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REVIEW ARTICLE

# The European Union Must Act Effectively for a New Plan of Action to Improve the Cardiovascular Health Burden of European citizens: A Narrative Review

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## Abstract

This Narrative Review presents data describing the health burden of Cardiovascular Disease (CVD) within and across the WHO European Region. CVD remains the most common cause of death in the region. Large disparities in data coverage and in country-level morbidity, treatment outcomes and mortality from CVD exist across Europe.

Cardiovascular Diseases (CVD) are the leading cause of death in the European Union (EU) [1]. They cover a broad spectrum of medical disorders that affect the circulatory system (the heart and blood vessels), with atherosclerotic CVD (ASCVD) representing most of the cases. ASCVD is characterized by the abnormal build-up of plaques made of, among other constituents, cholesterol or fatty substances and deposited on the inside walls of a person's arteries. Some of the most devastating manifestations of ASCVD include sudden cardiac death [2], myocardial infarction (heart attack) [3], and stroke (loss of focal neurological function due to infarction or hemorrhage in the relevant part of the brain, retina, or spinal cord) [4].

The COVID-19 pandemic placed unprecedented stress on healthcare systems across the world, and the pandemic severely disrupted medical care for CVD patients and exacerbated cardiovascular-related risk factors [5,6]. The need to increase surge capacity for acute and intensive care beds, combined with the need to prioritize the use of personnel and personal protective equipment for COVID-19 patients led to modifications in regular service provision [7]. Some services were curtailed/postponed due to the number of COVID-19 patients and staff shortages occurred within hospitals and day care centers due to infection/quarantine procedures. Further, patients' access to medical services was hindered due to their own infection/quarantine as well as lockdown or travel restrictions. Existing studies have shown dramatic changes in CVD mortality during the pandemic and a persistent threat may have long-term effects on patients with CVD [8]. The development and implementation of evidence-based preventive and treatment approaches must be supported in all countries by consistent surveillance and monitoring, such that we can quantify the health burden of CVD as well as target interventions and provide impetus for action across Europe.

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## Understanding the Issue

CVD dramatically impacts the lives of many European residents as it is the most common cause of death in the European Economic Area (EEA) member countries. Every year in the EU, more than 6 million new cases of CVD are diagnosed, which cause the death 1.7 of million people and represent around 37% of all deaths [9-11]. This percentage is considerably higher than the other prevalent cause of death, cancer (malignant neoplasms; 22.5 % of all deaths). The CVD burden is generally higher in central and eastern Europe than in northern, southern and western Europe [9,10,12].

Deaths from CVD in those aged <70 years, commonly referred to as premature, are of particular concern, with >60 million potential years of life lost to CVD annually across the WHO European Region. Although more women than men die from CVD, age-standardized rates of both morbidity and mortality are higher in men, and these rate differences are greatest in individuals aged <70 years [1]. Large inequalities in all measures of morbidity, treatment and mortality can be found between countries across the continent and must be a focus for improving health. Large differences also exist in the data available between countries. The development and implementation of evidence-based preventive and treatment approaches must be supported in all countries by consistent surveillance and monitoring, such that we can quantify the CVD health burden as well as target interventions and provide impetus for action across Europe.

Although ASCVD incidence and mortality rates are declining in many countries in Europe, ASCVD is still a major cause of morbidity and mortality [13]. The pathogenesis of ASCVD is complex and multifactorial. Some of the known individual determinants for ASCVD, such as age, sex, race/ethnicity and family history, are intrinsic to the individual and cannot be modified, whereas others are external and can be at least partially modified [14,15]. Established risk factors that can be modified to reduce ASCVD risks include:

- Clinical risk factors such as high blood pressure, high blood cholesterol, excess weight and obesity, and diabetes. Some of these may be partly hereditary.
- Behavioral risk factors such as unhealthy diet,

lack of physical activity, smoking and alcohol consumption.

- Environmental risk factors like exposure to air pollution, noise and chemicals in the environment and the workplace, second-hand smoke, some infectious agents, thermal stress, and limited accessibility to settings that facilitate physical activity like green spaces.

There is growing evidence that the atherosclerotic process, which leads to symptomatic ASCVD, starts at an early age. In young adults, exposure to cardiovascular risk factors, even at levels considered within normal limits, increases the prevalence of subclinical atherosclerosis and is associated with greater risk of cardiovascular events later in life [16]. There is a need, therefore, to identify high-risk features that predict early-onset ASCVD in the 20- to 39-year age range) [15]. These include tobacco use, elevated blood pressure/hypertension, family history of premature ASCVD, hypercholesterolemia, diabetes with diabetes-specific risk enhancing factors, or the presence of multiple other risk-enhancing factors, including in females, a history of preeclampsia or menopause under age 40.

### Potential therapeutic strategies

Pharmaceutical interventions, nutritional strategies, and lifestyle modifications offer complementary approaches towards addressing the primary prevention of cardiovascular disease.

This narrative review aims to elucidate the key pathophysiological mechanisms driving ASCVD, with a particular focus on primary prevention. Furthermore, we will discuss potential

Therapeutic strategies, including nutritional, lifestyle interventions and reducing air pollution exposure, to mitigate cardiovascular morbidity and mortality diseases.

### Strategic planning (2025 - 2030)

**Vision:** The European Action Plan is a major policy objective that aims to leverage financial markets to support sustainable economic growth in Europe, while managing risks stemming from environmental, social and governance issues. The vision of the European Action Plan on Cardiovascular Diseases is the sustainable, continuous and systematic activation of all involved scientific and social bodies for the

prevention and treatment of cardiovascular diseases through efficient, effective and quality services.

**Mission:** The mission of the European Action Plan in CVD is to lay the foundations for an integrated and sustainable horizontal policy aimed at:

- The primary prevention (action to reduce the incidence of disease and health problems within the population, either through universal measures that reduce lifestyle risks and their causes or by targeting high-risk groups) and secondary prevention (early disease detection and treatment, often before symptoms are present, thus minimizing serious consequences) of CVD.
- The effective treatment of CVD.
- The efficient and quality operation of services involved in the primary and secondary prevention as well as rehabilitation of CVD.
- The implementation of the necessary policies and actions through targeted programs.

### Strategic positioning

The reduction of morbidity and mortality rates due to CVD.

### Strategic objectives

- ▶ Gradual and measurable reduction of cardiovascular morbidity and mortality diseases up to 10% by 2030. Increase in patients' life expectancy and improvement of quality of life of patients and their families.
- ▶ Increase in citizens' accessibility to screening services (population screening)
- ▶ Increase in the effectiveness and efficiency of the services involved with prevention, treatment and rehabilitation of CVD.
- ▶ Development of multidiscipline cooperation and social participation in the prevention and the rehabilitation of CVD.
- ▶ The upgrade of the quality of services involved in prevention, treatment and rehabilitation of CVD.
- ▶ Improvement of the capacity to formulate and monitor policies relating to CVD.

### Values and principles of the European action plan

The preparation of the European Action Plan has been based on the principles and values listed below. It is important, however, to ensure that the plan responds to health needs of the population and its contribution to social protection and is economically viable. Collaboration with EU Institutions and national governments is required to take the necessary steps to improve cardiovascular health and help alleviate the CVD burden for Europe's citizens and for a more healthy and productive society.

The Values and Principles of the European Action Plan are included in its Values and Principles adopted by the European Union (Council of the European Union 2022) and World Health Organization (WHO).

#### Values

- ▶ Universality in access to health services.
- ▶ Access to quality health services.
- ▶ Equivalence in access to health services.
- ▶ Solidarity
- ▶ Principles
- ▶ Quality.
- ▶ Safety.
- ▶ Care based on Documentation and Ethics.
- ▶ Activation of the patient.
- ▶ Mass spaces for the development of health promotion actions (healthy settings).

According to WHO recommendations the most suitable places for the development of actions for the promotion of healthy settings are mass spaces where population groups spend a significant part of their day, and where it is easy to reach them. Such spaces are par excellence the school for children and workplaces for adults, but also any other places where gatherings occur (e.g. associations, churches, armed forces, etc.). Health promotion schools (health promoting schools) and workplace health promotion are included in the most important models of good practices, with the most effective approaches to creating a health-promoting environment.

## Expected Results from the Implementation of the European Action Plan

The implementation of the European Action Plan for the Prevention of Cardiovascular Diseases will contribute significantly to the improvement of the health level of the European population and will help to cover the costs caused by these diseases.

### Improving the level of health of citizens and the quality of life associated with health

Ischemic Heart Disease (IHD), one of the most frequent expressions of ASCVD, is responsible for most of the 4 million deaths per year due CVD in Europe [17,18]. However, strong health inequalities in the standardized mortality rates for IHD can be observed among the European countries, which are related to income level. Although the higher is the country income level, the better is the cardiovascular health, mortality cannot be entirely explained by income inequalities and strong geographical disparities are also apparent [19]. There is an urgent need for improved analysis and reporting of data to describe the determinants of cardiovascular health across Europe and policies may need to be tailored to individual countries rather than applying a one-size-fits-all approach.

### Public and private expenditure on cardiovascular diseases: Efforts for cost containment and rational allocation of resources

The direct economic costs include the costs of health services and pharmaceuticals care of cardiovascular diseases. A study on the economic burden of CVD across the 27 EU countries in 2021 estimated the CVD cost to the EU €282 billion annually, with health and long-term care accounting for €155 billion (55%), equaling 11% of EU-health expenditure [20]. Productivity losses accounted for 17% (€48 billion), whereas informal care costs were €79 billion (28%). CVD represented a cost of €630 per person, ranging from €381 in Cyprus to €903 in Germany. IHD accounted for 27% (€77 billion) and stroke for 27% (€76 billion) of CVD costs. The European Action Plan can lead to a significant reduction in the cost of care of CVD, both due to the expected reduction in incidence occurrence of new cases and relapses, as well as due to improvement and standardization pharmaceutical treatment of these diseases.

## Proposed key axes and actions of the European action plan

**1<sup>st</sup> Axis: Primary prevention** – Control and mitigation of risk factors  
**Action 1: Healthy nutrition** – Prevention of obesity.

**Description:** Excessive fat deposition in obesity is widely considered the result of disequilibrium between energy intake and expenditure. Despite specific public health policies and treatment efforts to combat the obesity epidemic, >2 billion people worldwide are overweight or obese [21]. The central nervous system circuitry, fuel turnover and metabolism as well as adipose tissue homeostasis are important to comprehend excessive weight gain and associated comorbidities. Obesity has a profound impact on quality of life and is a major risk factor for dyslipidemia, hypertension and diabetes. Diet, physical activity or exercise and lifestyle changes are the cornerstones of obesity treatment. Several dietary patterns can be adopted, where the predominance of fruits, vegetables, wholegrain cereals, and low-fat protein sources is more important than the precise proportions of total energy provided by the major macronutrients. Specific recommendations include salt restriction to values below 5 g daily as indicated by the results of numerous cost-effectiveness analyses which demonstrated that a reduction of dietary salt at the population level is highly cost-effective and cost-saving in reducing CVD [22,23]. Further, limiting saturated and trans fats and monitoring carbohydrate consumption, and increasing dietary fiber is of outmost importance. A Mediterranean-type diet, where fat sources are derived primarily from monounsaturated oils, is protective against ASCVD.

**Action 2: Smoking reduction.**

**Description:** Tobacco smoking is a major risk factor for preventable morbidity and mortality. It is estimated that more than a billion people smoke worldwide, and without increases in cessation, more than half will die prematurely from tobacco-related complications [24]. Brain changes contribute to the maintenance of nicotine or tobacco use despite knowledge of its negative consequences, a hallmark of addiction. The effectiveness of psychosocial and pharmacological interventions in helping people quit smoking has been demonstrated. It is important to carry out a multifaceted and integrated policy to combat smoking, including the implementation of the necessary actions and legislation regulations



within the frame of targeted programs, through an effective health and social system of interventions and communication of cessation of tobacco use. As most people who smoke ultimately relapse, it is important to enhance the reach of available interventions and to continue to develop novel interventions. These efforts associated with innovative policy regulations (aimed at reducing nicotine content or eliminating tobacco products) have the potential to reduce the prevalence of tobacco and nicotine use and their enormous adverse impact on population health.

**Action 3:** Reduction of alcohol consumption.

**Description:** For a long time, it has been considered that ethanol intake has a biphasic impact on the cardiovascular system. Many studies and meta-analyses reported the existence of a “U-type” or “J-shaped” relationship between alcohol and ASCVD, as well as mortality, indicating, that low to moderate alcohol consumption decreases the number of adverse cardiovascular events and deaths compared to abstinence, while excessive alcohol use has unquestionably deleterious effects on the circulatory system [25]. However, the cardioprotective effects of low doses of alcohol have been questioned by epidemiological data and excessive alcohol has been related to cardiac arrhythmias, dilated cardiomyopathy, arterial hypertension, diabetes mellitus, and ASCVD [26]. Building a multifaceted and integrated policy, therefore, for prevention and response on the effects of alcohol and alcoholism, as well as the implementation of necessary actions, policies and legislation, on the basis of targeted programs, through a horizontal one, a specialized and effective health and social system of interventions and communication on avoiding harmful use of alcohol.

**Action 4:** Development of integrated prevention and promotion programs of health in children and youth.

**Description:** The atherosclerotic lesions that are the basis of ASCVD can start already in childhood. For this reason, ASCVD prevention should be undertaken very early both in the general population and, in a targeted manner, in subjects at cardiovascular risk [27]. Preventive strategies should promote physical activity, correct eating habits and reduce exposure to pollutants. The main actors responsible for carrying out these preventive interventions are the local and national political authorities. Development of informative and educational programs related

to prevention of CVD in children and young people with active participation of the target population should be implemented. Modification of unhealthy behaviors and habits, to improve the overall health of children and young people should widely adopted early. Participation of people who care for children in the activities of the program is mandatory, so that they behaviors and habits will be adopted, which will maintaining children's health.

**Action 5:** Project development for prevention and Health Promotion (WHP) in the Workplace.

**Description:** Workplaces have been identified by the WHO as a priority setting for health promotion [28]. WHP can include primary and secondary strategies ranging from a single intervention to multicomponent health programs. Historically, there has been significant focus on behavior change through education and motivational counseling, placing responsibility on the individual for their health. However, human behavior is not only based on conscious consideration or knowledge but is influenced by the environment with little or no conscious awareness [29]. 11 Environmental strategies do not require the worker to participate in a specific program and while demanding less conscious involvement, they still rely on the individual taking an active role in these interventions. It is anticipated that WHP can favorably impact major modifiable risk factors for CVD such as smoking, overweight/obesity, alcohol, physical inactivity, and overweight/obesity [30].

**Action 6:** Information Campaign and Health Education of the General Population.

**Description:** Health literacy in higher-risk populations must be improved, but research remains underdeveloped. Future health literacy interventions should focus on (a) improving the quality of health communication that reaches a diversity of populations, especially by improving frontline professional skills and support; (b) enabling people to develop transferable skills in accessing, understanding, analyzing, and applying health information; and (c) ensuring that priority is proportionate to need by reaching and engaging the population groups who are disproportionately affected by low health literacy. Informing the general population about the prevention of CVD [31]. Peer education, whereby peers teach their other peers about health issues is an approach growing in popularity across schools, most likely due

to the fact that adolescents prefer to seek help for health-related issues from their peers rather than adults or professionals. School-based peer education interventions have been implemented worldwide spanning a wide range of health areas including CVD and appear to demonstrate to be effective, suggesting that peer education may be a promising strategy for health improvement in schools [32].

**Air pollution and cardiovascular disease:** Air pollution, both outdoor and indoors, is a risk factor for cardiovascular disease. Ischemic heart disease and stroke are the most common causes of preventable deaths attributable to air pollution exposure, followed by lung diseases and lung cancer (EEA, 2021). Ambient air pollutants known to contribute to cardiovascular disease include particulate matter, nitrogen oxides, black carbon and carbon monoxide, among others. Evidence of impacts related to ambient ozone exposure is less clear.

Cardiopulmonary organs are the first line of contact with air pollutants. Some can initiate immediate reactions, such as oxidative stress and inflammation that put pressure on the cardiovascular system. However, the effects of air pollution on the development of cardiovascular disease typically build up over the long term: for example, a  $10\mu\text{g}/\text{m}^3$  increase in long-term exposure to fine particulate matter ( $\text{PM}_{2.5}$ ) is associated with an 11% increase in cardiovascular mortality. Long-term air pollution exposure is associated with stroke and coronary heart disease, even at pollutant concentrations lower than current EU limit values. For example, a recent comprehensive multi-country study in some areas within the EU with low levels of pollution found that stroke was still associated with  $\text{PM}_{2.5}$  (hazard ratio 1.10 per  $5\mu\text{g}/\text{m}^3$  increase), nitrogen dioxide ( $\text{NO}_2$ ) (1.08 per  $10\mu\text{g}/\text{m}^3$  increase) and black carbon (1.06 per  $0.5\cdot 10^{-5}/\text{m}$  increase).

Over 7% of cardiovascular deaths in EEA member and cooperating countries [1] are due to air pollution (outdoor and indoor). For some specific cardiovascular diseases, the proportion due to the environment is higher. Around 8.8% of Ischemic Heart Disease (IHD) deaths are due to air pollution, as are 9.3% of stroke deaths (GBD Collaborative Network, 2020). The fraction of cardiovascular deaths attributed to the environment is overall higher in south-eastern and eastern Europe, with the highest proportion of attributable CVD deaths in Macedonia with almost 19%. Northern European countries generally have

lower values, with the lowest fraction of CVD cases due to air pollution observed in Sweden (1.11%).  
**Action 7:** Information campaign on promotion of physical activity.

**Description:** The term ‘social media’ broadly refers to any website or application that allows its users to generate and exchange content. In recent years, the number of active social media users worldwide has continued to increase, rising from 2.73 billion in 2017 to 4.59 billion in 2022 and by 2027, this number is projected to reach 5.85 billion [33]. As a result of their global accessibility and scalability, social media platforms are emerging as a favorable tool in health research. This includes health promotion interventions that aim to promote changes in health and health behaviors, such as physical activity levels, diet quality, anthropometric measurements and psychological health participants on a range of devices, including computers, laptops, mobile phones and tablets, at their convenience [34]. These interventions may also be more cost effective than traditional interventions. Moreover, the ease of access may allow a population with competing family, work and personal demands to participate in health promotion interventions at their convenience while eliminating the need to attend time-consuming in-person sessions [35].

**2<sup>nd</sup> Axis: Secondary prevention** – Population screening of pathological risk factors.

**Action 1:** Co-creation of national, regional and local programs for the early diagnosis and control of hypertension.

**Description:** High blood pressure is one of the most important risk factors for IHD, stroke, other CVD, chronic kidney disease and dementia and a leading preventable cause of CVD morbidity and mortality worldwide [36]. One of the global non communicable disease targets adopted by the World Health Assembly in 2013 is to lower the prevalence of raised blood pressure by 25% by 2025 compared with its 2010 level [37]. Raised blood pressure is defined as systolic blood pressure (SBP)  $\geq 140$  mmHg or Diastolic Blood Pressure (DBP)  $\geq 90$  mmHg. Measures such as increasing the availability and affordability of fresh fruits and vegetables, lowering the sodium content of packaged and prepared food and staples such as bread, and improving the availability of dietary salt substitutes can help lower blood pressure at the population level. The implementation and

effectiveness of hypertension treatment exhibits wide variability across countries influenced by factors such as a country's financial resources, health insurance and health facilities, frequency of people interaction with physicians and non-physician health personnel, extent of adoption of clinical guidelines, and the availability of medicines [38]. Scaling up treatment coverage and improving its community effectiveness can substantially reduce the health burden of hypertension.

**Action 2:** Co-creation of national, regional and local programs for the early detection and control of diabetes mellitus.

**Description:** From 2021 to 2050, the global burden of diabetes will increase from 529 million people to 1.3 billion people [39]. Diabetes is a serious chronic disease with substantial premature morbidity and mortality, affecting people across the lifespan, with incidence increasing in young people (up to age 25 years) and, as of 2021, a prevalence of gestational diabetes as high as 13.0–25.9% globally [40]. Type 2 diabetes accounts for more than 90% of patients with diabetes and leads to microvascular and macrovascular complications that cause profound psychological and physical distress to both patients and carers and put a huge burden on health-care systems [41]. Despite increasing knowledge regarding risk factors for type 2 diabetes and evidence for successful prevention programs, the incidence and prevalence of the disease continues to rise globally. Early detection through screening programs and the availability of safe and effective therapies reduces morbidity and mortality by preventing or delaying complications [42]. Increased understanding of specific diabetes phenotypes and genotypes might result in more specific and tailored management of patients with type 2 diabetes, as has been shown in patients with maturity onset diabetes of the young.

**Action 3:** Co-creation of national, regional and local programs for early detection and control of hypercholesterolemia.

**Description:** IHD attributable to hypercholesterolemia (high plasma levels of low-density lipoprotein cholesterol, LDL-C) remains a relevant global cause of morbidity and mortality despite improvements in treatment, the main reason being the global increase in life expectancy, which increases the number of subjects aged 60 + years exposed to high LDL-C [43]. Further, significant

differences exist among different world regions according to the income status. In high-income countries, the use of cholesterol-lowering drugs over the past 3 decades has significantly decreased the risk for of cardiovascular events attributable to elevated plasma LDL-C levels [44]. These reductions have not been observed in other income groups, due to several factors, two of the most important being the lack of timely implementation of lipid-lowering strategies [45] and the lower awareness of the burden of hypercholesterolemia [46]. Since the increasing burden of hypercholesterolemia and related CVD raises a considerable threat to public health, increasing the ability of community health workers to address CVD prevention through screening programs conducted locally (consisting of screening, referral to community health clinics, and follow-up) with the cooperation of the Ministries of Health and Education would provide a tool for the early identification, treatment, and prevention of CVD [47].

### 3<sup>rd</sup> Axis 3: Multidiscipline cooperation.

**Action 1:** Multidiscipline Cooperation for the Promotion of Healthy Nutrition and Obesity Control

**Description:** Obesity emerges as a crucial public health threat, with numerous nations witnessing a staggering rise in prevalence over the recent decades [48]. This escalating health crisis increases the risk of several diseases, including type 2 diabetes mellitus, fatty liver disease, hypertension, CVD, dementia, osteoarthritis, and various cancers, significantly contributing to morbidity and mortality. The adverse effects of obesity extend beyond health, and include unemployment, social disparities, and impaired life quality [49]. The ineffectiveness of conventional methods to manage obesity highlights the need for a new approach shifting away from emphasizing individual behavior change and promoting strategies that address environmental factors. The role of a multidisciplinary team, including nurses, dietitians, and psychologists, to support patients through their weight loss journey should not be neglected [50]. Multidisciplinary management of obesity has been recognized as an effective means to improve weight loss and associated health outcomes. Such an approach may be implemented by:

- Development of multidiscipline cooperation for the implementation of European Nutrition Policy.



- Promote the coordination of actions within the framework of the European Nutrition Policy.
- Multidiscipline cooperation to tackle the environment that causes obesity, with the aim is to promote sport and forms of mobility that promote physical activity.
- The action will be implemented in the context of the implementation of the respective Action Plan.

**Action 2:** Multidiscipline cooperation on tobacco and alcohol.

**Description:** Alcohol and tobacco are among the most widely consumed psychoactive drugs, both substances being consumed for several reasons, including their effects on the brain and body, as well as for social and cultural reasons [51]. However, alcohol and tobacco also rank among the most harmful psychoactive substances. They are leading causes of morbidity and mortality, and can cause harm not only to the individual, but to society as a whole. There is a need to change social norms in order to effectively implement interventions that target both alcohol and tobacco use in primary care clinics [52]. In this regard promotion of the coordination of actions against smoking and alcohol both in national and European level are necessary and the Action will be implemented in the context of the implementation of the respective Action Plans.

**Action 3:** Multidiscipline cooperation in health information and education.

**Description:** Social Determinants of Health (SDOH) describe conditions in one's environment that have an impact on health, quality-of-life, outcomes, and risks [53]. These include among others information and education. SDOH manifests as inequalities in cardiovascular risk factors and disease, and, therefore, contributes to CVD-related morbidity and mortality. The action, therefore, requires holistic management, as for the implementation of it requires the implementation of publicity and communication actions by the Action Plans for the smoking, alcohol, nutrition, and the environment.

**Objectives:** Informing and sensitizing pediatricians on the prevention of CVD in children.

- Informing nursery nurses, kindergarten teachers about the prevention of childhood obesity in preschoolers.

- Informing parents about healthy eating, obesity prevention, prevention alcohol consumption and smoking prevention.
- Informing the school community about healthy nutrition, obesity prevention, prevention of alcohol consumption and smoking prevention.
- Educating school-age children and adolescents healthy eating.
- Increase physical activity among children and young people.
- Reducing alcohol and tobacco consumption by young people.

**4<sup>th</sup> Axis:** Research

**Action 1:** Research and innovation projects.

**Description:** Although the burden of CVD is immense and greater than any other condition, CVD receives less research funding than other clinical areas. The CardioScape project has shown that research in CVD is disproportionately low at European level and that the research landscape is particularly fragmented [54]. The overall aim must be to increase both the strength of European cardiovascular research and the overall medical value achieved by this research. The latter is of increasing importance in the context of restricted research budgets and initiatives for 'Responsible Research and Innovation' (RRI) on the national as well as on the European level [55,56].

**Objectives:** The contribution to the scientific basis of the design of actions to address CVD.

- Assessing the advantages and disadvantages of potential prevention measures cardiovascular diseases.
- The promotion of cooperation and exchange of research and scientific data information with EU countries and third countries.

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