Future trends in the area of FOOD, NUTRITION & HUMAN HEALTH

An epidemiologists prediction

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Epidemiology

- Disease occurrence
  - Global, EU-15, EU-25
  - Global trends and cross sections

- Risk factors

- Prevention of disease
Life expectancy: developed and developing countries

Figure 1.1 Life expectancy at birth: developed and developing countries, 1955–2002

Note: The term developed countries includes Australia, Canada, European countries, former Soviet countries, Japan, New Zealand, and the USA. High mortality developing countries include those in sub-Saharan Africa, and countries with high child and adult mortality in Asia, Central and South America, and the Eastern Mediterranean. Other developing countries are referred to as “developing – low mortality”.

World Health Report 2003, Fig 1.1
Survival curves in three countries

WHR (2002)

- safe water
- sanitation and
- education

are likely to have large benefits and should be increased, especially in poorer countries.
The epidemiologic transition

Infections & sanitation
Micronut def’s (A, I, Fe)
Energy deficit
Food security

Safe water
Energy excess
Physical inactivity
Food abundance
The epidemiologic transition
Healthy life expectancy (Netherlands)

Men

Percentage, mannen

0 10 20 30 40 50 60 70 80 90

percentage, vrouwen

0 10 20 30 40 50 60 70 80 90

Ernstig ongezond • Matig ongezond • Licht ongezond • Gezond

Women

Life expectancy
by education level and region
European Union

- Disease pattern
- Enlargement & health
Major diseases: DALYs for top-10 diseases in Europe

- Cardiovascular, 33381
- Neuropsychiatric, 31080
- Malignancies, 17642
- Injuries, 22707
- Infectious & parasitic diseases, 6823
- Respiratory, 6416
- Musculoskeletal, 5304
- Digestive diseases, 7087
- Sensory organs, 4150
- Respir. infections, 3891
- All other causes, 14631

Death rates for circulatory and malignant diseases

Circulatory system

Total cancer, 0 – 64 yrs
Health Status Overview for former EC and new member states

Cardiovascular Disease

Fig. 9. Trends in mortality from cardiovascular diseases in the Czech Republic, Poland, Slovakia and Slovenia compared with the EU, age 0–64

Cancer

Fig. 13. Trends in mortality from cancer in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia compared with the EU, age 0–64

EU-15 (blue)

new members (10)

Health Status Overview for countries of central and eastern Europe that are candidates for accession to the EU, EC & WHO, 2002

Health and nutrition in early life

Infant mortality in former (15) and new member states (10) of the EU

Prevalence of stunted growth in preschool children (selected CCEE and NIS, 1990s)

Fig. 24. Infant mortality

Left: Health Status Overview for countries of central and eastern Europe that are candidates for accession to the EU; EC & WHO, 2002; website accessed on 2 May 2004: http://europa.eu.int/comm/health/ph_projects/1999/monitoring/health_status_overview_en.pdf

Right: http://www.euro.who.int/document/e78578.pdf
Prediction / summary so far........

EU-15 and 10 new members states
- Life expectancy less favorable
- Child health lags behind, develops favorably
- Higher rates of CVD & cervical cancer
- Lower breast cancer rates

Future
- EU+ will develop pattern of diseases like EU-15
- Can they prevent safety and health problems?
Epidemiology

- Disease occurrence
- Risk factors
  - Population attributable risks
  - Diet and lifestyle factors
- Prevention of disease
Attributable risks of death for 11 most important exposures (WHO)

- Zinc
- Vitamin A
- Iron
- Underweight
- Phys inactivity
- Vegetables, fruits
- Overweight
- Serum cholesterol
- Blood pressure
- Tobacco
- Alcohol

Under-nutrition
Unbalanced nutrition
Addiction
Lifestyle

Western economies
Developing countries

Attributable risks of death
for 11 most important exposures (WHO)
Lifestyle and prevention of CVD
- Example: US Nurses -

American Nurses, 1980-1994
Diet and prevention of chronic disease
- Example: The Netherlands -

Causes of death:
- Cardiovascular
- Cancer
- Vegetables and fruits
- Saturated fat
- Overweight
- Smoking

Dietary pattern:
- 1/6
- 1/6
### Disease burden attributable to nutrition

**Example: Europe**

<table>
<thead>
<tr>
<th>Causal factor</th>
<th>Contribution to overall burden of disease (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco smoking</td>
<td>9.0</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>8.4</td>
</tr>
<tr>
<td>Overweight*</td>
<td>3.7</td>
</tr>
<tr>
<td>Occupational risks</td>
<td>3.6</td>
</tr>
<tr>
<td>Low fruit and vegetable consumption*</td>
<td>3.5</td>
</tr>
<tr>
<td>Relative poverty</td>
<td>3.1</td>
</tr>
<tr>
<td>Unemployment</td>
<td>2.9</td>
</tr>
<tr>
<td>Illicit drugs</td>
<td>2.4</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>1.4</td>
</tr>
<tr>
<td>Diet high in saturated fat*</td>
<td>1.1</td>
</tr>
<tr>
<td>Outdoor air pollution</td>
<td>0.2</td>
</tr>
</tbody>
</table>

*Source: National Institute of Public Health*.  
* Diet-related factors.
Burden of disease in developed regions

Dietary and lifestyle factors

- Socio-economic
- Smoking & drinking
- Energy balance
- Diet and nutrition
Socio-economic determinants

Fig. 3. Relationship of income to consumption of fresh fruit and vegetables and the share of income spent on food

- **Consumption (grams per person per day)**
- **Income spent on food**

- **Deciles* of net family income (per head):**
  - 1 = lowest incomes; 10 = highest incomes.

**Source:** Department for Food, Environment and Rural Affairs (18).

Food and Health in Europe, WHO, 2002
http://www.euro.who.int/document/e78578.pdf
Lifestyle determinants: smoking and drinking
Energy balance: Overweight adults (BMI 25-29.9) in the European region (%)

- Relevance: CVD, diabetes, some malignancies
- Cause: Positive energy balance, mainly due to low physical activity

Physical activity
- 50% lower risk of dying from CVD
- Less hip fractures, HBP, NIDDM, obesity, functional limitations (aerobic capacity, independent living)

Healthy food supply: energy & nutrients

Energy balance

Composition
food pattern
Dietary patterns in Europe

Women, Germany (EPIC)
Margarines, butter, processed meat, sauces, coffee, alcohol, juices

Women, Greece (EPIC)
Vegetables, legumes, vegetable oils, fish products

Slimani, EPIC
Dietary patterns in Europe

Average availability of total added lipids by type in the DAFNE countries (g/person /day)
Risk factors of disease -- Summary

- Higher smoking prevalence
- (Still) lower drinking in new member states
- Diversity in European dietary patterns

Consequently:
- increased importance of suboptimal diet and NCD in EU+
Epidemiology

- Disease occurrence
- Risk factors
- Prevention of disease
  - Science
  - Society
Science: exploring the unknown

- Time: Classic deficiencies to healthy ageing
- Individual: Nutrigenomics and personalized diets

- Vegetables/fruit – antioxidants, folate, bioactives
- Fats – safa & trans; n-6, monounsaturates & n-3

- Overweight and chronic diseases
- Neuropsychiatric diseases
Science: evidence base for policy

Agricultural production  Food chain and retail  Food choice by consumer  Individual risk profile  Public health

- Smoking
- Serum cholesterol
- Blood pressure
- Overweight
- Physical activity
- Medical history
- Family history
- Susceptibility

Food chain: public health should be the driver
Science: evidence-base for policy

- **Occurrence: Monitoring and surveillance**
  - disease patterns, trends, modeling, forecasts
  - levels & trends in diet and lifestyle (FP6)

- **Risk factors: Etiological research**
  - epidemiological research and meta analysis
  - quantifying short/long term effects (risk, not hazard)

- **Prevention: Strategies**
  - quantifying adverse / beneficial effects
  - develop and communicate effective interventions
Needed: strengthen evidence base for policy

- Valid and reproducible tools to assess dietary patterns in a valid and reproducible manner, comparable in the EU member states
- Comparable data and recommendations for nutrient status and requirements from different populations groups, throughout the life cycle

FP6 topics 5.4.2.2 (STREP, 2005), and 5.4.2.4 (NoE, 2006)
Diet indicators for monitoring in Europe (EFCOSUM)

**Foods and nutrients**
- Vegetables
- Fruit
- Bread
- Fish
- Saturated FAs (% of E)
- Total fat (% of E)
- Ethanol (g/day)

**Biomarkers**
- Folate
- Vitamin D
- Iron
- Iodine
- Sodium

Steingrimsdottir et al for the EFCOSUM group. EJCN 56; 2002: S8-11
Society: stakeholders

Governmental agencies (ministries of health, agriculture), should play a stronger role in

- Formulating risk policies (effective, committed policies for the prevention of large risks to health)
- Appropriate balance between population-wide risk reduction and aiming to reduce risk in a smaller number of high-risk individuals.

A balance between government, community and individual action is necessary.

- e.g., great potential from community action by NGOs, local groups, the media
- others should be encouraged and expanded: stakeholders like food industry, insurance companies, municipal health agencies.

based on WHR 2002
Society: consumers’ choices

- Smoking and alcohol
- Safety and health
- Food choice and feedback
Society: consumers choices - lessons

- Tobacco
  - Risks identified 1950-60
  - Filter-tips, low-tar
  - Taxes, advertisement bans
  - Smoke free environment, social pressure

- Alcohol
  - More ambiguous (CVD), moderate drinking socially accepted
  - Fines, drivers license, taxes
  - Age-limit, restricted advertisement

- Lessons
  - Cognitive approaches < social environment
  - Direct physiological feedback controls behavior
Consumers choices: safety and health

- Food supply
- Food choice
  - Food habits
- Consumer
  - Nutritional pattern
- Safety
  - Short term
- Population health
  - Long term

- NL: 10-30% infected / yr
  (100 †)

- NL: 23,000 †
  NCD / yr

- Dietary habits
Consumers choices: feed back loops and time span

Feed back loops
- Short term: physiological (sufficient & safe food)
- Long term: cognitive (dietary pattern & health)

Time span
- Hours  Hunger / Satiety (today)
- Days   Safety (tomorrow)
- Years  Health - NCD (beyond tomorrow)
Society: food choice and feedback

- Mass campaigns on dietary habits
  - Risk communication cognitive, food choice?

- Restructure the environment
  - Involve consumers, retail, industry, ….

- Development to tailor-made / personalized advice
  - Individual dietary habits (internet)
  - Personalized dietary advice (with feedback)
  - Metabolic markers of individual susceptibility
Society: consumers’ choices

Needed

- Better understanding of consumer choices and dietary habits
  - Product side: physicochemical, sensory, product values, labelling
  - Consumer side: gender, age, lifestyle, SES
  - Research, training, communication: help consumer to make informed, healthy choices
Summary and conclusion

- Disease occurrence
  - NCDs more important in EU+

- Risk factors
  - Poor diet and alcohol as important as smoking
  - Monitor food habits & harmonize requirements (FP6)

- Prevention
  - Balance short and long term risks
  - Involve stakeholders (food chain, public health)

- Consumer is key player
  - Understand consumer choices (FP6)
Stages in development?

- Survival, hunger & satiety, poverty
- Safety, work force, economy
- Dietary recommendations
- Compression of disease, PH
- Personalized diets
- Consumer choices