An Overview of Dental Services and Oral Health in Northern Ireland and Ireland

Institute of Public Health

An Overview of Dental Services and Oral Health in Northern Ireland and Ireland

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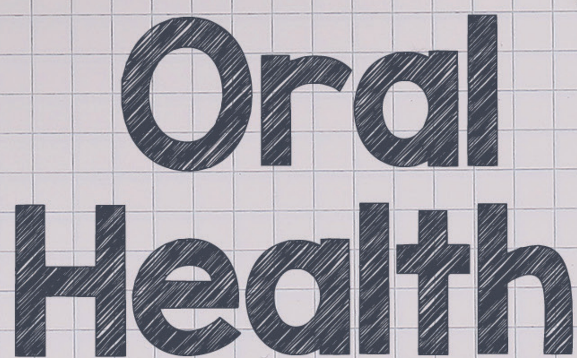
Glossary

CDC	Centers for Disease Control and Prevention
CSO	Central Statistics Office
CWF	Community Water Fluoridation
DOHI	Department of Health, Ireland
DOHNI	Department of Health, Northern Ireland
DTSS	Dental Treatment Services Scheme
GDP	General Dental Practitioner
GDS	General Dental Services
GUI	Growing Up in Ireland
HPV	Human Papillomavirus
HSC	Health and Social Care
HSCB	Health and Social Care Board
HSE	Health Service Executive
NCRI	National Cancer Registry Ireland
NHSCT	Northern Health and Social Care Trust
NICE	National Institute for Health and Care Excellence
NICR	Northern Ireland Cancer Registry
NID	Northern Ireland Direct
NIMDM	Northern Ireland Multiple Deprivation Measure
NISRA	Northern Ireland Statistics and Research Agency
PDS	Public Dental Service
PRSI	Pay Related Social Insurance
TBS	Treatment Benefit Scheme
TILDA	The Irish Longitudinal Study on Ageing
WHO	World Health Organization

1 Executive Summary



Executive Summary

The aim of this report is to describe dental health services and provide a summary of current data on oral health in Ireland and Northern Ireland. The report was compiled to provide information on oral health trends, to help to inform public policy and practice, and to highlight improvements in oral health behaviours and outcomes throughout both jurisdictions. Data for this report was compiled from government reports, official statistics, health service data and health surveys in Ireland and Northern Ireland.This report on oral health throughout Ireland and Northern Ireland, aims to be a resource for policymakers, dental professionals and the general public.

The first section of the report is comprised of an overview of oral health and the role that oral health plays in overall health. The high prevalence of tooth decay worldwide and the associated costs of treating dental disease are discussed. Evidence on the link between poor oral health and diabetes, atherosclerotic disease and pulmonary diseases is also summarised. Following this, an overview of the dental health systems in Ireland and Northern Ireland is provided, explaining how dental services are funded and provided by the state in both jurisdictions. The main section of the report is a synopsis of current oral health data, summarising trends in state-funded dental care in Northern Ireland, and presenting trends in adult and children's oral health in Ireland and Northern Ireland. Evidence shows that overall, oral health among adults and children has improved over the last number of decades. However, those living in disadvantaged areas experience poorer oral health and attend the dentist less frequently than those living in more advantaged areas. For this report, there was limited data available on oral health trends among children and adolescents in Ireland. As a result, an analysis on oral health data from the Growing Up In Ireland survey was carried out and the results are presented. This data shows overall positive trends in dental attendance, toothbrushing habits and oral health outcomes amongst adolescents in Ireland. However, the results show that those from more disadvantaged backgrounds consistently suffer poorer oral health outcomes than those from more advantaged backgrounds.

Based on the evidence presented in the report, several considerations for policy are noted. Health policies should be enhanced to encourage health promoting behaviours and reduce the risk factors that can cause both chronic conditions and dental disease, known as the 'common risk factor approach'. This includes targeting a reduction in smoking and alcohol consumption, improving diet, reducing stress and increasing exercise. Those from most disadvantaged backgrounds should be targeted as a priority for oral health policies and interventions as they consistently experience poorer oral health than those from more advantaged backgrounds. In Ireland, 'Smile Agus Sláinte', the new national oral health policy, should promote prevention of dental disease and encourage uptake of enhanced state services once implemented. Northern Ireland's 2007 Oral Health Strategy should also be updated and underpinned by current evidence as much of the data it is based on is now nearly two decades old.

In summary, overall trends in oral health are positive in Ireland and Northern Ireland and there have been consistent improvements in these trends over the past number of decades. However, efforts must be made to improve the oral health of those living in disadvantaged areas. In addition, further oral health research, in particular focusing on children's oral health and that of older adults, is urgently needed.

Key points

Northern Ireland

- Oral health policy is based on the Oral Health Strategy for Northern Ireland 2007 (Department of Health, Social Services and Public Safety (DHSSPS) 2007).
- Health and Social Care dental services are provided by dentists registered with the Health and Social Care Board who can be in private practice or employed directly by the Health and Social Care Board (Department of Health, Northern Ireland (DOHNI), 2014).
- Dental services for specific population groups including children, patients with complex medical needs and older adults living in nursing homes are provided by the Community Dental Service. These dentists are employed as salaried practitioners by the Health and Social Care Board.
- Those entitled to free public dental treatment include children, people with listed medical conditions, on certain social welfare payments, hospital patients, and pregnant or post-partum women. Subsidised treatment is available for people on low incomes. Non-eligible adults pay 80% of costs to a maximum of £384.
- In 2019/20 £104.9m was spent funding Northern Ireland's primary care dental services. Out of pocket (private) expenditure for dental treatment was £26m {Northern Ireland Statistics and Research Agency (NISRA), 2020).
- Payments to dentists are per patient and include increased fees for treating patients from the 20% most deprived areas (DHSSPS, 2007).
- The public water supply in Northern Ireland is not fluoridated (Payne, 2000).
- 61% of adults and 75% of children are registered with a health service dentist (NISRA, 2020).
- It is estimated that 4% of adults in NI had no teeth (edentate) in 2018, down from 33% in 1979 (Donaldson, 2021).
- 40% of 5-year-olds had tooth decay in 2013, down from 90% in 1963 (Ravaghi, 2015).
- One quarter (24.6%) of children registered with a dentist required a filling, extraction or crown in 2019/20. The number of children requiring a filling is down 16% since 2013/14. (NISRA, 2020).
- Children in more deprived areas are less likely to be registered with a dentist and much more likely to have extensive or severe dental decay (NISRA, 2020).
- Oral cancer cases and incidence rates are rising (Northern Ireland Cancer Registry (NICR), 2021), but referral rates fell by 36% during the first six months of the pandemic in 2020 which may delay diagnoses (Bissett, 2020). Oral cancer incidence runs along very clear socio-economic gradients with much higher rates presenting amongst those from the most deprived areas (NICR, 2021).

Ireland

- Oral healthcare delivery is based on the Dental Health Action Plan (1994). A new Oral Health Policy was launched in 2019 and is awaiting implementation Department of Health Ireland (DOHI), 2019c; Donnelly, 2021).
- Dental services are provided through a mixed private-public system, with 77% of treatment paid for privately (Central Statistics Office (CSO), 2020).
- State-funded services are delivered through the Dental Treatment Services Scheme for medical card holders; and the Treatment Benefit Scheme which provides one free check-up and one subsidised cleaning per year to those with sufficient pay-related social insurance (PRSI) contributions (Health Service Executive (HSE), 2021a).
- Schoolchildren in primary school and those with special needs are entitled to up to three dental screening appointments by HSE dentists and follow up treatment if required at public clinics (HSE, 2019a).
- All children under 16 are entitled to free emergency treatment provided by HSE dentists at public clinics.
- Public water supplies in Ireland have been fluoridated since 1964 and 71% of the population has access to these (Water_Team, 2021).
- Dental attendance in the last 12 months is highest among adults aged 55-64 at 63% and declines at older ages. People in the most disadvantaged areas and those who are unemployed are less likely to visit (CSO, 2019).
- Self-report data from the Healthy Ireland Survey shows that less than half of adults in Ireland have retained all their natural teeth, falling from 88% of those aged 15-24 to 4% of those aged 75+. 42% of those aged 75+ wear full dentures. (DOHI, 2019c).
- 22% of older adults (54+) in rural Ireland have no teeth compared to 10% in Dublin (Sheehan et al, 2017).
- In 2017, 413,133 people received dental treatment under the Dental Treatment Services Scheme, up from 343,067 in 2009, but this fell by 5.6% in 2018 (DOHI, 2018).
- In 1984 50% of 5-year-olds had tooth decay falling to 30% in 2014. For 12-year-olds the proportion with tooth decay fell from 80% to 40% (DOHI, 2019b).
- Approximately 7,000 children are referred each year through the HSE for dental extractions under general anaesthetic (HSE, 2019a).
- There are on average 554 new cases of lip, oral cavity and pharynx cancer in Ireland each year (National Cancer Registry Ireland (NCRI), 2021). Oral cancer rates increased significantly between 1999 and 2009 and there is increased risk of mortality in smokers, those aged 60+ and unemployed/retired people (Ali, 2016).
- Over half of 17/18-year-olds attend the dentist at least once a year but one third (32.6%) attend never or almost never. Attendance is lower in more disadvantaged households, Growing Up in Ireland data from 2016 shows.
- Four in five (79.4%) of 17/18-year-olds in ‘professional/managerial’ class had no permanent teeth extracted compared to 70.8% of those in the ‘never employed’ class. Growing Up in Ireland survey data shows.

2 Introduction

Introduction

This report presents a summary of key data on the oral health of children and adults living in Northern Ireland and Ireland. To the author's knowledge, this is the first report of its type summarising dental health services and oral health trends in both Ireland and Northern Ireland. It is envisioned that this report will serve as a resource, summarising current trends in oral health in both jurisdictions and will provide evidence for public health policy and practice. The first section of the report outlines the importance of oral health and highlights the connection between oral health and systemic health. The second section provides an overview of current oral health trends among both adults and children in Ireland and Northern Ireland. This is followed by an analysis of adolescent oral health in Ireland in the third section, using data from a Growing Up In Ireland survey carried out in 2015/2016. The fourth section provides considerations for oral health policy and practice in the future, based on evidence presented in the report. The final section outlines the limitations of the report and highlights gaps in evidence that exist, emphasising the need for future research on oral health in Ireland and Northern Ireland.

Importance of Oral Health

The Global Burden of Disease Study 2017 found that untreated dental decay in permanent teeth affects 2.4 billion people worldwide, making it the most common global health condition (GBD, 2019). This is a stark finding, as most dental decay is preventable (World Health Organization (WHO), 2020). In most high-income countries, 5% of total health expenditure and 20% of out of pocket health expenditure is spent on treatment of dental disease (WHO, 2020). In Ireland, dental decay is the most common chronic disease in childhood (Duane, 2017). Poor oral health in childhood can lead to pain, infections, increased risk of hospitalization, missed school days and subsequent poorer levels of education (Sheiham, 2005), and leads to increased incidence of decay in older years (McAuliffe, 2017). In addition, severe tooth decay at young ages can affect nutrition and subsequent growth and weight gain of a child (Sheiham, 2005). Poor oral health can have a negative impact on quality of life in adulthood (WOHR, 2003), with tooth loss having a significant impact on the wellbeing of older adults. Those who have lost all their teeth are less likely to be socially active and report poorer quality of life, increased loneliness and symptoms of depression when compared with adults who have retained all their teeth (Sheehan, 2017). Dental status can also impair ability to eat certain foods in older adults which appears to influence nutrient intake (Watson et al, 2019).

Oral diseases and the four major non-communicable diseases- cardiovascular disease, cancer, chronic respiratory disease and diabetes- share modifiable risk factors including tobacco and alcohol consumption and high- sugar diets (UN General Assembly, 2011). There a is growing understanding of the relationship between oral and systemic diseases in recent years. Periodontal disease is a severe form of gum disease that leads to loss of bone around teeth and can result in pain, gum infections and tooth loss. Individuals with systemic diseases (diabetes mellitus, cardiovascular disease and HIV/AIDS) or who are pregnant, suffer from more frequent and more severe periodontal disease than individuals without these conditions (Teshome, 2017). The relationship between diabetes mellitus and periodontal disease is well established, with evidence showing that the two conditions have a bidirectional relationship (Taylor 2001, Chee 2013, Wu 2020). Diabetes mellitus is

a widely accepted and recognized risk factor for periodontal disease and patients with poorly controlled diabetes mellitus are at risk of developing more severe and progressive periodontal disease than non-diabetic patients (Tsai, 2002). Conversely, uncontrolled periodontal disease may worsen glycemic control in diabetic patients (Taylor, 2008). Diabetic patients with severe periodontal disease have a higher risk of developing diabetes complications and have a higher mortality rate than those diabetic patients who do not have severe periodontal disease (Saremi, 2005). Comprehensive and effective periodontal treatment can improve glycemic control in patients with Type 2 diabetes mellitus (Teshome, 2017).

While not conclusive, there is growing evidence that improving oral health may lessen the risk of atherosclerotic disease (a disease in which plaque builds up inside your arteries) (Kuo, 2008). In addition, several studies have reported that improving the oral hygiene of institutionalised and ventilated patients can have a positive impact on their systemic health (Philstrom, 2005).

The connection between improved oral health and systemic health highlights the importance of prioritising oral health throughout the life cycle. The following section outlines the provision of dental care in Northern Ireland and Ireland and discusses state-funded dental services in both jurisdictions.

Key points

- Untreated dental decay in permanent teeth is the most common health condition worldwide
- Poor oral health in childhood can lead to pain, infections and hospitalisations, missed school days and a cycle of decay in older years
- For older adults, poor oral health can impact reduce quality of life and lead to increased loneliness and symptoms of depression. Dental status can also impact food choice and nutrient intake
- Oral and systemic diseases share common modifiable risk factors
- There is growing evidence concerning the link between poor oral health with major non-communicable diseases including diabetes, cardiovascular disease and pulmonary disease

3 Overview of Dental Health Systems

Overview of Dental Health Systems

Northern Ireland

Oral health policy is guided by the Oral Health Strategy for Northern Ireland 2007. When introduced, it aimed to reorient dental services in Northern Ireland, progressing from treatment-oriented services towards preventative services (DHSSPS, 2007). As the current policy was implemented over 14 years ago, there have been calls to develop a new national oral health policy to reflect the current oral health needs of those living in Northern Ireland based on updated data, and aimed at improving poor oral health outcomes (House of Commons Northern Ireland Affairs Committee, 2019).

General Dental Services

Dental services[1] in Northern Ireland are overseen by the Health and Social Care Board (HSCB) and provided by the HSC General Dental Service (GDS). Patients register with a General Dental Practitioner (GDP), also called 'High Street Dentist', to access health service dental treatments. GDPs are independently contracted to provide treatments on behalf of the HSCB and are paid fees per registered patient (see below) available (DOHNI, 2014). HSC dental treatments include dental examination, radiographs, periodontal treatment, restorations, extractions (including surgical), root canal treatment, dentures, crowns, bridges and referral to a dental hospital for specialist treatment if required (Northern Ireland Direct (NID), 2021a). Dentists are paid increased fees for treating patients from the 20% most deprived wards in Northern Ireland (DHSSPS, 2007).

Just under two thirds (64%) of the Northern Ireland population are registered with a health service dentist and this figure has been stable at around 63% for eight years. Children are more likely to be registered than adults (75% vs 61%) (NISRA, 2020).

In 2019/20, £104.9 million (net) was spent funding Northern Ireland's primary care dental services (NISRA, 2020), an increase from £99.5 million in 2018/19 (DOHNI, 2019). Out of pocket expenditure by patients on dental treatment not covered by the HSC or by health insurance was £26 million in 2019/20 (NISRA, 2020), up from £25.6 million in 2018/19 (DOHNI, 2019). Fees for HSC dental treatment are set by the HSCB using the Statement of Dental Renumeration (HSC Business Services Organisation, 2021).

[1] Health and Social Care (HSC) is the publicly funded healthcare system in Northern Ireland. It was established separatelyto the National Health Service (NHS) but is considered a part of the overall UK national health service.

Individuals eligible for free public dental treatment in Northern Ireland

- Children under the age of 18
- 18 and in full-time education
- Pregnant or have given birth in the past 12 months
- Has a listed medical condition
- Receiving (or partner receiving) income support, income-related employment and support allowance, income based jobseeker's allowance, pension credit guarantee credit, receiving tax credits
- War pensioner with war-related disability
- Hospital dental service outpatient
- Community dental service patients.

Source: NIDirect (2021a)

Patient Registration

Continuing Care (adults)

Adult registration with a GDS dentist is called continuing care (NID, 2021a). Registration occurs for a period of 24 months. The dentist receives a monthly fee for each registered patient, with dentists receiving up to 50% increased capitation payments for registered adults living in deprived areas (Donaldson, 2021).

Capitation (children)

Registration of under 18's and this system of payment towards the GDS dentist is termed 'capitation' (Croner-I, 2012). The dentist is paid a monthly fee once the child is registered, based on the child's age (Croner-I, 2012). Increased capitation fees of between 50% and 100% are paid to dentists for children living in areas with increased oral disease (based on postcodes and age) (Donaldson, 2021). When a child turns 18, they are automatically registered for continuing care, and must pay fees unless otherwise exempt (Croner-I, 2012).

HSC Low Income Scheme

Those not eligible for free dental treatment may be entitled to subsidised dental treatment. Adults who are not eligible for free treatment or the low income support scheme must pay 80% of the cost of treatment, up to a maximum of £384 (NID, 2021a).

Community Dental Services

Dental treatments are provided for patients who cannot receive treatment in general dental practice setting due to particular care needs. Referral for treatment is required. Services provided include inhalation sedation, dental assessments for residents of nursing/ residential homes and domiciliary visits for those unable to travel to a clinic/hospital (Northern Health and Social Care Trust (NHSCT), 2020). Care is provided by salaried practitioners who are employed directly by the HSCB.

Specialised dental services are provided in some hospitals for people with multiple complex medical conditions (NHSCT, 2020).

Key points

- Oral health policy 'Oral Health Strategy for Northern Ireland' published in 2007
- £104.9 million spent funding Northern Ireland's primary care dental services in 2019/2020
- In 2019/2020, out of pocket expenditure for dental treatment was £26 million
- Dentists are paid increased fees for treating patients from the 20% most deprived wards
- 64% of the population of NI are registered with a dentist (NISRA, 2020).

Ireland

Current oral healthcare in Ireland is based on the Dental Health Action Plan (1994). Smile Agus Sláinte National Oral Health Policy was launched in 2019 aimed at addressing gaps and inequalities in routine dental care for significant sectors of the population (DOHI, 2019c). However, the roll-out of this policy has been delayed, in part due to the COVID-19 pandemic (Donnelly, 2021). This policy plans to reorientate the provision of public dental services for children away from public dental clinics towards private clinics, with treatments carried out by private dentists contracted by the HSE (Nolan, 2019).

At present, dental services in the Ireland are provided through a mixed public-private system, with the majority of individuals paying out-of-pocket fees to independent, private dental clinics (Nolan, 2019). Central Statistics Office figures for 2018 indicate that 77% of dental care is funded privately, mainly from household out-of-pocket payments as well as some private insurance payments (CSO, 2020). State funded dental services are delivered through the Dental Treatment Services Scheme (DTSS), Treatment Benefit Scheme (TBS) and Public Dental Service (PDS).

Public Dental Services

Dental Treatment Services Scheme (DTSS)

One third of the population (32%) are eligible for a medical card (HSE, 2021b). Free dental treatment is provided to medical card holders aged 16 and older, and their dependents. Treatment is carried out by private dentists who hold a DTSS contract with the HSE (HSE, 2021a). Treatments provided are divided into 'above the line' and 'below the line' procedures. 'Above the line' procedures include one dental examination per year, two dental restorations per year, root canal treatment on front teeth, dental prescriptions and any number of dental extractions per year. Patients with certain medical conditions (eg diabetic patients, patients undergoing cancer treatment) are entitled to additional restorations and dental prophylaxis, requiring prior approval from the HSE before being carried out (HSE, 2021a). 'Below the line' procedures are include more complex treatments e.g. dentures, protracted periodontal treatments, and also require prior approval from the HSE. National spending on the DTSS has fallen from €75.8 million in 2010 to €56.08 million in 2019 (Irish Dental Association, 2021). The number of dentists holding DTSS contracts to provide treatments through this scheme has fallen from 1,847 in 2015 to 1,247 in 2021, a drop of 32% (McCarthy, 2021).

Treatment Benefit Scheme (TBS)

Adults who have paid the required Pay Related Social Insurance (PRSI) contributions are entitled to one dental examination and one subsidised dental prophylaxis (cleaning) per year. This scheme is funded by the Department of Social Protection (DSP). In 2020, total expenditure on this scheme was €41 million (DSP, 2021).

Public Dental Service (PDS)

The HSE is legally required to provide free dental care to preschool children and schoolchildren attending primary schools run by the state (Health (Dental Services for Children) Regulations 2000). Salaried HSE dentists provide emergency dental care, routine assessments and preventative treatments for children under the age of 16, and care for special needs patients of all ages. The HSE runs a school based dental screening programme, where children are screened up to three times throughout primary school. However, due to lack of resources in some regions, these screening assessments are sometimes delayed or deferred (Duane 2017; HSE, 2019a).

Key points

- Oral healthcare delivery is based on Dental Health Action Plan (1994). A new national oral health policy was launched in 2019, but its roll-out has been delayed, in part due to the Covid-19 pandemic.
- Most dental care is funded privately. In 2018, CSO figures show 77% of dental care was funded privately, mainly through household out-of-pocket payments.
- Adults aged 16+ are entitled to dental treatment through two schemes: DTSS and TBS.
- Salaried HSE dentists provide emergency dental care, routine assessments and preventative treatments for children under the age of 16 and care for people with special needs of all ages.

Water Fluoridation: Ireland and Northern Ireland

Community water fluoridation (CWF) is the 'controlled addition of fluoride to the public water supply for the prevention of dental caries' (Cronin 2021). The Centers for Disease Control and Prevention (CDC) called community water fluoridation one of the 10 great public health achievements of the 20th Century (CDC, 2018). It has been shown to be a very effective strategy to reduce the burden of dental decay in children (Jack et al, 2016) and evidence from Ireland indicates it is effective for those living in both advantaged and disadvantaged areas (Whelton et al, 2006). A Cochrane review of water fluoridation for the prevention of dental caries concluded that it resulted in children having 26% fewer decayed, missing and filled permanent teeth, and a 14% increase in children with no decay in permanent teeth ((Iheozor-Ejiofor et al, 2015). It could not find any evidence to show if there are benefits of fluoridated water for adults, or if it reduces inequalities in tooth decay between children from poorer or more affluent backgrounds

There have been concerns about potential negative health impacts, but reviews have found the only proven adverse effect is higher levels of fluorosis – the discolouration of tooth enamel which can be a cosmetic concern – in higher flouride areas (Sutton et al, 2015) (Jack et al, 2016).

In the United Kingdom policy on water fluoridation varies by region. Water fluoridation takes place in some parts of England where it is a matter for local authorities, but it is not practiced in Wales or Scotland. The drinking water supply in Northern Ireland is not fluoridated. In 1996 25 out of 26 local councils voted against introducing water fluoridation in Northern Ireland (Payne, 2000).

Water fluoridation was introduced in Ireland in 1964 and there is a legislative mandate for the fluoridation of the public water supply (Cronin 2021). 71% of the population in Ireland is supplied by fluoridated public water (Water_Team 2021). CWF costs €7.3 million annually in Ireland, approximately €2.15 per person (Cronin, 2021).

CWF is considered a cost effective public health measure to prevent dental decay in Irish schoolchildren. Cronin et al (2021) showed that the potential annual lifetime savings associated with CWF decay prevention is approximately €2.95 million annually over the lifetime of Irish schoolchildren.

It is evident that health systems and policies on CWF in Northern Ireland and Ireland vary widely. The differing structure of both dental systems, as well as differences in the available data, mean it is not possible to provide a direct comparison of oral health in both countries. Due to this, oral health data from Northern Ireland and Ireland will be presented separately in the following section

4 Oral Health in Northern Ireland and Ireland

Oral Health in Northern Ireland and Ireland

Key oral health data from Northern Ireland and Ireland are outlined in this section. The current oral health status of both children and adults and the impact of deprivation on oral health and trends in oral cancer rates are presented. Data from oral health surveys, online databases and government reports were used to inform this section (see appendix 1 and 2). Information on the oral health of children and adolescents in Ireland was not readily accessible in the timeframe of this report. In order to assess the oral health of adolescents in Ireland, an analysis was carried out on a Growing Up In Ireland (GUI) survey which contained data on oral health of 17/18 year-olds. The results of this analysis are presented in Section 4.

Northern Ireland

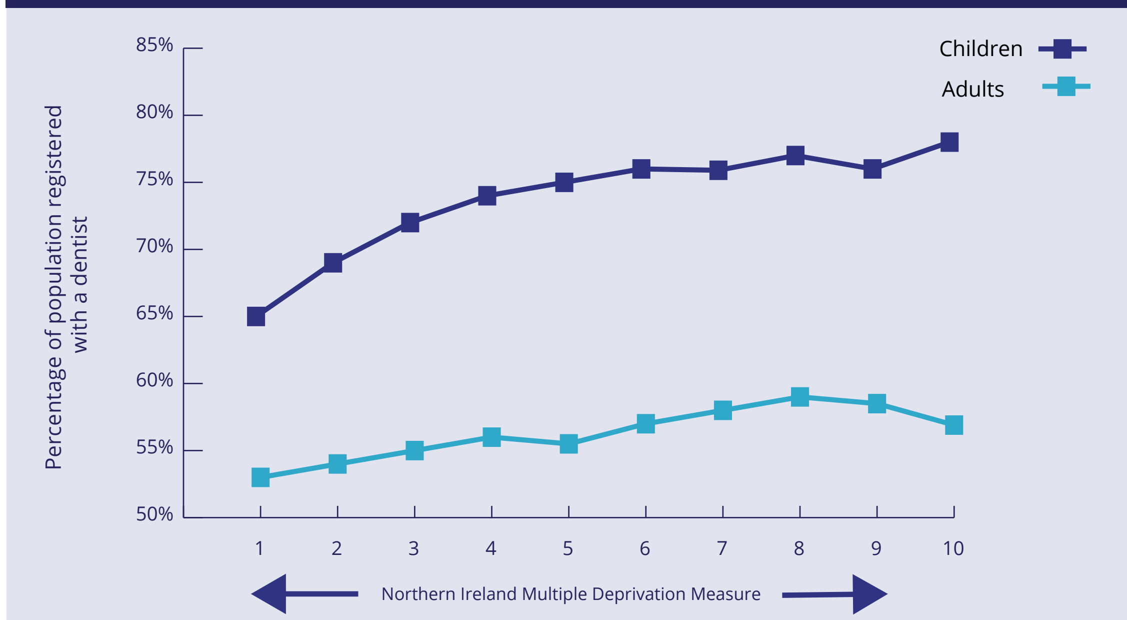
Adults

Registration with a HSC dentist

In total, 61% of the Northern Irish adult population are registered with a health service dentist, an increase from 50% in 2004. However, registration has remained stable since 2013, when 59% of adults were registered with a health service dentist. Females are more likely to be registered than males, in particular 18-44 year- olds, where 71% of females and 55% of males are registered with a dentist (NISRA, 2020).

Northern Ireland Multiple Deprivation Measure (NIMDM) is used as a measure of multiple deprivation in Northern Ireland and is made up of seven domains: income deprivation, employment deprivation, health deprivation and disability, education, skills and training, access to services, living environment and crime and disorder. An overall measure of deprivation is assigned to an area based on a weighted average of the seven domains, with areas ranked from least deprived to most deprived (NISRA, 2018). Adults living in lower NIMDM deciles (more deprived) are likely to have greater entitlements to free dental care, but despite this, fewer adults in these areas register with a health service dentist than adults from less deprived areas. Of adults in least deprived areas (deprivation decile 10) 58% were registered with a health service dentist in 2020, falling to 53% of adults in most deprived areas (decile 1) registered (figure 1).

Figure 1. Proportion of patients in Northern Ireland registered with a health service dentist by NIMDM 2020

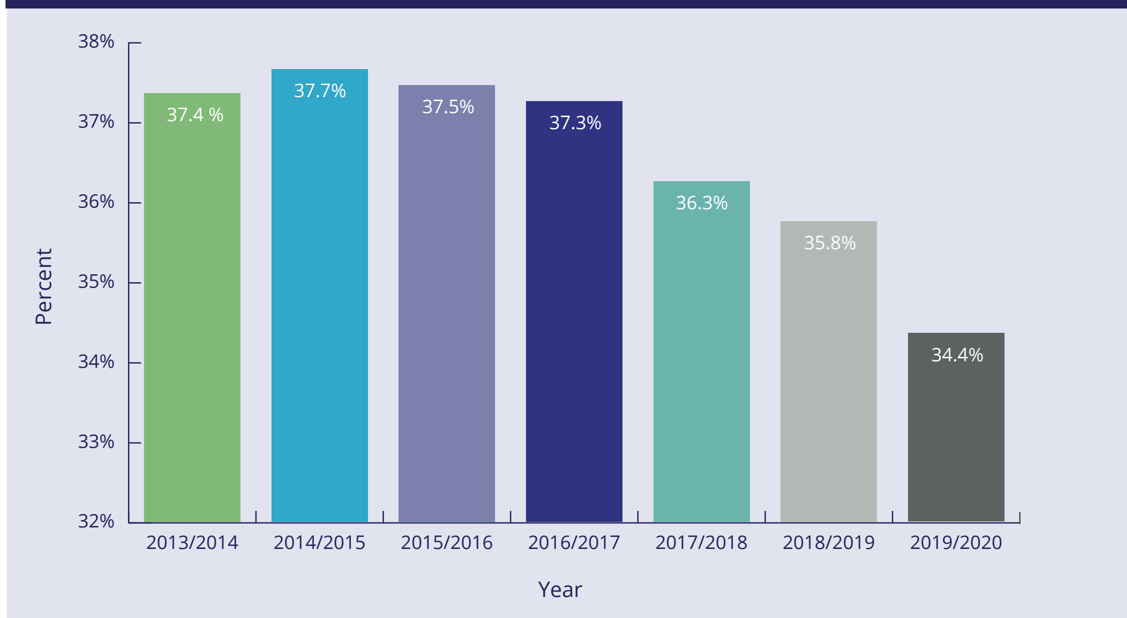


Source: NISRA 2020

Dental Treatments

The number of adults in Northern Ireland receiving fillings or extractions by HSC dentists has decreased since 2013. Between 2013 and 2020, the number of adult fillings carried out by health service dentists fell by 8% (figure 2), with extractions falling by 6%. However, the number of fillings and extractions carried out on adults aged 45 and over, in particular on those aged 75 and over, has increased (NISRA, 2020)

Figure 2. Proportion of Northern Irish adults registered with a health service dentist who received at least one filling 2013-2020



Source: NISRA 2020

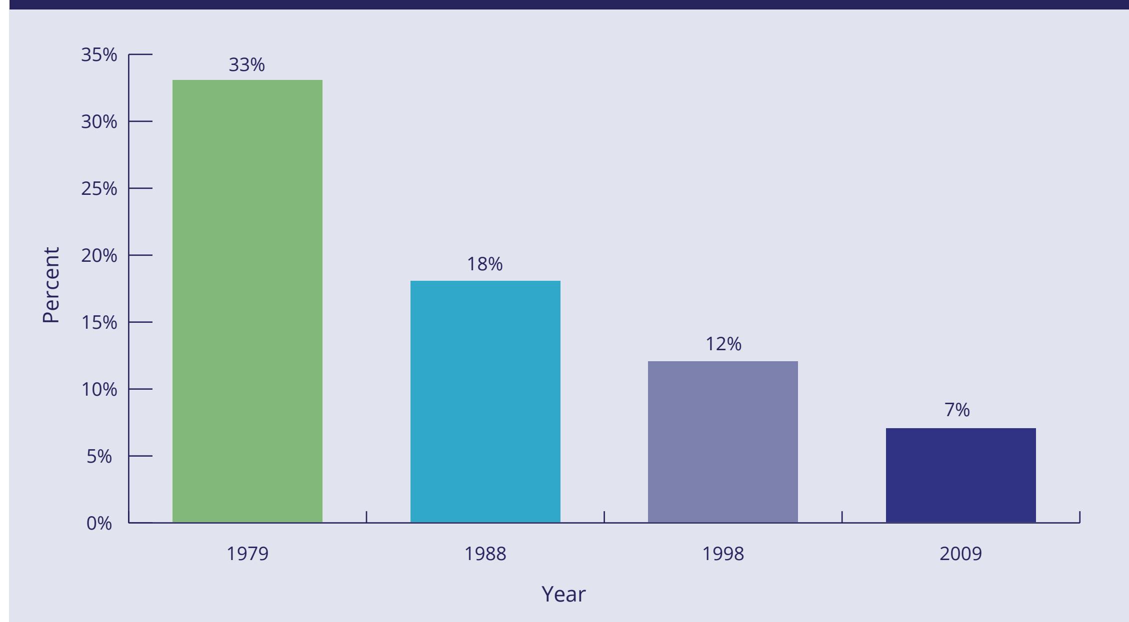
Toothbrushing

Toothbrushing habits have improved, with the proportion of dentate adults brushing their teeth at least twice daily increasing from 69% in 1988 to 75% in 2009. In 2009, 22% of adults brushed their teeth once daily (Chenery, 2011).

Tooth loss

In 1979, 33% of adults in Northern Ireland had no teeth. This dropped to 18% in 1988, 12% in 1998 and 7% in 2009 (figure 3). There has been no Adult Dental Health Survey carried out since 2009. However, based on tooth loss trends over the past number of years and the declining number of dentures being made through the public dental service, it is estimated that in 2018, 4% of adults in Northern Ireland had no teeth (Donaldson, 2021). The proportion of adults over 75 with no teeth has decreased from 78% in 1988 to 50% in 2009 (Chenery, 2011).

Figure 3. Proportion of adults in Northern Ireland with no natural teeth 1979-2009



Source: UK Adult Dental Health Surveys (Chenery, 2011)

Whilst increasing tooth retention is seen as a leap forward in the oral health of the older population it also brings with it the challenges of managing chronic dental diseases including caries and periodontal disease. Due to factors such as diet, reduced manual dexterity and xerostomia (dry mouth) these chronic diseases can cause considerable pain and suffering amongst older patients and impair oral function (Hayes, Da Mata, Cole et al, 2016). Dental caries in particular remains a problem for this age group with a high prevalence of coronal and root surface caries found amongst old-age populations. (Da Mata, McKenna, Anweigi et al, 2019). In the 1998 UK Adult Dental Health Survey, the proportion of adults in Northern Ireland with 18 or more sound and unrestored teeth was only 3% among those aged 55 years and over. The 2009 UK Adult Dental Health Survey indicated that this figure had improved but still remained at only 8% in Northern Ireland (NHS Digital, 2011). The 2009 survey also showed that in the UK (excluding Scotland), 27%

of adults aged 65-74 years had evidence of dental caries whilst this figure increased to 40% for those aged 75-84 years. (White, Tsakos, Pitts et al, 2012).

It is widely reported that the oral health status of older adults within nursing homes is significantly worse than their community living peers (Karki, Monaghan and Morgan, 2016). With increasing age, the ability to care for their mouth deteriorates: poly-pharmacy leads to xerostomia, and diets can become rich in sugars, while good daily oral hygiene is essential for the maintenance of complex dental restorations. All these factors increase the risk of oral disease and directly impact on comorbidities.

Unfortunately, a growing proportion of residents in care homes are unable to self-care and with increasing dependency, oral hygiene practices present a significant challenge in nursing homes. Challenges include inadequate resources and training and these are compounded by high staff turnover. There is significant difficulty in obtaining routine dental care due to the often very complex needs of institutionalised older people, with a significant proportion suffering from cognitive impairment and dementia. Access to domiciliary dental services is often limited with subsequent admission to hospital for dental problems distressing for individuals and their families and very costly to the healthcare provider (McKenna et al. 2020).

Within the United Kingdom, the National Institute for Health and Care Excellence (NICE) publishes evidence-based guidelines on all aspects of healthcare. In 2016 NICE published 'Oral health for adults in care homes (NG48)' which included a series of recommendations for older adults in care homes including improving access to dental services for residents, improving the oral health knowledge and skills of care home staff and the implementation of oral health assessments, mouth care plans and daily oral care for all residents (NICE, 2016). However, adoption of these recommendations has been challenging in many care homes as demonstrated by follow-up surveys in the United Kingdom (Care Quality Commission, 2019)

Children

Registration

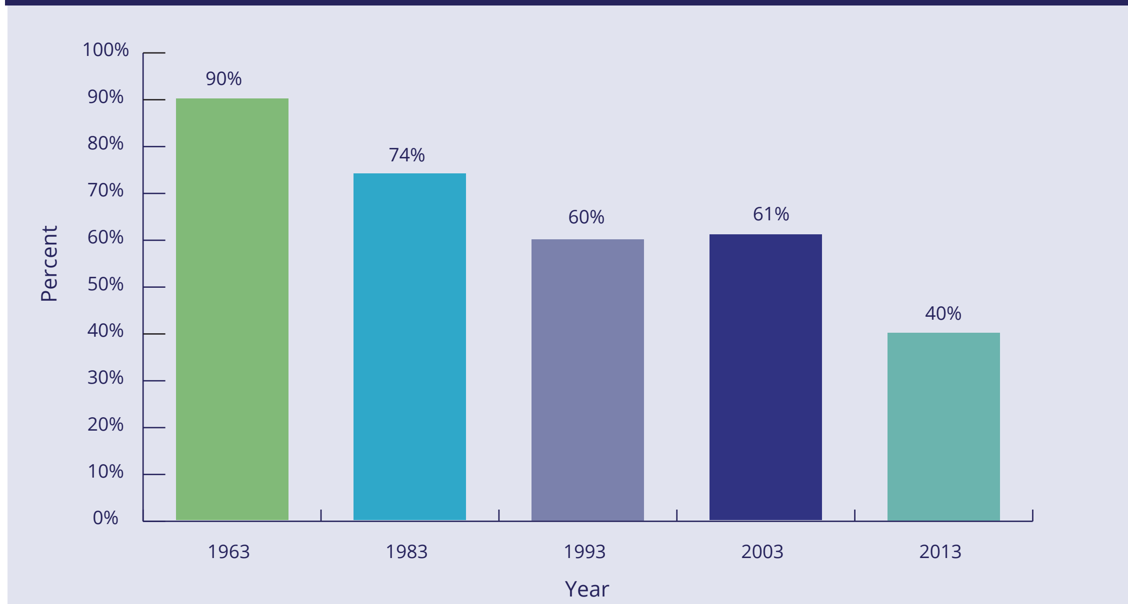
In total, 75% of children in Northern Ireland are registered with a health service dentist (NISRA, 2020). In a pattern also observed in adults, children's registration with a health service dentist decreases with increasing deprivation. In 2020, 65% of children in most deprived areas (deprivation decile 1) and 80% of children in least deprived areas (deprivation decile 10) registered with a health service dentist (figure 1).

Decay Experience

5 year-olds

In 2013, 40% of 5 year-olds had tooth decay, down from 90% in 1963 (figure 4). Based on an unpublished children's dental health survey, it is estimated that the proportion of 5-year-old children with tooth decay in 2019 was 32% (Donaldson, 2021). According to the 2013 UK Children's Dental Health Survey, 19% of 5 year-olds in Northern Ireland were affected by severe decay (Ravaghi, 2015).

Figure 4. Decay prevalence for 5 year-old children in Northern Ireland 1963-2013

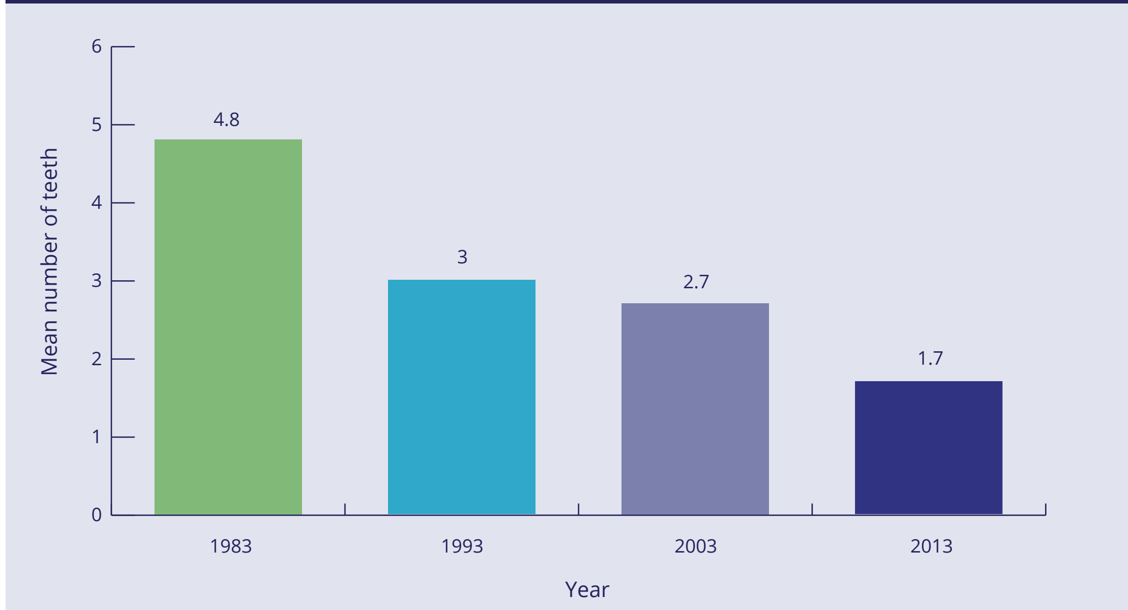


Source: UK Children's Dental Health Surveys (Ravaghi et al, 2015)

12 year-olds

In 2013, 57% of 12 year-olds had obvious decay in permanent teeth, down from 73% in 2003 (Ravaghi, 2015). The number of teeth affected by decay has reduced since 1983, with the mean number of teeth per child affected by dental decay down from 4.8 in 1983 to 1.7 in 2013 (Figure 5). The proportion of 12 year-olds with no decay in permanent teeth increased from 27% in 2003 to 43% in 2013 (Ravaghi, 2015).

Figure 5. Mean number of teeth per child affected by dental decay: 12 year-olds in Northern Ireland 1963-2013



Source: UK Children's Dental Health Surveys (Ravaghi et al, 2015)

15 year-olds

The proportion of 15 year-olds with obvious decay in permanent teeth decreased from 78% in 2003 to 72% in 2013. Of those with tooth decay in permanent teeth 2013, 36% were affected by severe or extensive decay and 28% had 5 or more decayed permanent teeth (Ravaghi, 2015).

Dental Treatments

One quarter (24.6%) of registered children in 2019/2020 required a filling, non- hospital extraction or crown. The number of children requiring treatment has fallen since 2013/2014, with the number of children requiring fillings down 16% and requiring non-hospital extractions down 9% (NISRA, 2020). The total number of fillings and non-hospital extractions carried out on those children requiring treatment also fell during this time (figure 6).

Figure 6. Proportion of children registered with a health service dentist in Northern Ireland who received at least one filling or extraction

Source: NISRA 2020

Preschool children that undergo dental extractions under general anaesthetic (GA) are at increased risk of developing further decay and requiring repeat extractions and treatment under GA as they grow older (McAuliffe, 2017). In 2017/2018, 4,724 children had dental extractions under GA in Northern Ireland (figure 7). A total of 23,035 teeth were extracted during this period, with an average of 4.9 teeth extracted per child (Donaldson, 2021).

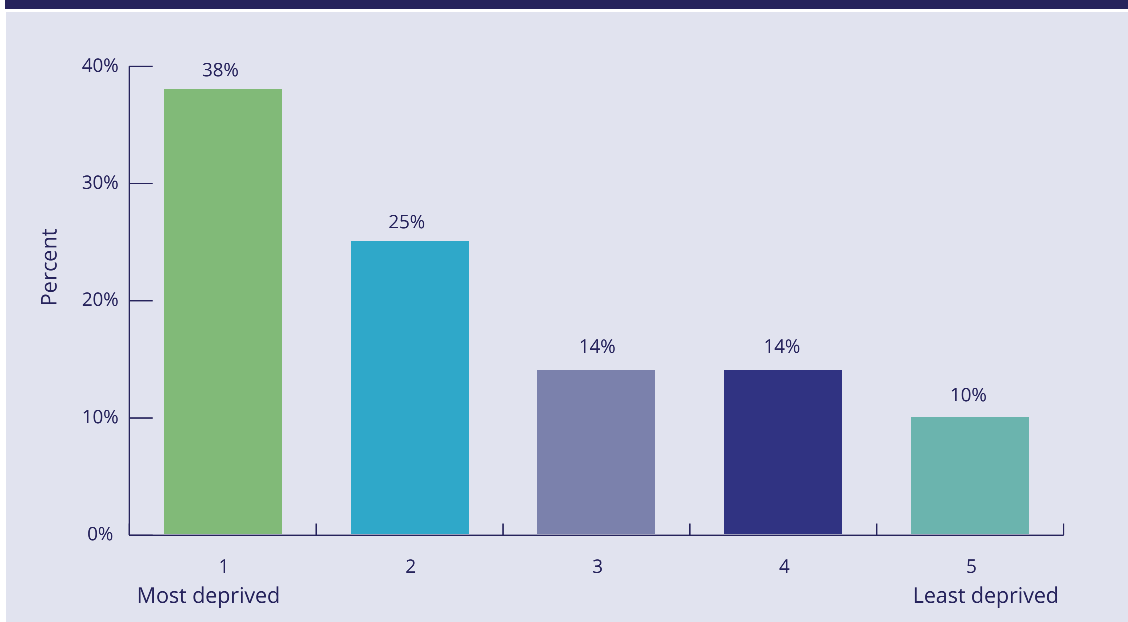
Figure 7. Number of children in Northern Ireland having dental extractions under general anaesthetic 2002-2017/18

Source: Donaldson 2021

Deprivation Areas

The proportion of 5- and 15-year-old children experiencing 'severe or extensive decay' is higher among those living in deprived areas of Northern Ireland (Ravaghi, 2015). In 2013, 38% of 5-year-olds in most deprived areas (decile 1) had tooth decay, compared with 10% of 5-year-olds in least deprived areas (decile 5) (figure 8).

Figure 8. Proportion of 5 year-olds in Northern Ireland with 'severe or extensive decay' by deprivation quintiles



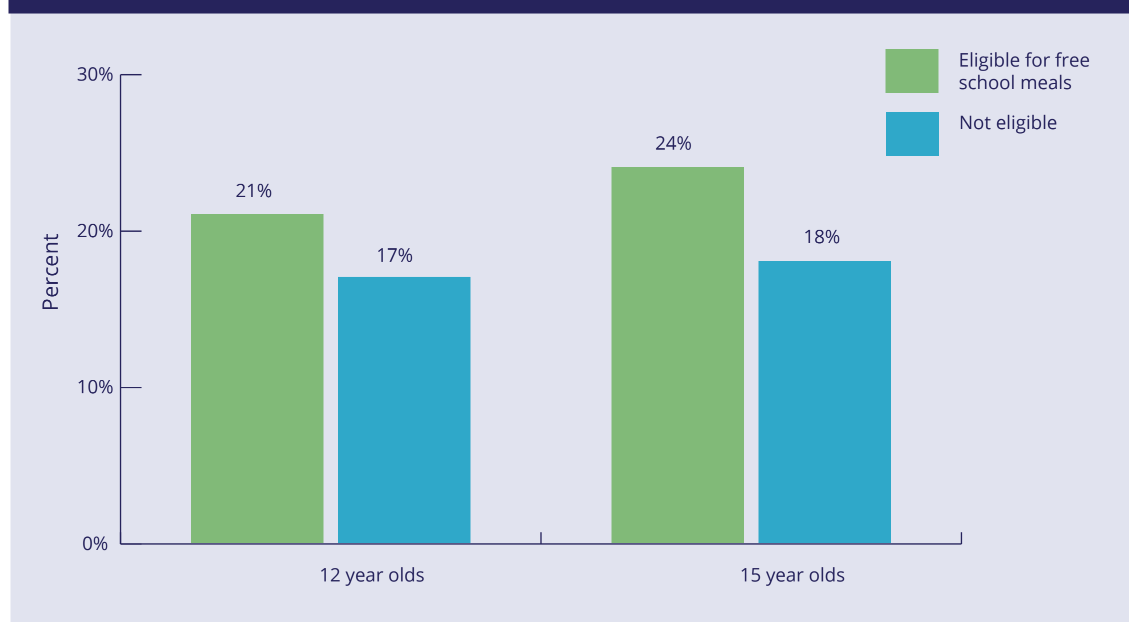
Source: UK Children's Dental Health Survey 2013 (Ravaghi et al, 2015)

According to the 2013 UK Children's Dental Health Survey, 58% of 12-year-olds and 46% of 15-year-olds in Northern Ireland reported problems with their teeth and mouth that affected their daily lives. Eligibility for free school meals is used as a proxy measure of disadvantage in the UK Children's Dental Health Surveys. In 2013, 12-year-old children in Northern Ireland who were eligible for free school meals were more likely to report problems with bleeding or swollen gums and toothaches than those not eligible (18% v 13% and 21% v 17% respectively as shown in figures 9 and 10). This trend is also evident among 15-year-olds, with a greater percentage of those eligible for free school meals reporting problems with bleeding gums (24% v 18% as shown in figure 10).

Figure 9. Self-reported toothache in Northern Irish children by age and eligibility for free school meals

Source: UK Children's Dental Health Survey 2013 (Ravaghi et al, 2015)

Figure 10. Self-reported bleeding or swollen gums in Northern Irish children by age and eligibility for free school meals

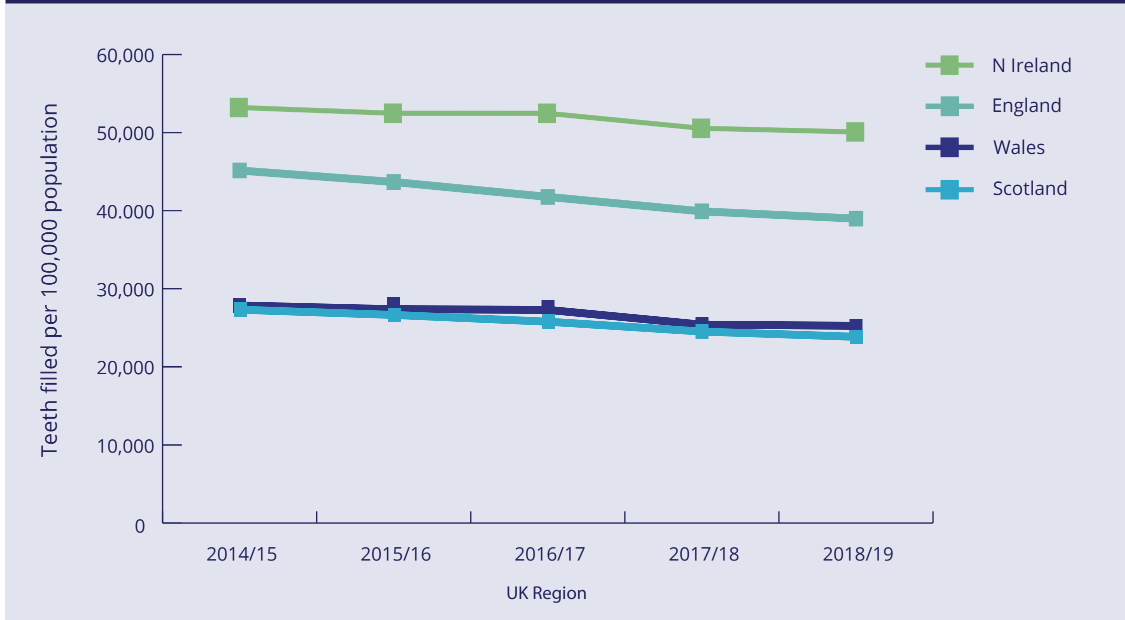


Source: UK Children's Dental Health Survey 2013 (Ravaghi et al, 2015)

Comparison with the UK (adults and children)

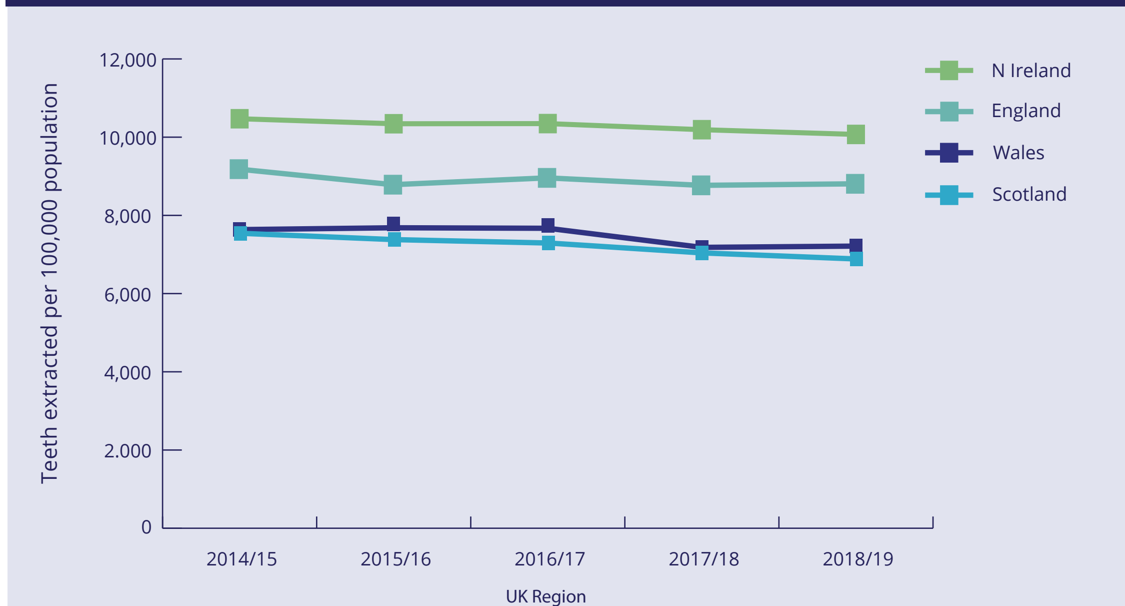
Despite the overall decrease in the number of fillings and extractions carried out, Northern Ireland is still performing poorly when compared with its UK counterparts. Between 2014/2015 and 2018/2019, Northern Ireland had the highest number of fillings carried out and the second highest number of extractions carried out in the UK (figure 11 and figure 12).

Figure 11. Number of teeth filled by health service dentists per 100,000 population by UK regions: 2014/15 to 2018/19



Source: NISRA 2020

Figure 12. Number of teeth extracted by health service dentists per 100,000 population by UK regions: 2014/15 to 2018/19



Source: Source: NISRA 2020

In 2018/2019, adults and children in Northern Ireland had the highest proportion of teeth filled by HSC dentists per 100,000 population throughout the four UK regions (figure 13).

Figure 13. Number of teeth filled by health service dentists per 100,000 population by UK regions-children and adults (2018/19)

Source: NISRA 2020

Oral Cancer

Oral cancer includes cancer of the lip, oral cavity, pharynx and nasopharynx (WHO, 2020), although it should be noted that there are differences in how countries group and report these so care should be taken with comparisons. An average of 256 cases a year of oral cancer were diagnosed in Northern Ireland each year between 2015 and 2019 (NICR, 2021). Over three quarters of cases were in people aged 55 or older and there are twice as many cases in men as in women. The age-standardised incidence rate of oral cancer in males was 21.6 cases per 100,000 person years in 2015-19, up from 20.0 in 2010-14. In females the age-standardised incidence rate rose from 8.8 per 100,000 person years in 2010-14 to 9.7 in 2015-19 (NICR, 2021). Both these increases were statistically non-significant. It is predicted that oral cancer cases in Northern Ireland will double between 2015 and 2035 due to rising rates and an ageing population (Cancer Focus Northern Ireland, 2020). However despite the increase in oral cancer, referrals to investigate potential oral cancer cases fell by 36% in the six months after March 2020, the beginning of the COVID-19 pandemic when dental practices were closed and medical services disrupted (Bissett, 2020). There is a concern that this may lead to many oral cancer cases being diagnosed at a later stage, with significant impacts on morbidity and mortality.

Key points

- Oral health of adults and children in Northern Ireland has improved over the past number of decades
- Northern Ireland compares poorly with its UK counterparts, despite improved overall oral health trends within Northern Ireland
- Dental disease disproportionately affects those living in more deprived areas and those living in deprived areas are less likely to register with a health service dentist
- The number of children requiring extractions under general anaesthetic remains high. In 2017/2018, 4,724 children had dental extractions under GA, with an average of 4.9 teeth extracted per child
- The cases and incidence rate of oral cancer are increasing in Northern Ireland. The closure of dental practices and disruption to medical services during the Covid-19 pandemic may lead to oral cancer being diagnosed at later stages with significant impacts on morbidity and mortality.

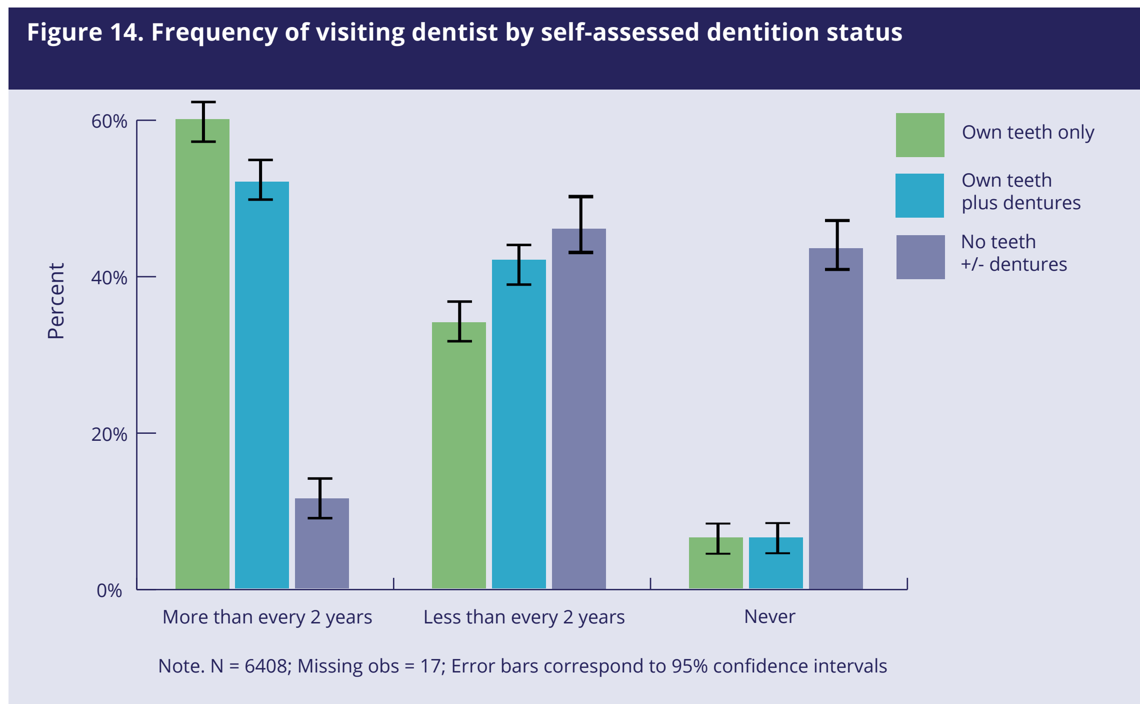
Ireland

Adults

Dental Attendance

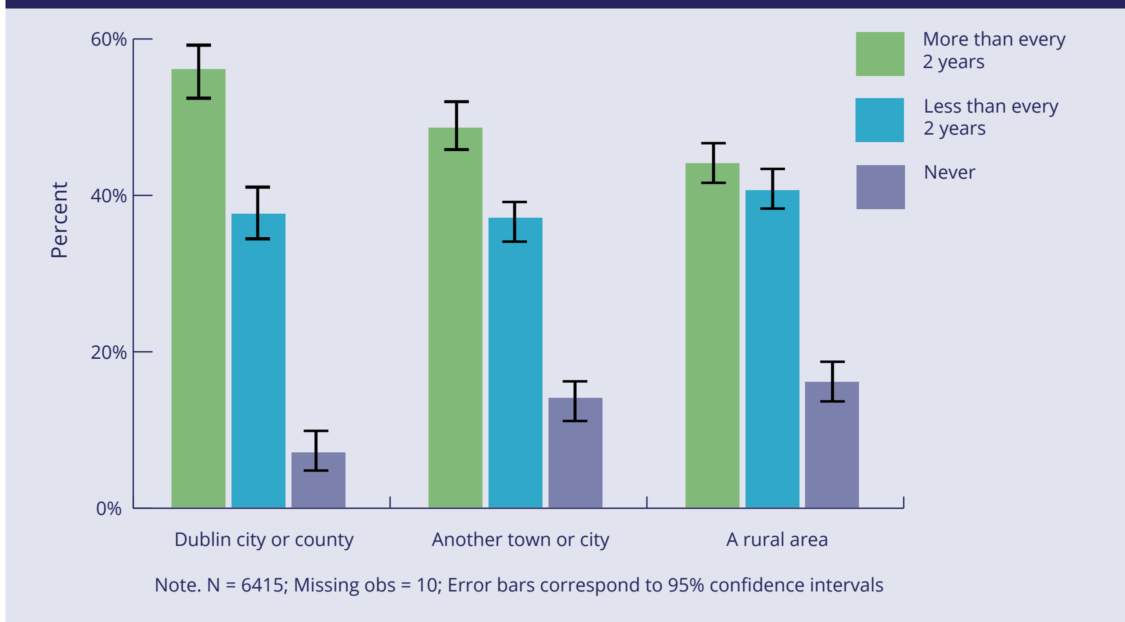
In Ireland, dental visits peak among adults aged 55 to 64 and decline sharply from age 65, with just 38% of those aged over 75 visiting a dentist in the last 12 months, the Irish Health Survey 2019 found (CSO, 2019). According to The Irish Longitudinal Study on Aging (TILDA) 2017, adults who have no teeth visit the dentist far less than those who have retained natural teeth (figure 14). Adults aged 54 and over and living in rural areas are less likely to visit the dentist than those of the same age living in Dublin (figure 15).

Figure 14. Frequency of visiting dentist by self-assessed dentition status



Source: TILDA 2017

Figure 15. Frequency of visiting dentist by location of residence



Source: TILDA (Sheehan et al, 2017)

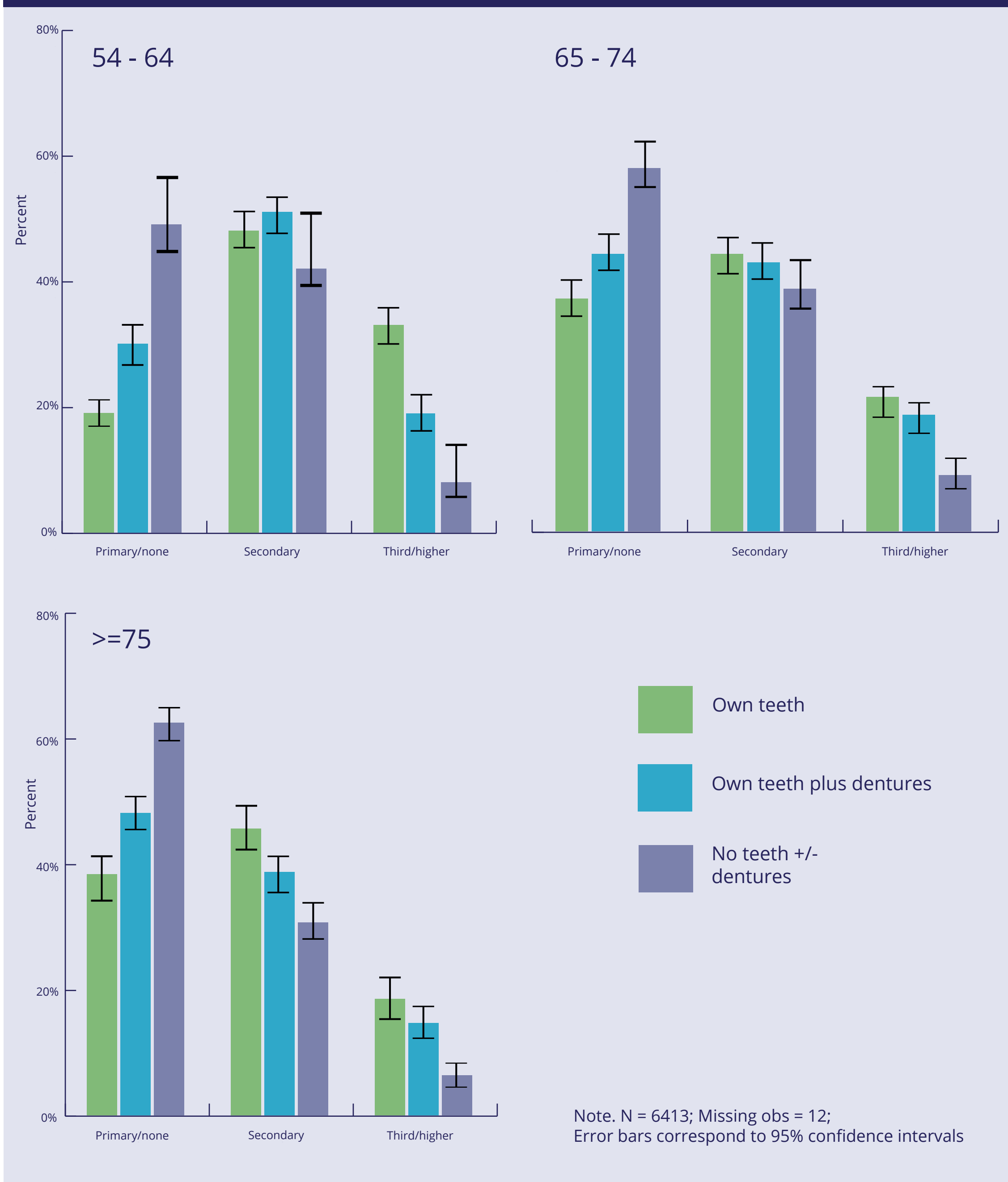
Dental Treatments

In 2009, 343,067 people in Ireland had dental treatment funded by the DTSS. This figure increased to 413,133 in 2017. However, there was a 5.6% drop in number of adults receiving public dental treatment through the DTSS from 2017 to 2018 (DOHI, 2019a). In addition, the number of dental treatments carried out through the DTSS has fallen from 1.58 million in 2009 to 1.11 million in 2018, a fall of 29.7% (DOHI, 2019a).

Missing teeth

Less than half (46%) of adults in Ireland have retained all their natural teeth (DOHI, 2019c). The proportion of adults with no missing teeth declines with age. According to the Healthy Ireland Survey carried out in 2018, 88% of 15-24 year-olds in Ireland had no missing teeth. Of those aged 75 years or over, just 4% had no missing teeth. This survey also found that 6% of adults have no natural teeth and wear a full set of dentures, with 42% of those aged 75 or older wearing a full set of dentures. One in nine (11%) adults aged 75 or older have difficulty eating due to problems with their mouths, teeth or dentures (DOHI, 2019c).

TILDA data shows that older adults and females are more likely to have lost all their teeth (Sheehan, 2017). Adults with higher education status are more likely to retain their own teeth, and 29% of adults who have retained their teeth have third level education, compared to 8% of adults with no teeth having third level education (figure 16).



Source: TILDA (Sheehan et al, 2017)

More older adults (50+) with a disability and who live in residential care have lost all their teeth compared with those with a disability who live at home (36% vs 19%) (DOHI, 2019b).

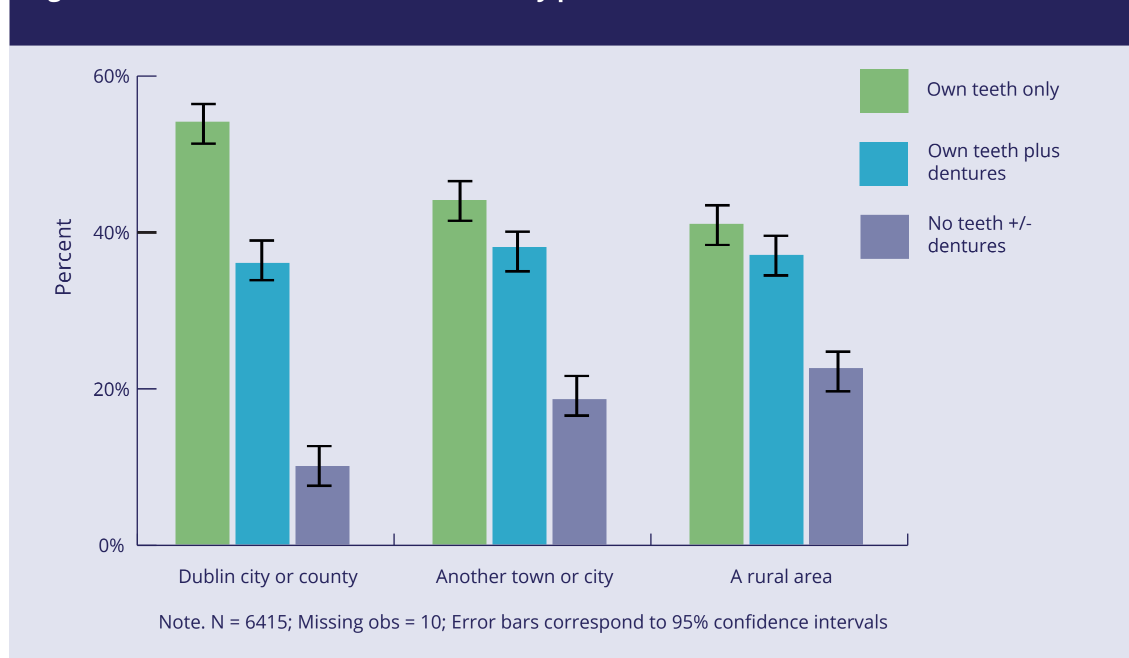
Deprivation and location

According to the Healthy Ireland Survey 2018, 89% of adults aged 15-24 in Ireland describe their oral health as good or very good. This declines to 65% among those aged 75 or older, 65% amongst those who are unemployed and 75% amongst those living in deprived areas. People in disadvantaged areas also visit the dentist less frequently than those from more advantaged backgrounds (DOHI, 2019c) .

Adults aged 54 and over living in Dublin are more likely to retain their own teeth (54%) than those living in other urban areas (44%) or rural areas (41%) (Sheehan, 2017). Strikingly, 22% of older adults living in rural Ireland have no teeth, compared with just 10% in Dublin (figure 17).

Older adults who have lost all their natural teeth are more than twice as likely to have a medical card (83%) as those who have retained some teeth (37%). Of those aged over 70, 75% with some teeth have a medical card, rising to 91% with no teeth or dentures having a medical card. This indicates that both ageing and disadvantage are factors associated with tooth loss among older adults (Sheehan, 2017).

Figure 17. Self-assessed dentition status by place of residence



Source: TILDA (Sheehan et al, 2017)

Children

Decay Experience

In 1984, 50% of 5 year-olds and 80% of 12 year-olds in Ireland experienced dental decay. In 2014, these figures had almost halved to 30% of 5 year-olds and 40% of 12 year-olds (DOHI, 2019b). In 2017, the prevalence of decay amongst 8-year-old children in Dublin was 55% and 56% amongst 8-year-olds in Cork and Kerry (James, 2020)

Dental Extractions

There is a lack of reliable data in Ireland on the number of GA procedures carried out on children (Duane, 2017). Approximately 7,000 children are referred each year through the HSE for dental extractions under general anaesthetic (HSE, 2019a). These extractions are carried out in acute hospital settings. In 2019, 3,232 children under 15 years were discharged from acute public hospitals after undergoing dental treatment (Healthcare Pricing Office, 2020). It has previously been reported that the majority of these discharges relate to general anaesthetic services (Duane, 2017).

Oral Cancer

There was an estimated average of 554 cases of lip, oral cavity and pharynx cancer each year in Ireland between 2018 and 2020 and 70% of cases were in men (NCRI, 2020). The average annual age-standardised rate in males was 20.3 per 100,000 in 2018-20, compared with 7.9 per 100,000 in females (NCRI, 2020). Men are also more likely to be diagnosed at a more advanced stage (NCRI, 2018). Oral cancer increased significantly among both males and females in Ireland between 1999 and 2009, and there is increased risk of mortality from oral cancer among those who smoke, those aged over 60, those who are unemployed or retired, those living in areas of high deprivation and those with tumours located in the base of the tongue (Ali, 2016). The five year net survival rate of oral and pharyngeal cancers rose from 40.1% in 1994-1998 to 49.9% in 2009-2013 (NCRI, 2018).[2]

Key points

- Tooth decay among schoolchildren in Ireland has fallen sharply over the past 40 years
- 7,000 children are referred each year through the HSE for dental extractions under general anaesthetic
- Dental visits peak among adults aged 55 to 64 and decline sharply after that
- Older adults who have no teeth and who live in rural areas visit the dentist less frequently
- Adults with higher education status are more likely to retain their own teeth
- Cases of oral cancer are increasing in Ireland, with incidence rates much higher among males, who are also more likely to be diagnosed at a more advanced age.

Discussion

The above data indicates that there have been steady improvements in some aspects of oral health in Ireland and Northern Ireland over that past number of decades. The proportion of the population in Northern Ireland registered with a HSC dentist has increased and the proportion of adults and children experiencing decay and requiring fillings and extractions has fallen. Oral health improvement programmes have been implemented, targeting children mainly from the 20% most deprived areas in Northern Ireland, patients with special care needs, older patients and other patient groups including ethnic minorities and the traveling community. However high levels of dental disease remain in these populations. Interventions targeting young children include one-to-one supervised toothbrushing, postal toothpaste schemes and midwife training in oral hygiene. Schemes targeting patients with disabilities or special care needs include patient and care staff training in oral hygiene in residential homes and care facilities, with some facilities having established toothbrushing programmes providing toothbrushes and toothpaste to

2. Oral cancer statistics are grouped and reported slightly differently in Ireland and Northern Ireland so should not be directly compared.

patients. For older adults in care homes, fluoride application and oral cancer screening is provided by community dental service teams (Donaldson, 2021).

However despite the improvements, Northern Ireland performs poorly when compared with its UK counterparts. It is estimated that under one third of 5-year-old children in Northern Ireland have dental decay (Donaldson, 2021). Decay at this age is significant, as decay in primary teeth greatly increases the likelihood that the child will develop decay in their permanent teeth in later years (Hall-Scullin, 2017). It also may lead to pain and infection, altered eating habits, absenteeism from school and potential need for treatment under general anaesthesia (McAuliffe, 2017). Dental decay is the most common reason for a child to undergo general anaesthesia in Northern Ireland, with three times more hospital dental anaesthetic procedures carried out on children in Northern Ireland than are carried out on children in England (British Dental Association, 2018). Dental treatment under general anaesthetic is concerning due to its associated risks of morbidity and mortality (Duane, 2017).

Ireland has seen a decrease in dental decay prevalence in both adults and children over the past number of decades. This decline has been attributed to the widespread continued use of fluoridated toothpaste and the addition of fluoride to public water supplies since 1964 (DOHI, 2019b).

In 2002, a cross-border survey was carried out to assess the oral health of children in Northern Ireland and Ireland. It showed that children with lifetime exposure to community water fluoridation in Ireland have lower levels of decay than those without lifetime exposure to community water fluoridation in Northern Ireland or Ireland (Whelton, 2006). Although decay levels were higher among the less well-off, disadvantage did not account for the difference between fluoridated and non-fluoridated groups, and fluoridation was found to be effective in reducing decay for both disadvantaged and non-disadvantaged children (Whelton, 2006).

In particular, the data laid out above indicates that an increasing proportion of the population in both Ireland and Northern Ireland are living longer and retaining more of their natural teeth. In 2019, it was estimated that 696,300 of the population of Ireland were aged 65 and over. By 2051, this is projected to have doubled to 1.56 million adults over the age of 65. In Northern Ireland, approximately 314,700 of the total population were aged 65 and over in 2019. This is expected to increase to 631,000 by 2051 (Sheehan and O'Sullivan, 2020). In addition, it is projected that by 2046, just 2.5% of adults aged 65 and over in Ireland will have lost all their natural teeth (DOH, 2019b). In Northern Ireland, recent trends show a marked decrease in the proportion of adults with no teeth, currently estimated at 4%, and this downward trend is expected to continue as oral health continues to improve throughout the life cycle.

Dental disease has a disproportionate effect on older adults (Lamster, 2004). As older adults are now retaining their natural teeth into older age prevention and treatment of chronic dental diseases in this group are becoming a significant challenge, particularly amongst care home residents. As people are living longer, there is an increased prevalence of chronic medical conditions and increasing numbers of older adults on multiple medications (polypharmacy). Reduced salivary flow or dry mouth (xerostomia) is a common side effect of over 80% medications (Lamster, 2004). Reduced salivary flow and xerostomia can lead to increased risk of dental decay and oral fungal infections, ill-fitting and uncomfortable dentures, reduced chewing efficiency and reduced quality of

life. In addition, many older adults suffer from multiple chronic medical conditions. There is growing awareness of the association between oral disease and systemic conditions including cardiovascular diseases, diabetes and respiratory diseases. As the population of Northern Ireland and Ireland ages, increasing proportions of older adults will live with these chronic conditions. There is therefore an increasing need to ensure oral health of this cohort is maintained and prioritised with effective preventative measures.

In Northern Ireland, both adults and children living in deprived areas are less likely to register with a public health dentist and therefore have reduced access to dental care, despite their greater need. Children in more deprived areas of Northern Ireland are more likely to experience dental decay than children of the same age living in less deprived areas.

In Ireland, adults who are over 75, unemployed or living in deprived areas are less likely than other adults to have positive perceptions of their oral health (DOHI, 2019c). Adults over 54 living in rural Ireland are more likely to have lost all their teeth and attend the dentist less frequently than those living in Dublin (Sheehan, 2017). This indicates that age, deprivation and location are all associated with poorer oral health.

Provision of services alone does not lead to increased utilisation. In Ireland, knowledge and uptake of state dental services is low amongst those living in rural areas, despite over 70% of those aged 70 or over having access to a medical card entitling them to dental treatment (DOHI, 2019a) In Northern Ireland, registration with a general dentist is lowest among those living in deprived areas, again demonstrating the need to encourage uptake of state services for those most in need (NISRA, 2020).

In both Ireland and Northern Ireland, rates of oral cancers are increasing with significant impacts due to COVID-19 disruption yet to be fully realised. This is due to a combination of increased life expectancy and lifestyle factors. Combined consumption of alcohol and tobacco greatly increases the risk of developing oral and oropharyngeal cancers, with the risk of developing these cancers approximately 30 times greater amongst those who smoke and drink heavily than those who do not smoke or drink (ACS, 2021). In addition to alcohol and smoking, human papillomavirus (HPV) is one of the main risk factors for oral and oropharyngeal cancers. HPV can be detected in approximately two-thirds of all oropharyngeal cancers and is most often linked to cancer of the tonsils and base of the tongue (ACS, 2021). Oropharyngeal cancers associated with HPV have increased over the last number of decades, and are increasingly common amongst younger people (ACS, 2021). There is therefore a need for increased awareness of the risk factors for head and neck cancers, and for public health policy to target its risk factors such as reducing alcohol and tobacco use and advocating for the uptake of the HPV vaccine.

Conclusion

In general, many aspects of oral health in Ireland and Northern Ireland have improved and these trends are expected to continue. Despite this movement towards better oral health, adults and children from more disadvantaged areas continue to experience poorer oral health outcomes with clear evidence of oral health inequalities in Northern Ireland and Ireland. In addition, older adults are retaining more of their natural teeth, leading to increased need for dental treatments and increased resources to provide this increasingly complex treatment. Finally, cases and incidence of oral cancer are increasing in Ireland and Northern Ireland. Continued efforts are needed to improve public awareness to increase early detection, reduce prevalence of alcohol and tobacco consumption and increase uptake of the HPV vaccine.

5 Oral Health Trends Among Older Adolescents in Ireland

Oral Health Trends Among Older Adolescents in Ireland

Background

As previously mentioned, this analysis was carried out as current literature on adolescent oral health in Ireland was not identified for this report. Growing Up in Ireland is the national longitudinal study of children and young people in Ireland. It began in 2006 and follows the progress of two cohorts of children- 9 year-olds (Child Cohort/Cohort '98) and 9-month-olds (Infant Cohort/Cohort '08). Data collection for the Child Cohort '98 began in 2008, with 8,500 9 year-olds included. Follow-up surveys (waves) of this cohort were carried out at ages 13, 17/18 and 20. The Infant '08 Cohort survey started in 2008, with data on more than 11,000 9 month-olds and their families collected. Subsequent waves were completed when this cohort was aged 3 years, 5 years, 7/8 years and 9 years.

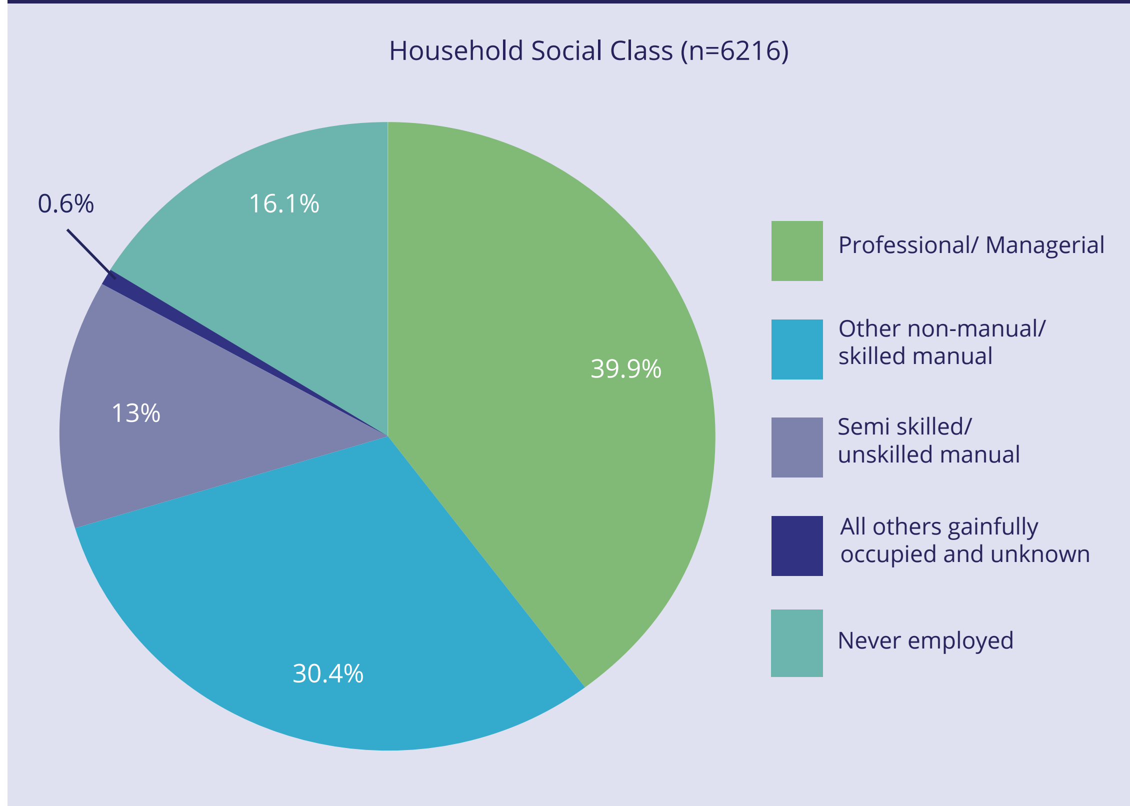
This report presents findings based on analysis of GUI Child Cohort/Cohort '98 at 17/18 years (wave 3) (Economic and Social Research Institute, 2018). This survey was carried out between 2015 and 2016 in Ireland. Sample size was 6,212. Data on participants family's social class, dental attendance, toothbrushing frequency, number of permanent teeth filled and extracted, and perception of oral heath, were analysed. The data were weighted prior to analysis to ensure the results were representative of the population.

Survey participants were assigned a household social class based on their parents'/primary caregivers' current or previous occupation (if unemployed or retired). This classification was adopted from the Central Statistics Office. If both parents were employed, the parents occupation with the most advantageous social class position was used to assign social class. 'Never employed' code was assigned for families where parent/s have never had an occupation outside the home (Murphy et al, 2018). Those from one parent families were more likely to be in this group.

Results

For this analysis, the nine CSO social class categories were combined into 'professional/ managerial', 'other non-manual/skilled manual', 'semi-skilled/unskilled manual' and 'never employed'. The majority of survey participants (70.3%) were in the more advantaged household social classes (professional/managerial and other non-manual/skilled manual). 13.0% of respondents were in the 'semi-skilled/unskilled manual' class and 16.1% were in the 'never employed' social class (figure 18).

Figure 18. Breakdown of survey participants according to household social class categorisation

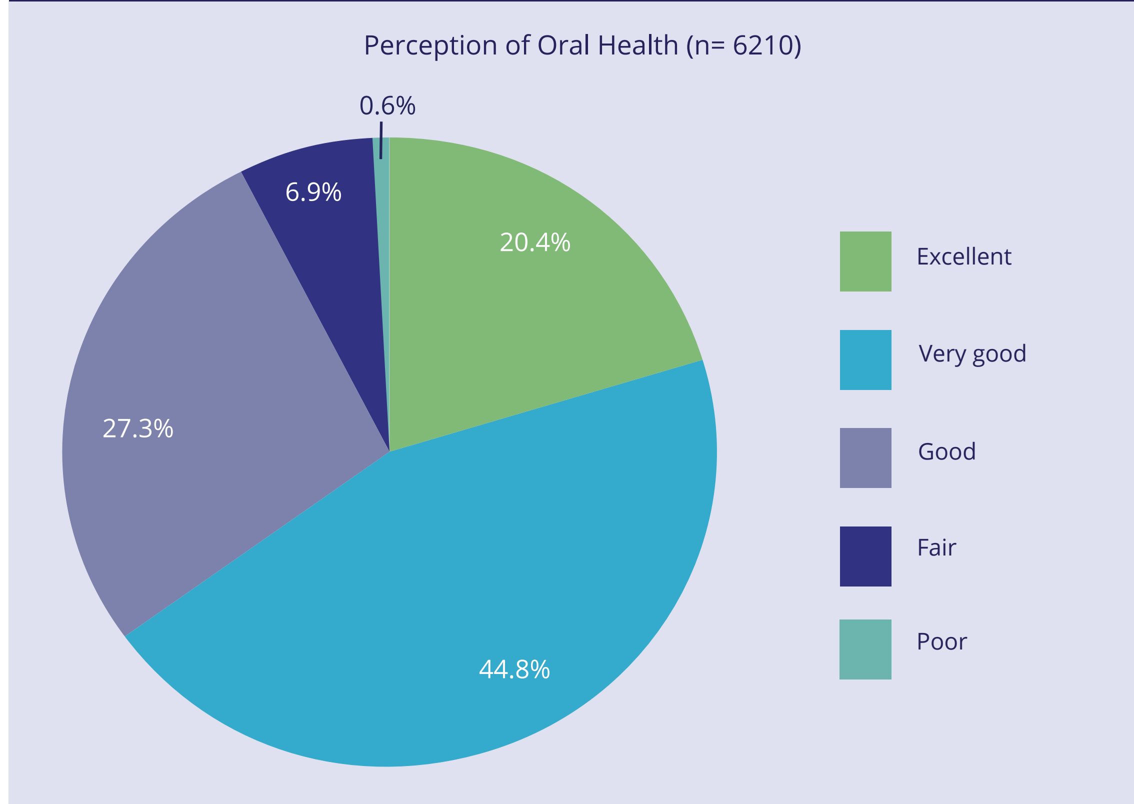


Source: Growing Up in Ireland '98 Cohort Wave 3

Perception of Oral Health

Participants generally had positive perceptions of their oral health. In total, just under two thirds of participants rated their oral health as being either excellent or very good, 27.3% rated it as good, 6.9% rated their oral health as being fair, with 0.6% reporting it as poor (figure 19).

Figure 19. Survey participant's perception of oral health



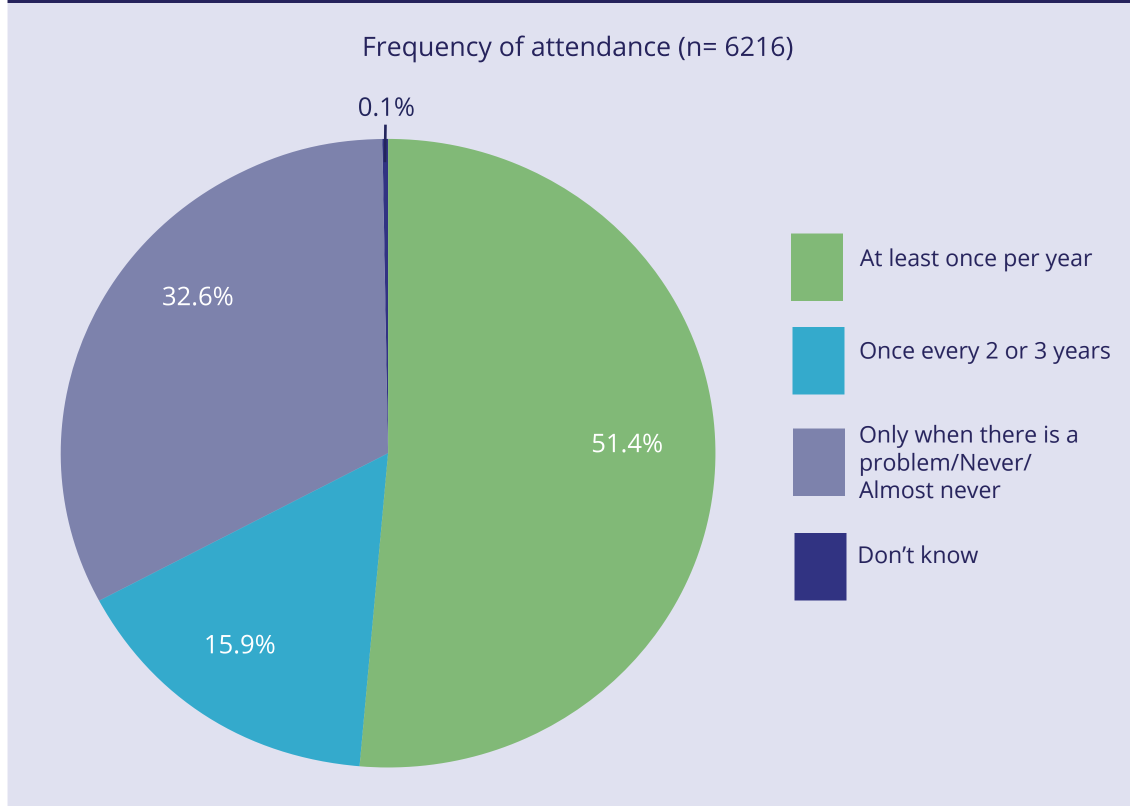
Source: Growing Up in Ireland '98 Cohort Wave 3

There was no statistically significant difference in perception of oral health across the different social classes.

Dental Attendance

Over half (51.4%) of 17/18 year-olds attend the dentist at least once every year. However, almost one third (32.6%) of those surveyed attend either never/almost never or only if they have a problem (figure 20).

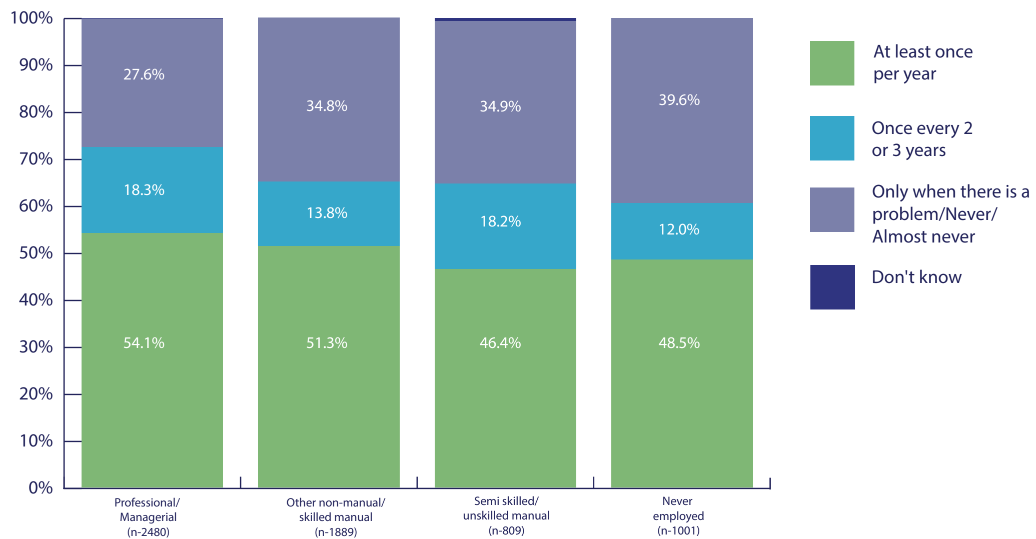
Figure 20. Survey participants' frequency of dental attendance



Source: Growing Up in Ireland '98 Cohort Wave 3

Of those in the 'professional/managerial' class, 54.1% attend the dentist at least once yearly. This falls to 51.3% and 46.4% for 'other non-manual/skilled manual' and 'semi-skilled/unskilled manual' classes respectively, and 48.5% among those in the 'never employed' class. Infrequent dental attendance is higher among those in 'never employed' class, with almost two fifths (39.6%) attending rarely or only if they have a problem (figure 21).

Figure 21. Dental attendance of 17/18 year-olds in Ireland by social class

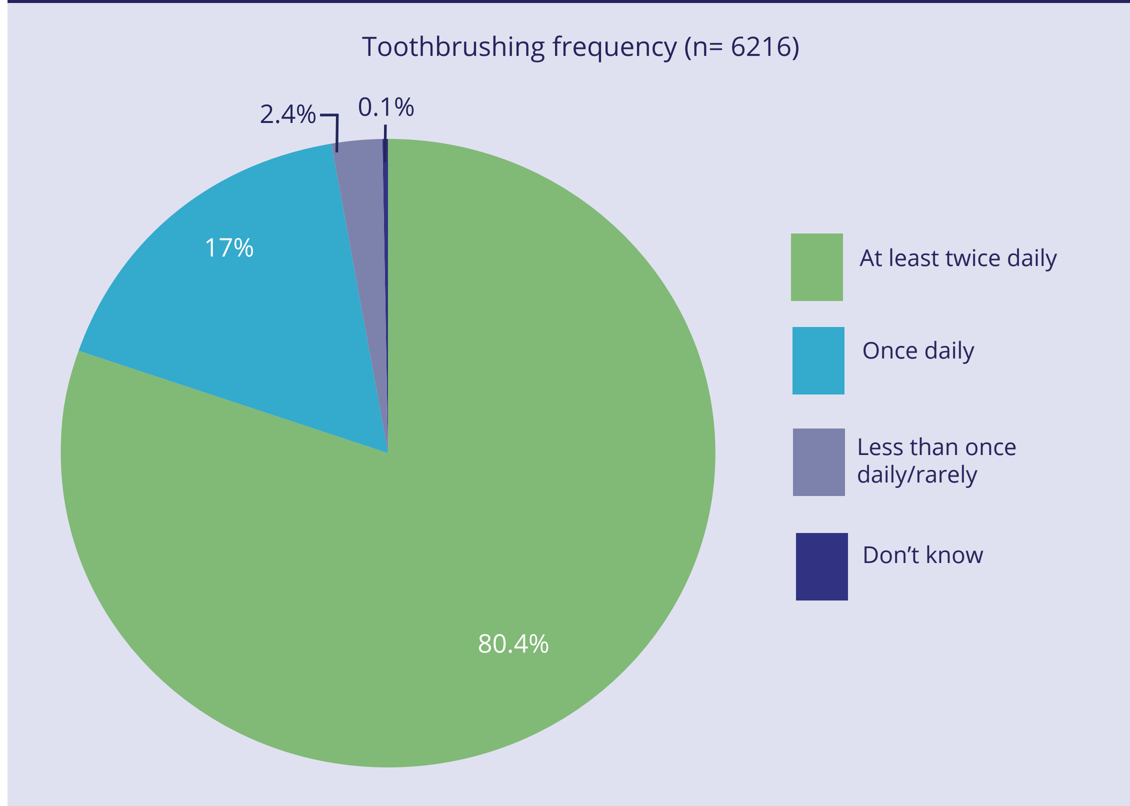


Source: Growing Up in Ireland '98 Cohort Wave 3

Toothbrushing Frequency

Four fifths (80.4%) of those surveyed achieve the recommended or greater than the recommended daily toothbrushing guidelines of twice daily. Less than one in five(17%) brush only once daily (figure 22).

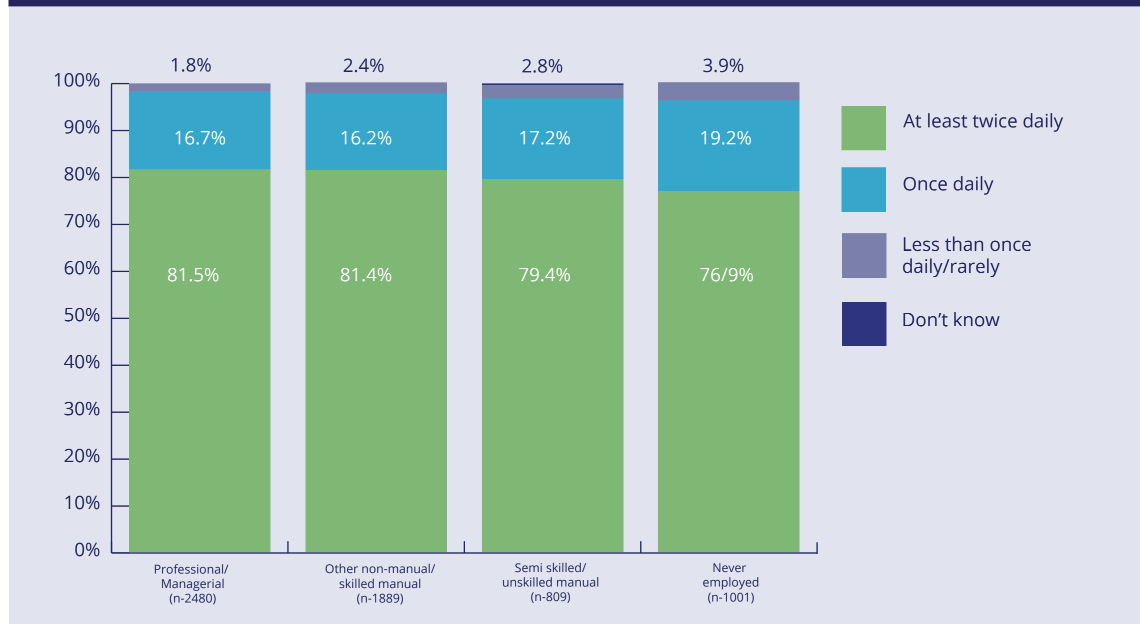
Figure 22. Survey participants' toothbrushing frequency



Source: Growing Up in Ireland '98 Cohort Wave 3

Across all household social classes, toothbrushing frequency remains high. However, those in the least advantaged group ‘never employed’ have the poorest reported brushing habits, with almost one-fifth brushing just once daily and 3.9% brushing less than once daily or rarely (figure 23).

Figure 23. Survey participants’ toothbrushing frequency according to household social class

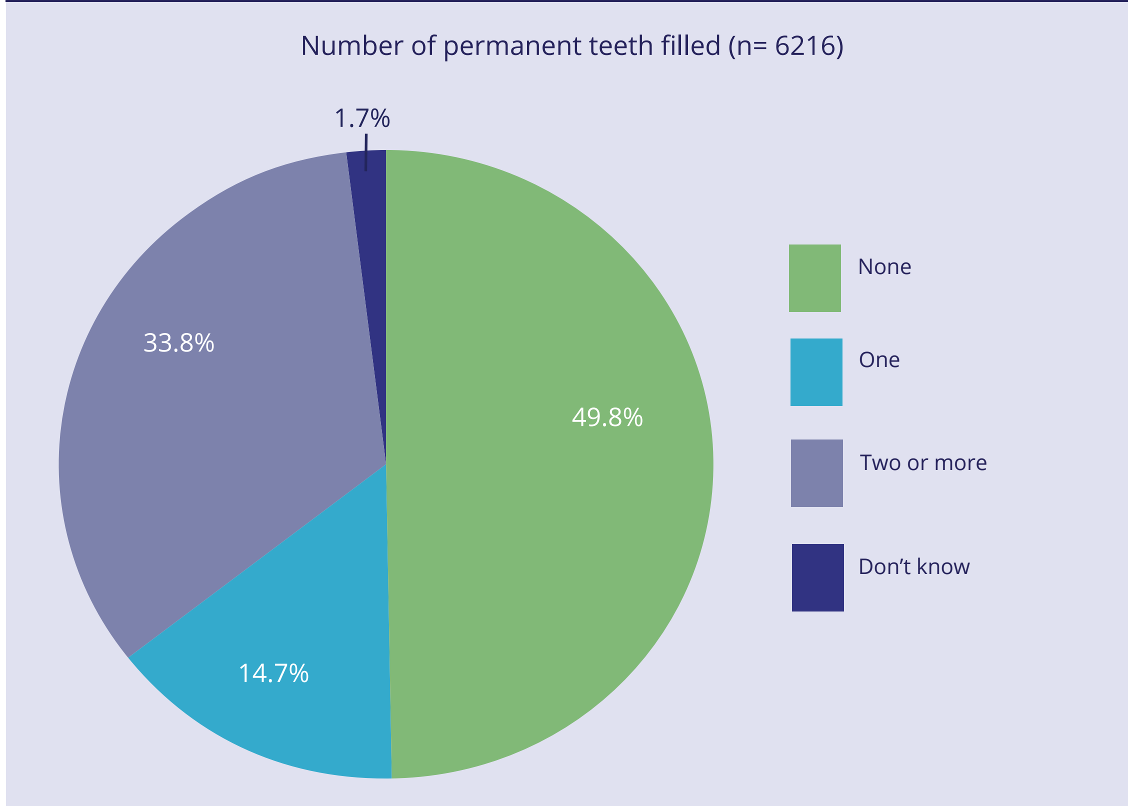


Source: Growing Up in Ireland ’98 Cohort Wave 3

Permanent Teeth Filled

Half (49.8%) of 17/18 year-olds surveyed had no permanent teeth filled. One third (33.8%) had two or more teeth filled (figure 24).

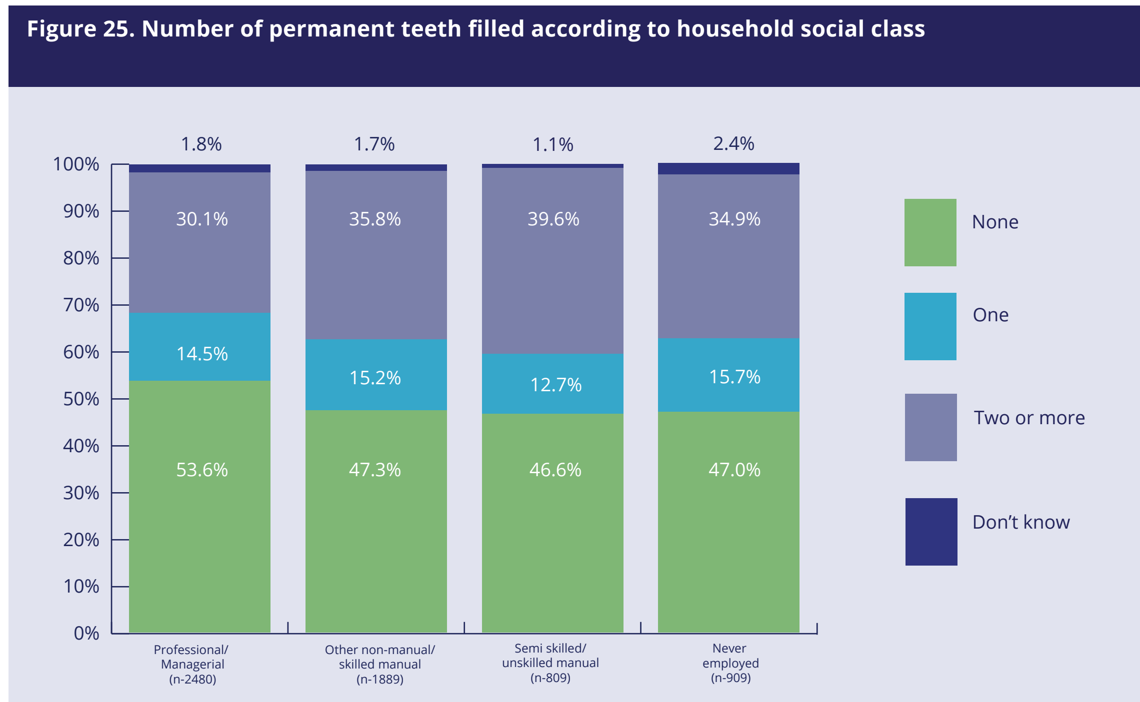
Figure 24. Number of permanent teeth filled



Source: Growing Up in Ireland '98 Cohort Wave 3

Those in ‘professional/managerial’ class performed better than the overall survey average, with 53.6% having no permanent teeth filled, and 30.1% having two or more permanent teeth filled (figure 25). Those in ‘semi-skilled/unskilled manual’ class had the lowest proportion with no permanent teeth filled (46.6%) and had the highest proportion with two or more teeth filled (39.6%).

Figure 25. Number of permanent teeth filled according to household social class

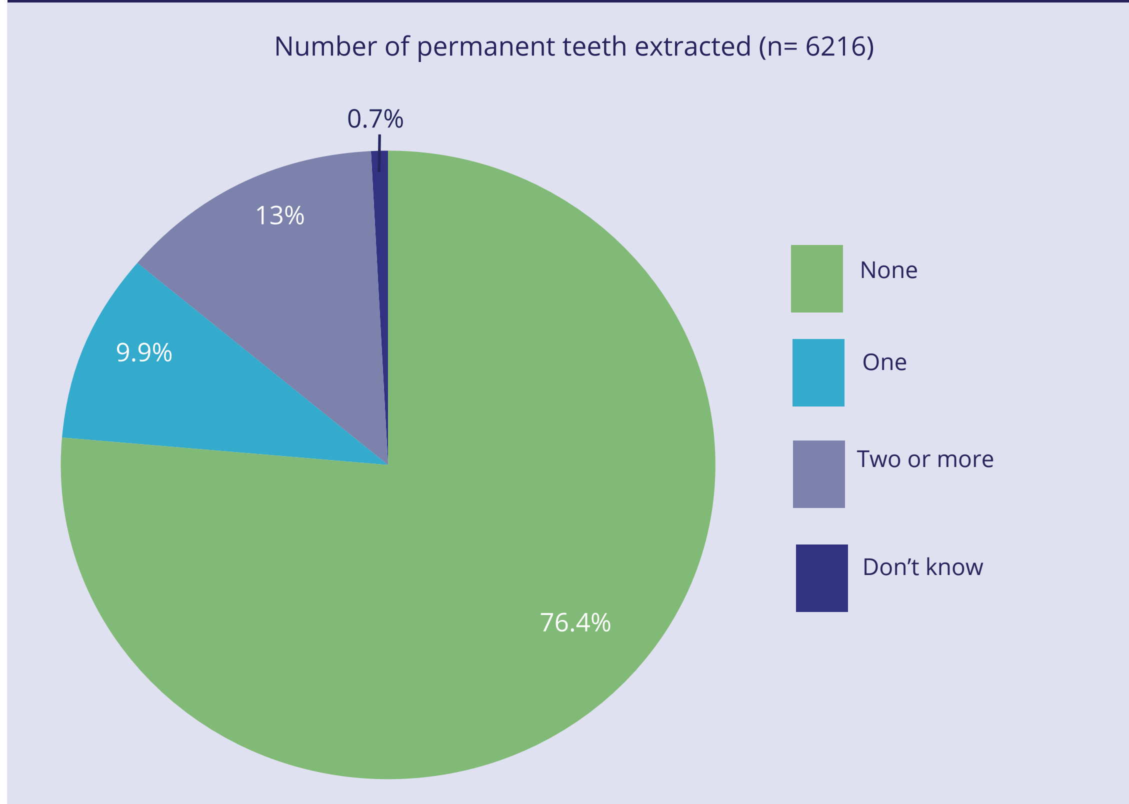


Source: Growing Up in Ireland ’98 Cohort Wave 3

Permanent Teeth Extracted

Three quarters (76.4%) of 17/18 year-olds surveyed had no permanent tooth extracted. 13% had two or more permanent teeth extracted (figure 26).

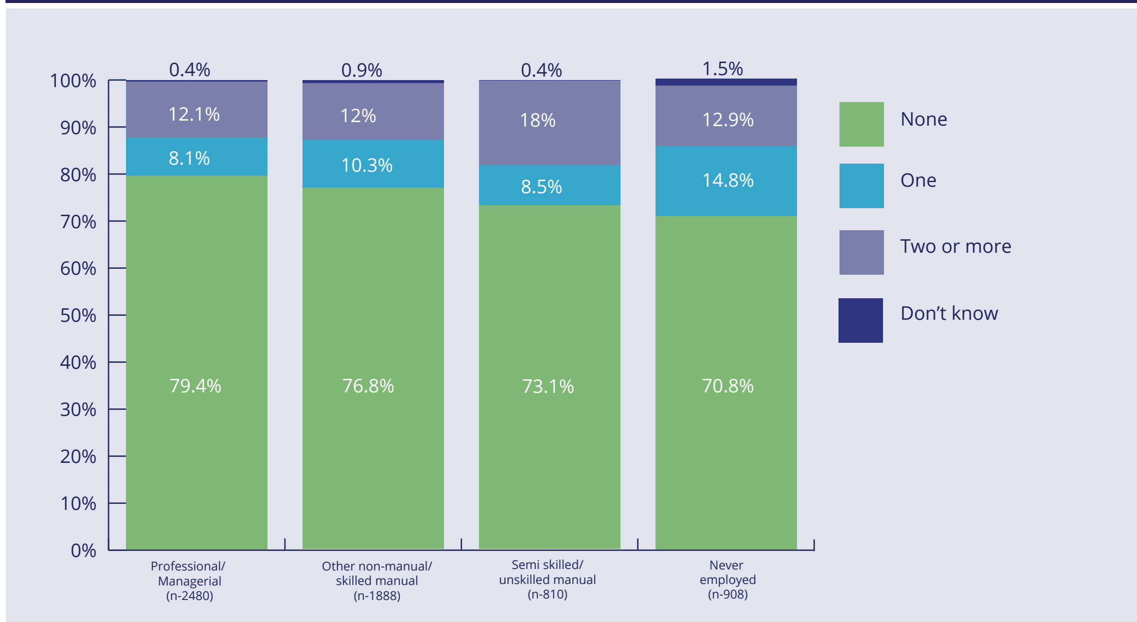
Figure 26. Number of permanent teeth extracted



Source: Growing Up in Ireland '98 Cohort Wave 3

There was a clear social gradient in tooth extractions. Nearly four-fifths (79.4%) of those in 'professional/managerial' class had no permanent teeth extracted. This drops to 76.8% of 'other non-manual/skilled manual', 73.1% of 'semi-skilled/unskilled manual' and 70.8% of 'never employed'. Some 14.8% of those in 'never employed' class had one permanent tooth extracted. 18% of those in 'semi-skilled/unskilled manual' class had two or more permanent teeth extracted, 5 percentage points higher than the survey average (figure 27).

Figure 27. Number of permanent teeth extracted by social class

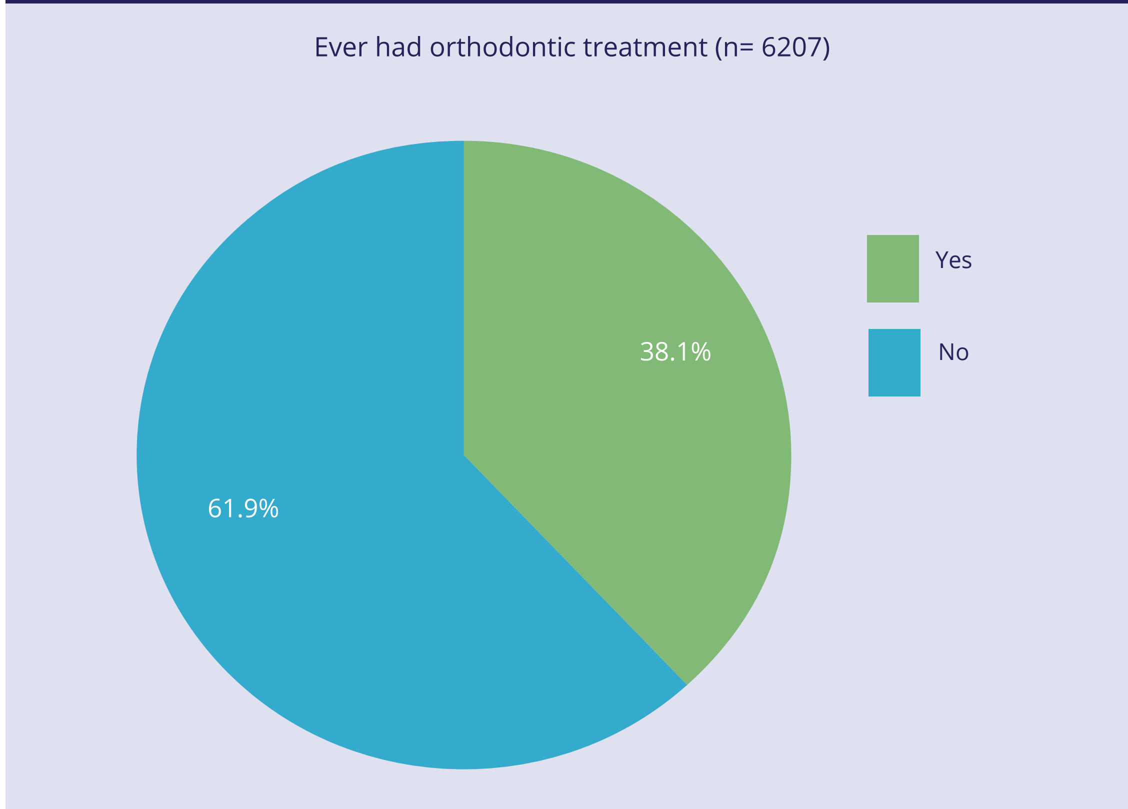


Source: Growing Up in Ireland '98 Cohort Wave 3

Orthodontic Treatment

Of those surveyed, just under two fifths (38.1%) had undergone orthodontic treatment (figure 28).

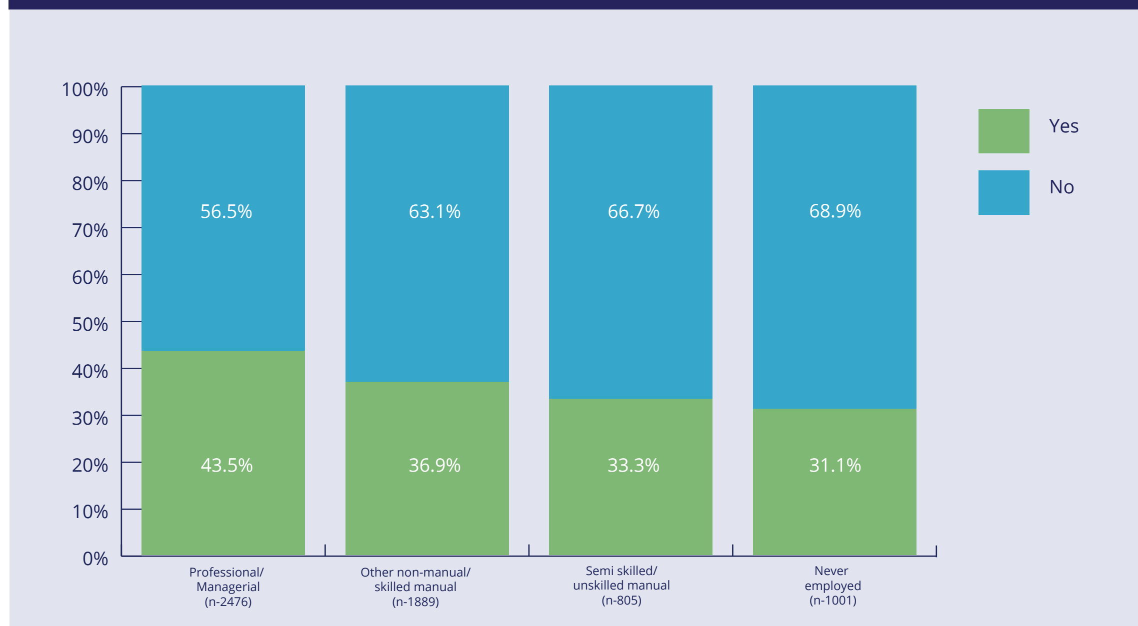
Figure 28. History of orthodontic treatment



Source: Growing Up in Ireland '98 Cohort Wave 3

Some 43.5% of those in 'professional/managerial' class had undergone orthodontic treatment, 5 percentage points higher than the survey average. The proportion receiving orthodontic treatment in the other three classes were all below the survey average. There is a clear social gradient in the proportions receiving orthodontic treatment , with 31.1% of those in 'never employed' class undergoing orthodontic treatment, when compared with 43.5% of 'professional/managerial' class (figure 29). Orthodontic treatment can be needed both to enhance the appearance of teeth and to improve future dental outcomes. Straightened teeth allow for improved cleaning and can reduce an individual's risk of developing gum disease and dental decay.

Figure 29. Orthodontic treatment breakdown by social class



Source: Growing Up in Ireland '98 Cohort Wave 3

Discussion

Overall, there are encouraging results from the GUI survey. On average, half (50.4%) of those surveyed are regular dental attendees and four fifths (80.4%) brush their teeth at least twice daily. Just under half had no permanent tooth filled and 76.4% had no permanent tooth extracted. However, a clear pattern can be seen, where those in most disadvantaged groups reported poorer oral health patterns and outcomes than those in most advantaged groups.

Regular dental attendance is to be encouraged as it is associated with improved oral health (Thomson, 2010). Of those surveyed, those in most advantaged groups tend to be more regular attendees, with increasing proportions of those in more disadvantaged groups attending rarely or only if there is a problem. Of concern, almost two-fifths of those in the 'never employed' social class attend the dentist rarely or only if there is an issue. A similar pattern can be seen with toothbrushing frequency, with those in most advantaged groups brushing more frequently than those in most disadvantaged groups. Just under one-fifth of adolescents in 'never employed' class brush their teeth just once daily, indicating poorer oral health habits within this cohort. Over two-fifths (44%) of adolescents surveyed had at least one permanent tooth filled, indicating that there needs to be a concerted effort to reduce the decay experience of Irish children and adolescents.

The Wave 3 GUI survey did not collect data on the reasons participants had dental extractions, with the possibility that some extractions may have been carried out as part of previous orthodontic treatment. However those most disadvantaged groups are less likely to have undergone orthodontic treatment. 43.5% of those in 'professional/managerial' class have undergone orthodontic treatment, compared to just 31.1% in 'never employed' social class. Despite being less likely to have undergone orthodontic treatment, those in most disadvantaged groups are still more likely to have had permanent teeth extracted. Some 14.8% of those in 'never employed' class had one permanent tooth extracted, compared with just 8.1% of those in the 'professional/managerial' class. Of note, those in 'semi-skilled/ unskilled' social class had the highest proportion with two or more teeth extracted (18%), compared with approximately 12% across the other social classes having two or more teeth extracted.

While it might be perceived that those in more disadvantaged groups would have more negative perceptions of their oral health given the poorer outcomes outlined, this was not the case in this analysis. In fact there was no statistically significant difference in perception of oral health between those in different social classes. However, despite some encouraging overall results, there is a clear gradient across the remaining categories between the most and least disadvantaged groups. Adolescents from most disadvantaged groups in Ireland attend the dentist less frequently, have poorer toothbrushing habits and are at increased risk of suffering poorer oral health outcomes. This is consistent with global trends where those from lower socioeconomic backgrounds experience higher levels of dental disease (Tsakos 2011, Mejia 2014, Mejia 2018). There is a clear need to orient oral health policies and services in Ireland to target those from most disadvantaged backgrounds and to reduce the burden of dental disease on those groups.

Key points

- Just under two thirds of 17/18 years-olds in Ireland rate their oral health as excellent or very good.
- Over half of those surveyed are regular dental attendees and over four fifths brush their teeth at least twice daily
- On average, 48.5% had at least one tooth filled and 22.9% had at least one permanent tooth extracted
- Those in most disadvantaged groups reported poorer oral health patterns and outcomes than those in more advantaged groups, with less frequent dental attendance, poorer brushing habits, more fillings and extractions and lower rates of orthodontic treatment

Conclusions and considerations for policy

Overall, positive trends in oral health in both Northern Ireland and Ireland can be seen. Caries levels have decreased and the number of adults retaining more of their natural teeth has markedly increased over the past number of decades (although this brings additional challenges). However, adults and children living in more deprived areas have disproportionately higher levels of dental disease and are less likely to attend the dentist, resulting in fewer opportunities to implement preventative strategies and screen for oral cancer. In addition, the cases and incidence of oral cancer in Northern Ireland and Ireland are increasing, in particular among males. Public health policies targeting the risk factors for oral disease, in particular among those living in deprived areas are of great importance.

Considerations for policy, practice and research

- Health policies must acknowledge to a greater degree the association between oral health and systemic health. The common risk factor approach should be incorporated when developing new national health strategies in order to protect both oral and general health.
- Sustained interventions are needed to target the risk factors of oral cancer, including policies to reduce tobacco and alcohol consumption, and campaigns to promote the uptake of the HPV vaccine in children.
- In Ireland, consideration must be given on how best to implement the new national oral health policy in order to promote prevention and encourage uptake of state dental services.
- Northern Ireland's 2007 Oral Health Strategy should be updated and underpinned by more recent evidence and new research on oral health status and trends in NI.
- Use of existing public dental services should be encouraged, particularly among those living in more disadvantaged areas.
- Community water fluoridation could be re-visited as a strategy to reduce dental decay in children in Northern Ireland as evidence from Ireland indicates it is effective in both disadvantaged and advantaged areas.
- Further research exploring oral health in Ireland, in particular children's oral health, is urgently needed.
- Aggregated or anonymised data from the HSE's National Dental and Information system should be made available for public health research.
- The oral health of older adults in Northern Ireland and Ireland has changed more significantly than any other population group. Specific attention must be paid to these patients with effective prevention and operative care required to maintain their oral health.
- The oral health of older adults in nursing homes is an emerging public health issue in Northern Ireland and Ireland. Whilst specific policies have been developed around oral health provision for patients in Northern Ireland, there is less clear guidance in Ireland. There is also a lack of clarity as to how oral health should be provided for care home residents including instruction and training for care home staff.

Limitations

A shortcoming of the report is the limited data presented on oral health in Ireland, in particular in relation to children's oral health. The most recent nationwide children's oral health survey was carried out in 2002. A survey on children's oral health in Dublin and Cork/Kerry was carried out 2013-2014 and 2016-2017, with only children in Dublin, Cork and Kerry surveyed. The analysis on GUI data for this report presents current oral health trends among older adolescents in Ireland, however limited data on younger children's oral health is presented. Data on oral health of 9 year old children was collected in 2017/2018 as part of data collection for GUI Wave 5 (infant cohort). Due to the time constraints for this report, this data was not analysed. In addition, HSE data on schoolchildren's dental health was not analysed for this report. Data on over 800,000 patients is collected through the new National Dental Record and Information system (HSE, 2019b). This system does not currently have permission to allow analysis outside of secondary use for business planning, but it would be very useful to make aggregate or anonymised data available for public health analysis. Data presented from Northern Ireland's dental health surveys are also somewhat outdated, with the most recent adult and children dental health surveys carried out over 10 years ago.

In addition, the Family Practitioner Services General Dental Statistics for Northern Ireland Annual Statistics 2019/20 informed much of the data on current oral health trends in Northern Ireland. However, this only provides information on adults and children who are registered with a health service dentist. Adults and children from the most deprived areas in Northern Ireland are less likely to have registered with a health service dentist, despite being at higher risk of dental disease. Therefore, the figures reported will not fully account for true decay experience and treatment needs and may not fully reflect the current oral health status of those living in Northern Ireland. In addition, the data provided does not account for treatments that are included in the registration fee so some treatments may undercount the true number of treatments carried out.

In both Northern Ireland and Ireland, there are a lack of oral health inequality indicators which limited the investigation and comparison of trends in deprivation in both jurisdictions.

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7 Appendices

Appendix 1

Data	Year Data Collected	Population	Variables
HSE Funded Dental Treatments (CSO)	2013-2016 *2016 most recent data	Adults 16+ eligible for treatment under DTSS	Gender Age Group Local Health Office Region Treatment type under GMS (fillings etc) Curative, preventative, miscellaneous
HSE PCRS DTSS Expenditure Report	Available monthly- latest report Feb 21	Adults 16+ eligible for treatment under DTSS	DTSS Treatment descriptions (filling, extraction etc) Number of treatments per age group Total amount paid per treatment
Central Statistics Office Irish Health Survey	2019	Adults 15+	Level of affluence versus dental attendance Dental attendance versus age
Central Statistics Office System of Health Accounts for Ireland 2018	2018	Residents of Ireland	Expenditure on health care in Ireland including public and private dental services
GUI Infant Cohort (08) Wave 5	2017-2018	Children 9 years	Rating of oral health Frequency of dental attendance HSE/private dental attendance Treatment (fillings, extractions) Oral hygiene habits Reasons for not receiving dental care (affordability, access, time etc) Family covered by GMS/private insurance. Breastfeeding Diet Socioeconomic Status Inequalities

GUI Child Cohort (98) Wave 1	2007-2008	Children 9 years	Frequency of dental visits Toothbrushing Not receiving necessary dental care Frequency of sugary foods, drinks Eating habits Family covered by GMS/private insurance Inequalities (financial, accommodation type, caregiver employment status/education status, social welfare payments)
GUI Child Cohort (98) Wave 3	2015-2016	17/18 years	Self-rated oral health Dental attendance Ortho GMS/health insurance coverage Primary caregiver education Inequalities (food/own a car/warm clothing etc) Diet Smoking
Healthy Ireland Survey	2017-2018	Adults 15+	Perceptions of oral health False teeth and dentures Visits to dentist (gender, age) Diet and nutrition Tobacco, alcohol General health Health service utilisation, health behaviours
HSBC Ireland Trends	1998-2018	Children (9-18)	Toothbrushing habits Gender Age Social Class

Fluoride and Caring for Children's Teeth (FACCT) Study	2013-2014	Children (5 and 12 y/o) in Dublin, Cork, Kerry	Change in water fluoridation on decay
North South Survey of Children's Oral Health in Ireland	2002	Ireland and Northern Ireland. Children and adolescents (age 5,8,12,15)	Dental decay Fluorosis Treatment needs Trauma Tooth wear Socioecological variables and decay levels (ROI and NI)
Oral Health of Irish Adults	2000-2002	Ireland and Northern Ireland Adults	Tooth loss, number of natural teeth Decayed, missing, filled teeth Need for dental treatment Oral health knowledge, perceptions etc
National Cancer Registry Ireland Annual Report	1994-2018 with estimates for 2018-2020	Ireland	Cancer prevalence, rates and trend with breakdowns by type including cancers of mouth, nasal cavity and pharynx
The Irish Longitudinal Study on Ageing (TILDA)	2014-2015	Older adults 54+	Dental healthcare utilisation, satisfaction with state services, oral health, dentition status

Appendix 2

Data	Year Data Collected	Population	Variables
General Dental Services Statistics for Northern Ireland	2019-2020	Adults (18+) Children (under 18) receiving public dental treatment in primary care setting	Number of dentists per residents (in local gov district) Number of dental practices per residents % of population registered with a dentist: broken down into adults, children, LGD, age, gender, urban/rural, deprivation Type of dental treatments: adults, children, ortho, LGD Comparison between UK and NI Dental Service Costs
SDR Items of Service Claims by Item number	2019-2020	Children (under 18)	Number of claims for treatments, Number of patients, Number of treatments (exam, prevention, fillings, referral treatments etc) carried out
Children's Dental Health Survey (Northern Ireland)	2013	Children (age 5,8,12,15)	Clinical oral health Perceptions, experiences of oral health Dental health related behaviours Patterns of dental service usage

Adult Dental Health Survey (Northern Ireland)	2009	Adults (18+)	Oral health and function Disease related disorders Urgent conditions Preventative behaviours Barriers/access to care
Health Survey Northern Ireland	2010/2011-2017/18	16+ years	Sugary food and drink consumption Smoking status Weight status Alcohol consumption
Understanding Society Survey Wave 10	2018/19	10-15: youth ques-tionaire 16+ adult ques-tionnaire (general population, ethnic minority boost sample, former British Household Survey Sample, Immigrant and Ethnic Minority Boost Sample)	Youth Questionnaire: Self-reported health Smoking status Alcohol consumption Adult: Child (age 3/5/8) brushes teeth w/o assistance Dental check up in the last 12 months
Northern Ireland Cancer Registry Oral cancer sta-tistics 1993-2019	1993-2019	Northern Ireland population	Oral cancer incidence, survival, mortality and prevalence

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