

# **Policy Paper on An Impact Evaluation System to Assess Prevention Outcomes**

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# 1 Background

Cancer no longer lags behind cardiovascular disease as an important cause of death in Europe (Nick Townsend et al. Cardiovascular disease in Europe: epidemiological update 2016. *European Heart Journal* 2016). In fact, cancer has overtaken cardiovascular disease as the main cause of death in 12 European countries (Belgium, Denmark, France, Italy, Luxembourg, the Netherlands, Portugal, Slovenia, Spain, UK, Norway, and Israel), highlighting the importance of a coordinated European effort towards prevention.

Up-to-date cancer incidence and mortality data in Europe are a key resource in both planning and assessing the impact of cancer control programmes at the country and regional levels. Europe carries a significant load of the global cancer burden, representing one quarter of all cases. There were an estimated 3.45 million new cases of cancer (excluding non-melanoma skin cancer) and 1.75 million deaths from cancer in Europe in 2012. The most common cancer sites were the female breast (464,000 cases), followed by colorectal (447,000), prostate (417,000) and lung (410,000). These four cancers represent half of the overall burden of cancer in Europe. The most common causes of death from cancer in Europe in 2013 were cancers of the lung (353,000 deaths), colorectal (215,000), breast (131,000) stomach (107,000), liver (62,000), bladder (52,400) and kidney (49,000) (Ferlay 2013).

Maintaining a healthy weight, staying physically active throughout life, consuming a healthy diet, stopping smoking and reducing alcohol intake can substantially reduce the lifetime risk of developing cancer, as well as influence overall health and survival after a cancer diagnosis. Thus many national and international guidelines on cancer prevention point to improving lifestyles and diet as a means to address the disease and promote health.

In this paper according to the Evidence Base Medicine the key points and primary cancer prevention evidence reviewed is classified according to the following scale: a= consistent, good-quality patient-oriented evidence; b = inconsistent or limited-quality patient-oriented evidence; and c = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. (<http://www.aafp.org/afpsort.xml>).

## 1 Achievement and maintenance of a healthy weight throughout life

a/ It is well documented that overweight and obesity are significant risk factors for cancers of the breast (post-menopausal), colorectum, endometrium, liver, oesophagus, pancreas, prostate and kidney (*Bergström 2001; Vainio 2002; Kushi 2006; Kushi 2007; Wahnerfriend 2008, Amling et al. 2005*);

b/ Overweight and obesity are risk factors for multiple myeloma and non-Hodgkin's and Hodgkin's lymphoma, and cancers of the cervix, gallbladder, gastric cardia, ovary, advanced prostate and leukaemia (*Bergström 2001; Vainio 2002; Kushi 2006; Lindblad 2005; Patel 2005; Amling 2005; Wahnerfriend 2008; Latino-Martel 2016, WCRF 2016*);

## 2 A plant-based diet high in fruits, vegetables, and whole grains and low in saturated fats and red and processed meats

a/ There is consistent evidence that high intake of red and processed meats and animal fat in general are associated with risk for colorectal cancer (*Kushi 2006, U.S. Department of Health and Human Services 2008, Latino-Martel 2016*);

b/ Evidence suggests that plant-based diets with high levels of fruits, vegetables and whole grains are protective for some cancers (*Kushi 2007; U.S. Department of Health and Human Services 2008, Erinosho 2015*).

**3 Regular physical activity of at least 30 minutes per day and at least five days per week**

a/ Consistent evidence indicates that physical activity offers significant protection for cancers of the breast, colon and endometrium (*Vainio 2002; Kushi 2006; Boyle 2003; U.S. Agency for Healthcare Research and Quality 2004, Latino-Martel 2016*).

**4 Avoid alcohol consumption**

a/ Consistent evidence exists that high alcohol intake is associated with increased risk for kidney, liver, esophagus, pancreas and head and neck cancers. Alcohol intake also is significantly associated with risk of breast cancer (*Kushi 2006; American Cancer Society 2007*).

**5 Tobacco smoking cessation**

a/ Cigarette smoking causes cancers of the lung, oral cavity and pharynx, larynx, esophagus, bladder, kidney, pancreas, stomach, uterine cervix, penile and acute myeloid leukaemia. Smoking avoidance and smoking cessation result in decreased incidence and mortality from cancer (*Kvaavik 2010; van Dam 2008; American Cancer Society 2007*).

*A call for public policy and community action make up a significant component of the primary prevention guidelines (Boyle 2003, Vainio 2002, CDC 2004, Weinhouse1991, Byer 2002, Kushi 2007).*

## 2 Search for evidence

This CanCon policy paper deals with the outcomes of prevention in relation to diet and nutrition, physical activity, alcohol consumption and tobacco control.

### Topic definition

The questions posed in this document include:

- What policies and interventions are currently implemented for prevention of cancer?
- Which indicators are used to measure the effectiveness of interventions in scientific research?
- Which indicators are present in the information systems for surveillance at the European Level?
- Is it possible to compare scientific and surveillance indicators?

A systematic review of review studies published in the scientific literature over the last 5 years (2010-2015) was undertaken to assess interventions throughout the world.

### Methodological approach and definitions

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement was adopted to conduct the review (Moher 2009).

#### a/ Ethical approval

As a review article, this document does not require ethical approval.

#### b/ Literature search strategy

Scientific literature was systematically searched for peer-reviewed studies that examined the impact of policies on healthy diet and nutrition, moderation of alcohol consumption, regular physical activity and tobacco control. Relevant literature published in peer reviewed journals was identified through keyword searches in relation to policy and health promotion and health impact for each determinant (diet, tobacco smoking, alcohol consumption and physical activity). PubMed, Scopus and Cochrane Library electronic databases were queried using search algorithms (for details see specific annexes).

- Annex 1: Diet and nutrition
- Annex 2: Physical activity
- Annex 3: Alcohol consumption
- Annex 4: Tobacco control

All annexes can be found as supplemental information at the website [www.cancon.eu](http://www.cancon.eu)

These databases were consulted for relevant peer reviewed publications in English between January 1st, 2010, and June 1st, 2015.

Initial screening of the documents retrieved was conducted by one reviewer and involved consideration of the title and abstract. Second, a full text examination was conducted, and articles were checked against the inclusion and exclusion criteria (reported below and in the specific annexes). Finally the retrieved articles' references were reviewed to identify secondary references meeting the inclusion criteria. After eliminating articles that did not meet the inclusion criteria, the remaining studies were collected and their characteristics summarized.

### **c/ Inclusion and exclusion criteria**

Eligible study designs included narrative or systematic review and meta-analysis. Studies focused on a specific population were excluded, e.g. categories of patients (asthmatic, HIV positive, etc.), ethnic groups (such as American Indians, Indios).

For more detailed information of inclusion and exclusion criteria for each topic, see the annexes (1-4).

### **d/ Information collection**

The full-text of the papers meeting the inclusion criteria were retrieved, and two investigators independently reviewed articles and compiled relevant data into a standardized data extraction form. A third reviewer resolved any uncertainties that arose during the process.

The following study characteristics were extracted, where applicable:

- 1/ Authors, year of publication
- 2/ Study design: systematic review, meta-analysis
- 3/ Types of policy or intervention (see below "*Classification of policies and interventions in macro-areas/ groups*")
- 4/ Setting (national level, clinical setting, school, etc.)
- 5/ Target population (general population, adults, adolescent)
- 6/ Indicators

### **e/ Classification of policies and interventions**

What constitutes a policy vs. an intervention?

- *Intervention* refers to a scientific trial in the classical sense, or an action realized at local level (school, local health units, interventions of health promotion not delivered by an institution, such as "Let's Move" (<http://www.letsmove.gov/>) or "Race for the Cure" (<http://www.komen.it/raceforthecure/>).
- *Policy* refers to prevention actions set out at institutional (ministerial or regional) levels or by government, such as national laws or campaigns.

In the areas of tobacco and alcohol prevention, WHO classifications for policies and interventions were used (WHO FCTC 2003; WHO 2010). For nutrition and physical activity the classification was performed using the policy interventions described in the papers selected for the review. In terms of nutrition outcomes, the distinction between policies and interventions was difficult to determine, since differences between action at the local or national levels often were not clear. Detailed tables that describe the selected papers in terms of policy and intervention typologies are provided in the annexes (1-4).

The following schemes were adopted for categorization:

## **NUTRITION**

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### INTERVENTIONS / POLICIES<sup>a</sup>

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Provision and food access (food environment policies)

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Taxation/fiscal policy/ food price policies/ monetary subsidies

---

Food marketing/labelling

---

Food marketing/advertising

---

Food marketing/mass media campaigns/promotion

---

Community interventions

---

Mixed community interventions

---

Education and environmental policies/interventions

---

Education/ awareness/ behavioural interventions

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<sup>a</sup> Review articles were searched for both interventions and policies (both were included). Categorizing the two types of actions was difficult, since some items could be referred to as both a policy and an intervention.

## **PHYSICAL ACTIVITY**

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### INTERVENTIONS

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### POLICIES

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Counselling

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Mass media campaigns

---

Advertising

---

Education/awareness

---

Education

---

Advertising/promotion

---

Promotion

---

## **ALCOHOL**

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### INTERVENTIONS

---

### POLICIES

---

Therapy and/or counselling

---

Advertising, promotion, sponsorship

---

Education and/or awareness

---

Availability

---

Brief interventions (BI)

---

Drinking and driving

---

Screening

---

Education and/or awareness

---

Policies on the alcohol industry

---

Packaging and/or labelling

---

Price and tax related

---

Protection from exposure

---

Monitoring

---

**TOBACCO CONSUMPTION**

INTERVENTIONS	POLICIES
Therapy/counselling	Therapy/counselling
Educational/awareness	Education/awareness
Protection from exposure	Protection from exposure
Bans on advertising, sponsorship	Bans on advertising, sponsorship
	Price and tax measures
	Packaging/labelling
	Availability <sup>a</sup>
	Mass media campaigns

<sup>a</sup> Restricting access to youth/ minors, regulating tobacco outlet density, tobacco retailer licensing.

**f/ Quality assessment**

Methodological quality was assessed for meta-analysis using the AMSTAR tool (Shea 2007).

**g/ Assessment of effectiveness**

The effectiveness of the policy/intervention was assessed only for meta-analysis studies. The main results were synthesized in tables. The percentages, OR or RR with their relative 95% confidence intervals or p-value were reported.

**h/ Feasibility of indicator implementation at the European level**

The indicators found in the scientific literature that measure the effectiveness of the policies/interventions were compared with the indicators present in European information databases: EUROSTAT, Health for All Europe (HFA) and European Core Health Indicators (ECHI). The Health Behaviour in School-aged Children (HBSC) survey was analysed to evaluate the specific indicators for adolescents and was presented in a separate section.

**i/ Analysis of results**

A synthesis of results is reported in the present document for each cancer determinant.

In particular the following tables are shown:

- Lists of the reviews stratified by typologies of policies and interventions
- Lists of indicators applied to monitoring policies or interventions in the scientific literature
- Description of indicators in areas of interest (behaviour, knowledge and health)
- Description of effective policies/interventions (meta-analysis only)
- Comparison of data indicators by European information systems (EUROSTAT, ECHI, HFA)
- Geographical distribution of the indicators in the EU28 and availability of the data



## Results

### A – DIET AND NUTRITION

*(for details see ANNEX 1 in supplemental information)*

This summary presents the evidence collected regarding available policies/interventions that aim to create a healthy food environment and support individuals' ability to make healthy food choices to prevent cancer related to unhealthy diets. A number of these policies are crucial in changing the dietary patterns of the population. The scientific literature describes the following:

#### 1. Policies that support a healthier composition of foods:

**These policies support changes to the composition of staple foods, thus having a direct influence on the nutrient intake** of the population (e.g. reducing saturated fatty acid content of oil; limiting energy-dense foods). Governments should use incentives to reward companies for promoting healthier foods and beverages.

#### 2. Multi-sectorial policies that facilitate the adoption of healthy diet:

Accessibility policies: those that aim to make healthy foods more accessible by reducing their price in relation unhealthy foods through fiscal measures.

Availability policies: both policy and environmental interventions targeting the built environment through increasing the availability to healthy foods and beverages (and reducing availability of unhealthy foods) in schools, worksites (e.g. in the cafeteria or in vending machines) and communities (e.g. strategies that influence availability at grocery stores, in vending machines, and at cafeterias and restaurants to support healthier choices).

This also includes policies that improve access to supermarkets and healthful food and limit access to fast-food restaurants, and those that address neighbourhood deprivation, reduction of disparities and promotion of more equitable access to healthy foods.

#### 3. Community-wide, multi-component programs/interventions:

These include programs to promote changes in individual behaviour, increased knowledge and self-monitoring (e.g. those conducted as a part of a national or global campaign to promote healthy lifestyles). They may address **dietary education and/or knowledge of the whole population** through:

- Long-term, intensive mass media campaigns
- Educational programs to support the purchase of healthier foods
- National health brands or logos to support consumers in making healthy food choices
- Advertisements including labelling and/or health warnings on healthy/unhealthy products
- Computer/web-based and e-health interventions or telephone/mobile counselling interventions with interactive personalized feedback (that can target high-risk groups)
- School-based or university curriculum that addresses healthy eating and body image
- Workplace interventions

**4. Primary, secondary and/or tertiary prevention programs/interventions conducted in the primary healthcare setting** targeting people that have an unhealthy diet, are overweight/obese and/ or have an both an unhealthy diet and a consequent chronic disease such as type 2 diabetes, cardiovascular disease and/ or cancer. The intensity of interventions ranges from mild (e.g. in primary prevention programs), including providing printed educational materials, telephone counselling, and internet consultations, to intense (e.g. in secondary prevention), where patients are regularly monitored in their participation in intensive educational nutrition programmes (that also involve the family) or where participants receive live-in rehabilitation services.

A total of 28 papers were reviewed (published from January 2010 to June 2015), 5 of which were meta-analyses (Table 1).

A total of 26 indicators were found, and the majority concerned nutritional behaviours (Tables 2 and 3).

The main results related to the effectiveness of policies/ interventions were summarised (meta-analysis studies only) (see supplemental information).

**Table 1** Distribution of the number of papers and indicators for each type of intervention/ policy

Area (policies / interventions)	Number of papers	Number of indicators
Provision and food access (food environment policies)	5	19
Taxation/fiscal policies/ food price policies/ monetary subsidies	7	17
Food marketing/labelling	3	2
Food marketing/advertising	2	5
Food marketing/mass media campaigns/ promotion	3	11
Community interventions	5	6
Mixed community interventions	1	1
Education and food environment policies/interventions	1	2
Education/awareness/behavioural interventions	1	3

**Table 2** Distribution of indicators by type of outcome: health, behaviour or knowledge

One indicator can be used in one or more areas.

Indicator area	Number of indicators
Knowledge	11
Behaviour	40
Health	22
Total	73

**Table 3** Description of all indicators reported for interventions/ policies

<b>Indicators for monitoring the effect of interventions/policies</b>	<b>Frequency</b>
<b>Change behaviours:</b>	50
1) Attitude towards healthy foods	
2) Increase in frequency and amount of healthy foods (a) (increase in purchases of fruit, vegetables etc.)	
3) Reduction of fat intake (reduction in purchases of foods with a high fat content)	
4) Reduction of high-fat snacks (reduction in purchases, availability)	
5) Less saturated fat intake (reduction in purchases of foods with a high saturated fat content)	
6) Reduction in calories consumed (reduction in purchases, availability)	
7) Reduction in sodium intake (reduction in purchases, availability)	
8) Beneficial increased consumption of dietary fibre, fruit and vegetables (increase in purchases, availability)	
9) Change in diet in favour of a healthier diet with an increase in fruit, vegetables and fibre (in the general population and setting) (increase in purchases, availability)	
10) Change in primary school diet or at worksites in favour of a healthier diet with a greater consumption of vegetables and fruit (increase in purchases, availability)	
11) Changes in cafeteria food content, foods: soft-drinks/ sugary beverages, fat, vegetables, breakfast, and snacks/ desserts (increase in purchases, availability)	
12) Weight related behaviours	
13) Behaviours (e.g. food preparation, mealtime, snacking)	
14) Frequency of purchase of healthy foods	
15) Nutrition purchase	
<b>Knowledge/ awareness</b>	10
1) Related to a healthy diet (more vegetables and fruit consumption, more fibre consumption, and less saturated fat content and calories consumed)	
2) Related to healthy foods	
3) Related to the purchase of healthy foods	
<b>Body weight reduction:</b>	5
1) BMI	
2) Overweight and obesity	
<b>Reduction in blood pressure</b>	2
<b>Reduction in blood glucose</b>	2
<b>Reduction in blood cholesterol</b>	2
<b>Metabolic risk factors for NCDs</b>	1
<b>Chronic disease</b>	1
<b>Attitude</b>	2

<sup>a</sup> Healthy foods or healthy diets refer to a high consumption of fruit and vegetables and fibre and a decrease in unhealthy foods such as those with high calories or high levels of saturated fats or sodium.

## General considerations on diet and nutrition

### EVIDENCE

The results from the systematic review of the literature and meta-analysis regarding the following intervention/policies show that any type of intervention targeted at the specific population represents a cost-effective approach, in detail:

- a/ Interventions to promote healthy diet in primary care are effective, especially those that increase fruit and vegetable consumption with a decrease in total fat intake, and as a consequence a decrease in serum cholesterol.
- b/ Primary school diet and physical activity policies have a positive influence on the reduction of body weight and in increasing physical activity.
- c/ Social media interventions for diet and exercise behaviours show a significant decrease in dietary fat consumption, despite no significant differences in changes in physical activity and weight.
- d/ Tailored multi-component preschool-based interventions for increasing fruit and vegetable consumption in children aged 5 years and under report an increase in mean child consumption of fruit and failed to significantly increase child consumption of vegetables.

### POLICY RECOMMENDATIONS

The review of the literature clearly defines the interventions/policies that have been demonstrated to be of proven efficacy/effectiveness, and therefore Member States should consider implementing them.

The recommendations related to indicators for nutrition are as follows:

- a/ When a decision on the implementation of a policy/intervention has been made, Member States should consider at least three dimensions for monitoring the impact of the policy in the short term:
  - i. Changes in terms of a healthy diet: the increase in healthy food consumption, especially fruit and vegetables, and the decrease in total fat intake, (especially saturated and hydrogenated trans fats), sodium, calories and the reduction in sugar;
  - ii. Changes in body weight and in the prevalence of overweight and obesity (monitoring BMI);
  - iii. Serum cholesterol reduction, blood glucose, blood pressure as well as the other dietary-related health status and nutritional and metabolic diseases (i.e. chronic disease, ischaemic heart disease and cerebrovascular diseases etc.).
- b/ If these indicators cannot be monitored annually, we recommend considering the revision of these indicators (EUROSTAT, Health for All) to ensure the best match between policy/intervention and annual monitoring (example: increase in healthy food consumption, especially fruit and vegetables, decrease in total fat intake, decrease in sodium consumption, decrease in calorie intake, prevalence of overweight and obesity (monitoring BMI), serum cholesterol reduction (prevalence of hypercholesterolemia/hyperlipidemia), blood glucose reduction (prevalence of diabetes/hyperglycemia), blood pressure (prevalence of hypertension), other dietary-related health status and nutritional and metabolic diseases (i.e. chronic disease, ischemic heart disease and cerebrovascular diseases etc.).

c/ In the meantime, if these indicators cannot be monitored annually, an observational study for monitoring is recommended in order to assess impact after the implementation of the policy at the national level.

## INFANTS, CHILDREN, AND ADOLESCENTS: EVIDENCE AND RECOMMENDATIONS

This systematic review highlights the “school” setting, with large-scale intervention (for example at regional or multi-centre levels). Outcomes concerning behaviour are the most studied.

The main interventions/policies reported in the scientific literature on adolescents/children with an evidence of effectiveness were:

- School-based programs for diet and nutrition
- Food promotions in general
- Advertising of food and beverage products and brand mascots and cartoon media characters that influence children’s diets
- Food environment interventions related to eating behaviours that regulate food availability in schools (with greater access to the consumption of healthy foods such as fruits and vegetables and less access to unhealthy foods) and the use of taxes or subsidies to influence purchasing decisions
- Meaningful partnerships of diverse school communities within obesity prevention interventions

No effectiveness or unclear evidence was found for policies or interventions related to multi-component programmes including home visiting programs and multi-component preschool-based interventions. The measures applied to assess the outcomes were the same as those included in the evidence on the general population: “childhood overweight and obesity”, “body weight reduction” and “children’s food preferences, choices, knowledge and food intake/healthy diets”. Specifically: “children’s food intake, especially for energy-dense and nutrient-poor foods (e.g. cookies, candy or chocolate)”; “increased children’s fruit or vegetable intake, reducing fat and calorie intake, and changing cafeteria food content, foods: soft-drinks/sugary beverages, fats, vegetables” and the “increase in the consumption of promoted products (fruits, vegetables and low-fat snacks sold in supermarkets, cafeterias, vending machines, farmers’ markets or restaurants)”.

Based on a comparison with the items included in the World Health Organisation collaborative cross-national survey “Health Behaviour in School-aged Children” on dietary habits in those aged 6-17 years, the items proposed are: “levels of daily fruit consumption”, “soft-drink consumption”, and- in addition- in the Health Behaviour in School-aged Children Survey, there are “eating breakfast on weekdays” and “frequency of having evening meals with the family” indicators.

## **B – PHYSICAL ACTIVITY PROMOTION**

*(for details see ANNEX 2 in supplemental information)*

According to the WHO (2004) document “Global Strategy on Diet, Physical Activity and Health” physical activity promotion and improving diet is recognized as an effective strategy for reducing deaths and the disease burden worldwide.

The preliminary results of analysis of systematic reviews and meta-analyses concern the following intervention/policies according to the WHO recommendations (Tables 4A and 4B):

- 1 After-school programs can improve physical activity levels and other health-related aspects;
- 2 Tertiary education students within the university/college setting are ideal targets for lifestyle interventions aimed at improving health behaviours;
- 3 Interventions that increase the proportion of time students spend in moderate-to-vigorous physical activity in school physical education lessons;
- 4 Interventions aimed at both parents and children had a significant effect on physical activity, but not on BMI;
- 5 Some workplace physical activity interventions can improve both health and important worksite outcomes;
- 6 The evidence from this review suggests that, when implemented alone, school diet and physical activity related policies appear insufficient to prevent or treat overweight or obesity in children, however, they do appear to have an effect when developed and implemented as part of a more extensive intervention program;
- 7 The synthesis of evidence indicates that several attributes of urban environments are associated with physical activity, including land-use mix and cycling infrastructure;
- 8 Increasing self-efficacy for physical activity;
- 9 Self-monitoring, group-based components, and motivational signs to encourage stair use were identified as promising strategies to increase physical activity;
- 10 Evidences supports the effectiveness of face to-face interventions for promoting physical activity;
- 11 Lifestyle interventions with a behavioural programmes aimed at changing diet and physical activity thinking patterns provide a significant and clinically meaningful decrease in overweight in both children and adolescents compared to standard care or self-help in the short- and the long-term through global, national, and regional public health policies and action;
- 12 There is no specific legislative framework regarding physical activity policy;
- 13 There is a need to include mass media in policy action in order increase the interest of policy makers in physical activity;
- 14 Policies adopted should be monitored closely; indicators must be established and used to monitor the implementation process;

15 Increased physical activity concerns many sectors: children, seniors, workplaces, and health, therefore, it is important that to act at the global level;

16 The recommendations made by the States based on WHO recommendations should report concrete objectives.

A total of 55 papers (systematic reviews and meta-analysis) were analysed, published from 2009 to 2015, and a total of 56 indicators were found (see supplemental information).

**Table 4A** Distribution of the number of papers and indicators for each type of intervention

One paper can be used in one or more area.

Macro area (interventions)	Number of papers	Number of indicators
Advertising	1	1
Counselling	6	14
Education	9	17
Promotion	15	36

**Table 4B** Distribution of the number of papers and indicators for each kind of policy

Macro area (policy)	Number of papers	Number of indicators
Promotion	1	4
Education	11	19
Advertising	6	2

**Table 5A** Distribution of indicator type for intervention outcomes: advertising, counselling, education, promotion or mass media campaign

Area of interest of indicators	Number of indicators
Education	17
Promotion	36
Counselling	14
Advertising	1

**Table 5B** Distribution of indicator type for policy outcomes: advertising, counselling, education, promotion or mass media campaign

Area of interest of indicators	Number of indicators
Education	19
Promotion	4
Advertising	2

**Table 6A** Description of all indicators reported among interventions

<b>Indicators</b>	<b>Frequency</b>
Time and frequency of physical activity	13
MVPA	11
BMI	7
Total energy expenditure (kcal/week)	3
Systolic and diastolic pressure	3
Lipid profile	5
Adverse events	3
Aerobic capacity	3
Quality of life (SF-12)	2
Weight loss	2
VO2 max	2

**MVPA:** Moderate to Vigorous Physical Activity

**BMI:** Body Mass Index

**Table 6B** Description of all indicators reported among policies

<b>Indicators for monitoring policies</b>	<b>Frequency</b>
BMI	3
Overweight	1
CDC Growth Charts	1
Fat mass index (FMI)	3
MPVA	1
BMI/SDS (deviation score)	1
Healthy Fitness Zone (HFZ)	1
Frequency	1
IPAQ Instrument	1
Precede model: facilitating factors	1
Trans theoretical model (TTM)	1
EPAQ Instrument	1

**MVPA:** Moderate to Vigorous Physical Activity

**BMI:** Body Mass Index



## General considerations on physical activity promotion

### EVIDENCE

The results from the systematic review of the literature and meta-analysis regarding the following intervention/policies show that:

- a/ A socio-ecological model for environmental urban facilities increases the level of physical activity and improves public health outcomes. This model of health promotion considers the complex interplay between individual, relationship, community, and societal factors.
- b/ Multiple-component physical activity programs encourage exercise participation, self-efficacy, and adherence over time.
- c/ School-based physical education and after school programmes improve blood pressure, lipid profile, BMI, school achievement, and MPVA.
- d/ In child care centres the education and training of staff is useful to promote physical activity.
- e/ Interactive computer-based interventions are effective for weight loss and weight maintenance.
- f/ Group counselling increases self-reported physical activity. Individual counselling improves lipid profile, BMI, and self-reported physical activity.
- g/ Community walking groups increase the time and frequency of physical.
- h/ Worksite health promotion improves lipid profiles, BMI, and decreases job stress and absenteeism.
- i/ Interventions of proven efficacy/effectiveness include:
  - i. Environmental urban facilities using a socio-ecological approach
  - ii. School-based physical education
  - iii. One to one or group counselling
  - iv. Worksite health promotion

### POLICY RECOMMANDATIONS

Scientific evidence shows that it is possible to devise a set of indicators on physical activity and compile a database that enables the integration and comparability of the data collected.

In particular, we recommend that:

- a/ The indicators chosen should be adopted by all countries in order to unify goals and monitoring activities.
- b/ In addition to choosing effective indicators based on scientific evidence, it is necessary that States base recommendations on those of the WHO and report concrete objectives.
- c/ The indicators highlighted in the literature are in line with those reported by EUROSTAT, Health for All and ECHI. This is an important factor that facilitates the implementation of policies.
- d/ An indicator is optimal if it can be measured in the living environment, and in school, after school, worksite, and urban environments: BMI, level of physical activity, total energy expenditure (kcal/ week), waist circumference, and time spent in moderate to vigorous physical activity (MPVA).

## **INFANTS, CHILDREN, AND ADOLESCENTS: EVIDENCE AND RECOMMENATIONS**

The systematic review highlights that physical education and physical activity promotion in school seem to be the best approach to increase movement in children and adolescents. School is the ideal setting to develop a positive attitude of children and adolescents towards regular physical activities. The main interventions/policies reported in the scientific literature on adolescents/children with evidence of effectiveness included:

- Physical education in school curriculum
- Health education in school with the involvement of teachers and family
- School-based interventions targeting both physical education and healthy diet
- Child care policies and practices
- Promotion through Internet, smart-phone, mail, telephone
- Interactive computer-based interventions
- One to one counselling

It is important to create an appropriate school environment where physical activity can be practised and encouraged through the building of playing fields and sports halls. Moreover, all actions aimed at making physical activity more attractive to children and young people should be promoted, because the school environment alone is not enough. In a multi-component approach, family and teachers should also be involved in promotion efforts, and urban facilities and environmental facilities should be suitable to encourage children's movement and physical activity.

- a/ No effectiveness or unclear evidence was found for policies or interventions related to advertising, community-wide campaigns, mass media campaigns and group counselling.
- b/ The indicators more studied were BMI, level of physical activity, total energy expenditure (kcal/week), waist circumference, and time spent in moderate to vigorous physical activity (MPVA).
- c/ Concerning the World Health Organisation collaborative cross-national survey "Health Behaviour in School-aged Children" in those aged 6-17 years, one item on physical activity is considered: "How many boys and girls achieve the recommended 60 minutes of MVPA daily?" The same indicator on time spent in MVPA is found in the review as well.

## C – ALCOHOL CONTROL

*(for details see ANNEX 3 in supplemental information)*

Alcohol is a recognized risk factor for oncologic diseases; in particular the Acetaldehyde associated with consumption of alcoholic beverages is considered carcinogenic. In 2012 the International Agency for Research on Cancer (IARC) confirmed alcohol as carcinogenic to humans (Group 1). The association between alcohol consumption and neoplasms of the mouth, pharynx, larynx, esophagus, pancreas, kidney, liver, and breast has been confirmed (Larc monography 100-E, 2012).

In 2010 the WHO developed the WHO Global Strategy to Reduce Harmful use of Alcohol («WHO | Global strategy to reduce harmful use of alcohol», s.d.) to promote policies and interventions to control alcohol consumption. In this document WHO pinpointed 10 areas of possible intervention to control the consumption of alcohol. We reviewed the scientific evidence to find the most effective policies and interventions as well as the indicators used in scientific literature to monitor their effects.

Our review provides information on the effectiveness of the following policies and interventions addressing alcohol consumption:

- 1 Health service response, in particular we focused on screening programs to detect alcohol addiction, programs of therapy and/or counselling, and brief Interventions;
- 2 Community action including education, awareness and prevention programs that are school or family based or multi-component;
- 3 Drunk driving countermeasures;
- 4 Availability of alcohol;
- 5 Marketing of alcoholic beverages, including limitations on advertising, promotions, sponsorship, and the legislation on packaging;
- 6 Pricing policies;
- 7 Reducing the public health impact of illicit alcohol and informally produced alcohol;
- 8 Monitoring systems.

A total of 34 articles published from January 2011 to June, 2015 were included. We evaluated systematic reviews and meta-analyses, and quantitative results of meta-analyses are shown in Tables 7-6 (see supplemental information). Seven meta-analyses have been performed in the last five years on this issue. Nevertheless, a huge body of individual studies and systematic reviews have been performed, and they suggest that the control of alcohol spread implies a range of measures, including policies at the national and local levels to prevent the onset of the alcoholic behaviour and to promote and support recovery from alcohol addiction.

Moreover, interventions at the local level that are tailored to specific population targets (e.g. children, adolescents, elderly people, and pregnant women) actively support national policies. Monitoring the effectiveness of policies and interventions in the field of alcohol consumption will be fundamental both for evaluating improvements in the risk profile of the population and for developing evidence to continually improve interventions.

**Table 7A** Distribution of the number of papers and indicators for each kind of intervention

\*One paper can be included in one or more area.

<b>Macro area of intervention</b>	<b>Number of papers*</b>	<b>Number of indicators</b>
Brief Intervention	4	15
E-health interventions	1	3
Education/ awareness	10	41
Screening	1	1
Therapy/counselling	5	30
Universal family-based prevention programs	1	6
Universal multi-component prevention programs	1	6
Universal school-based prevention programs	1	10

**Table 7B** Distribution of the number of papers and indicators for each type of policy

\*One paper can be included in one or more area.

<b>Macro area of policy</b>	<b>Number of papers*</b>	<b>Number of indicators</b>
Advertising, promotion, sponsorship	2	12
Availability	3	28
Drunk driving	2	5
Education/awareness	1	1
Encourage alcohol industry	1	1
Illegal alcohol	1	12
Monitoring	1	1
Packaging/labelling	2	10
Price and tax	6	25
Protection from exposure	2	3

**Table 8** Distribution of indicator of type of outcome: health, behaviour or knowledge

\*One indicator can be used in one or more outcome.

<b>Typology of indicator*</b>	<b>N</b>
Knowledge	4
Behaviour	16
Health	13

**Table 9A** Description of indicators more frequently reported among interventions (out of total=21)

<b>Intervention indicator</b>	<b>N</b>
Consumption	20
Consumption frequency	15
Consumption quantity	9
Abstinence	7
Alcohol related problem	6
Binge drinking	4
Drunk driving	4
Initiation age	4
Protective behaviours	4
Blood alcohol content	3
Knowledge	3
Incidence of drunkenness	2
Prevalence of drinkers	2

**Table 9B** Description of all indicators reported among policies (total=18)

<b>Policy indicator</b>	<b>N</b>
Consumption	15
Alcohol-related injuries	10
Violence	8
Alcohol-related diseases	7
Crime	4
Knowledge	4
Abuse	3
Blood Alcohol Concentration	3
Toxic effects	3
Unrecorded alcohol consumption	3
Awareness	2
Social disorder	2
Age of initiation	2
Number of outlets	2
Alcohol production	2
Risk perception	2
Sexually transmitted infections	2
Youth drinking	2

## General considerations on alcohol control

### EVIDENCE

The results from the review of systematic reviews and meta-analyses regarding the following intervention/policies show that:

#### a/ Health service response

Assessment of the effectiveness of screening programs to detect alcohol addiction, harmful drinking and therapy and/or counselling is difficult because of the lack of scientific evidence on some of these approaches, the heterogeneity of the interventions performed, the populations targeted and the indicators adopted in the evaluations.

Brief interventions are effective in reducing alcohol consumption, alcohol related injuries, alcohol related diseases and binge drinking, and the WHO supports their implementation.

#### b/ Community action

Summarizing education and/or awareness programs is difficult because of the heterogeneity of the interventions performed, the populations targeted and the indicators adopted in the evaluations. Nevertheless, provision of social norm information for alcohol misuse in university and college students is effective in reducing binge drinking. Motivational interviewing for alcohol misuse in young adults reduces the quantity and the frequency of alcohol consumption. School-based preventive interventions in adolescents reduces the prevalence of students' drinking alcohol and the frequency and quantity of alcohol consumption. E-health interventions may represent an important innovative option. They seem to obtain high levels of compliance, increase patients' motivation and prevent relapse in alcohol dependent patients.

#### c/ Drunk driving counter-measures

Enhanced enforcement of BAC seems to be effective in reducing blood alcohol levels and road accidents.

#### d/ Availability of alcohol

Limiting the hours of alcohol availability and the density of alcohol outlets seems to reduce alcohol consumption, sales and social violence in the areas of restriction. An increase in the minimum age of sale reduces alcohol consumption and alcohol-related injuries.

#### e/ Marketing of alcoholic beverages

Evidence suggests that marketing campaigns by alcohol producers increase alcohol consumption and positive beliefs about alcohol. Restricting or banning alcohol advertising is effective in reducing alcohol consumption in adults and adolescents. Forbidding sponsorship of social and sporting events seems to reduce alcohol consumption. The impact of health information on packaging on awareness and behaviours has not been shown, but packaging may be an important tool to inform customers about alcohol-related risks.

## f/ Pricing policies

Increasing the price of alcohol seems to be effective in reducing alcohol consumption production, the number of retail outlets, alcohol-related diseases, dependence and abuse.

## g/ Reducing the public health impact of illicit alcohol and informally produced alcohol

Several options are available to reduce alcohol production and the consequences of illegal production, but few studies have been performed on this issue. The main actions that can be undertaken are: mass media campaigns to inform about health risks, increasing internal and cross-border controls, and abolishing the tax exemption for denatured alcohol.

**POLICY RECOMMENDATIONS**

a/ Implement at the Member State level evidence that has been demonstrated to be of proven efficacy/effectiveness.

b/ Policies should be designed considering the different needs of populations exposed to different levels of risk. Primary, secondary and tertiary prevention should be implemented as well as brief interventions to treat alcohol consumption.

c/ When a decision on the implementation of a policy/intervention has been made, Member States must consider at least three dimensions for monitoring the impact of the policy in the short term:

- i. Alcohol consumption by- at minimum- gender and age
- ii. Prevalence of high risk drinkers
- iii. Alcohol related injuries

and two dimensions for monitoring the impact of policies in the long term:

- iv. Prevalence of alcohol-related diseases
- v. Mortality for alcohol-related diseases

d/ Monitoring of the policies' effectiveness through EUROSTAT official indicators, or through the European Information System on Alcohol and Health (GISAH) is important, as suggested by the European Action Plan to Reduce the Harmful use of Alcohol 2012–2020.

e/ If the suggested indicators cannot be monitored annually at the national level, we recommend performing an observational study after the policy's implementation.

## **INFANTS, CHILDREN, AND ADOLESCENTS: EVIDENCE AND RECOMMENDATIONS**

According to the systematic review, interventions targeting children or adolescents were in the areas of education and awareness- to prevent alcohol consumption- and therapy or counselling for those who already had begun consuming alcohol. The settings were mainly schools, families or community health departments. At the national level, the policy specifically targeting young people relates the area of protection from exposure, and in particular to the ban on alcoholic beverage sales to people under a certain age. Policies targeting the general population (e.g. in the area of packaging and labelling) may particularly impact the young population. According to our review, the interventions or policies that are effective in children and adolescents are warning labelling on alcohol products, the ban of alcoholic beverage sales to children and adolescents, the use of serious educational games, and some alcohol education and life skills training, including coping strategies and problem solving skills.

Indicators adopted in the scientific literature in the area of knowledge/awareness include: awareness of alcohol-related health risks and perception of harm; in the area of alcohol consumption behaviour- in terms of frequency and quantity- frequency of drunkenness, drunk driving, alcohol initiation age, and binge drinking; in the area of alcohol-related health consequences, the indicators are the Global Symptom Index scores and mental health status, alcohol related harms and road accidents.

The WHO Health Behaviour in School-aged Children (HBSC) Study identifies three key indicators to monitor alcohol behaviour among children and adolescents : weekly drinking, drunkenness initiation age and number of times being drunk.



## D – TOBACCO CONTROL

*(for details see ANNEX 4 in supplemental information)*

According to the WHO (2003), the policies for community interventions to control tobacco consumption by changing social norms are a good investment. Currently the policies realized worldwide represent a synergy between a public health approach, a health systems approach, surveillance and research.

The interventions/policies related to effectiveness on tobacco control were obtained from review of the scientific literature (systematic reviews and meta-analyses) and reported, according to the WHO categorization, as follows:

- 1 Smoke-free workplaces represent a cost-effective approach;
- 2 There are mixed conclusions to be drawn from articles on price and tax measures: some articles underscore high effectiveness in reducing demand, but other papers conclude that “a regressive measure today will probably achieve only a moderate reduction in tobacco use in the future, as smoking is becoming a phenomenon associated with poorer and less-educated people”;
- 3 Health warnings on tobacco products- picture-based advertisements on standardized packaging are effective at discouraging smoking;
- 4 Establishing the effect of mass media campaigns is difficult, as they are mostly guided by other measures such as tax increases;
- 5 Regarding interventions:
  - a/ School/university based interventions;
  - b/ Telephone/mobile counselling;
  - c/ Internet counselling, group-delivered behavioural interventions to achieve long-term smoking cessation, incentives, physician advice;
  - d/ Expert systems, tailored self-help materials and individual or group counselling;

Interventions of type D appear to be as effective in a stage-based intervention as they are in a non-stage-based form. The evidence is inconclusive for other types of stage-based interventions, including telephone counselling, interactive computer software, and training of physicians or lay supporters.

The control of the spread of tobacco and smoking requires a range of measures included in policies at the national level. It also requires intervention at the local level, such as counselling to improve motivation to quit and interventions to prevent starting to smoke. The success of these measures depends on their synergistic use in the broader context of a comprehensive tobacco-control strategy.

A total of 47 papers (systematic reviews and meta-analyses) were analysed, and a total of 66 indicators were found.

The policies and interventions were categorized into macro areas (Tables 10A-10B). The majority of interventions were focused on “protection from exposure” and “therapy/ counselling”. Whereas policies were focused on “price and tax measures” and “protection from exposure”.

Many indicators have been identified in the scientific literature (Annex 4 in supplemental information) to measure effectiveness, those most used are shown in Tables 11A and 11B. Table 12 reports the distribution of different areas of interest related to indicators: health, behaviours and knowledge. To measure effectiveness, the policies/interventions were studied only for meta-analysis studies published in 2010-2015 (N=18). The quality and the main results are reported in supplemental information.

The indicators most frequently reported in the scientific literature were compared to the existing indicators at the European level (EUROSTAT, ECHI and HFA). Tables 14 and 15 (see supplemental information) describe the indicators found in different systems and their availability within the different European regions (see supplemental information). The total number of different indicators found was 66. Forty related to policies and 43 related to interventions.

Some limitations should be mentioned. When the indicators differed in terms of the definition of smokers, or age or gender, they were classified as the same indicator, i.e. prevalence of smoker includes: prevalence of heavy smokers, prevalence of daily smokers, prevalence of subjects that have smoked 100 cigarettes in their lives, etc.

Another limitation is that some indicators combined different situations: for example the “quitting smoking” indicator includes different settings and target populations (adolescents, heavy and/or long-term smokers, low income populations, low education populations and the general population), different measurements (rates or percentages or frequencies) and different follow-up times (1 month, 6 months, one year, etc.)

Lastly, the EUROSTAT website published only the most robust indicators; other indicators are surely collected (such as the number of cigarettes smoked and type of product), but in this report they were not included.

**Table 10A** Distribution of the number of papers and indicators for each type of intervention

\*One paper can be used in one or more area.

<b>Macro area (interventions)</b>	<b>Number of papers</b>	<b>Number of indicators*</b>
Availability	1	1
Ban on advertising/sponsorship	8	8
Combined approach	2	5
Education/awareness	9	15
Mass media campaign	3	7
Protection from exposure	8	12
Therapy/counselling	17	17

**Table 10B** Distribution of the number of papers and indicators for each type of policy

\*One paper can be used in one or more area.

<b>Macro area (policy)</b>	<b>Number of papers</b>	<b>Number of indicators*</b>
Availability	3	6
Ban on advertising/sponsorship	5	5
Combined approach	1	1
Mass media campaign	5	5
Packaging/labelling	4	5
Price and tax measures	10	11
Protection from exposure	10	17
Therapy/counselling	2	2

**Table 11A** Description of indicators most frequently reported among interventions (out of total =42)

<b>Indicator</b>	<b>Frequency</b>
Quit rate	10
Quitting smoking (measure not specified )	7
Abstinence in late pregnancy	6
Smoking cessation prevalence	6
Smoking initiation prevalence	6
Smoking prevalence	6
Reduction of second hand smoke exposure	4
Reduction of tobacco consumption	4

**Table 11B** Description of indicators most frequently reported among policies (out of total=40)

<b>Indicator</b>	<b>Frequency</b>
Smoking prevalence	13
Tobacco consumption	12
Quit smoking	4
Smoking initiation prevalence	3

**Table 12** Distribution of indicator by type of outcome: health, behaviour or knowledge

\*One indicator can be used in one or more area.

<b>Area of interest of indicators</b>	<b>Number of indicators</b>
Knowledge	9
Behaviour	52
Health	9
Total*	66

## General considerations on tobacco control

### EVIDENCE

The main intervention/policies reported in the scientific literature were:

- 1 Smoke-free workplaces represent a cost-effective approach;
- 2 Price and tax measures give positive results in the reduction of smoking prevalence, even if of moderate impact;
- 3 The health warning on tobacco products and the pictorial warnings are quite effective in discouraging smoking;
- 4 Mass media campaigns cannot be easily monitored;
- 5 Interventions of proven efficacy/effectiveness include:
  - i. School/university based interventions,
  - ii. Counselling, telephone/mobile counselling,
  - iii. Internet counselling, group-delivered behavioural interventions to achieve long-term smoking cessation, incentives, physician advice;
  - iv. Expert systems, tailored self-help materials and individual counselling, appear to be as effective in a stage-based intervention as they are in a non-stage-based form. The evidence is inconclusive for other types of stage-based intervention, including telephone counselling, interactive computer software and training of physicians or lay supporters.

### POLICY RECOMMENDATIONS

The literature clearly defines the interventions/policies that have been demonstrated to be of proven efficacy/effectiveness, and therefore the Member States are recommended to implement them.

As far as the set of indicators related to tobacco, we recommend that:

- a/ When a decision on the implementation of a policy/intervention has been made, Member States must consider at least three dimensions for monitoring the impact of the policy in the short term:
  - i. Tobacco smoking prevalence
  - ii. Quit rate
  - iii. Initiation rate
- b/ If these indicators cannot be annually monitored, we recommend considering revising the indicators (EUROSTAT, Health for All) for the best fit between a policy/intervention and monitoring\*
- c/ In the meantime, if these indicators cannot be annually monitored, we recommend performing an observational study after the implementation of the policy at the national level.

## **INFANTS, CHILDREN, AND ADOLESCENTS: EVIDENCE AND RECOMMENDATIONS**

The systematic review shows that policies in the school setting are the most referenced, followed by policies at the national level. The outcomes concerning behaviour are the most studied. The main interventions/policies reported in the scientific literature related to adolescents/Children with evidence of effectiveness were:

- School-based programs for smoking prevention, health promotion
- Smoke-free air regulations and enforcement
- Smoking bans in workplaces, public space, etc.
- Voluntary home smoke-free policies
- Increase in taxes on tobacco products

No effectiveness or unclear evidence was found for policies or interventions related to incentives, competitions, lotteries or punishment, and sanctions, especially in high-school students.

The measures applied to assess the outcomes were the same included in the Evidence on the General Population, and they are: smoking prevalence, smoking initiation prevalence. Instead the “tobacco use initiation” seems to be preferred to the indicator “quit rate”.

In comparison with the items included in the World Health Organization collaborative cross-national Health Behaviour in School-aged Children Survey on tobacco consumption in those aged 6-17 years, the item related to smoking is: “How often do you smoke tobacco at present? % of boys and girls that replied ‘at least once a week’ ”.

## Summary list of indicators extracted from “Policy Recommendations”

### A – NUTRITION

- Changes towards a healthy diet
  - Increase in frequency and amount of healthy foods (fruit, vegetables)/average amount of fruits and vegetables available per person per year (kg)
  - Decrease in total fat intake (especially saturated and hydrogenated trans fats) sodium, calories, and reduction in sugar
- Changes in body weight and in the prevalence of overweight and obesity (monitoring of BMI)
- Reduction in serum cholesterol level, blood glucose level, blood pressure as well as other dietary-related health status and nutritional and metabolic diseases

### B – PHYSICAL ACTIVITY

- BMI
- Level of physical activity
- Total energy expenditure (kcal/week)
- Waist circumference
- Time spent in moderate to vigorous physical activity (MPVA) weekly
- Fat mass index (FMI)

### C – ALCOHOL

- Alcohol consumption by- at minimum- gender and age
- Prevalence of high-risk drinkers
- Alcohol related injuries
- Prevalence of alcohol-related diseases
- Mortality for alcohol-related diseases
- Frequency of binge drinking among adolescents

### D – TOBACCO

- Tobacco smoking prevalence
- Quit rate
- Initiation rate
- First use of tobacco (for adolescents)

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## 4 Authorship

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## 5 Acknowledgements

Dr. Emanuele Scafato ISS, Dr. Monica Pace ISTAT, and Dr. Lorenzo Spizzichino, Italian Ministry of Health.

## 6 Annexes

For annexes and supplemental information see website of the Joint Action Cancon: [www.cancercontrol.eu](http://www.cancercontrol.eu) under Policy paper “An Impact Evaluation System to Assess Prevention Outcomes”