

Department of Epidemiology
School of Public Health
University of North Carolina

EPID 160

Principles of Epidemiology

Fall 1967

PROGRAM EVALUATION

Laboratory Exercise

In 1944, the State Health Department of New York inaugurated a program to prevent dental caries in children. Dental caries is probably the most prevalent disease of civilized man and is particularly active in children.

The program was based upon a classic series of epidemiologic studies, which by 1942 had demonstrated an inverse relationship between the prevalence of dental caries and natural fluoride content of domestic water supplies.

Two cities were chosen, both drawing their water supply from the same river and located within 35 miles of each other.

The relevant attributes of these cities were:

- a) In both cases the water supply was fluoride free;
- b) The population size was approximately equal, and the age, race and sex composition of the population in the two cities was very similar.

Detailed dental examinations, by a single dentist using a standard technique were made on all children 6-14 years of age in both cities during 1944 and 1945. Following this, sodium fluoride in amounts to maintain a concentration of between 1-1.2 p.p.m. was added to the water supply of one city and continued for the next 10 years. No fluoride was added to the water supply of the other city.

Annual dental examinations were conducted on all 6-14 year old children for the next 10 years.

*straightforward
example to
evaluate a
program*

*Kingsdon
New York*

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*abstract of program
a sample to
to evaluate a
program*

*Kingsdon
Newburg*

1st permanent molar is the 1st tooth to erupt in the city and is most susceptible to caries.

Original Dental Journal of 1956

Results

Total Children

Dental Caries Prevalence per 100 Erupted Teeth. Age 10-12 years.

	<u>Test City</u>	<u>Control City</u>
1945	23.5	23.1
1955	13.9	26.3

RATE

Total Children

Percent of Erupted 1st Molars, 1955. Age 10-12 years.

	<u>Test City</u>	<u>Control City</u>
<u>No caries</u>	<u>36.8</u>	<u>10.0</u>
Untreated caries (D)	20.5	37.1
Missing (M)	2.5	11.6
Filled (F)	40.2	41.3
<u>Total DMF</u>	<u>63.2</u>	<u>90.0</u>

Sample

Periodic Dental Care, 1962-63. Age 5-6 years: lifetime residence.

<u>Mean services per child</u>	<u>Test City</u>	<u>Control City</u>
Initial year, 1962	2.3	5.4
Incremental year, 1963	0.8	1.8
<u>Mean cost of services per child</u>		
1962	\$14.82	\$32.59
1963	\$ 4.17	\$11.72

cohort

Ref: Journal of Am. Dental Ass., Vol 52, 1956, p. 290
 Follow-up Journal of P.H., Vol. 55, 1965, p. 811
 by Ast, D.

Life Time Resident Children Reconstructed Research Design

Assignment

1. Review the outline provided in the lecture on Scientific Public Health Practice and indicate how this rather straightforward but classic example illustrates the various steps that are described.
2. Be prepared to present further examples from your own experience or reading of programs that have been scientifically designed and evaluated as additional illustrations.

bones and teeth. When all the evidence is put together, it may be concluded that in water fluoridation adequate factors of safety exist against the known toxic effects of fluoride. Additional studies are

needed of population groups that have been for many years drinking fluoridated water. At present, the evidence does not justify the postponement of water fluoridation.

Newburgh-Kingston caries-fluorine study XIV. Combined clinical and roentgenographic dental findings after ten years of fluoride experience

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Among the important questions which have to be answered when a new public health practice is considered are (1) the need for this new practice, (2) its safety, (3) its practicability and (4) its effectiveness. The literature during the past two decades has reported numerous surveys which have demonstrated the magnitude of dental caries prevalence and the yearly incidence rates.¹ The inadequate means which are available to cope with this problem have also been reported.² The previous authors have discussed the practicability and safety of community water fluoridation as a prophylactic program for the partial control of new dental carious lesions. I shall try to demonstrate the degree to which a community water fluoridation program has contributed to the control of this disease.

Between June 1944 and February 1946, clinical dental examinations were made for all of the elementary grade school children aged 6 to 12 in both the

public and parochial schools in Newburgh and Kingston, N. Y. All the examinations at that time were made by a staff dentist using the classic mouth mirror and explorer technic. The recording was made according to an established classification which provided for caries-free teeth, untreated caries, filled, missing and unerupted teeth. Each tooth on the chart had some notation to indicate its status (Fig. 1).

Presented as part of a symposium, "Newburgh-Kingston caries-fluorine study: final report," at the Newburgh Institute of Clinical Oral Pathology, Inc., Newburgh, N. Y., December 12, 1955.

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[§]Biostatistician, Division of Medical Services, New York State Department of Health.

1. National Academy of Sciences—National Research Council, Survey of the literature of dental caries, Publication 225, Washington, D. C., National Academy of Sciences, 1952.

2. Klein, H., and Palmer, C. E. Disparity between dental need and dental care in school children. Hagerstown, Md., and environs. J.A.D.A. 28:1457-59, 1941.

The initial dental examination was made in 1944-45 in Newburgh and in 1945-46 in Kingston. The comparability of dental caries among the children aged 6 to 12 in the age-adjusted DMF rate in the two examinations was approximately 58 DMF teeth per hundred permanent teeth in Newburgh and in Kingston. The first permanent molar erupted at approximately 58 DMF teeth per hundred erupted first molars.

The community water supply in these examinations was fluoride deficient. Newburgh had 0.12 ppm fluoride (1 part per million) and Kingston had 0.05 ppm fluoride. On May 2, 1945, Newburgh water supply was supplemented with fluoride to bring its fluoride concentration up to 1.0 to 1.2 ppm. This concentration has been maintained since then. Kingston remained fluoride deficient during the study period.

EXAMINATION NUMBER _____ OR _____
PATIENT'S NAME _____ ADDRESS _____
DENTAL CLINIC _____ GRADUATION _____
KEY:
0 CARIES FREE
1 PIT OR FISSURE - INDICATE SURFACE
2 CARIES - INDICATE SURFACE
EX RIGHT 15 14 13 12
J I
18 19 K L
20 21
EX LEFT

Fig. 1 • Dental examination chart