

## EDWARD HUGHES

*Consulting in Applied Mathematics and Statistics  
Applications Software Development*

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**Name:** Edward Hughes

**Position:** Principal of Edward Hughes Consulting.

**Language:** English

**Current Security Clearance Level:** Reliability

**Education:**

B.A. (Mathematics) 1965, Rice University, Houston, Texas.  
Ph.D. (Mathematics) 1970, University of Wisconsin, Madison.  
NRC Postdoctoral Fellowship 1970-71, University of British Columbia, Vancouver.

**Professional Qualifications:**

Consulting in statistics and applied mathematics.  
Development of computational software.  
Mathematical modelling and simulation in economics, operations research, and engineering.  
Optimization.

**Professional Associations And Activity**

Member, Statistical Society of Canada; American Statistical Association.  
Statistical Society of Ottawa: President, 1996-97, and 2006-07.  
Affiliate Scientist, Institute of Population Health, University of Ottawa, from March 2003.

**Relevant Experience**

**Title:** A Net Impact Assessment of the National Child Benefit on Social Assistance Dependency

*Client:* Human Resources Development Canada and Government of Manitoba

*Time span:* Nov 2001 to June 2004.

*Description:* Analysis of provincial social assistance data from Manitoba, Saskatchewan, and British Columbia, using statistical survival analysis, to determine the impact of the National Child Benefit program on the frequency and duration of spells on social assistance in those three provinces.

*Total project budget (appr.):* \$150,000

*My level of effort (appr.):* 45 days.

*My Role:* Clean and transform the three provincial datasets; devise and implement survival regression models, for each province, to assess the NCB impact; run the regressions; analyze, interpret and report the results.

*Client reference:*

Harvey Stevens, Policy Analyst,  
Employment and Income Assistance  
Government of Manitoba, Family Services  
204-945-8423  
HStevens@gov.mb.ca

**Title:** Design and analysis of a survey for the Canadian Egg Marketing Agency

*Client:* Meyers Norris Penny LLP, subcontracting on a contract with CEMA.

*Time span:* April-November 2005

*Description:* 2004 CEMA Cost of Production Survey, which examines the 2004 records and operations of a sample of egg producers, and attempts to infer the average cost per dozen of egg production in 2004, with certain regional breakdowns.

*Total project budget (appr.):* \$100,000

*My level of effort (appr.):* 12-15 days.

*My Role:* Sampling design for the survey, estimation of survey precision, analysis and reporting of the survey results.

*Client reference:*

Tony Seguss, Senior Manager,  
Management Consulting  
Meyers Norris Penny, LLP  
Vancouver, BC V6C 1S4  
604-685-8408  
Tony.Seguss@mnp.ca

**Title:** Reanalysis of the American Cancer Society Study of Particulate Air Pollution and Mortality, Phase III: Extended Follow-up and Further Analyses

*Client:* Institute of Population Health, University of Ottawa.

*Time span:* Aug 2002 to Sept 2005

*Description:* Large-Scale reanalysis of a data set collected by the American Cancer Society, containing health histories of 500,000 subjects, with air pollution data for the areas of residence. Phase III is concentrated on mapping the spatial correlations in health outcomes, using survival analysis with spatial random effects.

*Total project budget:* Confidential

*My level of effort (appr.):* 400 days

*My Role:* Development of statistical estimation methods for coupling survival analysis with spatial analysis, in the form of 2-level random effects models for the Cox proportional hazards regression model. Development of numerical methods for computing the estimates, which maintain efficiency when scaled up to very large data sets. Design and development of a software system for implementing the estimation methods developed by me and other members of the team. The computational parts of the software are in the C++ language, and the user interface is in the R language.

*Client reference:*

Daniel Krewski, Professor and Director  
McLaughlin Centre for Population Health Risk Assessment  
Institute of Population Health, University of Ottawa  
Ottawa, Ontario CANADA K1N 6N5  
Tel: 613-562-5381  
dkrewski@uottawa.ca

**Title:** Study of Immigrant Business Activity

*Client:* Citizenship and Immigration Canada

*Time span:* May 2000 to April 2001

*Description:* Use of the IMDB immigrant database to study immigrant business activity. The aim was to obtain a quantitative picture of the number, size, and lifespan of immigrant-founded or immigrant-operated businesses in Canada.

*Total project budget (appr.):* \$25,000

*My level of effort (appr.):* 38 days

*My Role:* Developing methods for identifying business activity in the IMDB. Preliminary work on linking IMDB to various Statistics Canada business databases. Make and report tabulations and summary estimates for immigrant business activity.

*Client reference:*

Claude Langlois  
Manager, Research  
Citizenship and Immigration Canada, Strategic Research and Statistics  
Ottawa, Ontario, Canada K1A 1L1  
613-957-5905

**Title:** Effects of Traffic-Related Air Pollution on Cancer Incidence

*Client:* Prof. Mark Goldberg, McGill University

*Time span:* Nov 2004 to Nov 2005

*Description:* Estimating the effect of automobile-generated air pollution on rates of cancer in Montreal.

*Total project budget:* Not known

*My level of effort (appr.):* 35 days

*My Role:* Developing methods for coupling binomial generalized linear models to spatial models, with 2-level random effects models. Adding additional code to the random effects Cox software (developed in a project described above), to allow it to handle binomial GLM's as well as Cox regression models.

*Client reference:*

Prof. Mark Goldberg

Division of Clinical Epidemiology, Royal Victoria Hospital,

McGill University Health Centre

Montreal, Quebec H3A 1A1

934-1934, ext 36917

mark.goldberg@mcgill.ca

### **Other Relevant Projects**

Evaluation of survey sampling designs, for Social Development Canada.

Statistical analysis using the IMDB database to evaluate the effectiveness of the "points" system for screening potential immigrants, for Citizenship and Immigration Canada.

Development of methods for optimal stratum allocation in survey sampling design.

Analysis of a cost-allocation model for the Government of British Columbia

Statistical consultant to a major federal study of small-business policy: mainly survey design and analysis.

Development of sampling schemes for inventory management in a large warehouse; this work resulted in a new extension to the method of Dollar-Unit Sampling.

Use of statistical matching methods to evaluate the effect of a government-industry program, for the National Research Council.

Development of methods for statistical sampling and analysis of time series data on landings at airports, to assess the risk-reduction value of various safety regulations.

Development of new Dollar-Unit Sample evaluation methods for the Auditor-General of Canada.

Development of software for rapid solution of large systems of sparse linear equations.

Development of software for reliability and fault-tree analysis.

### **Previous Positions**

Edward Hughes Consulting started August 1988.

Research Scientist, Ontario Research Foundation, 1984-1988.

Senior Statistical Advisor, Informetrica Ltd., Ottawa, 1980-82 and 1983-84.

Mathematician, Department of Operations Research, Ontario Hydro, 1982-83.

Assistant Professor of Mathematics, Carleton University, Ottawa, 1971-1980.

### **Selected Publications**

D. Roland Thomas, Edward Hughes and Bruno D. Zumbo (1998): "On Variable Importance in Linear Regression"; *Social Indicators Research*; v. 45: 253-275.

Edward Hughes, Renjun Ma, Daniel Krewski, Richard T. Burnett (2000): "Computational Algorithm For A Poisson Modelling Approach To Random Effects Cox Models"; Technical report 342, October 2000, Laboratory for Research in Statistics and Probability, Carleton University, Ottawa. A later version is submitted for publication.

More than twenty-five talks, seminars, and refereed articles in various areas of statistics, applied mathematics, and computation.