The Health (Fluoridation of Water Supplies) Act 1960 (Stationery Office, Dublin) included provisions that a baseline survey of caries levels among children and adolescents would be undertaken prior to the implementation of the Act [Section 2, Subsection 4(a)(i)]. The Act also stipulated that regular caries surveys be undertaken “whenever and so often as the Minister requires” in order to monitor the effectiveness of fluoridation of water supplies in controlling dental caries. In this paper, some examples of the studies undertaken to comply with these welcome provisions are provided.

The baseline National Caries Study – 1961-1963
During the years 1961 to 1963, representative samples of five- to 16-year-olds were examined in each of the 26 counties in the Republic of Ireland. The diagnostic criteria adopted were those used in similar large-scale surveys in the UK during the 1950s. The clinical field workers were trained and calibrated by Dr Lucy Keniffe, who had participated in these earlier UK studies. The results were published in a series of reports (Stationery Office, Dublin, 1961, 1963). Following a lengthy legal challenge, water fluoridation was first introduced to Dublin City in July 1964, and Cork City in May 1965. By 1970 most of the major cities and towns in the Republic had fluoridated water supplies. High caries levels were recorded (Table 1), e.g., the mean decayed/missing/filled teeth (DMFT) for 15-year-old children was 8.2.

Cork City Study – 1970
To comply with the provisions of the Act, the Department of Health established a special unit in University Dental School, Cork, in 1965. This unit conducted a number of studies on dental caries and fluorides in the late ‘60s and early ‘70s. For example, a survey was conducted of a random sample of four- to 11-year-old school children in Cork City in 1969 and published in 1970. The children selected were those who had resided continuously in Cork City since May 1965 when water fluoridation was introduced. The clinical examiner was Dr Chris Collins, Director of the special unit and a member of the examining team that had previously conducted the baseline survey in 1961-'63. The results of the Cork City Study showed that the caries levels among children in 1969 were substantially lower than those recorded in the baseline studies in the same population in 1961 (Collins and O’Mullane, 1970). The authors concluded that there was a substantial reduction in dental caries among children in Cork City in the period 1961 to 1970. While the timing of the baseline study and the introduction of water fluoridation to Cork City did not allow a conclusion that the reduction was due to water fluoridation; nevertheless, the results were encouraging. In this regard it is worth noting that fluoride toothpastes were not available in Cork City until 1970. The hypothesis that water fluoridation could have a topical effect on those children whose permanent teeth had erupted at the time of the introduction of water fluoridation in 1965 prompted the
authors to suggest that water fluoridation might also be having a
topical effect, a relatively new concept at the time, having been noted
on only one previous occasion (Ast et al., 1950).

The Fermoy Mouth Rinse Study – 1970-1974
The special unit in the Cork Dental School was also charged with
investigating other methods of bringing the benefits of fluoride to
populations where water fluoridation was not feasible. The Fermoy
mouth rinse study commenced in 1970 (Collins and O’Mullane,
1972). It was designed to test the hypothesis that a fortnightly two-
and-a-half minute rinse with a 0.2% solution of sodium fluoride would
reduce the incidences of dental caries in children aged seven, eight,
nine and 10 attending primary schools in Fermoy, Co. Cork, which
was a non-fluoridated area at the time.

A pre-baseline dental status examination of the consenting children
was carried out in April 1970, in which the teeth present were
recorded. Caries was not recorded at this examination. Four months
after this examination a similar examination was carried out on the
same children, in which newly erupted teeth, i.e. teeth that erupted
during the four-month period, were recorded. Clinical and
radiographic caries examinations were undertaken using criteria based
on those described by Backer Dirks et al. (1950). Children were then
allocated to study and control groups on the basis of these newly
erupted teeth so that an equal number of comparable teeth were
included in each group. Teeth erupting during the trial were also
noted and the incidence of caries in these teeth was also compared. A
total of 74 rinsing sessions were conducted during the four-year
period of the study. The rinsing sessions and subsequent examinations
were double blind. Children in the study group rinsed with 10ccs of a
0.2% solution of sodium fluoride and children in the control group
rinsed with 10ccs of distilled water.

The results showed a highly significant reduction in the incidence of
dental caries in newly erupted teeth in the study group over the
control group over the four-year period of the study (Mageean and
Holland, 1977).

In 1982 the Department of Health commissioned a National Survey of
Children’s Dental Health, the primary aim of which was to measure
the effectiveness of water fluoridation on a countrywide basis
(O’Mullane et al., 1986). Random samples of children who were
lifetime residents of either fluoridated or non-fluoridated areas and
aged five, eight, 12 and 15 years were examined by 10
examiner/recorder teams. The criteria adopted were similar to those
used in the baseline studies of 1961-'63. It was also decided that levels
of enamel fluorosis would be recorded, using internationally accepted

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<td>7</td>
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P<0.0001 P<0.0001 P<0.0001
The North South Survey of Children’s Oral Health – 2002

In 2000 the Department of Health commissioned another National Survey of Children’s Dental Health, again with the main aim of monitoring the effectiveness of water fluoridation (Whelton et al., 2006). This study included a contemporaneous survey of children’s dental health in Northern Ireland, where water fluoridation has not been introduced (Whelton et al., 2006). The diagnostic criteria for both caries and dental fluorosis are the same as those used in the 1984 study. It was seen that in the period 1983/84 to 2002 there has been a substantial reduction in dental caries in both fluoridated and non-fluoridated communities in the Republic of Ireland, and in the non-fluoridated population of Northern Ireland. The decline in the period 1983/84 to 2002, however, is considerably greater in the fluoridated community. For example, in the five-year-old age group, the mean dmft among children who had been lifetime residents of fluoridated communities in the Republic of Ireland declined from 1.8 in 1983/84 to 1.3 in 2002, whereas the corresponding figures for five-year-old children in non-fluoridated areas in the Republic of Ireland were 3.0 and 1.7, and in Northern Ireland were 4.5 and 1.8. Similar trends are apparent in the figures recorded for caries among 15-year-olds in the two jurisdictions.

The prevalence of dental fluorosis increased substantially in the Republic of Ireland between 1984 and 2002, particularly in lifetime residents of fluoridated communities. In 1984, 94% of children residing in fluoridated communities in the Republic of Ireland had normal enamel; this figure had reduced to 76% in 2002 (Table 2). The figures for ‘questionable’, ‘very mild’ and ‘mild’ fluorosis in 1984 were 5%, 1% and 0%, respectively; these figures had increased to 11%, 8% and 4%, respectively, in 2002. These results for fluorosis were interpreted to indicate that ingestion of fluoride among children during the period when the enamel in permanent teeth is being formed needed to be reduced. As a result of these findings the level of fluoride in drinking water in the Republic of Ireland was reduced in 2007 from a level of 0.8 to 1.0 parts per million (ppm), with a target of 0.9ppm, to a level of 0.6 to 0.8ppm, with a target of 0.7ppm. In addition, recommendations regarding the use of fluoride toothpaste by infants and young children were introduced, as previous studies had indicated that infants and young children were prone to swallow toothpaste, leading to excessive intake of fluoride (www.fluoridationforum.ie, 2002).

References

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