

**Re-collection and
analysis of data from
the Ontario Dental
Health Indices Survey**

July 1999



**Central East
Health Information
Partnership**

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Ontario Dental Health Indices Survey**

G.L. Woodward and A. Knight

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Acknowledgements

We wish to thank Jim Leake, Pat Main, Terry Hicks, Sandy Bennett, John McGurran and Sten Ardal for their efforts in the re-collection of the DHIS information and/or their assistance in drafting this report.

Executive Summary

Beginning in the early 1970's, the Ontario Ministry of Health (MOH) began the Ontario Dental Health Indices Survey (DHIS). This survey of Ontario school children provided dental health data that were used to address issues of program planning, program evaluation, distribution of provincial dental care funds, and research.

In the fall of 1997, the Central East Health Information Partnership (CEHIP) requested DHIS documentation and data from the MOH. This information was required by CEHIP's partners to study the prevalence of dental caries in the health areas of Central East Ontario. Subsequently, CEHIP was informed by the MOH that the documentation and data could not be located and would not be available. CEHIP then proceeded to re-collect and analyze DHIS data that were available from the health units in Central East Ontario.

Findings of the re-collection and analysis indicate that the MOH and many of the local health units need to focus much more attention on preserving data and the associated documentation. Much of the information from DHIS has been lost. From the information available, it appears that dental caries is no longer in decline as was the case through the 1980's. Additional, but currently uncollected, data are required to monitor this apparent trend.

Introduction

In the early 1970's, the Ontario Ministry of Health (MOH) began the Ontario Dental Health Indices Survey (DHIS). This biennial survey involved a sample of Ontario school children who were examined by local health unit personnel. Results from this survey were used to address program planning, program evaluation, and the distribution of provincial dental care funds (Farrell 1983). Results have also been used for research purposes (e.g. Leake & Main 1995, 1996; Bennett 1996; Speechley & Johnston 1996).

Data from the DHIS are valuable to public health epidemiologists, planners, and researchers for a number of reasons. The data were collected regularly for a period of twenty years allowing for trend analysis. Sample sizes, especially beginning in the 1980's, were relatively large allowing for the calculation of precise, age-specific, point estimates. The data were collected for each public health unit area in Ontario, facilitating health unit comparisons.

In October of 1997, the Central East Health Information Partnership (CEHIP) was asked to analyse and summarise data from the DHIS. These data were required for public health epidemiologists and planners in Ontario's Central East Planning Region (CEO) to study the dental health of their own and neighbouring planning regions. A request for these data was made to the MOH. Their response however, indicated that the survey data and documentation were no longer available from the MOH. Further investigation revealed that documentation and data prior to 1994 were only available in summary format from the public health units in CEO. Thus it was necessary for CEHIP to re-collect this information in order to summarise the dental health of children in CEO.

Purpose

This report serves two purposes:

1. To document the history, methods and results of the DHIS.
2. To re-collect DHIS data and summarise the dental health of the residents of CEHIP's partner agencies.

Background

The DHIS was initiated by the MOH in the early 1970's. The survey was designed to include a sample of odd-aged children aged 5 to 13 years who were attending a publicly funded school at the time of the survey. Dental examinations for the survey were performed every second year by public health unit staff. Examination results were sent to the MOH for analyses from which each public health unit received a standard report. This report summarized the findings of the survey for their health unit area and for the province.

Following the 1989-90 survey, the MOH lengthened the period between surveys from two years to four years. Reasons for this change included the more stable caries levels now being witnessed and the decreasing resources for public programs (Leake & Main 1995).

The initial objectives of the DHIS were to provide a "basis for measuring and comparing the effectiveness of dental health programs, and for determining the optimum method of distribution of provincial funds reserved for dental care. It is also useful to Health Units as it may be used as a basis for program evaluation" (Farrell 1983). These objectives were refined in 1993 (Ontario Ministry of Health):

- To monitor the levels of dental care given to Ontario school children including the dental health status of selected age groups.
- To identify at-risk segments of the population that would most benefit from targeted dental health education and preventive programs.
- To identify areas where environmental factors adversely affect dental health.
- To measure and compare the effectiveness of the dental health care system, in general, and dental public health programs, in particular.
- To determine the optimum method of distribution of public funds reserved for dental health care.

Prior to the 1993-94 survey, samples for the DHIS were determined by the individual health units using enrolment lists from Ontario's publicly funded schools. Survey results were weighted to the population from which they were drawn. Three general sampling strategies were suggested for use by the public health units (Farrell 1983):

1. Selective Sampling – All Schools

Sequentially or randomly selecting a pre-determined proportion of children from each school and collecting the survey data at the time of the annual dental examination. Survey data could be collected during the examination or from the child's dental records.

2. Total Sampling – Selected Schools

Required that schools “be categorized by factors of interest, e.g. geographical position, economic situation, ethnic background, proximity to unusual environmental conditions. Classes from each category (with total enrolment approximating the required sample size) would than be selected, and all children those classes would be sampled.”

3. Selective Sampling – Selected Schools

This method was a combination of strategies 1 and 2. Classes would be chosen from selected schools. A pre-determined proportion of children then would be sequentially or randomly selected from these classes.

No documentation indicated which method each health unit employed. We suspect that some variant of the third method was predominantly used.

The sampling strategy was revised for the 1993-94 survey, becoming a one stage stratified random sample with a target population of all odd-aged children aged 5 to 13 years who were attending publicly funded schools at the time of the survey. The MOH stratified schools from each public health unit area into three levels based on enrolment size - small, medium, and large. From each stratum within each health unit area, the MOH selected schools based on the proportion to size method. This method allowed for the design of a self-weighted sample within each health unit area. A list of the selected schools from each public health unit area was then sent to the respective health unit. For their own purposes, health units could examine children from additional schools and additional age groups.

Methods

To study the dental health of residents within the CEO, CEHIP requested a copy the DHIS data and methodology from the Ontario Ministry of Health (MOH). Subsequently, CEHIP was informed that the data and methods, up to and including the 1989-90 survey, were

no longer available; this included all electronic and printed versions. Data from the 1993-94 survey were available in electronic, individual record level format.

A request was then made to each public health unit (PHU) in the CEO for copies all DHIS standard reports that were issued by the MOH from 1970-71 forward (Appendix 1). Each PHU was contacted and/or visited to discuss this request and to collect the available data.

DHIS reports/data were collected from the PHUs, copies were made, and originals were returned. Items/statistics present in all of the collected DHIS reports were entered into an SPSS data file using the SPSS Data Entry Module for Windows. Data from reports generated by the PHUs themselves were not entered into this file. Data from the 1993/94 survey were analysed using SPSS for Windows (Version 8.0) and summary statistics were generated based on those provided in the DHIS standard reports.

Caries immunity and DMFT scores were used to generate “Chartbook Pages” according to the specifications of the Community Health Status Collaboration (CHSC), a collection of epidemiologists and health planners in the Central East Planning Region. A page was generated for each public health unit area and the Central East Planning Region. Statistics for the six divisions within the City of Toronto Department of Public Health, previously six individual health units, were combined into one “City of Toronto” statistic.

Each Chartbook Page contains two charts. The first chart shows the mean deft (age 5) and DMFT (age 13) scores for Ontario and the selected health unit area from 1980 to 1994. CEO means for 1980-94 and 1994 Ontario means are weighted according to the age and year specific populations (Statistics Canada) of the respective health unit areas. CEO means were not calculated for years where less than half of the health units in CEO provided data. The second chart shows 1994 caries immunity status of 5 and 13 year olds in each health unit area, as well as the Central East Planning Region and Ontario. Age specific populations again were used to calculate weighted statistics for CEO and Ontario.

Results and Discussion

1. Documentation and Data Re-collection

A few health units (e.g. North York Public Health Department, Simcoe County District Health Unit provided some DHIS documentation detailing the methods and results). However, most of the documentation was incomplete or missing. Prior to 1983, no documentation was available and the documentation for the years 1983 through 1992 was in draft format. Complete and final documentation was only available for the 1994 survey. This lack of background information is very unfortunate and can make data analysis and interpretation problematic.

Although some DHIS data/reports were available for all health units in CEO, the amount of information available from each varied considerably. Some health units provided very little data for their area (e.g. Peel Region) whereas others provided many years of data for their area and Ontario (e.g. Simcoe County District Health Unit, City of Toronto Department of Public Health, North York Division – previously the North York Public Health Department). No PHU-based reports were generated by the MOH using the 1993-94 data but the primary data file for all participating health units was provided.

The format of the DHIS reports has changed over the years of the survey. Early reports were simple computer printouts with a few, short labels such as LOST TTH, BE LOST, DECAYED, FILLED. These labels were assumed to represent teeth lost due to caries, teeth to be lost due to caries, decayed teeth and teeth filled due to caries, respectively, but no documentation was available to confirm this. Although these reports identified the health unit area, they lacked the survey year, which, in most cases, was added by the health unit. Beginning with the 1979-80 survey, the report quality increased significantly, becoming more clearly labelled and including the survey year. Interestingly, this is also when an increasing number of PHUs were able to provide reports.

Aside from the format, other ‘irregularities’ were noted when reviewing the DHIS reports:

- 1) Omission of the survey year in earlier reports, as noted above, may have resulted in some of the survey years being misidentified by some PHUs i.e. the same survey year may have been labelled inconsistently among the PHUs (e.g. 1973-74 vs 1974). The improved report format in 1979-80 appears to have remedied this problem (Table 1).

- 2) Although “population” is defined in the available methodology as the number of individuals from which the sample was drawn, the data presented often do not match this definition. Population numbers in some reports are much lower than Statistics Canada Census findings. For example, from 1986 through 1990 the Peterborough reports show a 5 year-old population of 1,039 to 1,701 but Statistics Canada estimates for that area are greater than 8,000. It is suspected that the sample size has been provided and incorrectly identified as the population.
- 3) Ontario statistics were generated by the MOH for years where PHU participation was very low. In 1991-92, a non-survey year, Ontario statistics were generated from the results of only 8-10 PHUs, depending on the age category. Participation appears low (Tables 1 and 2) in other years as well, although this assumes that the presence or absence of data reflects health unit participation. The reduced sampling frame for these years brings into question the validity of the Ontario statistics.
- 4) The survey was to include only odd aged children but even aged statistics also were generated for health units and Ontario. Ontario statistics for even aged children often were based on data from very few health units (Table 2) and their validity may be questioned.

Although the findings have shown that the DHIS data has limitations, it remains the only province wide, direct measure of children’s dental health. Public health planners and researchers have used the survey results since the 1970’s. Data from private insurance companies and the MOH CINOT program may provide some insight into the dental services required by children in Ontario but they do not measure health directly. Thus the DHIS data still are of considerable value to public health even though certain aspects of the data can be questioned.

2. Dental Health

Analyses of dental health were hindered the lack of documentation and data, which is reflected in the Chartbook Pages (Appendix 2). Survey results prior to 1980 were not presented because the methods were unavailable, the data were not available for many health

units, and the correct survey year could not be verified in some cases. Many health unit areas have few data points to document the caries status of their children over the past 15 years. No page was created for Peel Region as there were no data available after 1975-76. All Toronto estimates, except 1994, do not include data from the Toronto Division of the new City of Toronto Department of Public Health (previously the City of Toronto Health Unit).

In general, the data show a decline in dental caries from 1980 to 1988. After 1988, the caries prevalence appears to level off and may be on the rise (Bennett 1996; Speechley & Johnston 1996), but a definitive statement based on only two valid years of data cannot be made. As well, the change in the survey methodology for 1994 may make a comparison of its results to previous results problematic. Future MOH plans regarding dental health include a census of all 5 year-olds, with no data being collected for other age groups. These future should data enable this issue to be better examined.

Caries immunity in Ontario children has increased 30-40% over the past two decades. In 1994, two-thirds to three-quarters of 5-year-olds in Central East PHUs were caries free. Caries immunity ranged from 47-59% in the permanent teeth of 13-year-olds. In both age groups, caries immunity is lowest in the more rural PHUs (e.g. Muskoka-Parry Sound, HKPR).

Table 1. Summary of DHIS Data Availability by Public Health Unit and Survey Year

Public Health Unit Name*	Year of Survey ^a																				Total Number of Years of Data Available	
	70-71	71	72	73-74	74	75-76	76	77-78	78	79-80	80	81-82	83-84	84-85	85-86	86-87	87-88	88-89	89-90	91-92		93-94
Durham Regional Health Department										X							X			X ^b	X	4
HKPR Health Unit				X			X	X		X			X		X	X	X		X	X	X	11
Halton Regional Health Unit	X ^b																X		X		X	4
Muskoka-Parry Sound Health Unit													X	X	X	X		X	X		X	7
Peel Region Health Unit				X		X																2
Peterborough County-City Health Unit									X		X	X	X		X		X		X		X	8
Simcoe County District Health Unit	X			X		X			X	X		X	X	X	X	X	X	X	X	X	X	14
York Region Health Services								X ^b		X ^b		X	X		X		X		X		X	8
City of Etobicoke Health Department	X			X		X						X ^b	X ^b		X		X		X		X	9
City of Toronto Health Unit																					X	1
City of York Health Unit				X		X			X	X		X		X							X	7
East York Health Unit									X ^b		X	X		X		X		X		X	X	7
North York Public Health Department	X			X	X	X	X	X ^b	X ^b		X	X	X	X	X	X	X	X	X	X	X	16
Scarborough Health Unit								X		X	X	X	X	X	X	X	X	X	X	X	X	11
Sub-Total "Metro Toronto" PHUs with Available Data	2	0	0	2	1	3	1	0	2	3	2	4	5	2	5	2	4	2	4	2	5	
Total of CEO PHUs with Available Data	4	0	0	5	1	5	2	2	4	7	3	7	10	4	10	5	10	4	10	4	12	
Ontario	X	X	X		X	X			X	X	X	X	X		X		X		X	X		

* Includes the six previously independent health units that now make up the City of Toronto Department of Public Health

^a Based on those documented on the DHIS Standard Reports

^b Missing data for one or more ages

Table 2. Number of health units* contributing data to Ontario estimates by Age.

Year	Number of Health Units Providing Data	
	Odd Ages, 5-13	Other Even Ages (3-15)
1979-80	24-28	4-18
1981-82	28-30	5-12
1983-84	33-35	2-7
1985-86	37-38	2-12
1987-88	41-42	none
1989-90	40-41	8-19
1991-92	8-10	1-2

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References

- Bennett, S. 1996. Results from the 1993-94 Ontario Dental Health Indices Survey. *PHERO* 7(8): 355-358.
- Farrell, V. 1983. Ontario Dental Health Indices Health Unit Procedures. Ontario Ministry of Health.
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- Ontario Ministry of Health. 1993. Ontario Dental Indices Survey Field Guide. Ontario Ministry of Health.
- Speechley, M., and Johnston, D.W. 1996. Some evidence from Ontario, Canada, of a reversal in the dental caries decline. *Caries Research* 30: 423-427.

Appendix 1.

**DHIS Project letter to public health units in the Central East Region
and DHIS example reports.**

Appendix 2.

**Community Health Status Collaboration Chartbook Pages
for public health units in Central East Ontario.**

Children's Dental Caries

Technical Notes

Definitions

deft = number of decayed, extracted and filled deciduous teeth due to dental caries per child.

DMFT = number of decayed, missing and filled permanent teeth due to caries per child.

Caries Immunity = Percentage of children who have no evidence of dental caries (deft=0 or DMFT=0).

Significance/Use:

- ❖ Most commonly used measure of children's dental health.
- ❖ Summarizes past and present dental decay.
- ❖ Useful in planning preventive and promotional interventions.

Limitations:

- ❖ Survey only includes publicly funded, primary schools in Ontario.
- ❖ During the course of the survey, sampling methods and participation have varied within and among public health units.

Notes:

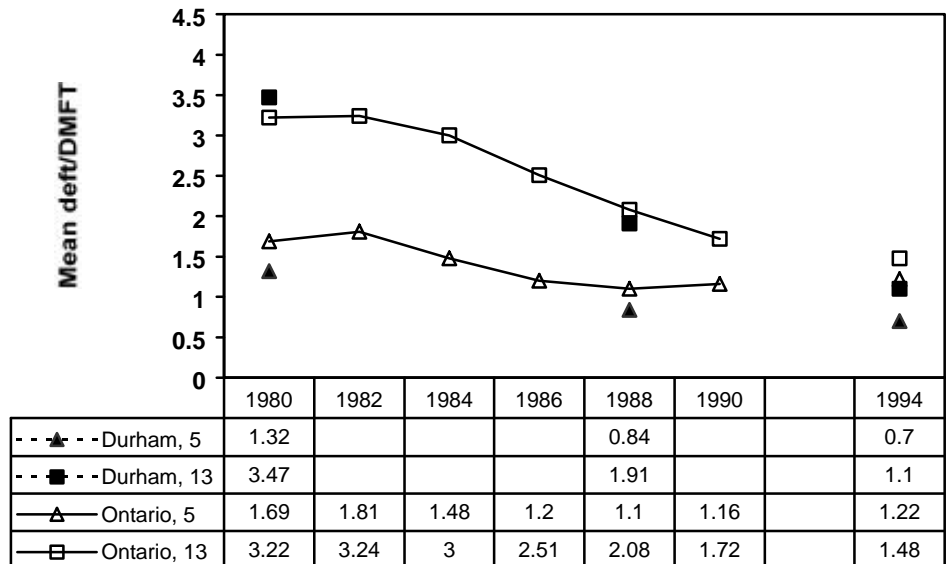
- ❖ Age 5 includes only deft data and age 13 includes only DMFT data.

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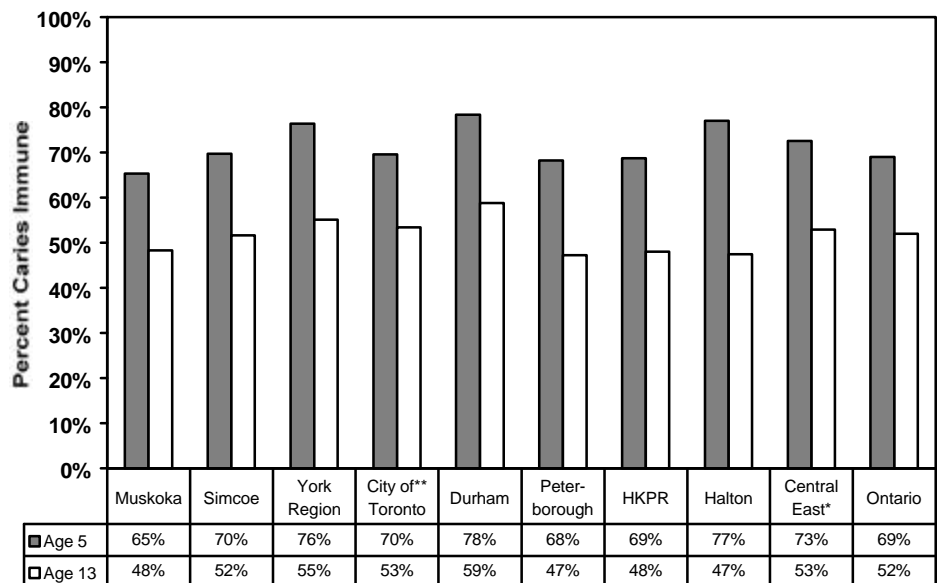
Dental Caries:
The Ontario Dental Health Indices Survey.

Population:
Statistics Canada

Mean deft and DMFT,
Children Aged 5 and 13 Years,
Durham Region, 1980-94



Caries Immunity
Public Health Unit Areas & Central East Region,
Ages 5 and 13, 1994



*Central East not including Peel or Scarborough (no data), but including Halton

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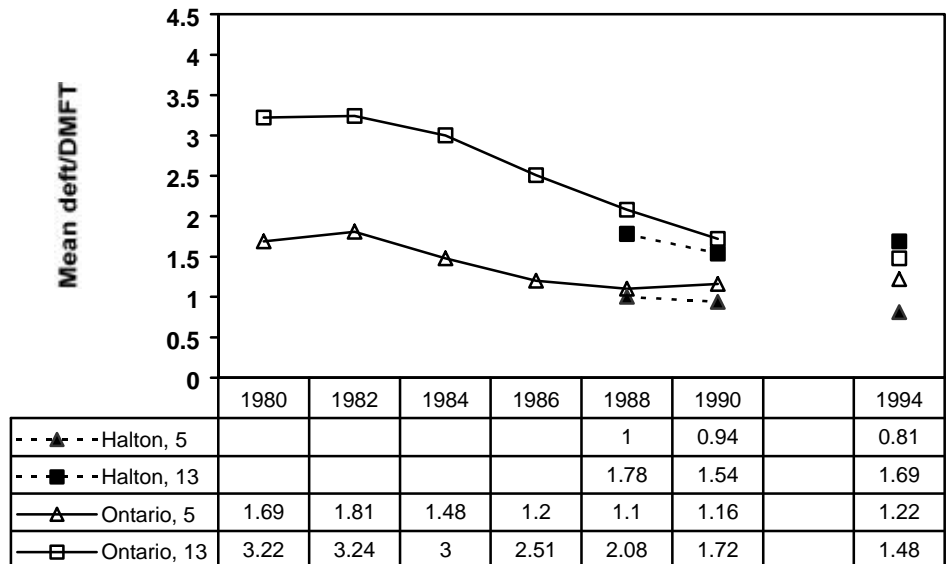
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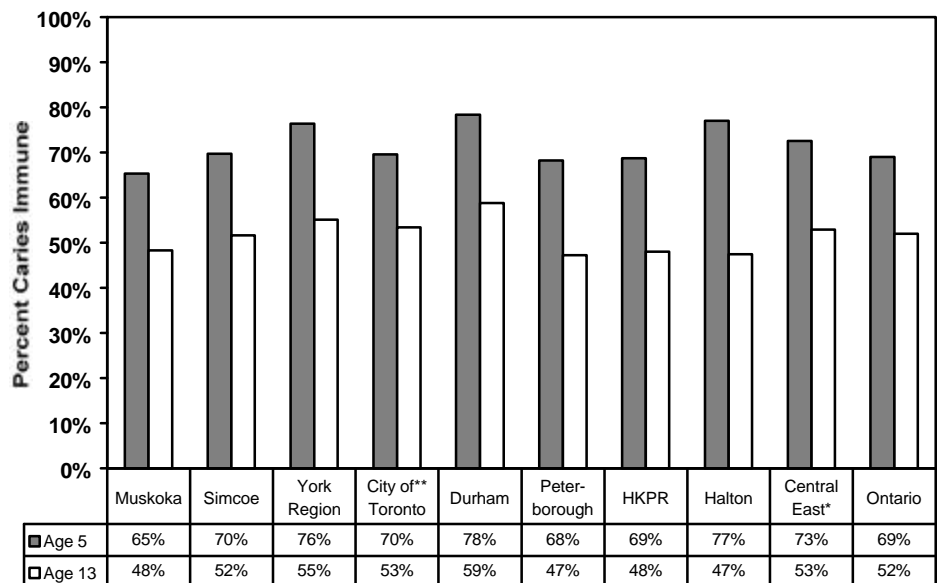
Dental Caries:
The Ontario Dental Health Indices Survey.

Population:
Statistics Canada

Mean deft and DMFT,
Children Aged 5 and 13 Years,
Halton Region, 1980-94



Caries Immunity
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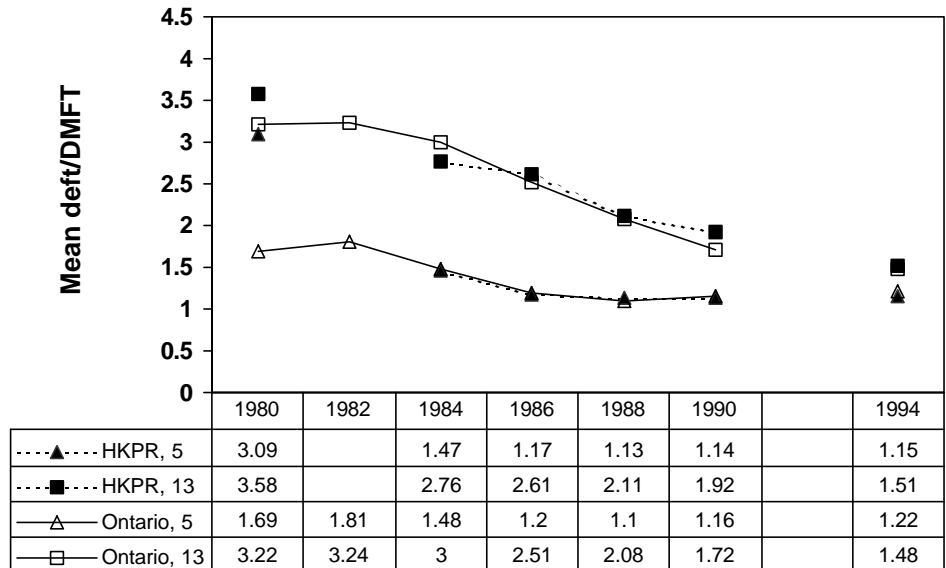
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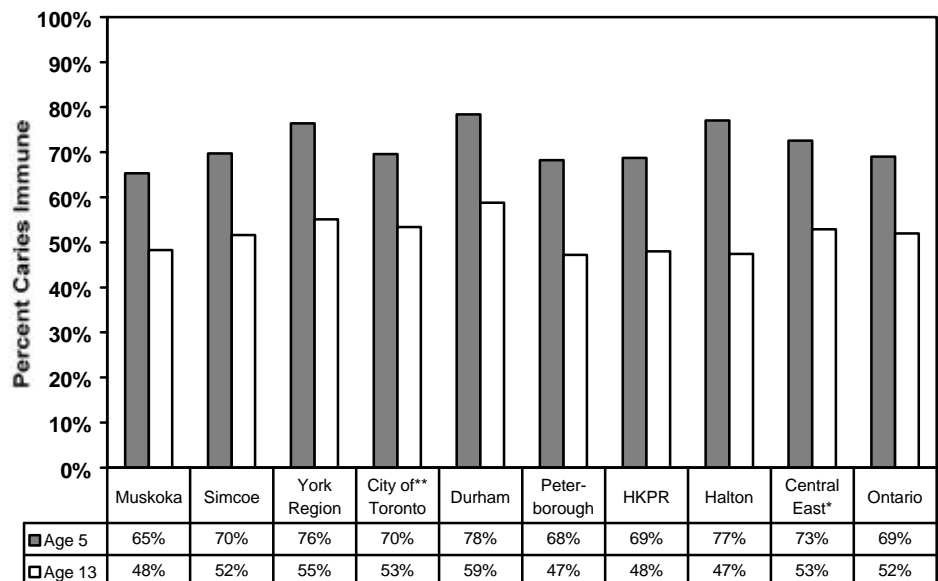
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HKPR, 1980-94



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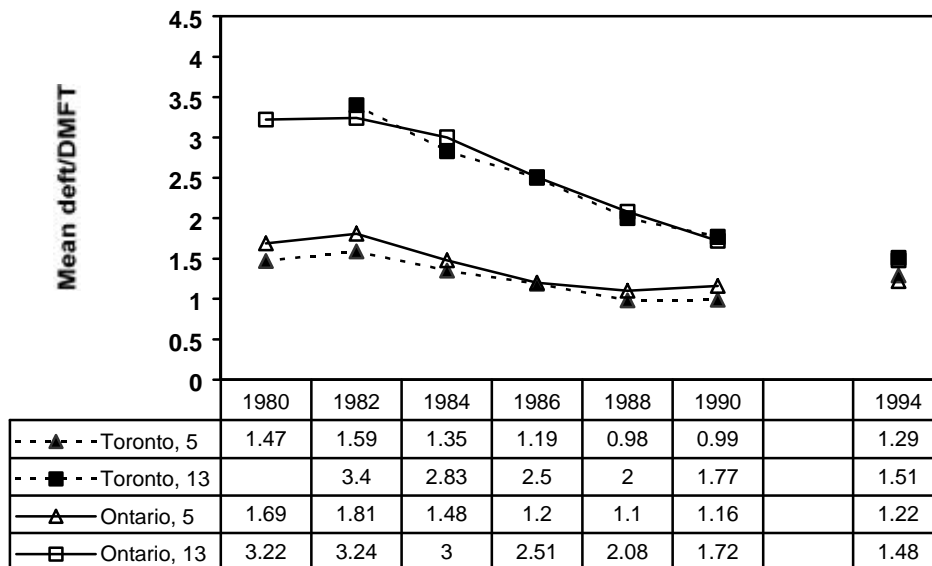
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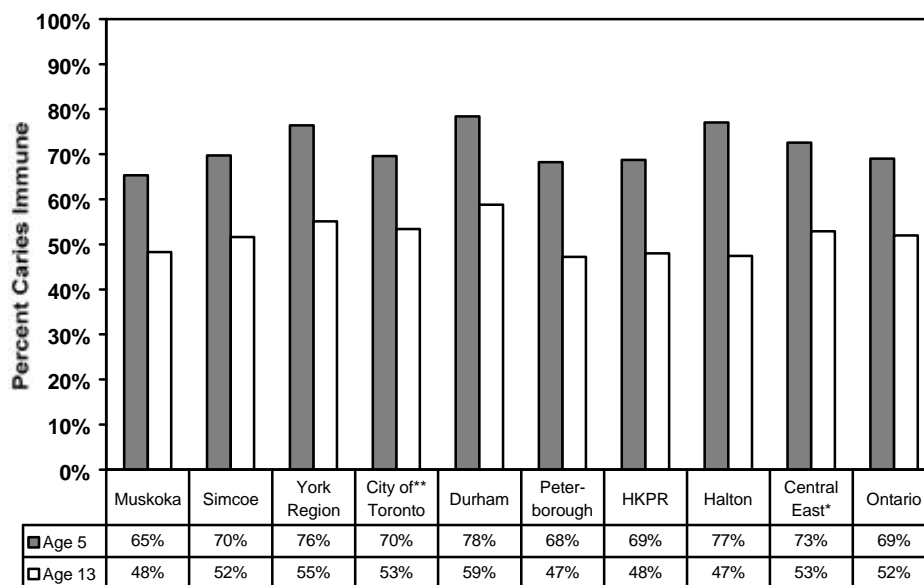
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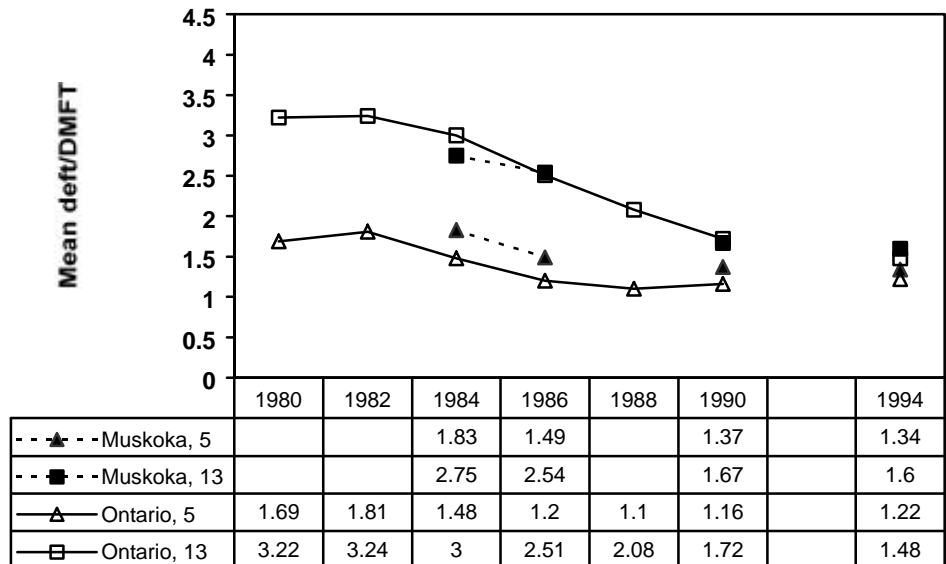
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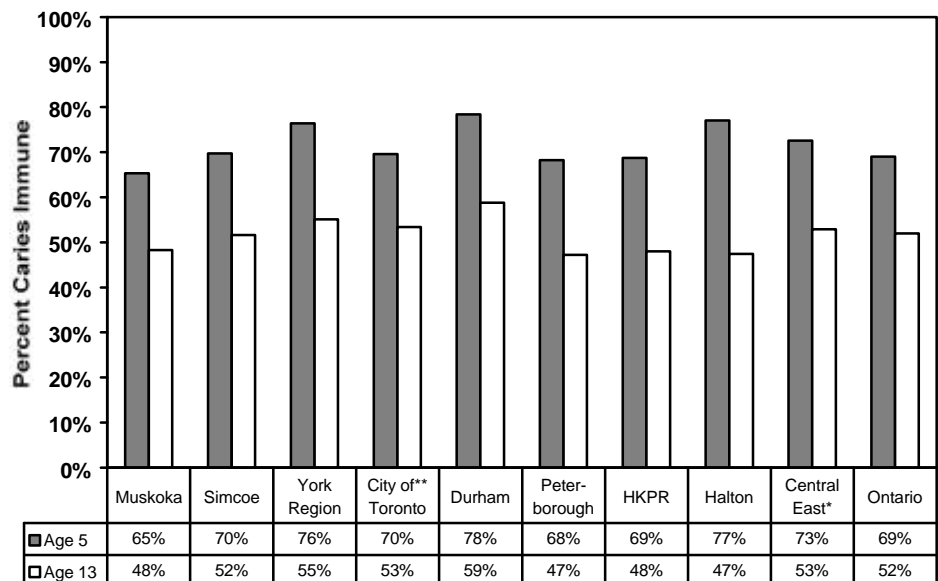
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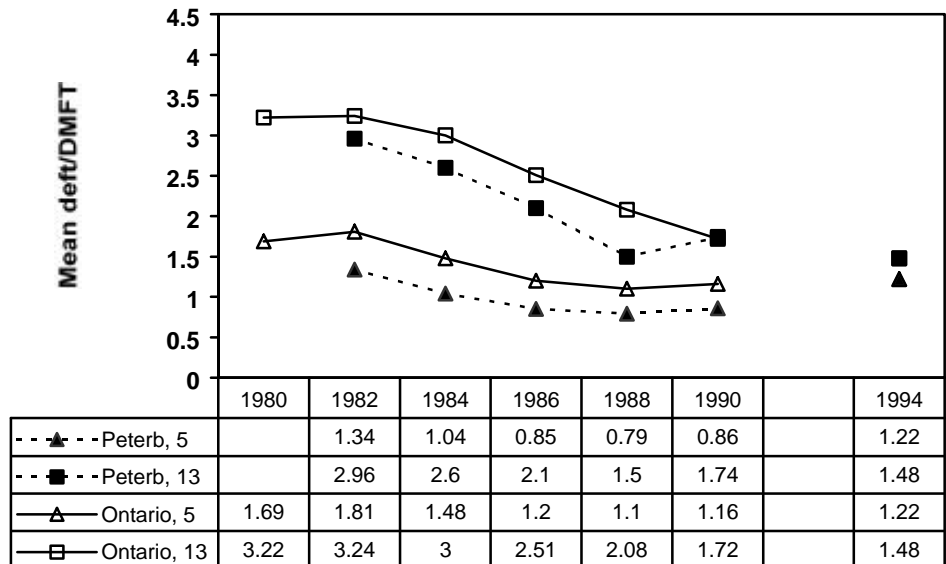
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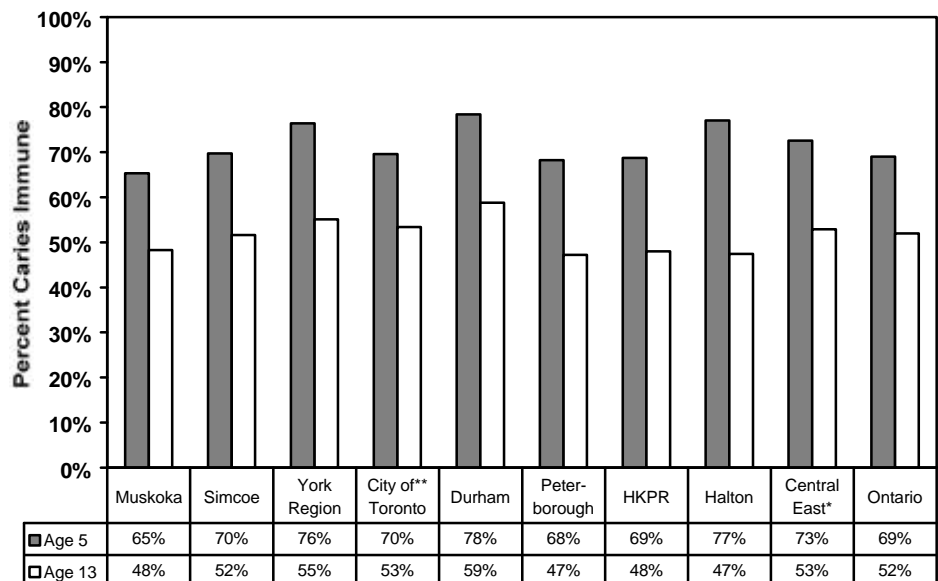
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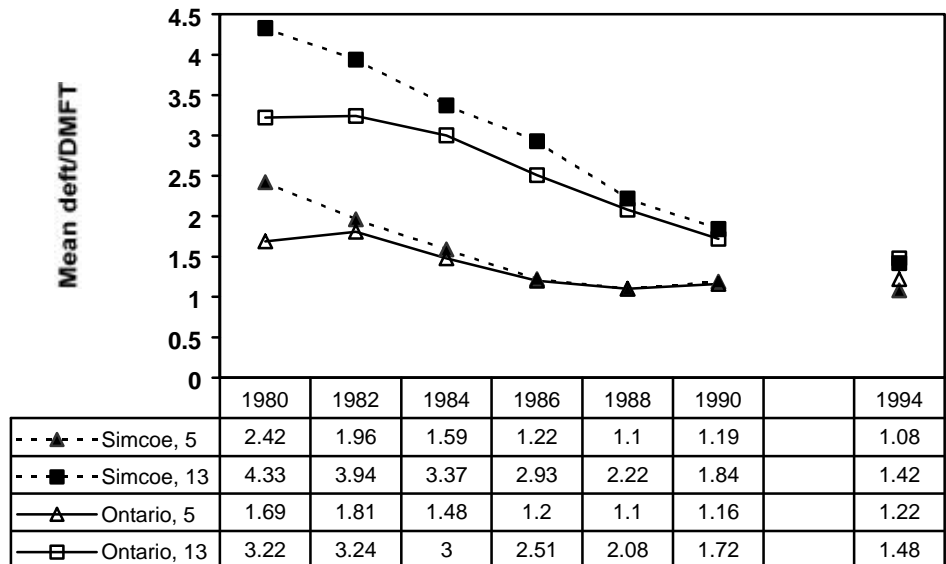
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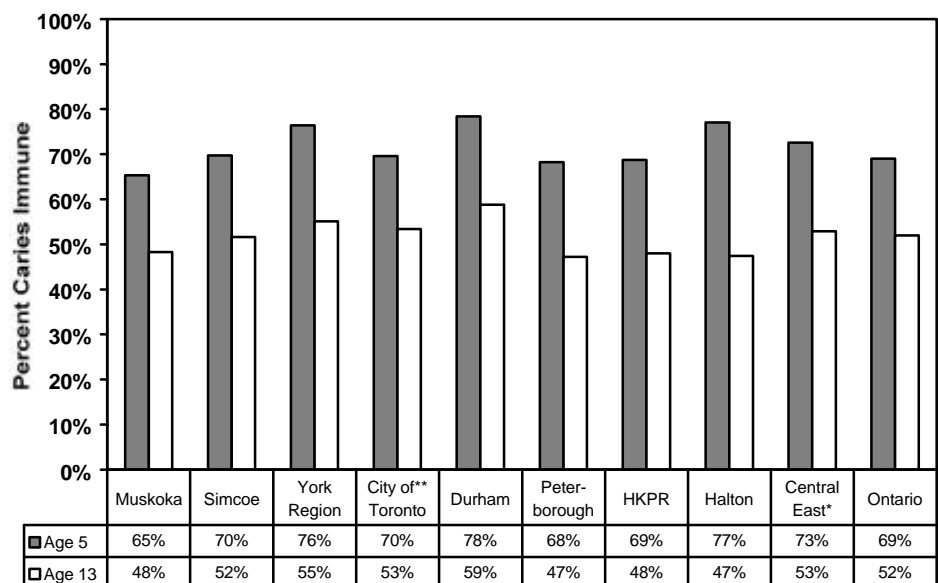
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Limitations:

- ❖ Survey only includes publicly funded, primary schools in Ontario.
- ❖ During the course of the survey, sampling methods and participation have varied within and among public health units.

Notes:

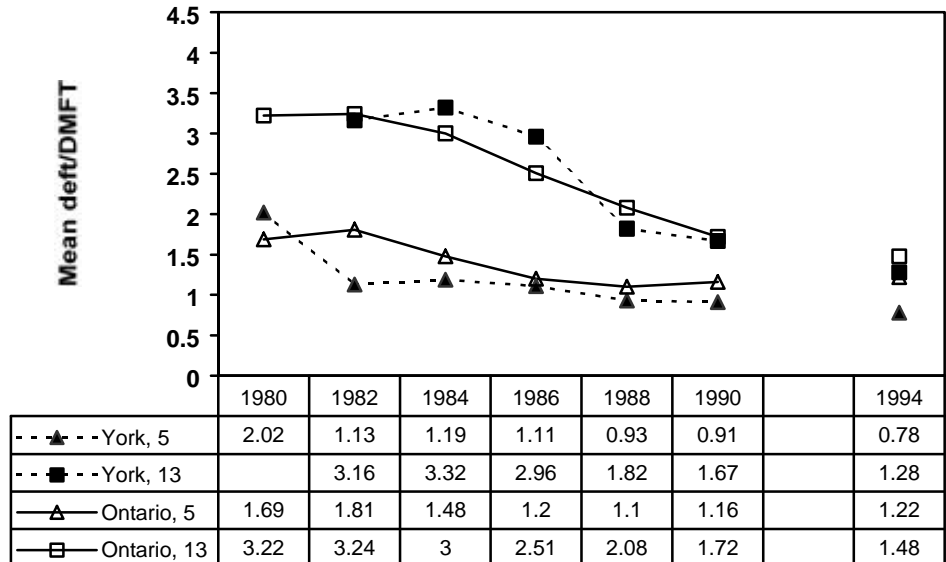
- ❖ Age 5 includes only deft data and age 13 includes only DMFT data.

Source:

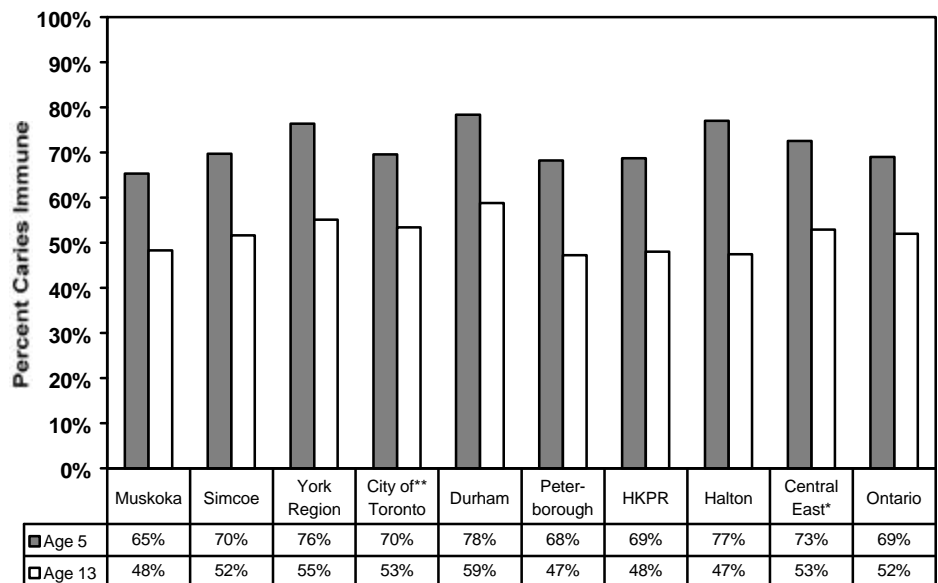
Dental Caries:
The Ontario Dental Health Indices Survey.

Population:
Statistics Canada

Mean deft and DMFT,
Children Aged 5 and 13 Years,
York Region, 1980-94



Caries Immunity
Public Health Unit Areas & Central East Region,
Ages 5 and 13, 1994



*Central East not including Peel or Scarborough (no data), but including Halton

**City of Toronto not including Scarborough (no data)

