Oral Health - General Health; A Common Risk Factor Approach

The Borrow Lecture

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European Association of Dental Public Health

Malta 2013
My lecture will have three parts;

• In the first part I shall deal with the fact that despite the decrease in DMFT in children, the DMFT increases year by year, and adults account for most dental disease. That continuous increase suggests the profession is not controlling the main known cause of caries and tooth loss – sugars.

• The second part will suggest that although, as we have heard in other talks here, there are associations between oral health and general health. However, the aspects of general health definitely linked with oral health are largely ignored. Those largely ignored links will be highlighted.

• The third part will be on the common risk factor approach and the risk factor, sugars, that must be addressed to stem the unabated increase in caries with increasing age in all populations. That involves integrated policies linked to those on NCDs and Health 2020.
The Unabated increase in DMFT levels

Bernabé, Sheiham 2013
The Unabated increase in DMFT levels in children and adults in European Countries

Bernabé, Sheiham 2013
Untreated decayed teeth and dental sepsis in 5-year-old Scottish children.

- 4.8% of children examined had dental sepsis.
- 2% in the most affluent areas to 11% in the most deprived.

Oral Health - General Health;

Unsound teeth—

—undermine general health.

Poisons from bad teeth cause abscesses; the discharge is swallowed and makes us tired and listless. It poisons the blood stream and may cause serious injury to our health.

BDA Poster in the 1940s
Aspects of general health definitely linked with oral health that are largely ignored.

- School absence and poorer school performance
- Malnutrition in children
- Nutrition in older people
- Quality of Life of Adults and Older People
- Pneumonia
Dental Pain

- Dental pain is highly prevalent among children, **even in contemporary populations with historically low levels of caries experience.**
- Prevalence ranging from 5% to 33.
- Dental pain is consistently associated with population levels of caries experience.
- **5% to 6% increase in probability of toothache for each additional deciduous tooth with caries experience.**

(Slade 2001)
The impacts of dental pain; children

- **Disturbance of sleep, anxiety, irritability, withdrawal from normal activities.**
- **Attention Problems**: Difficult to relax and paying attention in class.
- **Delayed social development.** Especially with missing front teeth children often have problems forming words correctly and tend to retreat into shyness and avoid socializing.
- **Infection.** Infected teeth may lead to ear infections, sinus infections, abscess, high treatment costs.
- **Nutrition problems**: Painful teeth make chewing and swallowing difficult. Children often do not get sufficient nutrition for normal growth.
The Impacts of tooth decay and tooth loss; Children

- Children with missing teeth limit their food choices because of chewing problems, which may result in nutritionally inadequate diets.
- That affects their readiness for school.
- Early tooth loss of primary teeth can prevent some children from speaking clearly and eating properly.
- Missed school days: Missing school and disruption of education poor performance: affect the child’s school attendance, and mental and social well-being while at school.
Children’s School Performance: Impact of Oral Health

• The poorer a child’s oral health status, the higher the likelihood of missing school as a result of dental pain or infection:

• A child with good, fair, or poor oral health was nearly 3 times more likely than a child with very good or excellent oral health to be absent as a result of dental pain or infection. (Jackson et al 2011).

• Children with both poor oral and general health were 2.3 times more likely to report poor school performance than those with both good oral and general health (Blumenshine et al 2008).
“What amounts to a silent epidemic of dental and oral diseases is affecting some population groups. This burden of disease restricts activities in schools, work, and home, and often significantly diminishes the quality of life.”

Surgeon General David Satcher
Oral Health and Learning; When Children’s Oral Health Suffers, So Does Their Ability to Learn

• 66% of children missed school due to acute dental problems: USA Students ages 5 to 17 years missed 1,611,000 school days due to acute dental problems - an average of 3.1 days per 100 students.

• Children from families with low incomes had nearly 12 times as many, days of missed school because of dental problems as did children from families with higher incomes.
Caries and malnutrition

Caries in primary dentition was associated with early childhood malnutrition. (Psoter, Reid, Katz 2005)

Children with Severe–ECC had:
• significantly greater odds of having **low vitamin D status**.

• significantly **lower levels of calcium and serum albumin and higher levels of parathyroid hormone**. (Schroth et al 2013 A)

• significantly greater odds of having **low ferritin status**.

• significantly greater odds for iron deficiency. (Schroth et al 2013 B)

1. Children with untreated caries **weighed less** and have significantly **poorer oral health-related quality of life** than age and sex matched caries free controls.

2. Children with Early Childhood Caries sometimes weighed less than **80% of their ideal weight** (Acs et al 1999; Ayhan et al, 1996).

3. Children’s **growth improved by eliminating dental pain and sepsis** that negatively affected children’s ability to eat and sleep.

4. Extraction of severely decayed primary teeth resulted in **significant weight gain** in underweight children.

5. Untreated dental decay should be considered an important co-factor affecting child growth and should be considered when planning for interventions to improve child growth (Monse et al 2012).
Mechanisms by which growth retardation and dental caries may be related

Dental pain and chronic infections

Direct effect

↓ Food intake

Malnutrition

Indirect effect

Metabolic changes effect

• Calorie wasting
• ↑ Caloric demands
• ↓ Appetite
• Malabsorption
• Impairment of iron utilization (ACD)

↓ Slow Wave Sleep

Growth Hormone disturbance

Growth Retardation
Oral health of older people affects intake of nutritious foods

Number of natural teeth was related to diet.

- Trend for reduced dietary intake overall.

- **Edentulous** at a nutritional disadvantage compared with dentate individuals
The Impact of Edentulism on Oral and General Health

- Compared to dentate, edentulous consumed fewer vegetables, less fibre, and less carotene intake, while consuming more cholesterol and saturated fats.

- Total tooth loss was associated with low citrus fruit consumption, low plasma vitamin C levels, and increased amounts of inflammatory reactants, such as plasma C-reactive protein.

- They also had increased levels of plasma interleukin-6, fibrinogen, and factor VIII in women.

The Impact of Edentulism on Oral and General Health

- Edentulous women had dietary intakes associated with an increased rate of **cardiovascular disease**.
- Excessive intakes of highly processed high fat and high-carbohydrate foods contribute to **obesity and obesity-related diseases**, such as insulin resistance, cardiovascular disease, and hyperlipidemia.
- Lower intake of fruits and vegetables, fibre, and carotene and increased cholesterol and saturated fats
- Increased rates of **chronic inflammatory changes** of the gastric mucosa, upper gastrointestinal and pancreatic cancer, and higher rates of peptic or duodenal ulcers.
Tooth loss and oral health-related quality of life: a systematic review and meta-analysis

• Most included studies found statistically significant associations between missing teeth and unfavourable OHQoL scores.

• Tooth loss is associated with impairment of OHRQoL and location - distribution of tooth loss affect the severity of the impairment.

• Having fewer than 9 teeth had more impact on health-related QoL than having cancer, hypertension, or allergy.

(Gerritsen et al 2010)
Oral Health Related Quality of life in Adults

- UK: 39% of dentate adults had one or more dental impacts (ADHS 2009);
- Australia: 18.2% reported oral impacts “fairly” or “very often” (Slade et al., 2005)
- Norway: 18.3% had at least one oral impact on their daily life
Oral impacts on eating in elderly people

- USA: 30% negative effect on chewing and biting, 25% on eating and 20% on enjoyment of eating (Strauss and Hunt, 1993)
- Great Britain: 7% of dentate and 11% of edentulous (Sheiham et al., 2001)
- Australia: 60+ years-old: more than 10% of edentulous and 5% of dentate (Slade and Spencer, 1994)
- Greece: 29.9% of dentate and 41.2% of edentulous (Tsakos et al., 2001)
Pneumonia is a common infection in elderly people and the most common cause of mortality from nosocomial infection in elderly patients, with a mortality rate of up to 25%.

Bacterial species that normally do not colonize the oropharynx frequently cause health care–associated pneumonia, and the oral cavity has been suggested as an important reservoir for these respiratory pathogens.

The RCTs revealed positive preventive effects of oral hygiene on pneumonia and respiratory tract infection in hospitalized elderly people and elderly nursing home residents, with ARRs from 6.6% to 11.7% and NNTs from 8.6 to 15.3 individuals.

Mechanical oral hygiene has a preventive effect on mortality from pneumonia, and nonfatal pneumonia in hospitalized elderly people and elderly nursing home residents.

Approximately one in 10 cases of death from pneumonia in elderly nursing home residents may be prevented by improving oral hygiene.
1. There is fair evidence of an association of pneumonia with oral health depending on oral health indicators.

2. There is poor evidence of a weak association between obstructive pulmonary disease (COPD) and oral health.

3. There is good evidence that improved oral hygiene and frequent professional oral health care reduces the progression or occurrence of respiratory diseases among high-risk elderly adults living in nursing homes and especially those in intensive care units.

1. Critically ill people in intensive care units often need to have machines to help them breathe.

2. Chlorhexidine either as a mouthrinse or a gel reduced the odds of VAP in adults by about 40%.

3. For every **15** people on ventilators in intensive care, the use of oral hygiene care including chlorhexidine will prevent **one** person developing VAP.

   (Shi et al Cochrane Library 2013)
Common Risk/Health Factor Approach

- Diet
  - Obesity
  - Diabetes
  - Cancers
  - Cardiovascular diseases
  - Respiratory disease
  - Mental illness
  - Dental caries
  - Periodontal diseases
  - Skin diseases
  - Trauma-teeth and bones
- Stress
- Control
- Hygiene
- Smoking
- Alcohol
- Exercise
- Injuries

### NCD - Risk factors contribute to morbidity and premature deaths

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Condition</th>
<th>CVD</th>
<th>Diabetes</th>
<th>Cancer</th>
<th>Chronic obstructive pulmonary disease</th>
<th>Oral/dental diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco use</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Alcohol use</td>
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<tr>
<td>Physical inactivity</td>
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<tr>
<td>Nutrition</td>
<td></td>
<td>✓</td>
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<tr>
<td>Obesity</td>
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<td>Raised blood pressure</td>
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<tr>
<td>Dietary fat/ blood lipids</td>
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<td>✓</td>
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<tr>
<td>Sugar</td>
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</tr>
</tbody>
</table>

The causes of the causes

Distal risk factors → Proximal modifiable risk factors → Outcome

Socio-environmental conditions
Economics
Employment Status
Sex
Tobacco
SUGAR
Alcohol
Hygiene
Stress
Chronic diseases
Conclusions. Among free living people involving ad libitum diets, intake of free sugars or sugar sweetened beverages is a determinant of body weight.

Sugar-Sweetened Beverages and Risk of Metabolic Syndrome and Type 2 Diabetes; A meta-analysis

- Individuals in the highest quantile of SSB intake (most often 1–2 servings/day) had a 26% greater risk of developing type 2 diabetes than those in the lowest quantile (none or 1 serving/month) (relative risk [RR] 1.26 [95% CI 1.12–1.41]).
- Among studies evaluating metabolic syndrome, the pooled RR was 1.20 [1.02–1.42].

Conclusions
- In addition to weight gain, higher consumption of SSBs is associated with development of metabolic syndrome and type 2 diabetes.
- These data provide empirical evidence that intake of SSBs should be limited to reduce obesity-related risk of chronic metabolic diseases.

(Malik et al Diabetes Care 2010.)
Sugar and Caries

• “Sugars are undoubtedly the most important dietary factor in the development of dental caries” and dental caries is the most common chronic disease in the world (WHO 2003; Moynihan 2005; Moynihan & Petersen 2004; Sheiham 1983, 2001; Zero 2004).

• Treating caries responsible for 6-10% of total health costs, even though there has been a decline in dental caries levels in many countries.

• A significant relationship between sugars and caries persists despite the regular widescale use of fluoride toothpaste and flouridated water.

• The much greater adult burden of dental caries highlights the need for very low sugar intakes e.g 2-3%E, whether or not fluoride intake is optimum.
Obesity and dental caries in children: a systematic review and meta-analysis.

There is a significant relationship between obesity and dental caries in children from industrialized countries. (Hayden et al 2013)
Prevalence of overweight children aged 7-11 years in different EU countries. (IOTF data: www.iotf.org)
Malta has worst child obesity rate in Europe

Wednesday 8 December 2010

• The proportion of overweight or obese children in Malta is 29.5%. No other country has a proportion above 20%.
Over half of adults living in the European Union countries are now overweight or obese.

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>7.9</td>
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<tr>
<td>Italy</td>
<td>10.3</td>
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<tr>
<td>Netherlands</td>
<td>11.4</td>
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<tr>
<td>Bulgaria</td>
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<tr>
<td>Austria</td>
<td>12.8</td>
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<tr>
<td>France</td>
<td>12.9</td>
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<tr>
<td>Sweden</td>
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<tr>
<td>Denmark</td>
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<tr>
<td>Belgium</td>
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<tr>
<td>Germany</td>
<td>14.7</td>
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<td>Portugal</td>
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<tr>
<td>Cyprus</td>
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<tr>
<td>Finland</td>
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<td>Poland</td>
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<tr>
<td>EU-27</td>
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<tr>
<td>Slovenia</td>
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<td>Estonia</td>
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<td>Latvia</td>
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<tr>
<td>Slovakia</td>
<td>16.9</td>
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<tr>
<td>Greece</td>
<td>17.3</td>
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<td>Lithuania</td>
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<td>Czech Republic</td>
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<tr>
<td>Luxembourg</td>
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<tr>
<td>Malta</td>
<td>22.9</td>
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<tr>
<td>Ireland</td>
<td>23.0</td>
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<tr>
<td>Great Britain</td>
<td>26.1</td>
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<tr>
<td>Hungary</td>
<td>28.5</td>
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</tbody>
</table>

Figures represent a percentage of the adult population (18+) suffering from obesity.

The WHO defines obesity as having a Body Mass Index (BMI) of 30 or more. BMI is found by dividing body mass (in kilograms) by a person's height squared (in meters).

Source: OECD Health Data 2012; Eurostat; WHO | statistics date from 2006-2010
Major developments in food, nutrition and physical activity policy and strategy since 2002

A new global framework

• The WHO issued an important report on Diet, nutrition and the prevention of chronic diseases (WHO Technical Report Series 916)

• In 2004 the World Health Assembly endorsed the WHO Global Strategy on Diet, Physical Activity and Health.

• WHO Action Plan for the Prevention of Non-Communicable Diseases in 2008. Since May 2007—following a resolution by the World Health Assembly—WHO has been in the process of developing a set of recommendations on the marketing of foods and non-alcoholic beverages to children.
WHO European Action Plan For Food And Nutrition Policy 2007-2012

Action Areas

1. Supporting a healthy start
2. Ensuring a safe, healthy and sustainable food supply
3. Providing comprehensive information and education to consumers
4. Carrying out integrated actions to address related determinants
5. Strengthening nutrition and food safety in the health sector
6. Monitoring and evaluation
WHO European Action Plan For Food And Nutrition Policy 2007-2012

Population nutrition goals adopted in line with FAO/WHO recommendations:

1. <10% of daily energy intake from saturated fatty acids
2. <1% of daily energy intake from trans fatty acids
3. <10% of daily energy intake from free sugars
4. ≥ 400 g fruits and vegetables a day
5. <5 g a day of salt.
Specific actions:
1. Promote optimal fetal nutrition
2. Protect, promote and support breastfeeding and timely, appropriate and safe complementary feeding of infants and young children by reviewing existing guidelines
3. Promote the development of pre-school and school nutrition and food safety policies
4. Improve the nutritional quality of the food supply and food safety in public institutions
5. Develop food-based dietary guidelines and food safety guidelines, aimed at the general population and at vulnerable groups (especially infants and young children, pregnant women, and the elderly).
Why a school nutrition policy?  
School meals: investment in learning and health in the WHO European Region

Schools are key environmental setting to promote healthy choices
- Focus on a whole-school approach
- Targeting the wider community
- Need to start interventions early in life
- Schools provide a opportunity for prevention.
Food and nutrition policy for schools

A tool for the development of school nutrition programmes in the European Region

Programme for Nutrition and Food Security
WHO Regional Office for Europe
Copenhagen 2006
Non communicable diseases prevention and control in the South-eastern Europe Health Network. An analysis of intersectoral collaboration

Unhealthy diet

Global Strategy on Diet, Physical Activity and Health,
The European Charter on Counteracting Obesity,

• A healthy start is the development of policies on nutrition in schools, including, the provision of healthy options in canteens and the establishment of fruit- and vegetable-distribution schemes.
• “Whole of-government commitment is necessary for implementation ..., in the spirit of health-in-all policies”
• Sectors which should be involved - agriculture, fisheries, food, consumer protection, education, sport, transport, urban planning and housing, environment, labour, social policy, and research.
Taxing unhealthy food

• The use of taxes for public health goals is not new—tobacco and alcohol are widely taxed.

• At the local level, pricing strategies in public institutions—such as schools, hospitals and sports facilities—may also have potential to influence what people eat in these premises.
Why tax Sugar-Sweetened Beverages?

Promote public health
Growing evidence that raising price of unhealthy foods/beverages reduces consumption, promotes healthier eating, improves weight.

Link to Obesity
• Several meta-analyses conclude that increased SSB consumption causes increased weight, obesity, dental caries
• Increased calories from SSBs not offset by reductions in calories from other sources because SSBs do not affect satiety

Other health consequences
• Type 2 diabetes
• Dental caries
Soda Consumption and Obesity Prevalence
U.S. 1980-2008

Source: National Health and Nutrition Examination Survey (NHANES) 2007-2008,
Carbonated Beverage Prices and Youth Obesity 1995-2009, Inflation Adjusted

Source: BLS; YRBS
The Public Health and Economic Benefits of Taxing Sugar-Sweetened Beverages

Kelly D. Brownell, Ph.D., Thomas Farley, M.D., M.P.H., Walter C. Willett, M.D., Dr.P.H., Barry M. Popkin, Ph.D., Frank J. Chaloupka, Ph.D., Joseph W. Thompson, M.D., M.P.H., and David S. Ludwig, M.D., Ph.D.
Sugar tax ‘best option’ to limit escalating health problems, say Credit Suisse

“Sugar Consumption at a Crossroads”

• A new report from Credit Suisse says the global backlash against sugar is about to start hitting the stocks of food and beverage makers over the next few years.

• Sugar has for decades been blamed for causing obesity and diabetes, but researchers have recently concluded that the sweetener is a lot more harmful to human health than previously thought.

• Credit Suisse said the new views on sugar mean negative public opinion is surging and the threat of regulation and taxation is rising.

“As with alcohol and tobacco, higher taxation on drinks is the best option to reduce sugar intake and help fund the fast growing healthcare costs associated with diabetes and obesity”
Conclusions

A 20% tax on-sugar sweetened drinks would lead to a reduction in the prevalence of obesity in the UK of 1.3% (around 180,000 people). The greatest effects may occur in young people, with no significant differences between income groups. Both effects warrant further exploration. Taxation of sugar sweetened drinks is a promising population measure to target population obesity, particularly among younger adults.
Mopping the floor
Tap is full on so mess in floor
Caries increasing with increasing age
In all countries caries is not being controlled

Bernabé, Sheiham 2013
DMFT trends (1968-2048) in individuals aged 16 years or more in England and Wales. Actual DMFT values are shown in solid lines and projected DMFT values in dashed lines.
Why Health 2020?

Economic opportunities and threats: need to champion public health values and approaches
Health 2020, 2 + 4

Two strategic objectives and four common policy priorities for health

- Working to improve health for all and reducing the health divide
- Improving leadership, and participatory governance for health

The four priority areas are interlinked and are interdependent and mutually supportive.

- Investing in health through a life-course approach and empowering people
- Tackling Europe’s major health challenges of NCDs and communicable diseases
- Strengthening people-centred health systems and public health capacities, and emergency preparedness, surveillance and response
- Creating resilient communities and supportive environments

Jakab, WHO Regional Director for Europe
Health 2020: strategic objectives

- Working to improve health for all and reducing the health divide
- Improving leadership, and participatory governance for health

Health 2020: 4 common policy priorities for health

- Investing in health through a life-course approach and empowering people
- Tackling Europe’s major health challenges: NCDs and communicable diseases
- Strengthening people-centred health systems and public health capacities, and emergency preparedness, surveillance and response
- Creating resilient communities and supportive environments

Zsuzsanna JakabWHO Regional Director for Europe
Reaching higher and wider

• Going upstream to address root causes
• Making the case for whole-of-government and whole-of-society approaches
• Offering a framework for integrated and coherent interventions

Vision

A WHO European Region in which all people are enabled and supported in achieving their full health potential and well-being and in which countries, individually and jointly, work towards reducing inequities in health within the Region and beyond.
Economic burden of chronic disease

- Cardiovascular diseases (CVD): €169 billion annually in the European Union (EU), health care accounting for 62% of costs
- Alcohol-related harm: €125 billion annually in the EU, equivalent to 1.3% of gross domestic product (GDP)
- Obesity-related illness (including diabetes and CVD): Over 1% GDP in the United States, 1–3% of health expenditure in most countries
- Cancer: 6.5% of all health care expenditure in Europe
- Road-traffic injuries: Up to 2% of GDP in middle- and high-income countries

Dental Disease: Expenditure on dental care was 7.8% of health expenditures in Germany

Adapted from Jakab, WHO Regional Director for Europe
Improving efficiency reduces adverse effects of the crisis and helps to secure support for more future spending.

- Eliminate ineffective and inappropriate services
- Cut the volume of least cost-effective services
- Integrate health promotion approaches on NCDs

Adapted from Jakab, WHO Regional Director for Europe
Recommendations

1. Unless there is change in dental strategy, caries rates will continue to increase with increasing age and will continue to be a major NCD for the remainder of this century.

2. The dental profession should adopt an integrated common risk factor strategy with groups concerned about reducing sugars consumption to reduce other NCDs.

3. Integrate activities on sugars and smoking with groups concerned with obesity and NCDs.

4. Dentists should join an Action On Sugar Group to lobby for reductions in sugars consumption.

5. Develop and implement guidelines on sugars in nurseries, schools, institutions.

6. Consider a sugars tax on Sugar Sweetened Beverages (SSBs)
Dear prime minister, minister, mayor or member of parliament:

Good health underpins social and economic development and strengthens policies across all sectors. However, the economic and fiscal crisis facing many countries presents serious challenges and potentially risks undermining the positive progress that has been made. Nevertheless, it also presents an important opportunity to refocus and renew our efforts to improve the health of all people.

All sectors and levels of government and society contribute to health creation. **Your leadership for health and well-being can make a tremendous difference** for the people of your country, state, region or city and for European Region as a whole.

Your support for **Health 2020** is truly essential.

Jakab, WHO Regional Director for Europe