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# Childhood overweight and obesity abatement policies in Europe

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## Summary

Over the past two decades, a concerted effort to combat the rising tide of childhood overweight and obesity has taken shape. The World Health Organization (WHO) Commission on Ending Childhood Obesity (ECHO) provides recommendations for six priority areas of action, including the promotion of healthy food consumption, promotion of physical activity, preconception and pregnancy care, early childhood diet and physical activity, healthy nutrition and physical activity for school-aged children, and community-based weight management. This paper provides a snapshot of policies and measures aligned to these areas of action within the WHO European Region in order to encourage other countries to make similar efforts. Examples are drawn from Portugal (sugar-sweetened beverage tax, integrated nutrition strategy), the United Kingdom (soft drink levy, active commuting programs, urban design principles), Lithuania (prohibition of energy drinks), Norway (industry and government partnerships to promote healthier foods, nutrition education curriculum for schools), Hungary (tax subsidies to promote healthy diets), the European Union (cross-border marketing regulations, preconception and pregnancy care), Slovenia (food marketing restrictions), Spain (marketing restrictions within educational settings), Poland (investing in sports infrastructure), Russia (increasing sports participation), Estonia (redevelopment of the physical education curriculum), Netherlands (preconception and pregnancy care), Croatia (conditions to support breastfeeding), Austria (perinatal and early childhood nutrition), Czechia (life-course strategy), San Marino (nutrition and physical activity for school-aged children), Ukraine (potable water for schools), Ireland and Italy (community-based weight management approaches). Our findings suggest that a large disparity exists among the type and breadth of policies adopted by Member States, with a mix of single-issue policy responses and more cohesive strategies. The role of data, implementation research, and ongoing surveillance of country-level progress related to childhood overweight and obesity policies are discussed as an essential part of the iterative process of policy development. Additional work to systematically gather context-specific information on policy development, implementation, and reach according to ECHO's six areas of action by WHO European Region countries will inform future policy paradigms within the region.

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KEYWORDS
childhood obesity, childhood overweight, Ending Childhood Obesity Commission, obesity policy

## 1 | INTRODUCTION

The silent epidemic of childhood overweight and obesity[1] threatens the health of current and future generations. It is underscored by increasing recognition that the perinatal period, infancy, and childhood carry a cumulative influence on long-term health over the life-course, such that children with overweight and obesity are at a greater risk of adult obesity and the development of non-communicable diseases (NCDs) later in life.[2,3] A social gradient further compounds childhood overweight and obesity rates and its associated risk factors, disproportionately affecting those from lower socioeconomic groups, lower levels of educational attainment, and underserved areas.[4]

The European Region of the World Health Organization (WHO) carries the highest burden of childhood overweight and obesity of all WHO regions, and is projected to rise further if left unchecked.[5,6] Many WHO European countries are off-track to meet their commitments of preventing an increase in overweight among children under the age of 5, school-aged children, and adolescents by 2025.[7] The transition of dietary habits and a mismatch with energy expenditure, within the setting of shifting socioeconomic and cultural factors, are thought to be driving the unprecedented trend of childhood obesity within the region.[8] The double-pronged consequences of the COVID-19 pandemic on childhood obesity—that is, the exacerbation of environmental risk factors that lead to obesity[9] and the increased susceptibility of children with obesity to SARS-CoV-2[10]—draw attention to the importance of ongoing action on childhood obesity to mitigate both its short– and long-term health and socioeconomic consequences.

In recognition of the challenges posed by childhood overweight and obesity, the WHO Commission on Ending Childhood Obesity (ECHO) was established in 2014. It embarked on a comprehensive approach to address the social, economic, and behavioral determinants of childhood obesity in its final report and implementation plan.[8] The plan, guided by a life-course and rights-based approach, aims to curtail the obesogenic environment through a wide repertoire of integrated measures spanning regulatory mechanisms, economic instruments, multisectoral collaborations, procedural guidelines and community education, empowerment of families and communities, health promotion activities, and urban planning considerations.[11] Within the European region, policy priorities and guidance are set out by WHO in the WHO European Food and Nutrition Action Plan 2015–2020,[12] Physical Activity Strategy for the WHO European Region 2016–2025,[13] and the WHO European Programme of Work 2020–2025[14], and by the European Union (EU) in the EU Action Plan on Childhood Obesity 2014–2020.[15] The international roadmap and framework entailing the WHO Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020[16] emphasises many shared objectives with these regional plans.

In order to promote policy development to abate childhood overweight and obesity, we document examples that highlight the feasibility and breadth of policy approaches adopted by WHO European countries, capturing the six key areas of action of the ECHO implementation plan, several of which are mirrored in WHO's European Food and Nutrition Action Plan 2015–2020 and the Physical Activity Strategy for the WHO European Region 2016–2025.

## 2 | METHODS

We highlight policies and measures related to the six key areas of action recommended by ECHO for children and adolescents: (1) promoting intake of healthy foods, (2) promoting physical activity, (3) preconception and pregnancy care, (4) early childhood diet and physical activity, (5) school-based nutrition and physical activity for children, and (6) weight management.[11] We employed a narrative approach, identifying country-level examples from within the WHO European Region for each of the policy actions recommended by the Commission. Policies selected were contemporary in nature, a reflection of the geographic territory of the WHO European Region, and entailed sufficient detail. In cases where policies specific to children were not available, population-based policies that included children were described. The content of policies was derived from online databases, including the WHO NCD Document Repository, Global database on the Implementation of Nutrition Action (GINA), and the World Cancer Research Fund's repository of global data on nutrition and physical activity policy actions. Relevant policies were also identified by searches of the formal literature from PubMed and Google Scholar and gray literature of published WHO reports.

## 3 | RESULTS

### 3.1 | Promoting healthy diets and reducing unhealthy foods and sugar-sweetened beverages

This action aims to empower individuals to make informed decisions about diet through taxation mechanisms, marketing restrictions, improved labeling practices, equity of access to nutritious foods, and distribution of dietary guidelines.

One of the key ways that countries can modify the food environment is by limiting the consumption of added sugars.[17] The high consumption of soft drinks has been linked to obesity, diabetes, cardiovascular disease, hypertension, metabolic syndrome, dental caries,

and some cancers,[18] and in 2015, the WHO recommended limiting intake to 10% of total energy consumption.[17] Reducing sugar consumption has been suggested as a highly cost-effective intervention for childhood obesity, hence the WHO recommends implementing fiscal policies to increase the price of sugar-sweetened beverages (SSBs) to achieve this.[19,20] Sugary drinks taxes in countries like Mexico have demonstrated that such measures effectively modify behavior.[21]

Within the WHO European Region, the United Kingdom introduced a Sugar Drink Industry Levy (SDIL) in 2017.[22] The levy, imposed on producers and importers, is based on the sugar content of drinks. Revenue from the levy is reinvested into programs to reduce obesity and encourage physical activity and balanced diets for school-aged children. The SDIL successfully stimulated importers and manufacturers, seeking to circumvent the levy, to reduce sugar content in SSBs below the sugar content threshold at which it applied, although outcomes specific to childhood obesity are unclear.[23] Employing an alternate fiscal lever, Portugal in 2017, under the special consumption tax (Decreto-Lei No 73/2010, de 21/6), imposed a direct sugar tax on mineral, flavored, and aerated waters that contain added sugars or other sweeteners.[24] This arose in response to the WHO's Childhood Obesity Surveillance Initiative (COSI) data showing the majority of children (80%) aged 6 to 8 years old were drinking soft drinks regularly. Evaluation of the tax found that it led to not only a reduction in the demand for SSBs but also product reformulation, with an estimated 11% reduction in total energy intake from sweetened beverages.[24] It also provided a rare insight into projected age-specific impacts, with a decrease of 7.82 obesity cases per year for children aged 0 to less than 10 years old, although larger impacts were seen in adolescents and adults aged 18–65.[25]

Choice of food is influenced not only by physiological need and genetics but also by economic factors (affordability and availability), sociocultural factors (traditional dietary practices and customs, and the influence of family and environment), and nutritional literacy, prompting the need for broad interventions targeting environmental and social norms to allay detrimental discretionary choices.[26] This can be seen in the case of Lithuania, where an estimated 10% of school-aged children consumed energy drinks at least once a week, a source of high levels of caffeine and added sugars. In response, a statutory ban was issued in 2014 on the sale of energy drinks to youth under 18 years of age.[27] This was supported by the prohibition of advertising and promotion of energy drinks to persons under 18 years of age in educational institutions, sporting venues and events, or via media outlets. Impact assessments of these policies on childhood obesity were not available.

Foods high in saturated fat, sugar, and salt are high in energy, low in micronutrients, inexpensive, and heavily marketed, and are a significant contributor to overweight and obesity.[28] Data show that there is increasing consumption of these foods among children, particularly from low-income families.[29] Norway has taken a collaborative approach with industry to improve population-level dietary intake, with the Directorate of Health and food industry signing an agreement for 2016–2021 to reduce salt intake by 8 g per person per day and added sugar by 12.5% by 2021, and a longer term goal of lowering the contribution of saturated fat to energy intake to 10%. In conjunction, it advocates the increased consumption of fruits, vegetables, wholegrains, and fish, consistent with national dietary guidelines.[30] Additional objectives aim to influence consumer behaviors about nutritional and health literacy, and the need to monitor progress of the agreement.[30] The Norwegian Salt Partnership (which comprises the salt arm of the overall partnership and served as a precursor to the wider collaboration) consists of 91 partners as of 2019 that work to reduce salt content in food products (in all food groups) and served meals by facilities (e.g., canteens), labeling of salt content in food products, and communication campaigns on nutrition and diet. Indeed, the secondary effects of this initiative flow onto the composition of unhealthy foods and improving the obesogenic environment that can lead to childhood obesity.[31] Salt intake for Norwegians at the outset of the Salt Partnership in 2010–2011 was estimated to be considerably higher than the recommended intake at 10 g per day for men and slightly less for women.[32] An impact assessment of the Salt Partnership was carried out for the 2015–2018 period and revealed that approximately 40–50% of food categories, depending on criteria, met the salt content target; however, there have been no accompanying surveys to measure changes in population salt intake.[32]

In stark contrast, Hungary has leveraged fiscal policy to target unhealthy foods, introducing a public health product tax in 2011 based on the sugar, salt, and methylxanthine content of prepackaged foods, with revenue reinvested into the reformulation of foods and into the health sector.[33] Incentives were also introduced via reduced taxes for poultry, milk, and fish products to promote a healthier food environment.[33] Longitudinal evaluations of Hungary's taxes have found a sustained reduction in consumption of goods with increased taxes, and that more than two thirds of the population adapted to healthier alternatives, most frequently mineral water, fresh fruit and vegetables, and herbs and spices.[33] Revenue from the tax has also met forecasts and contributed to increased investments in the health sector.[33]

The promotion of healthy diets is often overshadowed by advertisements for foods high in saturated fat, sugar, and salt, a profound commercial determinant of health. Children are particularly susceptible to marketing of unhealthy foods.[34] Cross-border marketing is addressed by the EU's Audiovisual Media Services Directive (AVMSD),[35] as a coordinated attempt to align national policies to a minimum standard across TV and on-demand services, with the goal of protecting children and consumers from the marketing of unhealthy foods and beverages. Slovenia has transposed the AVMSD in its Act on Audiovisual Media Services, which restricts food marketing during children's programming and outlines a code of conduct regarding the advertisement of foods with an energy-dense profile, or with the potential to cause excessive consumption of fats, trans-fatty acids, salt, or sugar.[36] The WHO Regional Office for Europe nutrient profile model[37] forms the basis upon which the guide is implemented, with Slovenia being one of the earliest adopters of the rigorous model.[38] Marketing bans are also extended to the educational sector, as seen in the preschool and school settings in Spain under the Law on Nutrition and Food Safety.[38] A report on marketing of foods to children in the WHO European Region found that many countries were deficient

in regulations addressing targeted behavioral advertising on social media as well as exposure to advertising during peak children's viewing times rather than children's programming.[38] It also found that self-regulatory codes of broadcast advertising were not adhered to and largely ineffectual.[38]

National nutritional policies often encompass a wide variety of actions, as epitomized by Portugal. The Portuguese government declared into law the Integrated Strategy for the Promotion of Healthy Eating (EIPAS).[39] The crux of the strategy is defined by "health in all policies" as endorsed by the WHO and steered by a unique collaboration between several ministries to carry out 51 actions to realize this plan (the absence of such a collaboration was cited as an obstacle to previous plans). Four primary objectives are presented and align with Recommendation 1 outlined by ECHO: first, the creation of healthier food environments through monitoring of the nutritional composition of food, food reformulation, food availability in different public settings (including a food aid program for low-income groups to tackle food insecurity which can lead to a higher risk of unhealthy diets), and improvement of food availability in the catering sector; second, improved quality and accessibility to food choices via an interpretative front-of-pack nutrition labeling model, restrictions on marketing to children, and health promotion and communication at local settings and in public institutions; third, the development of health literacy of consumers starting from the pediatric age, with promotion of the Mediterranean diet, and efforts to improve the nutritional knowledge of both the public and health professionals; and fourth, a focus on innovation and entrepreneurship in healthy eating.[39] This follows the relative success of the earlier Portuguese National Programme for the Promotion of Healthy Eating 2012–2015 commended for effectively communicating information about food and nutrition, supported by its novel digital strategy. Output indicators at this nascent stage of the program included the evaluation of childhood obesity, salt consumption, and intake of breakfast by school-aged children.[40]

### 3.2 | Encouraging physical activity, whilst tackling sedentary behaviors

Measures to promote physical activity have in many countries preceded the introduction of policies aimed at overweight and obesity. The mainstay of this recommendation is to ensure the availability of infrastructure to boost physical activity opportunities for children and the formation and distribution of physical activity guidelines.

One way to promote physical activity among children is to provide the means to participate in sports, as part of school-based activities, sports competitions, or for leisure. From 2016 to 2019, Poland funded the School Sports Infrastructure Development Programme to renew or develop school-based sports infrastructure for physical education, to enable children to spend leisure time actively, and to facilitate sports competitions.[41] This was in parallel with investments made to develop local and regional sports infrastructure and represented the highest year-to-year investments since 2010.[41] Overall, 6098 sports facilities were completed as a result of these programs, and a gradual uptake of sports and physical activity occurred across Polish society.[41] The Russian Federation is endeavouring to increase sports participation rates through "The Sport is the Norm of Life project," which is part of the national Demography project.[42] This initiative aims to increase the level of physical activity among children and youth by up to 86% by 2024, through a mix of new sports infrastructure (e.g., gyms, sports grounds, and sports schools) and promotion of sports in schools and workplaces.[42]

School-based physical activity is another way to help ensure that children stay active. A nexus of the Fundamentals of Estonia sports policy 2030 is to recalibrate physical education that is conducive to lifelong physical activity and imparts a desire to be active.[43] This approach can be seen in the Schools in Motion project in Estonia, a multicomponent approach to physical activity incorporating active lessons, active recesses, active transport, physical education, and the integration of physical activity into other subjects.[43] The Physical Activity Strategy for the WHO European Region recognizes the limited opportunities for physical activity during school hours, other than during physical education, and recommends that future teachers are equipped with knowledge and skills on health-enhancing physical activity to promote physical activity throughout the school day.[13,43]

Active transport is another way to encourage children to be physically active and reduce sedentary behavior. Toward this end, the United Kingdom initiated several cycling program schemes, including Bikeability, Modeshift, STARS, and The Big Bike Revival, to encourage active commuting to and from school and was supported by youth training programs, reward schemes, and equipment maintenance.[44] The Active School Travel Programme in Northern Ireland, for instance, rolled out across 22% of schools in the country in 2016–2017, saw an increase in the number of children who walked, cycled, or scootered from 36% to 46% by the end of the school year.[43] Urban design and layout policies have also been informed by initiatives to foster physical activity in the general population through intersectoral collaborations.[44]

### 3.3 | Strengthening preconception and antenatal advice regarding NCD prevention in offspring

Maternal weight during the preconception and antenatal periods is recognized as a crucial determinant of childhood obesity. Mitigating gestational complications and ensuring optimal maternal nutrition during this period can reduce the risk of intergenerational obesity.

In the Netherlands, a whole-of-systems approach is applied in the Amsterdam Healthy Weight Programme (launched in 2013).[5] A vital component of the program is the "first 1000 days approach," which extends to preconception and antenatal risk minimization and the promotion of healthy weight among expectant mothers. It incorporates counseling for expectant mothers, information provision to pregnant women about healthy diets, screening of infants at risk of obesity, and additional support of adolescent parents and mothers from low socioeconomic backgrounds. At its rollout, Amsterdam had a notably higher youth (18 years of age and under)

overweight/obesity prevalence rate of 21% compared with the nationwide average of 15%.[5] A review of the program in 2017 reported an improvement in obesity and overweight rates, including children from low socioeconomic backgrounds, and an uptake of breastfeeding, although there was an unexplained increase in the number of 2-year-olds with overweight.[45]

The EU has also taken action to promote maternal nutrition. The EU Action Plan on Childhood Obesity 2014–2020[15] prioritizes the importance of conditions that are conducive to a healthy start in life. It encourages healthier food habits and physical activity in pregnant women, such as folic acid supplementation. It recommends increasing prenatal awareness of a healthy weight range preconception, and the provision of counseling support for families at risk of overweight or obesity. In its midterm evaluation, 24 EU Member States provided nutritional guidance before, during, and after pregnancy, with only a few countries in Central and Eastern Europe lacking policy action in this area.[46]

### 3.4 | Supporting healthy diet, quality sleep, and physical activity during formative years, to engender lifelong healthy habits

A healthy lifestyle from birth, characterized by breastfeeding, physical activity, and access to healthy foods from family and in the community, supports a child's optimal growth and development.

Croatia has mandated a constellation of policies and regulations to support breastfeeding: a national breastfeeding promotion and protection program (2015–2016), statutory rights to breastfeed during working hours and for pregnancy and breastfeeding leave, and the provision of birth support including breastfeeding counseling.[47] The World Breastfeeding Trends Initiative in 2018 found that Croatia had the highest exclusive breastfeeding rate for the first 6 months (65%) among European countries and scored highly in several indicators, such as the adequacy of funding of national policy and the number of maternity wards that support the timely initiation and establishment of breastfeeding.[48] Other laws stipulate appropriate foods for infants and young children, including processed cereal-based foods for infants.[47]

In Austria, "Healthy eating from the start!" is a health promotion program designed to establish healthy nutritional habits from birth, providing targeted groups with curated knowledge from experts, and catering to different educational backgrounds and languages.[49] The program targets pregnant and breastfeeding women and families with children up to 10 years of age and delivers workshops on nutrition during pregnancy, lactation, and complementary feeding. Evaluation of the program was unavailable.

### 3.5 | Embedding health literacy and healthy environments across educational systems and settings

A school environment that seeks to improve food and beverage options with the provision of healthy meals and access to potable water, facilitates physical activity, and educates children and parents/carers about nutrition and healthy lifestyles can form healthy habits for a lifetime.

In Czechia, a life-course health approach forms part of the Health 2020: National Strategy.[50] It highlights the importance of health promotion and embraces a proactive agenda to empower individuals to attain their full health potential over the life course. It focuses on the role of health literacy, with peer-to-peer education, youth organizations, and school-based programs playing central roles in its delivery.

With an estimated 31% of primary school children with overweight and obesity in 2014, San Marino passed a resolution to coordinate health promotion and educational activities in schools as part of its national health plan for 2015-2017.[5] Stakeholders, including educators and families, supported activities across several aspects of the school setting, including the provision of healthy foods in school canteens, development of sports infrastructure, addressing psychological aspects of overweight and obesity, and a commitment to participate in periodic international surveillance surveys that also encompass other NCD risk factors. A working group was established to improve school catering by sourcing sustainable, organic, locally grown produce in alliance with the agricultural sector. Educational opportunities to instill improved nutritional and eating behaviors among children also arose as a result of this collaboration, delivered through science classes and bespoke workshops.[51] Evaluations to measure efficacy of the policy entailed school-based evaluations to assess knowledge acquisition of children, nutrition and dietary assessments of parents and educators, and surrogate measures derived from national surveys, which documented incipient decreases in childhood overweight and obesity prevalence rates in 2016.[51]

The importance of nutritional education is also found in Norway, where the Directorate of Education has embedded food preparation classes as part of the curriculum in food and health (MHE1-02) for children in Grades 4, 7, and 10.[52] The curriculum entails the topics of healthy diet (involving cooking and preparation of healthy and safe meals), sustainable food habits and consumption, and customs and cultural identity associated with food. One focus-group based study of students and teachers in three schools in Southern Norway found that emphasis was given to practical cooking demonstrations, whereas pedagogical outcomes related to nutritional education were often relegated due to time pressures.[53]

Interventions that provide access to and encourage water consumption, especially in school settings, have been shown to reduce the risk of obesity and soft drink consumption among children.[54,55] Ukrainian policy, Drinking Water of Ukraine 2006–2020 (Ordinance No. 2455-IV (2005)), set out to allocate funds to achieve improved potable water quality and supply to preschools, schools, and health facilities, primarily in rural regions.[56] A coverage target of 25-30% of schools was set without a timeframe for the rollout. The policy had been costed and partially implemented, with budgetary constraints identified as a limiting factor to implementation.[56]

### 3.6 | Providing family-based weight management services for youth diagnosed with obesity

Within the context of a universal healthcare system, primary-level health care providers in tandem with families and schools play key roles to mitigate the risk of obesity, institute community-based interventions, and identify through early detection children with, or at risk of, overweight and obesity for referral onto specialist services for further management.

One of the 10 steps of Ireland's Obesity Policy and Action Plan, 2016–2025,[57] aims to enhance prevention and early detection of overweight and obesity through community-based interventions and a primary care surveillance and referral system. The action targets community-based health promotion programs at high-risk individuals, and recognizes the instrumental role a family assumes in a child's eating habits and physical activity. It also emphasizes obesity prevention and care as a responsibility of general practitioners (GP), embedding age-based assessments for 2- and 5-year-olds within GP contracts. Primary care capacity building is essential to the implementation of this step, which advocates the use of a brief intervention model to maximize its reach.[57] A complementary step of the national plan appoints a clinical lead to oversee the development of a service model for specialist care of children with overweight and obesity and its rollout across the health system.[57] Progress on its implementation and outcomes were not publicly available.

The administrative region of Emilia-Romagna in Italy developed a management model for childhood obesity by way of a regional, multidisciplinary framework that engages an escalating model of network providers who deliver supervision, counseling, and interventions.[5] The family-based multicomponent interventions include nutrition, physical activity, and psychosocial support. Training in childhood obesity prevention and management is provided to all regional primary care providers, as well as dietitians, sport-medicine and public health specialists, and psychologists. The first and second stages of remediation are provided by primary care providers, while the third stage involves tertiary care intervention. Treatment engages families with care providers and utilizes consistent tools across all stages and settings. Evaluation indicators of anthropometrics, lifestyle changes (eating habits, sedentary and physical activity), and equity are used to measure the effectiveness of services. This model has resulted in a decrease in mean body mass index (BMI) *z* scores for both children and adolescents with overweight and obesity.[5]

## 4 | DISCUSSION

This paper highlights the broad range of policy actions underway in WHO European Member States to address childhood obesity and overweight at pivotal stages of human development in line with ECHO recommendations. Many policies, whether single issue or all-encompassing, are reliant on mutual attributes of multisector coalition building, leadership provided by community stakeholders and all levels of government, capacity building of human and physical capital, equity of access, and ongoing surveillance to evaluate efficacy of policies and support accountability activities into the future. WHO's NCD Document Repository[58] enables a cursory estimate of countries holding integrated obesity policies and those favoring issue-specific policies. Thirty-two countries (out of 53) within the WHO European Region have a publicly available national health or obesity strategy (inclusive of all searchable languages in the database). There is an apparent disparity in the policy mix among WHO European Region countries—those from Central and Western Asia and Eastern Europe show a propensity for specific food-targeted policies, for example, salt reduction or marketing policies, while countries of Central and Western Europe return a greater mix of integrated obesity, dietary, or physical activity policies, as well as specific food-based policies. In all, 49 out of 53 countries of the WHO European Region have at least one obesity-related policy document available in the repository. Policies aimed at ECHO Recommendations 1 and 2 are relatively common among WHO European Region countries, whereas Recommendations 3-6 are seldom described or absent from the policy suite of many countries.[58,59] The diverse approaches among Member States may be explained by the governance structures, socioeconomic constraints, and cultural constructs that operate within a country; thus, a context assessment may enable identification of strengths and gaps in existing policies to reap cost-effective gains.

A relatively comprehensive and cohesive policy strategy is a shared trait of many countries participating in COSI that appear to be stemming childhood obesity rates. Another common feature of policy longevity and success is the allocation of stable, long-term funding and sufficient resourcing. As portrayed in our results, policy actions can be targeted at the microenvironment, such as in schools or health care services, or at the macroenvironment, such as the food sector or urban planning. Italy, Ireland, Slovenia, Spain, and Portugal, among others, have experienced notable decreases in the prevalence rates of childhood overweight (including obesity) in the fourth round of COSI compared with the initial rounds and are noted to have interventions that target recommendations across the spectrum of the ECHO implementation plan. In contrast, countries such as Lithuania and Czechia have experienced an increase in prevalence of childhood overweight (including obesity), despite the latter's life-course based national health strategy. Reversal of obesity trends may require broader and more far-reaching policy measures that embody a systems-wide approach, draw on greater resources and investment, and strengthen national capabilities, governance systems, and multisectoral collaborations. Single-policy approaches may provide tangible benefits but can result in policy silos that impede multidisciplinary collaborations and long-term aims. Voluntary industry codes and political reticence to enact evidence-based regulatory and fiscal policy mechanisms also attenuate potential outcomes for childhood obesity.

The varied prevalence of childhood obesity and overweight rates, particularly between those of Southern European countries and Northern/Western European countries, may be attributable to the risk profiles of countries, partly driven by socioeconomic and cultural factors.[60] Although regional patterns are evident, it is important to exercise caution when inferring potential etiologies due to the complex nature of obesity. Socioeconomic status is inversely associated with childhood obesity,[61–63] and this association may also extend to the

national level when comparing Western European countries, with generally higher gross domestic products and lower obesity rates, with their Southern European counterparts. However, national figures can often mask the realities of intracountry regional differences. For example, examination of regional differences in Portugal, disaggregated by various socioeconomic factors, has led to tailored policy responses such as the provision of breakfasts and healthy snacks in schools in disadvantaged areas with high rates of childhood obesity and has led to a concomitant reduction in consumption of energy-dense snacks.[63]

A number of risk factors are at play in Mediterranean populations leading to childhood obesity, including a lack of physical activity,[64] insufficient sleep duration,[65] and exposure to TV viewing and excess screen time.[66] Western European countries in contrast, such as Belgium, the Netherlands, Denmark, and Finland, may be reaping the benefits of a lifestyle that is steeped in outdoor physical pursuits (e.g., cycling and skiing) and are most likely protective factors to weight gain.[60] From a dietary perspective, Mediterranean countries have experienced a shift from the Mediterranean diet to a Western-style diet, with one study from Greece showing that only 11.3% of children adhered to a traditional Mediterranean diet.[62,67] Other factors, including local food habits, traditional cuisine, and economic conditions affecting food and health, require further research at the national level to identify high-risk foods and high-risk eating habits.[60] The wide differences seen in food marketing regulations across Europe may also play a role; few countries such as Norway and Sweden adopt mandatory regulatory approaches while most opt for diluted self-regulatory schemes.[62]

Differences in approach during the perinatal period may also be a factor in geographic variations. Evidence suggests that breastfeeding infants leads to a decreased likelihood of obesity owing to the lower prevalence of childhood obesity in countries with high rates of breastfeeding such as Sweden, Finland, and Austria, compared with countries such as Italy, Greece, and the United Kingdom, where prevalence and duration of breastfeeding are comparably lower.[62] The use of infant formula in lieu of breastfeeding in the first year of life can lead to weight gain; for example, in Sweden, the use of a milk-cereal drink in the early years of life was associated with weight gain.[60] Moreover, parental obesity increases the risk of intergenerational transmission (as a result of behavioral and biological factors), and so it follows that countries with higher rates of adult obesity also have higher rates of childhood obesity.[68] Likewise, parental feeding choices significantly influence a child's eating habits during the formative years.[62]

The complexity of childhood overweight and obesity compels the need for a multifaceted, integrated, population-based approach,[69] as concluded in previous reviews.[70,71] Research suggests that upstream policies targeting varied sectors, taking into account social, geographic, and cultural parameters, are likely to be more effective than policies solely addressing personal responsibility.[72] In keeping with this, policy levers addressing socioeconomic and environmental factors—such as the built environment; food production, formulation, marketing, accessibility and affordability; and parental leave—form essentials aspects of the ECHO implementation plan.

To this end, national obesity and nutritional policies recognize the complex interplay of factors implicated in the etiology of obesity, by unifying a plurality of approaches and shifting the onus from individual responsibility to a whole-of-society approach. Ireland's Obesity Policy and Action Plan 2016 to 2025 presents a 10-step roadmap for addressing obesity, combining upstream measures (multisectoral action with the support of government departments and agencies, regulations to create healthier environments, leadership and governance by the Department of Health, and investment in research and surveillance closely linked to policy actions to monitor progress) and downstream measures (demographically tailored communication strategies, community-based health programs, a service model for specialist care, physical activity initiatives, and assistance for marginalized families and children during the first 1000 days of life) to effect multilevel change.[57] It aims for the stabilization of obesity rates, a sustained downward trend of 0.5% in excess weight across adults and children, and to close the gap in terms of obesity levels between the highest and lowest socioeconomic groups. France's National Health and Nutrition Program 2019–2023 (Programme National Nutrition Santé (PNNS)),[73] its fourth release since 2001, deploys an arsenal of synergistic, multisectoral actions to reduce obesity by safeguarding the nutritional and physical environment of its population (clear nutritional labeling, known as Nutri-Score, to enable informed food choices at individual and collective levels, and ongoing work to reduce the salt, fat, and sugar content of food, whilst increasing the amount of fiber), encouraging healthy behaviors (national nutritional guidelines, and food education in preschool and school), and addressing nutritional disorders. It has leveled specific policies at childhood obesity, namely, guidelines on school meal nutrition, freshwater fountain installation, a ban on vending machine sales of unhealthy snacks in schools, taxes on the marketing of unhealthy foods, and health warnings attached to adverts for SSBs and manufactured foods.[74] Additionally, France has instituted a successful SSB tax, which it has reinvested into the health system and in 2017, introduced restrictions on the unlimited sale of soft drinks at a fixed price.[73,75] France's latest plan aims to reduce childhood and adolescent overweight and obesity by 20%.[73] Both Ireland and France exemplify the feasibility of coordinated and expansive policy action, as recommended by the ECHO implementation plan.

In spite of the former examples, a shift is underway toward process-driven policies from target-focused policies as countries often fall short of the latter. England's national childhood obesity policy subscribes to this trend, accommodating one specific target of 20% sugar reduction in food products, whilst delineating a range of other strategies: the introduction of an an SDIL; updates to the nutrient profile model; an increase in the accessibility, affordability, and food composition details of healthy food options (including in schools); augmented quality and duration of physical activity in schools; and upskilled health professionals to support families.[22] Similarly, as part of Finland's National Obesity Programme 2012–2018, a commitment was made to reduce the number of children and young people that grow up to develop obesity, with hallmarks of success related to equitable access to inclusive and empowering lifestyle guidance and health monitoring; dissemination of guidelines on diet, physical activity, and clinical practice which are widely applied; the creation of obesity prevention networks; the consideration of health promotion and obesity

prevention in all strategic planning and decision-making at local, regional, and national levels; the inclusion of obesity prevention in the vocational curriculum and continuing education of health and education professions; the availability of healthy dietary choices and environments that support physical activity; and the provision of early interventions for new and expectant mothers and families.[76]

The policy process requires a robust evidence base, especially in the case of childhood obesity, to garner public attention and consensus among multiple actors as well as to counter the competing influence of industry. An example of data framing the case for policy action can be seen in North Macedonia. COSI data showed that compared with other countries that had participated in multiple rounds, North Macedonia experienced the largest increase in prevalence of overweight (including obesity) from the second to the fourth round for 7-year-old girls (approximately 4%), and a smaller increase in overweight and obesity levels in age-equivalent boys.[77] This was compounded by the fact that about a third of primary school children were living with overweight (including obesity).[77] Data also revealed that time allocated for physical education classes could be increased nationally.[77] This set in motion the development of the Tandem Model, whereby formally trained physical activity educators, so called "tandem teachers," accompanied regular first-grade class teachers to deliver physical education classes and provide opportunities for physical activity throughout the school day.[78] This has been reflected by changes to laws on primary school education, with an anticipated rollout of this policy for all children in Grades 1 to 5 in the next 5 years. Rigorous, regular, and timely data—entailing anthropometrics, nutritional habits, and physical activity, of children in all age groups, disaggregated by age, sex, and socioeconomic factors, and informed by high-quality, standardized collection methods and analytics tools—form the basis of evidence-based policy action. Consolidation of national and international surveillance systems and uniformity of data collection between countries will enable efficient comparison between Member States, based on trustworthy, reliable, and transparent information and enhance policymaking. Embedding childhood obesity data collection within existing national health systems and surveillance initiatives will ensure its long-term sustainability.

As with the need for data, evaluation and monitoring of policy development, implementation, and outcomes are central components of the policy cycle. Policy implementation, monitoring, and oversight of obesity levels in a review of nine European countries found that it typically falls within the remit of national public health institutions or health ministries.[79] The WHO plays an important role in providing technical assistance and country support to advance the health agenda for children and adolescents, and existing surveillance systems such as COSI and the WHO Health Behaviours in School-aged Children (HBSC) surveys could be augmented to provide feedback about obesity policies. The midterm evaluation of the EU Action Plan on Childhood Obesity revealed that Member States (28 of 53 countries comprising WHO Europe, plus Iceland, Norway, Switzerland, Serbia, and Montenegro) are making progress on providing healthier environments in educational settings, policies related to physical activity, and monitoring and surveillance activities—26 out of 33 countries in the evaluation participated in the fourth round of COSI, and data on weight and height of children were collected in 94% of Member States.[46] However, policies restricting marketing and advertising to children and promoting healthier food choices were found to be lagging behind.[46]

The benefit of dietary and physical activity interventions on childhood obesity in controlled settings have been demonstrated in several trials and reviews.[80,81] Yet when it comes to unpicking the population-level impacts of childhood obesity policies, the literature is primarily constrained to reporting proximal indicators sourced from commonly available instruments, such as observing trends in serial obesity and overweight prevalence rates. Based on stalling prevalence rates, Malta is one country example that appears to have arrested the rise of excess weight in children from 2010 to 2016.[82] We can speculate that the mix of policies Malta has instituted related to breastfeeding, nutrient guidelines, physical activity uptake, and the establishment of an advisory council on healthy lifestyles are attributable to this result. However, there is a pressing need for implementation research based on clearly defined indicators, processes, outputs, and outcomes, to identify challenges and barriers to policy implementation and to rigorously assess the degree of impact of policies, whilst accounting for confounders. Indicators and benchmarks derived from the six key areas of action in the ECHO implementation plan could advance this objective. Evaluations that could not be ascertained for policies and programs identified in our results may have been indicative of implementation deficits.

To date, progress and evaluation of the ECHO implementation plan have received little scrutiny in the literature. The review process identified the fragmented availability of country-specific childhood obesity policies and whole-population obesity policies in major databases, which often provided unique results. Moreover, the evaluation and outcomes of policies were in many cases not readily accessible. Future systematic mapping reviews or WHO audits that catalogue the complete extent of country policies on childhood obesity can lead to improved transparency and collaboration between countries, facilitate implementation research, generate models of best practice, and complement monitoring and evaluation of policies.

This brief review suggests that there is a mixed approach to tackling childhood obesity among WHO European Member States; many countries have directed efforts toward single-policy issues, whilst few have comprehensive strategies addressing most elements of the ECHO implementation plan. Comprehensive and integrated strategies that comprise policies targeted at macroenvironmental factors may have played a role in reversing childhood obesity trends in several countries. A synergistic loop of policy implementation research and serial monitoring will inform policymakers, governments, and regional/international bodies of the immediate and long-term efficacy of childhood obesity policies and allow for honing policies to meet local needs. Enacting integrated policies will provide further impetus to make headways against childhood obesity and bring about multiple dividends.

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## AUTHOR CONTRIBUTIONS

SC and KW conceptualized the manuscript. SC researched, wrote, and edited the manuscript. SC, KW, JW, MWW, AIR, HR, and JB reviewed the manuscript.

## DISCLAIMER

KW, JB, MWW, and JW are staff members of WHO, and SC and HR are consultants with WHO. The authors alone are responsible for the views expressed in this article, and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

## ETHICS STATEMENT

This paper is a review article and therefore does not report new empirical research involving human subjects.

## CONFLICT OF INTEREST

No conflicts of interest declared.

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