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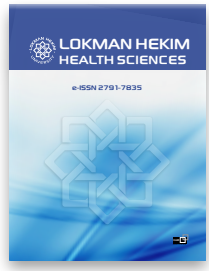

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REVIEW

Childhood Obesity: A Generation Growing up in the Shadow of an Obesogenic Environment

Çocukluk Çağı Obezitesi: Obezojenik Çevrenin Gölgesinde Büyüyen Bir Nesil

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Abstract

Obesity is a widespread global health problem affecting people of all ages, and the increasing incidence of obesity from early childhood makes obesity a major public health concern. The habits acquired in early childhood shape the lifestyle of the individual in later ages. Therefore, it is extremely important to prevent obesity and adopt a healthy lifestyle during this period. In order to develop effective strategies to combat obesity, it is first necessary to understand the factors that cause obesity. Environmental factors are also recognized as important contributors to obesity, in addition to individual factors such as genetic predisposition. In this context, understanding this environment is of great importance to develop effective intervention strategies against obesity, and the concept of obesogenic environment has helped us to better understand the environmental factors that increase the risk of developing obesity. The 'obesogenic environment' consists of micro, viz., immediate environment such as family, home, kindergarten and macro, i.e., wider environment such as advertising, urban planning, technological developments, components that lead individuals to develop obesity. In this review, it is aimed to evaluate obesity in early childhood and the effect of obesogenic environment in this process in light of the current line of literature. Moreover, the impact of obesity on children's health is examined, with a strong focus on prevention strategies.

Keywords: Childhood obesity; Environmental impact; Obesity; Public health

Obesity is a major health problem that affects all age groups and has a high prevalence worldwide. This worrying condition affects not only adults but also children in the early stages of life.[1] Early childhood is a critical period in an individual's life, when basic habits, healthy eating and an active lifestyle are learned.[2] Obesity developing during this stage raises the risk of children becoming obese later in life and encountering various health issues in adulthood. Consequently, this period is regarded as crucial for preventing overweight and obesity. Both genetic predisposition and environmental factors are recognized as important contributors to the development of obesity. It is therefore important to understand the 'obesogenic' environment that promotes consumption of high-calorie

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foods and sedentary lifestyles in early childhood, and to develop effective interventions. This review aims to outline early childhood obesity and assess the influence of the obesogenic environment on its development, based on existing literature. The review begins with a summary of the global prevalence of childhood obesity, then goes on to discuss the concept of the obesogenic environment, its contributing factors and the consequences of obesity. The next step was to highlight the health effects of obesity in children and prevention strategies.

This review discusses the effects of obesity and obesogenic environments in early childhood. Articles included in the review were searched using keywords such as 'childhood obesity', 'obesogenic environment', 'early childhood nutrition', and 'physical activity in children'. The review in question gave priority to studies in peer-reviewed journals that examined the relationship between childhood obesity and environmental factors. The literature search was conducted using international databases such as PubMed, Scopus and Web of Science. The selected articles included studies on the causes of obesity in early childhood, the role of the obesogenic environment and strategies to prevent obesity.

Determination of Obesity

Methods and criteria for identifying obesity, which are essential for evaluating children's health, primarily rely on fundamental measurements like body mass index (BMI). These criteria are important for the early identification and management of obesity in children. For children and adolescents, obesity is determined using age- and sex-specific BMI cut-off points, which are adjusted to reflect physiological changes during normal growth.[3] The Centers for Disease Control and Prevention (CDC) states that a BMI-for-age percentile below the 5th percentile indicates malnutrition, between the 5th and 85th percentiles represents normal weight, between the 86th and 95th percentiles suggests overweight, and above the 95th percentile signifies obesity.[4] According to the World Health Organization (WHO), the classification of overweight and obesity in children varies by age group. For children under 5 years of age, overweight is defined as a weight-for-height greater than 2 standard deviations (SD) above the WHO Child Growth Standards median, while obesity is classified as a weight-for-height greater than 3 SD above the median. In contrast, for children aged 5–19 years, overweight is determined by a BMI-for-age greater than 1 SD above the WHO Growth Reference median, and obesity is classified as a BMI-for-age greater than 2 SD above the median.[5] If age-standardized BMI standards are used for school-age children and adolescents, according to the 50th percentile, a child with a BMI of less than 90% can be considered underweight, between 90–110% can be considered normal, between 110–120% can be considered mildly obese, and 120% or more can be considered obese.[6] In addition to these measurements, the waist-to-height ratio is a more sensitive health indicator than BMI and is easier to calculate. It is also practical to use, as the limits of the waist-to-height ratio are the same for children over the age of five and for adults. According to the Ashwell classification, precautions are recommended for people with a waist-to-height ratio of 0.5 and above.[3]

Table 1. Estimated and projected prevalence of overweight and obesity in children and adolescents, and number of affected individuals

	2000	2020	2030
Children under 5 years with overweight	5.4% 33.3 million	5.7% 38.9 million	5.9% 40.1 million
	2000	**2016**	**2030**
Children 5–19 years with obesity	2.9% 52.3 million	150 million	254 million

Who. A Primary Health Care Approach To Obesity Prevention and Management in Children and Adolescents: Policy Brief. Available at: https://www.who.int/publications/i/item/9789240072671. Accessed Dec 20,2023.[1]

Prevalence of Childhood Obesity

Obesity is an escalating global issue, impacting not just adults but also children, who represent the future of our world. In 2020, 39 million children under the age of 5 were overweight or obese globally, and this alarming number is projected to increase to 40 million by 2030.[7] According to the COSI-TUR 2022 survey, 12.5% of students in the second grade of primary school (7–8 years old) in Türkiye are overweight and 9.9% are obese. Obesity is on the rise in all age groups.[8] This worrying trend highlights the negative impact of obesity on younger generations and is a strong call for the promotion of healthy diets and physical activity worldwide. These estimates clearly show that obesity is a global problem that can increase the burden not only on the health of individuals, but also on health systems and societies (Table 1).[3]

Obesogenic Environment

Obesity is strongly linked not only to the dietary habits and physical activity levels of individuals, but also to environmental factors. In this context, the concept of

Table 2. Examples of microenvironmental settings and macroenvironmental sectors

Microenvironmental settings	Macroenvironmental sectors
Homes	Technology/design (e.g., labor- saving devices, architecture)
Workplaces	Media (e.g., women's magazines)
Schools	Food production/importing
Universities/tertiary institutions	Food manufacturing
Community groups (e.g., clubs, churches)	Food marketing (e.g., fast food advertising)
Community places (e.g., parks, shopping malls)	Food distribution (e.g., wholesalers)
Institutions (e.g., hospitals, boarding schools)	Food catering services
Food retailers (e.g., supermarkets)	Sports/leisure industry (e.g., instructor training programs)
Food service outlets (e.g., lunch bars, restaurants)	Urban/rural development (e.g., town planning, local councils)
Recreation facilities (e.g., pools, gyms)	Transport system (e.g., public transportation systems)
Neighborhoods (e.g., cycle paths, street safety)	Health system (e.g., Ministry of Health, medical schools, professional associations)
Transport service centers (e.g., airports, bus stations)	
Local health care (e.g., GP, hospital)	

Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. Prev Med 1999;29(6 Pt 1):563–70.[9]

the obesogenic environment has been introduced and has helped us to understand the factors that play an important role in the spread of obesity. The concept of the obesogenic environment, which emerged in the 1990s, was defined by Swinburn et al.[9] as 'the home and non-home environment that contributes to weight gain and is not conducive to weight loss'. This concept is intricate and multifaceted, incorporating 'attitudinal, behavioral, political, geographical, economic, social, familial, individual, technological, and physical' dimensions.[10] To better understand the obesogenic environment, Swinburn et al.[9] divided it into two main components: Macro and micro environments. These two components aid in gaining a deeper understanding of the factors contributing to obesity and in designing effective interventions. The macro environment generally includes social, economic, political and cultural factors, while the micro environment includes more individual and direct environmental factors (Table 2).

Microenvironment

The microenvironment includes the immediate surroundings in which people interact directly, including places where they shop, their homes, neighborhoods, schools, workplaces and areas where children play sports. The family is an important component of the microsystem. Parents, siblings and close relatives are the key elements of this system. Family habits and parental attitudes play an important role in shaping dietary preferences and physical activity behavior in early childhood.[10] In addition, the type, quantity and quality of food offered in the family environment is one of the factors that effectively shape children's eating habits. Families who eat together and organize mealtimes are more likely to choose healthier foods, whereas distracting activities such as eating out or watching television are often associated with high-fat foods.[11] The way in which the home environment affects children's physical activity levels may vary depending on children's access to stimulating factors and opportunities for movement in their environment. Television and restricted play areas in the home are recognized as factors that reduce children's physical activity. Sedentary behavior in early childhood is related to increased body fat and negative effects on psychosocial health and cognitive development. This lack of activity starts early in childhood, as children spend a lot of time watching television (TV) before the age of two.[12]

Other environments that are important for the development of obesity in early childhood include day care centers and nurseries. The type and composition of the food served in day-care centers, and the opportunities for physical activity available to young children, play a crucial role in preventing childhood obesity. A study conducted in day care centers found an association between reduced availability of high-sugar and high-fat foods and a lower likelihood of being overweight. It was also found that children in environments with more support for physical activity and more active play minutes were less likely to be overweight.[13] Furthermore, research shows that the number and

proximity of fast food restaurants in school neighborhoods are positively associated with obesity rates.[14] The obesogenic environment of children's neighborhoods is associated with modifiable environmental factors that affect their weight status and have indirect effects on diet and physical activity. In particular, lack of safe walking and play areas, long distances, unsafe zones and unlit areas limit children's opportunities for physical activity. A study to assess the risk of childhood obesity looked at various environmental factors that affect children's body weight. The findings of this four-year study involving 500 children revealed that the key factors influencing children's body weight were the length of the street they lived on, the proximity of the nearest playground, the frequency of public transport on the street, and the socioeconomic status of the neighborhood.[15]

Macro Environment

Macro-obesogenic environments refer to broader factors that contribute to conditions that are conducive to obesity, particularly in early childhood. Factors such as marketing, social media, transport systems, urban development, health systems and technology often affect people over a wide geographical area. The influence of the macro-environment on obesity is broader and more indirect compared to the effects of the micro-environment.[10] In the macro environment, marketing and advertising are important elements that significantly influence consumer behavior. Globally, children are frequently exposed to advertisements for unhealthy foods and soft drinks containing saturated fat, salt and/or sugar. Children are frequently exposed to unhealthy food marketing through many channels such as television, films, videos, promotional games, promotions, involvement of athletes and celebrities, the internet, and social media.[16] In an analysis of digital content related to food and drink, Amson and colleagues highlighted that the most frequently advertised food and drink categories are fast food, energy drinks and sweets.[17]

In recent years, food marketers have adopted a new branding strategy called 'advergames'. These games create a brand-saturated environment by integrating advertisements into video gameplay. Products are intertwined with elements of entertainment and competition that appeal to child gamers. For instance, a cereal or candy item could be incorporated into the game as a playable element or as a reward that can be used during gameplay.[18]

Urban planning is essential in promoting healthy lifestyles and combating obesity. The presence of parks, green spaces, cycle paths and outdoor sports areas encourages physical activity and enables people to adopt a healthy lifestyle. On the contrary, insufficient physical activity areas contributes to the spread of health problems such as obesity and weight gain. Therefore, urban planning plays an important role in creating a favorable environment for healthy living. According to various studies, the amount of green spaces is inversely related to body mass index (BMI) and the likelihood of being overweight or obese. These green spaces have the potential to increase individuals' physical activity, reduce stress and positively impact their overall health, thus playing an important role in the fight against obesity.[19]

Causes of Childhood Obesity

Perinatal Factors

The onset of obesity and carbohydrate intolerance in children is strongly associated with several perinatal factors. Maternal smoking and prolonged exposure to hyperglycemia during pregnancy- particularly in mothers with insulin resistance, obesity, or diabetes- may raise the risk of childhood obesity. In addition, maternal obesity and significant gestational weight gain may enhance the effects of insulin-like growth factor (IGF-1), which has been linked to fetal overgrowth. Elevated levels of leptin, IL-6, and insulin resistance have been detected in newborns of mothers with obesity. This highlights the influence of nutritional and metabolic conditions during the perinatal period in shaping childhood obesity risk.[20]

Nutrition

Nutrition starts in the early stages of life with breast milk. Breast milk helps babies develop regular eating habits and control their appetite. The nutrients found in breast milk support healthy development and help lower the risk of obesity in adulthood. There is considerable evidence that breastfeeding is a protective factor in the first 1000 days of life. A meta-analysis indicates that breastfeeding is linked to a 13% decrease in the risk of overweight and obesity.[21]

Research shows that children's eating habits during this period are not in line with recommendations. Unhealthy eating patterns, such as high protein intake, sugary drinks, are related to an increased risk of obesity later in life. Another factor contributing to the rise in obesity is the consumption of foods that are energy-dense, low in fiber, and high in fat. The proliferation of convenience and fast foods has been linked to an increase in weight problems.[22]

In addition, children's eating habits are directly related to obesity. Eating habits that influence childhood obesity are influenced by factors such as the number of daily meals, snack preferences and portion sizes. In addition, habits such as food refusal and skipping meals harm childhood obesity. Skipping meals can lead to irregular blood glucose levels and increase the tendency to overeat at later meals.[23]

Physical Inactivity

Changing lifestyles in society have led to a trend of decreasing physical activity and increasing sedentary behavior in children and adults from the earliest ages.[24] The growing prevalence of screen-based activities has resulted in reduced physical activity levels and heightened sedentary behavior, especially among children and adolescents.[22] Research shows that extended screen time raises the likelihood of obesity and various chronic health conditions. While the likelihood of being overweight or obese increased by 10–27% in adolescents and children who watched 1–3 hours of TV per day, it rose by 45% in those who watched more than 5 hours daily.[25] Increased sedentary time often encourages excessive food consumption. In particular, snacking while engaging in screen-based activities like playing computer games and watching television has become a common habit. This behavior can negatively affect healthy eating patterns in children and adolescents, contributing to a higher likelihood of obesity.[26]

Genetic Factors

Genetic influences contribute to 25–40% of obesity development. While genetic factors determine susceptibility to obesity, the presence of an obesogenic environment is necessary for its manifestation.[3] The complex relationships between genetics, environmental factors, and gene-gene interactions underscore the dynamic and complex etiology of obesity.[27]

Environmental Factors

Environmental factors, particularly the concept of the 'built environment', have a major impact on obesity; elements such as land use, urban design projects, transport systems and the physical environment increase the risk of obesity by promoting unhealthy lifestyles. Factors such as the presence of parks, playgrounds or sports facilities suitable for physical activity, road traffic density, land use types and transport systems affect children's access to healthy living spaces.[28]

Air pollution, both indoors and outdoors, is a factor of serious concern in childhood obesity. Air pollution from sources such as fossil fuel combustion, waste incineration and industrial processes often includes harmful substances such as particulate matter, ozone, sulfur dioxide, carbon monoxide, polycyclic aromatic hydrocarbons and nitrogen dioxide. Indoor air pollutants consist of substances like tobacco smoke, mould spores, and volatile organic compounds. Prenatal exposure to tobacco smoke is associated with an increased risk of being overweight at ages 3 and 7 in large national cohort studies in the US and UK.[29]

In recent years, numerous environmental chemicals have been found to interfere with hormonal functions, and these substances are referred to as endocrine-disrupting chemicals (EDCs). While most studies have examined the effects of EDCs on reproductive and thyroid hormone function, there is growing evidence that certain EDCs may also disrupt metabolic regulation and fat cell development. These chemicals may play a role in obesity by interfering with the body's weight regulation mechanisms. These substances are often referred to as 'obesogens'. In children, it is known that exposure to obesogens, especially in utero, may further impair adipogenesis and energy storage processes and lead to increased susceptibility to overweight and obesity. Persistent organic pollutants (POPs) such as bisphenol A (BPA), tributyltin (TBT), phthalates, organochlorine pesticides (OCPs), dioxins and polychlorinated biphenyls (PCBs) are among the most studied obesogens.[30]

Socio-Economic Factors

The relationship between socio-economic factors and obesity is complex. In less affluent countries, obesity is more prevalent among the wealthier population, while in developing countries, the burden is increasingly shifting to lower-income groups.[31] Most obese children reside in countries with moderate economic development. In the coming years, obesity rates are projected to decline in high-income nations while rising in middle- and low-income regions. In less developed countries, various factors are expected to contribute to the growing prevalence of obesity. These include increasing trends towards processed foods, widespread sedentary lifestyles, poor nutritional policies and inadequate health services. As national income per capita is limited in low-income countries, children cannot be adequately supported in terms of healthy eating, and obesity prevention measures in schools and families are inadequate.[32]

Psychosocial Factors

Psychosocial factors such as emotional states, stress and depression contribute to overeating and obesity in some children. Developmental conflicts, especially in the parent-child relationship at an early age, can lead to an eating crisis in children. Adverse childhood experiences (ACEs) are also a risk factor for childhood obesity. ACEs include traumatic experiences during childhood: physical, psychological, or sexual abuse; neglect; substance abuse, mental illness, or criminal behavior of family members; parental divorce, separation or death. ACEs suggest that chronic or severe stress in childhood may increase the risk of obesity. These experiences can lead to changes in hormonal responses, problems with appetite control and obesity-related behaviors.[33]

COVID-19

The COVID-19 pandemic and quarantine measures harmed children's diets and lifestyles. During this period, children were more exposed to high-calorie ready meals and fast food instead of school meals, which affected their calorie balance. Physical activity decreased with the closure of sports facilities and the increase in online education. Changes in sleep patterns and later bedtimes and wake-up times also paved the way for weight gain. Research indicates that the prevalence of overweight and obesity among children rose by 13% during the pandemic. This underscores the influence of COVID-19 and quarantine measures on health issues like excessive weight gain.[34]

Consequences of Childhood Obesity

Childhood obesity is a chronic, inflammatory health problem that starts early and leads to several serious complications due to its effects at the metabolic level.[26] The risk of hypertension, dyslipidemia, coronary heart disease, insulin resistance (IR) and type 2 diabetes is increased in obese children. In addition, obesity has adverse effects on the lungs, gastrointestinal system, kidneys, immune system and other organ systems.

Respiratory System

Obesity can lead to reduced lung function, laryngotracheal narrowing and the development of obstructive sleep apnoea syndrome. Furthermore, it may heighten the risk of adverse outcomes and complications from acute respiratory infections by impacting respiratory muscles, lung capacity, and immune function. In particular, obesity, which affects approximately 20% of children aged 12–17 years in the US, has been associated with an increase in severe cases of COVID-19. In addition, obese children were found to require longer and more intensive care, and the need for admission to pediatric intensive care units increased due to obesity.[35]

Gastrointestinal System

A major gastrointestinal concern associated with childhood obesity is non-alcoholic fatty liver disease (NAFLD). NAFLD can affect up to 70% of patients and varies from simple fat accumulation to non-alcoholic steatohepatitis (NASH). NASH also increases the risk of hepatocellular carcinoma in the pediatric population. Loss of bone density in patients with NASH increases the risk of fracture. Another common digestive system problem is gastroesophageal reflux, which is frequently seen in obese individuals.[36]

Urinary System

With the global increase in obesity, chronic end-stage renal disease is becoming more prevalent. Chronic kidney disease adversely affects kidney function due to the consequences of childhood obesity, such as type 2 diabetes and hypertension. In addition, obesity-related insulin resistance can lead to glomerular hypertrophy and impaired renal function. However, metabolic and cardiovascular problems caused by obesity are also common causes of pediatric chronic kidney disease.[37]

Others

Obesity leads to changes in the immune system through the accumulation of excess adipose tissue in the body. Some immune cells increase (such as macrophages and mast cells), while others decrease (eosinophils, certain T-lymphocyte subtypes). This imbalance favors low levels of inflammation in obese people.[36] In addition, epidemiological research has shown a strong association between a high body mass index (BMI) in childhood and adolescence and an increased risk of several cancers in adulthood, including leukemia, Hodgkin's lymphoma, breast cancer and colorectal cancer.[38]

Without the necessary interventions, obesity that begins in childhood and adolescence is likely to persist in adulthood, leading to serious health risks such as cardiovascular disease.[1] Studies show that obese children aged 3–5 years are 4.7 times more likely to be obese in adulthood, children aged 6–9 years are 8.8 times more likely, and children aged 10–14 years are 22.3 times more likely.[39]

Childhood obesity also has a negative psychosocial impact, affecting self-esteem, academic performance, mental health, social engagement and overall quality of life, often exacerbated by stigma, discrimination and bullying. Obese children are bullied more often than children of a healthy weight, and their social lives are often disrupted, leading to a reduction in their quality of life.[1]

Ways to Prevent Obesity

Preventing obesity in infants and young children presents a crucial opportunity not only to curb the childhood obesity epidemic but also to lower obesity rates in adulthood. Prevention efforts have largely targeted school-aged children, with less emphasis on those under 5 years old. Recently, however, there has been increasing recognition that strategies to combat childhood obesity should start before children enter formal education.[24] As obesity is difficult to reverse, it is recognized that the most effective strategy is early prevention. Interventions focusing on known risk factors should start early with young children, parents and other carers.[22]

The World Health Organization (WHO) has developed a comprehensive package to provide integrated health services for the prevention and management of obesity. WHO emphasizes the importance of a primary health care (PHC) approach to the prevention and management of childhood obesity. This approach emphasizes the need to provide preventive, curative and rehabilitative health services in an integrated manner. It also states that multisectoral policies and actions should be implemented to address the social, economic and environmental determinants of obesity. Finally, it emphasizes the empowerment of individuals and communities and the active participation of children, adolescents and families in the design and implementation of health services.[1]

Obesity prevention begins before and during pregnancy, and critical interventions during these periods influence lifelong obesity risk. Therefore, obesity management during pregnancy and early life should be integrated into existing antenatal and preconception programmes and delivered through a systematic multidisciplinary approach. For children under 5 years of age, obesity prevention and management services should be integrated into child health programmes (e.g. breastfeeding and complementary feeding promotion, immunization, growth monitoring, integrated management of childhood diseases, under-five clinic.[1]

The early years of life, from birth to age 5, are a critical period during which parents play a vital role in preventing obesity. Starting with eating habits, it is the responsibility of parents to ensure that children are given healthy food and a balanced diet. It is also important to encourage physical activity and keep children active. Parents should provide opportunities for their children to play games, do sports and be active outdoors and encourage them to adopt these habits. Establishing regular sleep habits and limiting screen time are also important factors in preventing obesity. Parents should follow the recommendations of health professionals and attend regular check-ups to monitor their children's health. During this time, it is also extremely important for parents to model healthy lifestyles and set a positive example for their children.[24]

Limiting children's screen time is an important strategy for reducing the risk of obesity. Health professionals recommend that parents and caregivers avoid allowing computers, televisions or other digital media devices in children's bedrooms. Additionally, a long-term social marketing campaign should be launched to promote positive media use and deliver consistent messages to parents and caregivers regarding obesity prevention strategies.[24] However, it is envisaged that web-based or telephone-based interventions, which are feasible and effective at the community level, can increase access to a wide audience in the prevention of childhood obesity and provide equal access to families from different socioeconomic groups.[40]

Conclusion

Obesity is a long-term and recurring health issue that can result in various serious complications starting in early childhood and remains a significant public health challenge globally. It can have adverse effects on many systems in the body, including respiratory, digestive, urinary and immune systems. In addition, the psychosocial consequences of obesity should not be ignored. To prevent the obesity epidemic, it is crucial to understand the factors that contribute to the development of obesity from early childhood. The obesogenic environment is an important component of these factors. The obesogenic environment can be categorized into two primary components: the micro-environment and the macro-environment. The micro-environment refers to the immediate surroundings that individuals engage with directly in their everyday lives. Factors such as eating habits, physical activity levels and family dynamics are part of this environment. On the other hand, the macro environment encompasses a wide range of factors and usually includes elements that are spread over

a large geographical area. It includes factors such as urban planning, public transport, food advertising and policies. Both micro- and macro-environments need to be considered in the fight against obesity. At the micro-environmental level, various interventions can be made to encourage healthy lifestyle choices by individuals, while at the macro-environmental level, comprehensive approaches such as policy changes and community-level strategies are required.

A multisectoral approach is essential to effectively tackle childhood obesity. Holistic policies are needed, involving different sectors such as health, education, food and agriculture, sport, media, government and civil society. However, the role of families is crucial to the success of these policies. To prevent childhood obesity, families should promote healthy eating habits and teach children the importance of a balanced diet. This includes a balanced intake of foods containing fruit, vegetables, whole grains and protein, while limiting foods high in fat and sugar, such as fast food. In addition, interactive games and activities that support cognitive development should be encouraged rather than passive screen time. Families should model healthy lifestyles, support their children by meeting their emotional needs and not neglect regular health checks.

Programs and policies to promote healthy eating and physical activity should be implemented in kindergartens and nursery schools. A "nutrition-friendly school plan" should be developed in kindergartens and nursery schools, and activities and practices should be organized within this framework. In these centers, nutrition education that is appropriate to the needs, age and cultural structure of the children should be effectively provided in accordance with the curricula. Nutrition education should cover not only the classroom but also the school environment, staff and family.[41] In addition, special events such as 'Nutrition Days' should be organized by nutritionists and educators to give informative presentations to children and families about healthy eating, and healthy cooking demonstrations should be organized. In addition, a 'Healthy Breakfast Corner' should be set up in kindergartens so that children can have their daily breakfast with healthy options, and 'Fruit and Vegetable Tasting Days' should be organized so that children can discover the importance of healthy eating by experiencing different fruits and vegetables. Kindergartens should regularly organize outdoor games and create playgrounds for children. In addition, areas for physical activity such as gyms or sports halls, should be provided. A 'Physical Fitness Report Card' should be developed to promote physical activity among students. This report card should assess factors such as the sports activities in which students participate, their physical activity levels and healthy lifestyle habits. Such projects can help children improve their eating habits and adopt healthy lifestyles.

To prevent and manage obesity in children under five, health services should be integrated into existing child health programs. For example, established child health programs such as breastfeeding and complementary feeding promotion, immunization, growth monitoring, and integrated management of childhood diseases can play an effective role in combating obesity. Information and education programs on nutrition and physical activity should be organized for families and families should be supported in this regard.

Public policies and regulations also play an effective role in the fight against obesity. The advertising and marketing strategies of fast-food chains and junk food producers should be regulated, incentives should be provided to promote healthy foods, and environmental factors that contribute to obesity should be reduced. Investment should also be made in urban planning and infrastructure development projects to promote physical activity. Public awareness and education are also very important. The public should be informed about the adverse health effects of obesity and encouraged to adopt healthy lifestyles. Given the rate of increase in obesity in low- and middle-income countries, economic regulations such as tax policies are also important to reduce the consumption of unhealthy foods in these countries. The price of healthy foods should be regulated, and the consumption of unhealthy foods should be discouraged. Within this framework, equal access to health services should be ensured and health services should be encouraged to include obesity prevention measures. The combination of all these strategies may make it possible to effectively prevent obesity in early childhood. Preventing obesity in early childhood will have a positive impact on the overall health of society and contribute to the healthy growth of future generations.

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