

The economic benefits of sugarfree gum

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Working for better oral healthcare

Contents

p3 - The burden of poor oral health

P9 - The role of sugarfree gum in oral health

p12 - The economic benefits of sugarfree gum

P15 - Study methodology

P22 - Key study findings

The burden of poor oral health

Dental disease is a significant global economic burden



Globally:

- WHO estimates oral diseases are the fourth most expensive conditions to treat¹

In the UK:

- £3.4bn per year spent by the NHS on dental disease²
- >1 million patient contacts with NHS dental services per week² with many seeking treatment for dental disease
- Funding gap of £30bn²

1. What is the burden of oral disease? WHO. http://www.who.int/oral_health/disease_burden/global/en. Last accessed August 2015.

2. NHS England. Improving Dental Care – A Call to Action. Available at: <http://www.england.nhs.uk/wp-content/uploads/2014/02/improving-dental-care.pdf>. Last accessed August 2015.

Oral health in England

A generational issue

Oral health in England¹

Prevalence of tooth decay and exposure to risk factors for poor oral health is a multi-generational issue:

- It is estimated that one in every three adults in England has active or untreated tooth decay
- Tooth extractions are the main reason for children to be admitted to hospital and receive a general anaesthetic

Oral health in England

Importance of children & teenagers

- WHO states that: “**Oral health is integral to overall health and essential for wellbeing.**”¹
- Poor oral health in children has wide-ranging impacts, including:²
 - Pain and infection
 - Missing school/college days and parents losing work days
 - Increased risk of caries in adult teeth

Cost is also a major factor:

- The NHS is pivotal in children’s oral care: 70% of children are cared for by an NHS dentist,³ leading to an estimated cost of £33.4 million per year⁴
- Whilst children’s oral health has improved over the past 20 years⁵ more can be done
 - Not just for clinical reasons – NHS spent £30 million on hospital-based tooth extractions for children aged 18 years and under in 2012–13⁶

¹ Department of Health (2005) Choosing Better Oral Health: an oral health plan for England

² Faculty of Dental Surgery (2015) The state of children’s oral health in England

³ <http://www.hscic.gov.uk/article/3445/Seven-out-of-ten-children-in-England-seen-by-NHS-dentists>

⁴ Claxton, L, Taylor, M, Kay, E. The Economic Impact of sugarfree Gum Use in the UK. Data on File. 2015

⁵ Public Health England (2014) Local authorities improving oral health: commissioning better oral health for children and young people

⁶ Department of Health (2013) Reference costs 2012 to 2013.

Oral health in England

Inequalities

- Significant inequalities exist across England which are often related or experienced in tandem – a problem for policy-makers and practitioners
- Health inequalities are potentially avoidable – specifically those that are related to wealth, education or social position
- A number of factors contribute to regional variation, including: socio-economic situation, water fluoridation availability and access to NHS care¹

¹ Faculty of Dental Surgery (2015) The state of children's oral health in England

² Table taken from:

Oral health in England

Policy progress

Growing policy recognition

- Policy attention is being focussed on the connection between oral health and overall wellbeing
- Oral health improvement is the responsibility of local authorities – with a focus on partnership action to address the wider determinants of health¹

Delivering Better Oral Health²

- Recognises oral health's contribution to general health and well-being of individuals
- Includes of 'good practice' – pragmatic recommendations
- Focuses on integration of oral health in wider programmes

¹ Public Health England (2014) Local authorities improving oral health: commissioning better oral health for children and young people

² Public Health England (2014) Delivering better oral health: an evidence-based toolkit for prevention: 3rd Edition

Role of sugarfree gum in oral health

Wealth of clinical evidence supports the oral health benefits of sugarfree gum

The oral care benefits of sugarfree gum are supported by clinical studies spanning more than 40 years and demonstrated by a **median reduction in dental caries incidence of 52%¹**

Study	Country of study	N	Population	Intervention	Follow-up period	Baseline caries
Möller 1973	Denmark	340	School children	Sorbitol gum	2 years	NR
Scheinin 1975	Finland	100	Young adults	Xylitol gum	1 year	NR
Glass 1983	USA	540	Children aged 7-11	Sorbitol gum twice a day	2 years	NR
Isokangas 1989	Finland	324	Children aged 11-12	Xylitol gum	5 years	NR
Kandelman 1990	Canada	274	Children aged 8-9	15% and 65% Xylitol gum	2 years	NR
Mäkinen 1995	Belize	1,277	Children aged 10	Sorbitol, xylitol or combinations	40 months	NR
Mäkinen 1996	Belize	510	Children aged 6	Sorbitol, xylitol or combinations	24 months	NR
Beiswanger 1998	Puerto Rico	1,402	Children in grades 5-7	Sorbitol gum, daily after meals.	2 years	NR
Alanen 2000	Estonia	740	Children aged 10	Xylitol gum	3 years	Control group DMFS: 2.18 (SD 3.30)/ Xylitol group DMFS: 2.10 (SD 2.55) Measurement excludes surfaces with incipient caries
Szöke 2001	Hungary	547	School children aged 8-13	Sorbitol stick, daily after meals	2 years	Control group DMFS: 1.94 (2.85) Gum group DMFS: 1.69 (SD 2.64) Measurement excludes surfaces with incipient caries
Machiulskiene 2001	Lithuania	432	Children aged 9-14	Sorbitol, xylitol, HIS gum	3 years	Control group DMFS: 6.4 (SD 4.3) Xylitol gum group DMFS: 5.0 (SD 3.9) Measurement includes all stages of caries formation
Kovari 2003	Finland	921	Children in day care centres	Xylitol gum	6 years	NR
Peng 2004	China	1,143	Children aged 6-7	Sorbitol, xylitol, carbamide gum	2 years	Control group DMFS: 0.05 (SD 0.30) Gum group DMFS: 0.07 (SD 0.32) Measurement includes all stages of caries formation
Morgan 2008	Australia	2,720	Children aged 11-13	CPP-ACP gum	2 years	Control group D ₁ MFS: 2.80 (SD 3.85) Gum group D ₁ MFS: 2.76 (SD 3.79) Measurement includes all stages of caries formation

1. Wrigley Oral Healthcare Program data on file. May 2015.

Independent recognition of the oral health benefits of sugarfree gum

European Commission has approved five oral health claims for sugarfree gum¹ and the benefits are also recognised by the FDI World Dental Federation²

Three claims: general function (EC authorized Article 13 claim)

1. Sugar-free chewing gum contributes to the neutralization of plaque acids.
2. Sugar-free chewing gum contributes to the maintenance of tooth mineralization.
3. Sugar-free chewing gum contributes to the reduction of oral dryness.

Two claims: disease risk reduction (EC authorized Article 14 claim)

1. Chewing sugar-free gum helps neutralize plaque acids. Plaque acids are a risk factor in the development of dental caries.
2. Chewing sugar-free gum helps reduce tooth demineralization. Tooth demineralization is a risk factor in the development of dental caries.

¹ EFSA (2010) Scientific Opinion on the substantiation of a health claim related to sugar-free chewing gum and reduction of tooth demineralisation which reduces the risk of dental caries pursuant to Article 14 of Regulation (EC) No 1924/2006. Available at:

http://www.efsa.europa.eu/sites/default/files/scientific_output/files/main_documents/1775.pdf. Last accessed: October 2015

² FDI Worldwide

Economic benefits of sugarfree gum

Economic models are becoming increasingly important

- Increased constraints on healthcare budgets means economic considerations in decision-making about health interventions have increased
- Economic models help assess the value for money of an intervention

What are economic models?

- Models represent the detailed 'real world' in a more understandable structure
- This is the first time a cost-effectiveness study has been done on sugarfree gum as an intervention
- The aim of this model is to calculate the reduction in expenditure on dental treatment that would occur if the use of sugarfree gum increased

Methodology

Methodology overview¹

- Rapid review of literature regarding sugarfree gum
- Model constructed using baseline data from 12 year old population in the UK
 - Majority of evidence reviewing oral health impact of sugarfree gum are based on child and teenage populations
 - Tooth decay is most likely to develop before the age of 15
 - Teenagers are most likely consumers of sugarfree gum
- Comparison of current health spend with various hypothetical situations in which there are higher levels of sugarfree gum use
- Outcomes were assessed over a one-year time horizon.
- NHS – costs to the consumer for the purchase of SFG or to the body bearing the costs of a promotional campaign to increase SFG usage were not included. Patient charges for dental treatment were also excluded.
- Primary analysis assumed full compliance and uptake of the SFG regimen within each scenario
- Sensitivity analyses performed to analyse the effect of each variable

1. Claxton, L, Taylor, M, Kay, E. The Economic Impact of sugarfree Gum Use in the UK. Data on File. 2015

Modelled three hypothetical scenarios

1. An increase of one additional sugarfree gum chewing occasion per day across the model population
2. Two sugarfree gum chewing occasions per day across the model population
3. Three sugarfree gum chewing occasions per day across the model population

Methodology - estimates for frequency of chewing

- Sugarfree gum usage estimated using consumer survey of a nationally representative sample of people aged 10 - 59 year¹

Group	Group definition	Annual number of chewing occasions	Proportion of SFG users
Group 1: No use	No use of SFG	0	6%
Group 2: Infrequent use	Less than one chewing occasion per week	26	22%
Group 3: Light use	Between 1 and 4 chewing occasions per week	130	36%
Group 4: Moderate use	Between 5 and 10 chewing occasions per week	390	22%
Group 5: Frequent use	More than 10 chewing occasions per week	780	14%

Chewing frequency behaviours in the UK in children aged 10 to 14 (2014)

- Observed situation among teenagers applied to a hypothetical population of teenagers with greater use of sugarfree gum.

Methodology - baseline risk of disease in selected population

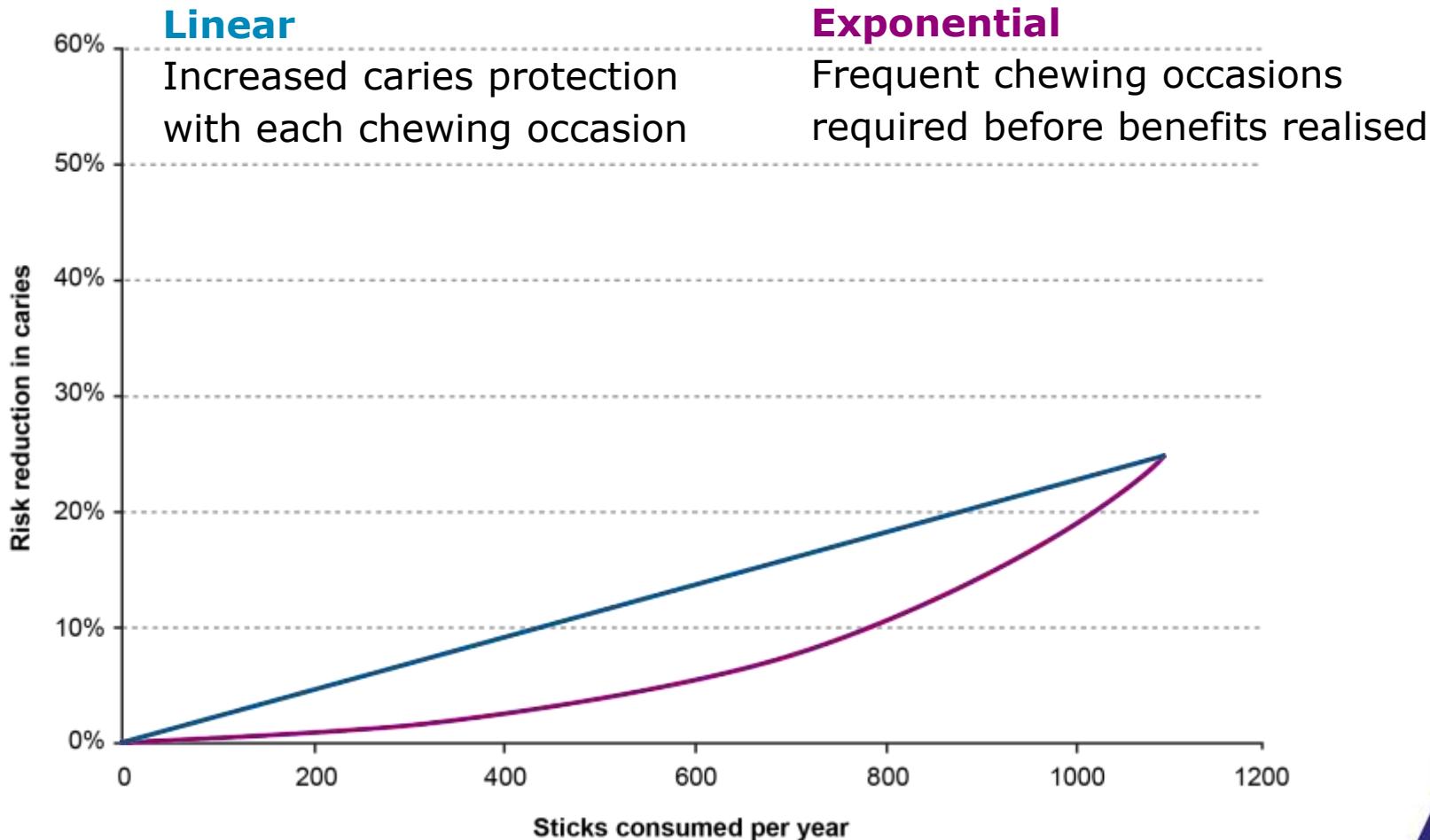
- Baseline risk of disease obtained from the Dental Public Health Epidemiology Programme¹
 - Used to determine population of 12 year olds in 2009 and determine proportion of children with tooth decay who received treatment and the treatment they received

Parameter	Value
Children examined	89,442
Average of DMFT	0.7
Number with caries experience (DMFT>0)	30,181
Proportion with caries experience (% DMFT>0)	33.74%
With caries experience, number with extraction experience (MT>0)	3,165
With caries experience, proportion with extraction experience (%MT>0)	10.49%
With caries experience, number with fillings present (FT>0)	18,158
With caries experience, proportion with fillings present (%FT>0)	20.30%

Baseline risk of decay in 12 year olds

1. Public Health England. The NHS dental epidemiology programme for England: oral health survey of 12 year old children. 2013

Methodology - the dose response relationship



Methodology - treatment cost assumptions

- Of those with caries experience
 - the proportion with restorations was used to estimate the average spend on restorations per case of caries
 - the proportion with extraction experience was used to estimate average spend on extractions per case of caries
- Cost of tooth restoration and tooth extraction estimated to be £75 in primary care setting
 - 20% estimated to be under local anaesthetic
 - 80% under general anaesthetic
- In-patient treatment for extractions estimated to be £1,165¹
- All estimated parameters were subjected to sensitivity analysis

1. Curtis L. Unit costs of health and social care. Canterbury: Personal Social Services Research Unit, University of Kent, 2014.

Key findings

Scenario 1:

An increase of one additional sugarfree gum chewing occasion per day across the model population

	Base case	Hypothetical scenario (linear model)	Hypothetical scenario (exponential model)
Extraction costs	£22,948,628	£21,018,002	£22,234,639
Restoration costs	£10,427,070	£9,549,860	£10,102,659
Total costs	£33,375,698	£30,567,863	£32,337,298
Total savings for this population		£2,807,836	£1,038,400
Average savings per person		£4.10	£1.52

Scenario 2: Two sugarfree gum chewing occasions per day across the model population



	Base case	Hypothetical scenario (linear model)	Hypothetical scenario (exponential model)
Extraction costs	£22,948,628	£20,702,245	£22,148,906
Restoration costs	£10,427,070	£9,406,391	£10,063,704
Total costs	£33,375,698	£30,108,637	£32,212,610
Total savings for this population		£3,267,062	£1,163,089
Average savings per person		£4.77	£1.70

Scenario 3: **Three sugarfree gum chewing occasions per day across the model population**



	Base case	Hypothetical scenario (linear model)	Hypothetical scenario (exponential model)
Extraction costs	£22,948,628	£17,502,923	£17,313,302
Restoration costs	£10,427,070	£7,952,729	£7,866,571
Total costs	£33,375,698	£25,455,652	£25,179,873
Total savings for this population		£7,920,046	£8,195,826
Average savings per person		£11.57	£11.97

Estimated cost savings for 12-year-olds by increased sugarfree gum chewing

Cost savings predicted by different levels of sugarfree gum chewing occasions

Number of sugarfree gum chewing occasions per day	Cost saving (per year)
One additional sugarfree gum chewing occasion per day	£1.1 - £2.8 million
Two sugarfree gum chewing occasions per day	£1.2 - £3.3 million
Three sugarfree gum chewing occasions per day	£7.9 - £8.2 million

Further long-term cost savings will also be generated
by the prevention of successive restorations

Summary

- An oral health policy that includes the chewing of sugarfree gum could lead to:
 - Improved oral health and wellbeing
 - Significant cost savings on dental care
 - A reduction in capacity pressure on the UK dental health care system
- There are lifetime benefits, not just those gained in the year of exposure
- Consider the savings if these results were applied to the whole population, not just 12 year olds

End