Cholesterol and cardiovascular mortality in Poland. Are we going in the right direction?

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Dr Chris Kypridemos, Dr Edyta Drzazga-Bandosz
Life expectancy in Poland (age 15+)

Source: HFA DB (WHO)
Which causes of deaths contributed to increased longevity?

CVD is main cause of mortality and

Changes in CVD mortality mainly contributed to recent total mortality decrease in Poland
Changes in premature cardiovascular mortality in Central Europe, former EU & US

Central Europe

EU before 2005 & USA

Socioeconomic changes

Poland
Czechoslovakia
Romania
Czech Republic
United Kingdom
Finland
USA
Austria
Netherlands
The reasons for decline in cardiovascular mortality in Poland in 1990’s

<table>
<thead>
<tr>
<th>Ecolological study</th>
<th>Modelling study (IMPACT CHD Model)</th>
</tr>
</thead>
</table>

**Main message:**

- “Candidate dietary explanations were the substitution of unsaturated for saturated fats and increased consumption of fresh fruit and vegetables”

- ↑ uptake of treatments explained 37% of observed mortality decline
- Improve in RFs explained 54%
- Most important driver: ↓ cholesterol (diet) explains 39% of mortality decrease
IMPACT CHD Model: Mortality decrease attributable to treatments and risk factor changes in Poland 1991-2005

Risk factors worse +7%
- Obesity +4.5%
- Diabetes +2.5%

Risk factors better-61%
- Cholesterol (diet!) -39%
- Smoking -11%
- Physical activity -10%
- Population blood pressure 0%
  \( \uparrow M \downarrow K \)

Treatments -37%
- Acute Coronary Syndrome -9%
- Secondary prevention -7%
- Heart failure -12%
- Angina -3%
- Hypertension treatment -2%
- Primary Prev. Statins -3%

26,200 less deaths in 2005 →
Reduction (%) in CHD mortality caused by decrease in cholesterol level in Poland, Czech and Slovakia

Poland 1991-2005: -19%
Czech 1985-2007: -26%
Slovakia 1993-2008: -19%

1Bandosz et al., BMJ. 2012 Jan 25;344:d8136. doi: 10.1136/bmj.d8136
2Psota et al., JECH 2014;68:Suppl 1 A28-A29 doi:10.1136/jech-2014-204726.57
3Bruthans et al., Eur J Prev Cardiol. 2012 Nov 24;21(7):829-839
Usual cholesterol and CHD mortality
Meta-analysis from observational studies

Total cholesterol concentration lower by 1 mmol/L is associated with CHD mortality lower by:
• $\frac{1}{2}$ at age 40-49
• $\frac{1}{3}$ at age 50-69
• $\frac{1}{6}$ at age 70-89

No threshold value

### Lifestyle and cholesterol

<table>
<thead>
<tr>
<th>Lifestyle Factor</th>
<th>Cholesterol Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated fatty acids</td>
<td>↑</td>
</tr>
<tr>
<td>Polyunsaturated fatty acids</td>
<td>↓</td>
</tr>
<tr>
<td>Monounsaturated fatty acids</td>
<td>↓</td>
</tr>
<tr>
<td>Fish fat</td>
<td>↓</td>
</tr>
<tr>
<td>Alcohol</td>
<td>?</td>
</tr>
<tr>
<td>Obesity</td>
<td>↑</td>
</tr>
<tr>
<td>Soluble fiber</td>
<td>↓</td>
</tr>
<tr>
<td>Smoking</td>
<td>-</td>
</tr>
<tr>
<td>Physical activity</td>
<td>↓</td>
</tr>
</tbody>
</table>

#### Fat supply quantity

**Poland**

- Animal products (all)
- Vegetal products (all)

Source: FAOSTAT
• Change in atherogenicity of diet was the main driver for impressive increase in life expectancy in Poland (and also Czech and Slovakia) in 1990’s
• This was mainly related to economical reasons – changes in relative prices of food products and increased availability of different food products
• This natural experiment is a equivalent to structural intervention

**Structural intervention in public health:** modification of contextual or environmental factors that influence risk behavior rather than intervention in characteristics of individuals who engage in risk behaviors.
• Can we go further?
• Is cholesterol level in Poland already optimal?
Mean cholesterol levels in different populations (USA & Japan)

Standardized death rate, CHD:
1980

USA: 261,7
Japan: 52,9

Japan data: Ueshima, H. Journal of Atherosclerosis and Thrombosis Vol.14, No.6
Mean cholesterol levels in different populations

Mean cholesterol level in Japan in people aged 40-60 was ~25mg/dL lower in Japan (1980) than in Poland (2011)

Dane dla Japonii i USA pochodzą z pracy Ueshima, H. Journal of Atherosclerosis and Thrombosis Vol.14, No.6
Favourable changes of the atherogenicity of diet in Poland are no longer existing

Statins used in middle/old age are leaving important residual risk

- No intervention
  - Atherosclerosis progression
  - High risk strategy (using statins)
  - Population strategy affecting nutrition

10:04
A story about saving lives
How to improve atherogenicity of the diet in the population?

Let’s use experiences from successful anti-tobacco policies!
Tobacco Control Scale (TCS)
Estimated effects of different policy options

TCS points

- Cessation support, few centres
- Quitline advice
- Free medication NRT
- Cessation Services, limited
- Cessation Services, nationwide
- Advertising: partial bans
- Pack health-warnings
- Smokefree laws: workplaces
- Advertising: total ban
- Media information campaigns
- Smokefree laws: all public places
- Tobacco PRICE

Downstream ────────────────── Upstream

Joosens & Raw 2008
Dietary Industrial Transfat reduction
Estimated effects of different policy options

Coombes BMJ 2011 343 d55677

Downstream Upstream policies

Restaurant restrictions plus Food Labelling (USA)
Comprehensive interventions + Regulation (Denmark)

Restaurant restrictions (USA)

Food labelling (USA)

Voluntary Reformulation (UK)

Primary care advice

Voluntary Reformulation (NYC)
Dietary Salt Reduction
Estimated effects of different policy options

Primary care advice (UK)
Labelling (Finland)
Social marketing (UK)
Reformulation (UK, Finland)
Taxation (Finland, NYC)
Regulation and marketing control (Finland)

Salt reduction (g/day)

Downstream → Upstream

Cappuccio et al. BMJ 2010
An Effectiveness Hierarchy for Public Health

“Downstream” prevention interventions targeting individuals consistently achieve a smaller public health impact than “upstream” policies such as regulation or taxes...
Agency and Structure

Solely depends on an individual’s response

Do Not depends on an individual’s response

INCREASE POPULATION IMPACT

INCREASE INDIVIDUAL EFFORT

McLaren et al 2009
Frohlich et al 2010
Adams et al 2016
Frieden 2011
Population strategy based on regulation is widely used:

- Sanitary security
- Road traffic
- Immunization
- Smoking (lessons to learn here)
- Many more

But the main (and avoidable) killer is atherogenic diet

... and we have (almost) no structural policies here.
Final thoughts

• Diet seems to be too important to be just left in hands of food industry; Companies prioritize benefit rather than health value

• We need to think about regulations and fiscal policies aiming to decrease atherogenicity of diet

• In our country we are even not systematically monitoring our biggest killer (diet & cholesterol)