a slight under-coverage, mainly in Wave 1, of babies whose gestational age was between 24 and 36 weeks, namely premature ones. The under-coverage was estimated to be 0.6%. Appropriate poststratification[21] corrected this type of irregularity.

The percentage of overlap of the ÉLDEQ 1998-2002 sample and that of the NLSCY was analyzed in the 1996 pretest (Des Groseilliers, 1997, p. 244). The low percentage observed means that the babies covered by both surveys should be considered non-respondents.

A random sample proportional to size was used to select the two "remote" regions, namely Abitibi-Témiscamingue and Gaspésie, as shown in Table 3.1. At the second stage, the SSUs were selected (as seen earlier) with a probability proportional to the number of births in the strata with a lower number of births, and with certitude in the other strata. At the third stage, the selection of babies (TSUs) was proportional to the number of births registered (see Annex 2). Twice as many babies were selected in the two "remote" regions, which were included in the survey to increase overall precision.

21. This corrective measure pre-supposes that premature babies excluded from the survey were similar to those who were included.

3.2 Application of the Methodology

3.2.1 The 1996 Pretest[22]

The two main goals of the pilot survey, conducted between September and December of 1996, were to evaluate the feasibility of conducting a survey on a cohort of Québec babies, and estimate the prevalence of certain characteristics in this cohort. It provided a means of verifying the quality of the sample design, operational aspects of the sampling, data collection process, quality of the questionnaires, and steps involved in generating the results. In its wake, some modifications were made in order to increase the response rates in the longitudinal study - birth register records were matched with those of the *Régie de l'assurance-maladie du Québec - RAMQ* to increase the accuracy of addresses, the eligible age of the babies was extended, the duration of the interview was reduced, and an annual token of appreciation was added for participating households.

3.2.2 Response Rates of ÉLDEQ 1998-2002 (5-Month-Old Infants)

Table 3.2 presents the distribution of the response results of the CQCI, the instrument which is compulsory for a household to be considered a respondent. It is only after having completed this that response to the other instruments is set into motion. As shown in the table, the response rate obtained for ÉLDEQ 1998-2002 on 5-month-old infants was 75.8%.[23]

According to the definition of Hidiroglou, Drew and Gray (1993), the response rate is the ratio of the number of responding units (participating households) to the total number of units eligible for the survey (responding and non-responding units) and unresolved cases. The responding units are the units eligible for the survey who responded by the deadline (the end) of the data collection wave. Unresolved cases are the number of units for which a status could not be established by the end of the data collection stage.

22. For a detailed description of the pretest, see the Preliminary Report (Santé Québec, Jetté,M., H. Desrosiers & R. E. Tremblay, 1997).

23. In other words, a response rate nearly 4% higher than that expected (72%) and close to 15% higher than that of the 1996 pretest.

Table 3.2
Distribution of the 1998 Data Collection Results, ÉLDEQ 1998-2002, by Participation in the CQCI, 1998

	n	%
Household responding to the CQCI	2,223	75.6
Interview completed	2,223	75.6
Interview semi-completed	0	0.0
Responding units (participating households)	**2,223**	**75.6**
Household refusal	440	15.0
Participating in the NLSCY	3	0.1
Part of the longitudinal pretest	1	0.0
Non-responding units	444	15.1
Untraceable	140	4.8
Foreign language	81	2.8
Out-of-province	25	0.8
No response after 8 tries	5	0.2
Prolonged absence	6	0.2
No telephone	2	0.0
Business	6	0.2
Unresolved cases	265	9.0
Sub-total of non-responding units + unresolved cases	**709**	**24.1**
Death of the baby	5	0.2
Twin	1	0.0
Physical handicap	2	0.0
Units not eligible for the survey	**8**	**0.2**
Total/Response rate of the survey (2,223)(2,223+444+265))	**2,940**	**75.8**

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

Table 3.3 presents a list of the main data collection instruments, the number of respondents who totally completed each instrument (for which statistics were generated), and the corresponding response rates.

With the exception of the SAQFABS, for biological fathers absent from the household and for whom the response rate was less than 50% (see Section 3.4), the response rates varied between 63.1% and 75.8% for the other instruments.

Table 3.3
List of Collection Instruments, by Number of Respondents, and Response Rates, 1998

	Number of respondents	Response rate
CQCI	2,223	75,8 %
PQCI	2,223	75,8 %
Medical records	2,184	74,5 %
1, 2, 3 Hands Game[1]	1,851	63,1 %
SAQM	2,146	73,2 %
SAQF	1,855	66,2 %
SAQFABS[2]	45	45,9 %
Baby Diary[3]	nd	nd
OFL	2,221	75,8 %

1. 12.7% of the infants did not completely finish the game (see Section 2.2).
2. Self-administered questionnaire for biological fathers absent from the household who have contact with the child at least once a month.
3. At the time of publication of this paper, it is possible that the results of this instrument will be published in early 2000, though they require arduous and sophisticated data processing. The Baby Diary may be the subject of the 13th paper in the present series (Volume 1); if not, the data will be available in Volume 2, slated for publication in 2002.

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

It is important to indicate that overall non-response rates, namely of the survey or a particular instrument, or partial non-response rates, namely of one or more questions in an instrument, can engender biases in the results.

Table 3.4 presents the response rates of certain groups of individuals whose characteristics were linked to variables measured in the study. To limit potential bias due to non-response, corrections were made vis-a-vis the whole target population and specifically non-respondents, using supplementary data in the *Fichier maître des naissances*. Two standard methods were used - weighting and poststratification. These are described in the following section.

Table 3.4
Response Rates by Certain Demographic and Administrative Variables, [a] **1998**

	Categories	Response rates
Age of mother	Under 19 yrs of age	65.5 %
	20-24 yrs	73.9 %
	25-29 yrs	77.6 %
	30-34 yrs	77.6 %
	35 yrs of age and over	69.4 %
Education of mother	Elementary school	43.3 %
	High school	65.8 %
	College	74.3 %
	University	83.6 %
Language used at home[b]	French	79.3 %
	English	68.5 %
	Other	45.9 %
Region (*région sociosanitaire*)	Saguenay - Lac-Saint-Jean	87.4 %
	Québec	84.0 %
	Mauricie	86.2 %
	Estrie	82.3 %
	Montréal	63.2 %
	Outaouais	78.0 %
	Abitibi-Témiscamingue	79.3 %
	Gaspésie - Îles-de-la-Madeleine	85.2 %
	Chaudière-Appalaches	84.2 %
	Laval	63.4 %
	Lanaudière	75.8 %
	Laurentides	76.7 %
	Montérégie	79.8 %

a. Variables appearing in the Register of Live births *(Fichier des naissances vivantes)* and distinct from the derivative variables used in the 12 or 13 papers in this volume (Vol. 1).
b. Categories are exclusive.

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

3.2.3 Weighting

To make inferences from the sample data to the target population, each responding unit had to be ascribed a weight. The weight was the number of babies targeted by the survey and "represented" by the respondent. Three steps were used in the weighting process. First, a preliminary weight was calculated as the inverse of the probability of being selected.[24] Second, it was adjusted to take into account non-response, and third, adjusted again, in poststratification, to increase precision and account for under-coverage (Cox & Cohen, 1985).

Non-Response

The general objective in adjusting for non-response (weighting) and poststratification is to reduce possible bias in the estimates and make them more accurate. However, to begin these operations, it is necessary to have complementary information on both the non-respondents and the entire study population. In ÉLDEQ, this was done by using the *Fichier maître des naissances*, which contained a number of additional variables on all the babies in the target population.

It should be noted that weight adjustment methods do not absolutely guarantee the elimination of all bias in the results, and have certain limits. The ultimate aim is to modify the sample of respondents to take into account certain characteristics of non-respondents. However, it is always possible that non-respondents have certain specific characteristics for which no supplementary information is available. These could affect responses, and therefore the results, if they had taken part in the survey. Therefore, for weighting to be effective, it is important to link the supplementary information available to the variables measured in the survey. Otherwise, the impact of weighting in terms of reducing potential bias, would be negligible.

In short, adjusting for non-response consists of modifying the sample of respondents by adjusting the weighting to render it, as much as possible, similar to the sample initially selected.

24. For more details on the calculation of the preliminary weights, see Annex 3.

In adjusting for non-response in ÉLDEQ 1998-2002, weighting cells were created using the modeling by segmentation technique. This approach is based on the CHAID algorithm (Chi-Square Automatic Interaction Detection) developed by Kass (1980).[25]

The general concept of the method is as follows: The population can be divided into homogeneous cells (groups), in which each individual has the same probability of responding if selected for the sample. The probability of responding varies among the cells.

Therefore, to significantly reduce non-response bias, these cells must be carefully constructed according to previously-defined criteria.

Among the supplementary variables in the *Fichier maître des naissances*, we used age of the mother, education of the mother, and language used at home. These seemed to have the strongest relationship to the phenomena being studied, namely the precursors to psychosocial adjustment in school. The region variable was also used (see Table 3.4). The process of weighting adjustment led to the formation of 13 cells for the whole sample (see Annex 4).

Poststratification

Poststratification consists of stratifying the population after data collection; it requires knowing the proportion of the population that belongs to certain groups (Cox & Cohen, 1985). Similar to stratification, poststratification increases the precision of the estimates. It contributes to both reducing the possible bias of non-response and correcting for under-coverage.

As in the non-response model, poststratification involves adjusting the weighting. The aim in this survey was to ensure that the weighted distribution of respondents conformed to the distribution of the target population or the 1998 *Fichier maître des naissances* with respect to certain sociodemographic variables. The variables that were used for the weighting were: region, sex of the baby and duration of the pregnancy. Homogeneous groups, called poststrata, were formed from these variables (see Annex 5).

25. The CHAID algorithm uses chi-square tests to divide category predictors and retain the most significant result at each step. This means a large number of co-variables can be processed, and because of the structure of the decision tree, it is easy to establish interactions (Tambay *et autres*, 1998; Brien, 1998).

3.3 Evaluating the Survey Data

In any statistical survey, the estimates produced are affected by errors. On the one hand, there are errors related to the sampling. These are due to the fact that we survey only a part of the population observed. On the other hand, there are errors designated as "not due to the sampling" that can arise because of an insufficient response rate, a weakness in the sample design, questions that are difficult to understand, data capture errors, etc.

3.3.1 Sampling errors

A sampling error is the difference between the estimates generated by a sample and those that would be generated by study of the entire population under the same conditions. Two tests for sampling errors were used - margin of error and coefficient of variation (CV).

The margin of error, for a risk of a 5% error, is a measure of a result's precision, and is defined as follows:

$$\text{margin of error} = 1.96 \text{ x } \sqrt{\text{variance of estimate}}$$

From the margin of error, the 95% **confidence interval** (CI) of the result (estimate) can be calculated as:

$$\text{CI} = \text{estimate} \pm \text{margin of error}$$

This interval illustrates the range of possible values that a given variable can have in the study population. This means that, if the survey were repeated a number of times, 19 out of 20 intervals would contain the real value of the estimate.

The ***coefficient of variation (CV)*** provides a means of quantifying the precision of a result (estimate) and is calculated as follows:

$$\text{CV} = \frac{\text{Margin of error}}{(1.96 \text{ x estimate})}$$

The higher the CV, the lower the precision of a result, and vice-versa. Table 3.5 indicates the relationship between the CV and the

precision of an estimate. It shows that prudence is necessary when interpreting results with only an "acceptable" level of precision (one asterisk "*" in the cells of the tables in this volume). Results with a high CV are subject to a high degree of variability, and should be used for information purposes only (two asterisks "**" in the cells of the tables). The benefit of the CV is that it provides a means of comparing the precision of various results.

Table 3.5
Quality of the Results (Standard Used by the Methodology and Special Surveys Division of the ISQ), 1998

CV	Precision of the result
# 5 %	Very good
5 % < CV #15 %	Good
15 % < CV # 25 %	Acceptable *
> 25 %	Low **

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

The precision of certain proportions is shown in Tables 3.6 and 3.7

Table 3.6
Precision of Certain Proportions When the Number of Respondents to a Question Was 2,223 (100% of the Respondents in the Survey), 1998

Proportion	Margin of error	CV	Approximation used
	%		
1	0.6	24.1	Binomial
2	0.8	16.9	Binomial
2.5	0.9	15.0	Binomial
3	0.9	13.8	Binomial
4	1.0	11.9	Binomial
5	1.0	10.5	Normal
10	1.4	7.3	Normal
15	1.7	5.8	Normal
20	1.9	4.8	Normal
30	2.2	3.7	Normal
50	2.4	2.4	Normal
70	2.2	1.6	Normal
80	1.9	1.2	Normal
95	1.0	0.6	Normal

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

Table 3.7
Precision of Certain Proportions When the Number of Respondents to a Question Was 1,100 (*i.e.* the Number of Respondents by Sex), 1998

Proportion	Margin of error	CV	Approximation used
	%		
2 %	1,2 %	25,0 %	Binomial
5 %	1,7 %	15,0 %	Binomial
10 %	2,0 %	10,3 %	Normal
15 %	2,4 %	8,2 %	Normal
20 %	2,7 %	6,9 %	Normal
30 %	3,1 %	5,3 %	Normal
50 %	3,4 %	3,4 %	Normal
70 %	3,1 %	2,3 %	Normal
80 %	2,7 %	1,7 %	Normal
95 %	1,7 %	0,8 %	Binomial

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

Care must be taken with regards to the estimate of confidence intervals of small proportions (Cochran, 1977). For these, the normal approximation used to calculate the CI is no longer valid. It is suggested instead to employ the approximation based on the binomial distribution, calculated using the F distribution (Korn & Graubard, 1998).

The efficacy of the sample design used for a survey can be evaluated *a posteriori*. We compare the results, in terms of statistical precision, with those that could have been obtained if we had selected a simple random sample. For this survey, we used a mean design effect. The mean design effect for the proportions was estimated at 1.3. Therefore, the variance of the proportions was estimated to be approximately 30% higher than they would have been with a simple random design.

3.3.2 Non-Sampling Errors

All other types of errors, such as those of observation, response, data processing and non-response, are considered not to be due to sampling. The one with the greatest impact is non-response, which can induce bias in the results.

Non-response is total when, for one reason or another, a selected person refuses to participate in either the survey or a particular survey instrument. With the exception of the SAQFABS, the overall

response rates in ÉLDEQ 1998-2002 varied between 63.1% and 75.8%, according to the instrument (see Table 3.3).

Partial non-response means that only a part of a questionnaire was filled out. A partial non-response rate lower than 5% should not normally be cause for concern. However, when a rate is higher than 5%, it can be a warning sign of potential bias. We therefore analyzed the partial non-response of each instrument. This consisted of evaluating non-response for each question, targeting problem areas, and determining its importance in the instrument. The six paper questionnaires (PQCI, SAQM, SAQF, Ice-Storm, OFL, 1, 2, 3 Hands Game) and the Computerized Questionnaire Completed by the Interviewer (CQCI) were studied. Non-response to each question was obtained by the ratio of the weighted number of individuals not having responded to a question to the weighted number who should have responded (potential respondents). The partial non-response rate of the medical records and baby diaries will be presented in the particular analytical papers devoted to these, since the complex data processing for them has not yet been completed.

Most of the questions in the survey had very low partial non-response rates, except for certain ones in the SAQM, CQCI and PQCI (see Annex 6 for the cautions concerning rates exceeding 5%). Therefore, ÉLDEQ 1998-2002 does not seem to have had any serious problems with regards to the presence of potential biases.

3.4 Methods of Analysis

The majority of the methods and computer programs available to analyze data are used for simple random samples. However, this survey employed a three-stage sampling design. There was therefore a risk of engendering biases in the results and under-estimating their variance if a simple random sample had been hypothesized. Consequently, statistical tests could have led to erroneous conclusions.

It was therefore important to take into account the sample design when the data were to be analyzed. Two complementary corrections were done - the first related to the results themselves, the second related to their precision.

First, the results were weighted. As seen in Section 3.2.3, each respondent was ascribed a value (weight) corresponding to the number of persons he/she represented in the population. This allowed us to infer the sample data to the target population. Three series of cross-sectional weights were calculated - one for the Self-Administered Questionnaire for the Father (SAQF), one for the Paper Questionnaire Completed by the Interviewer (PQCI) and the third for the 1, 2, 3 Hands Game. The weights obtained for the PQCI were also valid for the CQCI, SAQM, OFL and medical records, even though the number of respondents to certain instruments did not attain 2,223. For the three series of weights, the population weights and sample weights were calculated.[26]

The Self-Administered Questionnaire for the Absent Father (SAQFABS) was not weighted due to the low response rate, 46%, and to the fact that the non-respondents seemed to have had a different profile with regards to education and number of contacts with the child. Moreover, respondent absent fathers seemed to differ from respondent fathers living in the household with regards to certain characteristics measured by the questionnaire. Therefore, inferring the results to the population of babies whose father was absent is impossible. However, this sample allowed us to conduct certain descriptive analyses specifically focusing on babies with absent fathers (see No. 2 in this series of papers).

The second correction was related to the precision of the results. When we do not have detailed parameters in the sample design, we can determine the precision of the estimates of proportions by using a mean design effect, as discussed in 3.3.1. We therefore multiplied the estimated mean design effect (1.3) by the variance of a simple random sample to obtain the variance of the survey's sample design. The mean design effect was also used to compare two proportions and for conducting the chi-square tests. For the latter, the correction consisted of dividing the statistic by the mean design effect. This was equivalent to dividing the weights with a mean of one by the mean design effect.

26. The sample weights are those with a mean of one that retain the ratio between the population weights, and whose sum is in concordance with the number of respondents to the instrument.

However, in questionable cases, namely when the threshold observed was close to that set for the chi-square test, or the confidence intervals comparing proportions barely overlapped, an approach other than the mean design effect had to be used. For these cases, it was preferable to use a program such as SUDAAN[27] (SAS, 1985; Shah *et al.*, 1992) that can calculate estimates of variance taking into account a complex sample design.

For multivariate analyses, no approximation method was recommended. It was suggested to first proceed by not taking into account the sample design in estimating variances, but to weight the data with mean of one (sample weights). Secondly, the final models were tested with SUDAAN. No variable was added to the model. However, some parameters were no longer significant. Linear and logistic regressions, linear log models and variance analyses could be done with this program.

3.4.1 Scope and Limits of the Data

Having seen in detail the methodological foundations of ÉLDEQ 1998-2002, it is hoped the reader is now in a position to interpret and make judicious use of the data. To summarize:

1) The survey had eight main collection instruments.

2) Given the variation in response rates of the instruments, three series of weights had to be calculated, and had to be used to make accurate inferences about the population.

3) Apart from the SAQFABS and a series of questions in the CQCI on absent biological fathers - two instruments in which overall or partial non-response rates were too high - all the instruments could be weighted; therefore the results presented have all been adjusted to reduce possible bias.

4) All the data with a coefficient of variation (CV) greater than 15% are shown with one or two asterisks to clearly indicate their variability.

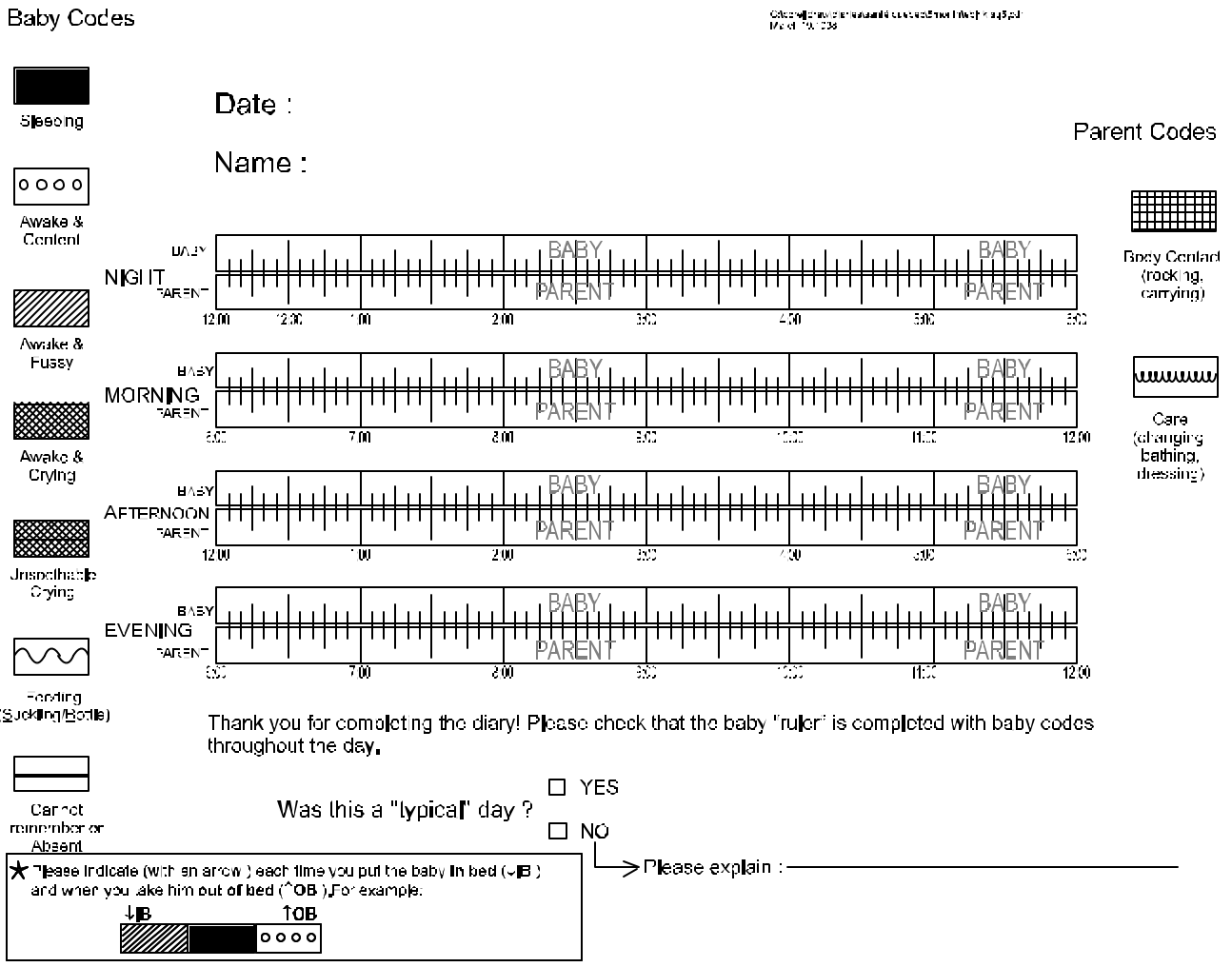
5) If results with a partial non-response rate higher than 5% are shown, there is a note specifying for which population sub-group they are less accurate.

As in any cross-sectional population survey, this first part of ÉLDEQ 1998-2002 has certain limits, yet still retains excellent data quality. The vast majority of the results are valid and accurate. They furnish a particularly detailed portrait of 5-month-old babies born in Québec, 1997-1998.

Far from being their only asset, longitudinal surveys that show innovation must obviously have a first round so that improvements can be made in subsequent ones. This first survey of an annual Québec cohort has surpassed the expectations of everyone involved. The response rate was 15% higher than that of the pretest. Partial non-response rates were, in the vast majority of cases, below 5%. Virtually all the instruments were completely filled out, so that there was no need to impute. Problem respondents - men in general, recognized in the literature as such, and absent fathers, hitherto practically unknown in the world of population surveys - and the 5-month-old infants themselves - all had high response rates. In short, the quality of the results presented in these 12 (possibly 13) analytical papers of Volume 1 has been established, and we enthusiastically look forward to further longitudinal monitoring of this Québec cohort.

27. For the chi-square tests, the Satterthwaite correction in the program was used. For the equal proportion tests, Taylor's linearization method in the program was used to measure precision related to the differences of the proportions.

Annex 1
Child Diary Specimen



Annex 2
Distribution of the Sample of Newborns by Region, Collection Wave and Sex, 1998

Region *(Région sociosanitaire)*	Sex	Wave 1 Mar. 16	Wave 2 Apr. 13	Wave 3 May 11	Wave 4 Sept. 7	Wave 5 Oct. 5	Wave 6 Nov. 2	n
02	Male	9	9	8	7	10	10	53
	Female	8	8	9	10	7	7	49
03	Male	16	19	21	20	19	15	110
	Female	19	20	18	19	19	23	118
04	Male	15	18	12	13	12	15	85
	Female	12	10	16	15	17	13	83
05	Male	9	11	9	9	8	13	59
	Female	10	8	10	10	11	6	55
06	Male	68	65	63	64	68	69	397
	Female	59	62	64	63	59	58	365
07	Male	11	12	10	10	7	11	61
	Female	8	7	9	9	12	8	53
08 *	Male	8	9	15	13	12	7	64
	Female	8	13	7	10	10	14	62
11 *	Male	7	5	4	5	6	7	34
	Female	4	6	6	6	2	8	32
12	Male	13	15	12	10	12	14	76
	Female	11	10	13	15	14	11	74
13	Male	14	14	14	11	12	12	77
	Female	9	9	9	12	11	11	61
14	Male	15	17	18	16	13	15	94
	Female	13	11	10	12	15	13	74
15	Male	17	20	13	13	16	13	92
	Female	12	10	17	17	15	17	88
16	Male	20	48	71	55	62	60	316
	Female	21	44	63	64	57	59	308
Total		**416**	**480**	**521**	**508**	**506**	**509**	**2,940**

* Indicates the so-called “remote” regions that were selected.

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

Annex 3
Probability of Selection

The probability of selecting baby i belonging to SSU j from stratum k and PSU l is (Kish, 1965):

$$\pi(ijkl) = \pi(k|l) \cdot \pi(j|kl) \cdot \pi(i|jkl)$$

where

$p(l)$ is the probability of selecting PSU l;

$p(k|l)$ is the probability of selecting stratum k given that it is included in PSU l; this probability is equal to 1 for all strata k;

$p(j|kl)$ is the probability of selecting SSU j, given that it is included in stratum k and PSU l; this probability is proportionnal to the number of births in SSU j;

$p(i|jkl)$ is the probability of selecting baby i given that he resides in SSU j from stratum k and PSU l; this probability is equal for all babies residing in a given SSU j.

Let

$$p(l) = \frac{r(l)}{R(t)}$$

where

r(l) is the number of births from the 1996 census in PSU l from stratum of size t;
R(t) is the number of births from the 1996 census from all PSU's belonging to the stratum of size t; r(l) = R(t) for all regions which are not remote.

Furthermore,

$$p(j|kl) = m(k)\frac{n(j)}{N(k)}$$

where

m(k) is the number of SSU's in stratum k;
n(j) is the number of births from the 1996 census for SSU j;
N(k) is the number of births from the 1996 census for all SSU's in stratum k.

Finally,

$$p(i \mid jkl) = \frac{b(j)}{B(j)}$$

where

b(j) is the number of babies selected in SSU j;
B(j) is the number of babies in the target population for SSU j.

The probability of selecting baby i belonging to SSU j from stratum k and PSU l reduces to:

$$p(ijkl) = \frac{r(1)}{R(t)} m(k) \frac{n(j)}{N(k)} \frac{b(j)}{B(j)}$$

However, according to different situations, the selection probability becomes:

- $p(ijkl) = \frac{r(l)}{R(t)} \frac{b(j)}{B(j)}$ for remote regions;
- $p(ijkl) = \frac{b(j)}{B(j)}$ for strata k which have a high birth rate and belong to regions which are not remote;
- $p(ijkl) = m(k) \frac{b(j)}{N'(k)}$ for strata k which have a low birth rate, belong to regions which are not remote and the choice of SSU's j within each wave varies;
- $p(ijkl) = m(k) \frac{n(j)}{N(k)} \frac{b(j)}{B(j)}$ for strata k which have a low birth rate, belong to regions which are not remote and the choice of SSU's j within each wave is fixed;

where

$N'(k)$ is the number of births in the target population for all SSU's in stratum k.

Therefore, the initial weighting is the inverse of the probability of selection:

$$\mathrm{P}_0(ijkl) = \frac{1}{p(ijkl)}.$$

Annex 4
Adjustment for Non-Response

The ajustment for non-response is expressed as a weighting factor, obtained by the inverse of the response rate for each homogeneous group c. The response rate is defined as the weighted sum of responding units over the weighted sum of eligible units:

$$T_c = \frac{\sum_{i,j,k,lec} P_0(ijkl) \cdot R(ijkl)}{\sum_{i,j,k,lec} P_0(ijkl) \cdot A(ijkl)}$$

where

$$R(ijkl) = \begin{cases} 1 \text{ if the unit is a respondent} \\ 0 \text{ if not} \end{cases}$$

$$A(ijkl) = \begin{cases} 1 \text{ if the unit is eligible} \\ 0 \text{ if not} \end{cases}$$

Therefore, each responding unit belonging to group c is attributed a weight as follows:

$$P_1(ijklc) = \frac{p_0(ijkl)}{T_c}.$$

Annex 5
Poststratification

The poststratification correction is represented by the following weighting factor:

$$T_p = \frac{W(p)}{\sum_{i,j,k,lcep} P_{1(ijklc)}}$$

where

$W(p)$ is the size of the target population for poststratum p, and

$\sum_{i,j,k,lcep} P_1(ijklc)$ is the weighted sum of responding units over each poststratum p, following adjustment for non-response.

Each responding unit belonging to group c and poststratum p is attributed a weight P_2 as follows:

$$P_2(ijklcp) = P_1(ijklc) \cdot T_p .$$

Annex 6
Partial Non-Response Exceeding 5% (SAQM, CQCI, AND PQCI)

Most questions in the survey had very low non-response rates, except for certain ones in the SAQM, CQCI and PQCI.

The majority of variables in the SAQM were characterized by very low non-response rates, except for those on putting the baby to bed (Q12B), temperature of the baby's room (Q17) and leisure-time activities (Q76B, Q76C, Q76D, Q76E). The non-response rates for these varied between 6% and 10%. Non-respondents to questions Q12B and Q17 tended to be less educated, and the language used at home was more frequently other than French or English. In addition, non-respondents to questions Q76B, Q76C, Q76D, Q76E were more likely to live in the Outaouais or Abitibi-Témiscamingue regions, have participated in Waves 1 and 2, and speak a language other than French or English at home. Therefore, the results for these variables should be viewed with great caution.

Certain variables in the CQCI had non-response rates varying between 6% and 14% - ages of paternal grandmother and grandfather, living/deceased status of paternal grandmother and grandfather, health status of maternal grandmother, and age of the eldest child in the father's family. In general, non-respondents tended to be older, less educated, and use neither English nor French at home. Therefore, the results for these variables should also be viewed with great caution.

Additional caution should be used with the SAQM and PQCI for some questions on sleep and diet, because the responses could be directly related to the age of the child. Given that the duration of pregnancies can vary, certain babies selected could have been 4, others, 6 months of age. Therefore, at data collection time, all the target babies were not the same age. Hence, the age of the target population likely played a role with regards to the percentage of babies who were sleeping through the night, since perhaps some were too young to be doing this (Question 1 of the SAQM). As a result, the percentages would tend to under-estimate the actual numbers if we specify that the mean age of the infants was 5 months. This also applies to the age at which they began to drink or eat a particular food.

Another particularity concerns information on absent biological fathers gathered indirectly from the PMK in the CQCI. These sociodemographic data, as well as the background and personal history of absent fathers collected from the mothers in the SAQM, have been put into a separate file to describe the characteristics of this sub-group. Since the partial non-response rate of the majority of these questions is particularly high, no weighting was done in this file. However, it is possible to conduct descriptive analyses, and the results do provide a portrait of this sample of absent fathers.

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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 Regional 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
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 Pyschosocial Maladjustment
Institut de la statistique du Québec, ISQ	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)
Politique de la santé et du bien-être	Policy on Health and Well-Being
Service de 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

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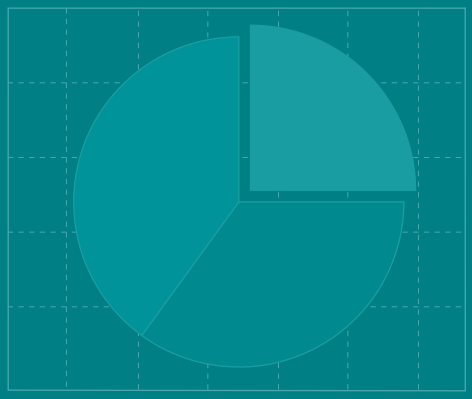

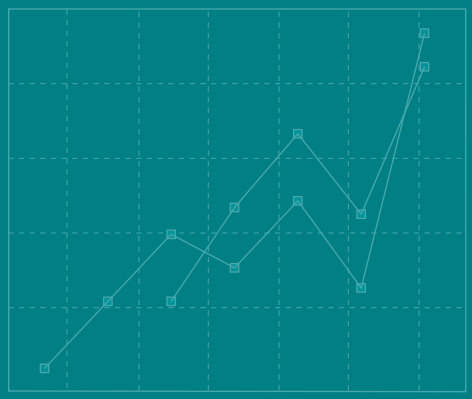

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