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The evaluation of nutrition educational programs and their results: Impact of the GYERE® – Children's Health Program, socioeconomic status, and social isolation on the nutritional status of 6–12-year-old children

PhD thesis

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LIST OF ABBREVATIONS

BMI	body mass index
COSI	European Childhood Obesity Surveillance Initiative
COVID-19	coronavirus disease
EBRB	energy balance-related behaviors
EPHE	Epode for the Promotion of Health
EPODE	Ensemble Prévenons l'Obésité Des Enfants
EU	European Union
FAO	Food and Agriculture Organization
GPE	Global Partnership for Education
GYERE®	Children's Health Program
HBSC	Health Behaviour in School-aged Children
HPS	Health Promoting School Equity
IOTF	International Obesity Task Force
JOGG	Youth at Healthy Weight
MDOSZ	Hungarian Dietetic Association
NCD	non-communicable diseases
NNGYK	National Centre for Public Health and Pharmacy
OECD	Organisation for Economic Co-operation and Development
ONV2	2nd National Growth Survey
SD	standard deviation
SES	socioeconomic status
SFN	school food and nutrition
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children’s Fund
USDA	United States Department of Agriculture
WFP	World Food Programme
WHO	World Health Organization

1. Introduction

In 2023, the global population of children aged 6–12 was 965 million, including 652 thousand children in this age group in Hungary (1).

The age period from six to twelve years is often referred to as middle childhood. It is a transition period from early childhood into adolescence, with physical and psychological development that affects later life outcomes (2). In this period, a small mid-growth spurt can be observed in physical growth, body composition transforms, muscle and fat mass increases, and sex differences become more obvious. Increased adiposity among girls, increased bone strength and muscularity among boys can be observed. Brain volume is approaching its peak, characterized by a high rate of synapse formation in the gray matter and the swift growth of axonal connections in the white matter. An increase in gross and fine motor skills, cognitive abilities (increased reasoning, problem-solving, self-regulation, executive functions, mentalizing skills), and development in perceptual abilities (shift from local to global visual processing) can be observed (3).

Eating habits play a central role in determining children's nutritional status. Dietary behaviors and food preferences in childhood are influenced by individual, parental, and community factors. Individual factors include genetic predisposition, gender, health status, body mass index (BMI), birth weight, early feeding style, complementary feeding, early flavor experience, and experiential learning (4).

6-12-year-old children gain greater autonomy over their food choices and have to navigate the food environment, their preferences and their views on how healthy or tasty foods are beginning to significantly influence their decisions. Tastiness reflects a personal preference of a food, an internal sense of pleasure or displeasure, while healthiness is a credence characteristic, cannot be directly observed, and requires prior knowledge. Modeling, parenting determinants, and educational environments contribute to the learning process of making healthy food choices (5).

Parental, home environmental factors include the parents' socioeconomic status, educational level, income, ethnicity, gender, BMI, nutritional knowledge, feeding practices, food preferences and eating habits, family structure and household food security. Low socioeconomic status, low level of maternal education, food insecurity, food restriction or giving food as a reward, and an obesogenic family environment can negatively influence children's food intake and food preferences (4, 6).

Community factors, such as neighborhood environment, exposure to media (food advertisements), school food environment, accessibility to the school lunch program, recreation, and sports facilities, in a broader view, the implementation of nutritional policies and educational programs may also have an impact on children's eating behavior. These factors commonly interact with one another, so it takes a holistic approach to their analysis (4). The following section briefly discusses the factors selected for examination in this research due to length limitations.

1.1.Factors influencing children's eating habits and nutritional status

1.1.1. Socioeconomic status

Socioeconomic status (SES) can be considered an indicator of health outcomes and well-being, and can influence the dietary habits and lifestyle of children and adults. Generally, SES is determined by the educational level, occupation, and income position of the parents.

The Organisation for Economic Co-operation and Development (OECD) working paper no. 321, about the measurement of socioeconomic status in the Programme for International Student Assessment, examines more variables based on student reports. These include parental educational attainment (in years), parental occupational status (on the "International Socioeconomic Index" scale), an index of household possessions, screen devices and books, food insecurity, subjective socioeconomic status and household composition (number of siblings) (7). In OECD countries, a socioeconomic gap in mathematics and science performance can be detected among 15-year-olds, where students from socioeconomically disadvantaged families are seven times more likely to lack basic proficiency in mathematics and science than their advantaged peers. Moreover, disadvantaged students are over five times more likely to perform poorly in reading compared to students from advantaged backgrounds (8).

The World Health Organization (WHO) European Childhood Obesity Surveillance Initiative (COSI) assessed socioeconomic status by parental education, employment, and family-perceived wealth. Low education was described by educational attainment as primary or secondary school and higher education as bachelor's degree or higher. Two categories were distinguished by employment status: low (unemployed) and high (employed). Family perceived wealth was categorized into three levels (low-medium-

high) based on how easily families met the end of the month with their own earnings. Results confirmed that lower SES, low parental education, and family-perceived wealth are related to unhealthy food habits and low consumption of fruit and vegetables among 6- to 9-year-old children (9). Furthermore, an inverse association between SES (parental education and family-perceived wealth) and prevalence of childhood overweight was found in European high-income countries, while positive relationship was confirmed in middle-income countries (10).

The Global Network Socioeconomic Status Index has good reliability and validity in low- and middle-income countries. The 10-item index does not include occupation or income but contains questions about household assets (bicycle, motorbike, car/truck/tractor, electricity, television, refrigerator, computer, smartphone) and living conditions (number of people and rooms in the home, source of drinking water, sanitation facilities, type of flooring material, and type of fuel for cooking). Every household item means 1 point, where 1 indicates higher SES and 0 lower SES. Based on the total scores, pregnant women were enrolled in three SES categories: low, moderate, and high. Results show that women in the low and moderate SES categories had higher rates of stillbirth, perinatal, and neonatal mortality than those with high SES. Higher SES was associated with more years of educational attainment (11,12).

The Health Behaviour in School-aged Children (HBSC) survey uses Family Affluence Scale III as a socioeconomic proxy, where six indicators are included: car /van/ truck ownership, own bedroom, number of bathrooms, holidays abroad, number of computers, dishwasher. Socioeconomic indices are determined by the sum score – 6. The HBSC from 2021/2022 survey reported no significant differences between socioeconomic categories and family meals, and school experience (school satisfaction and pressure, teacher and classmate support). Although, adolescents from high-affluence families were more likely to have support from their families, more effectively communicate with their parents, and share family meals every day compared to their peers from low-affluence families (13).

Socioeconomic status can be assessed in many ways, by using different determinants or validated tools. To ensure accurate comparability, studies should take into account the indicators used in literature findings for determining socioeconomic status.

1.1.2. Food security

The Food and Agriculture Organization (FAO) has defined four fundamental pillars of food security: availability, access, utilization, and stability. „Food and nutrition security exists when all people, at all times, have physical, social, and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences...for a healthy and active life” (14).

The evaluation of household food security in the context of health and lifestyle is a fast-growing research area. Several food security indicators have been developed, but there is not yet a gold standard for its assesment. Most of them explore accessibility to food and report personal experiences of stress or hunger arising from inadequate access to food. The inclusion of food consumption and anthropometry data in food security measurements has been recommended (15).

Household food insecurity, in relation to children's nutritional status, has been associated with growth disorders, increased risk of stunting, underweight, overweight and obesity (6, 16). According to the literature, it may also have an impact on children’s mental health, cognitive function, educational achievement, and dietary behavior (17, 18). A relationship between disordered eating, such as loss-of-control eating, binge eating, eating in the absence of hunger, and picky eating in children and adolescents and food security has been confirmed. 8-10 year- old children from food-insecure households indicated higher levels of disordered eating behaviors, eating past satiation and in the absence of hunger than those from food-secure environments. (18).

Food security has also been linked with diet quality, children from food-insecure households have higher added sugar intake and consume lower amounts of fruit, vegetables, seafood, and plant protein (6, 19, 20).

1.1.3. Parenting practices

Parents and caregivers as role models play an important part in the social, cognitive, and physical development of the children. The attitudes, behaviors of the family can influence children’s dietary behaviors, food choices, nutrient intake, which contribute to their optimal development and health.

Parenting practices have an impact on children’s weight outcomes. A systematic review and meta-analysis indicate that restriction of food intake is associated with a higher

weight status, while pressure to eat with a lower weight status (21, 22). Restriction or setting limits for food consumption may result in both healthy and unhealthy food consumption in children. Yee et al. reported that unhealthy food consumption negatively correlates with restrictive guidance and verbal praise while positively with availability, modelling, pressure to eat, and using food as reward. Healthy food consumption positively correlates with active guidance, availability, modeling, and verbal praise, and negatively with pressure to eat (22). Permissive or indulgent parenting styles may be associated with children's higher BMI, lack of parental presence or supervision, and unhealthy food consumption (23, 24).

1.1.4. Nutritional knowledge of the parents and the children

Nutrition literacy is 'the degree to which individuals have the capacity to obtain, process, and understand nutrition information and skills needed in order to make appropriate nutrition decisions' (25).

Nutrition literacy positively influences the development of children's eating behaviors and their food choices. Parents with high nutrition literacy are more likely to encourage children to eat fruits and vegetables, focus on nutrition-related information, and read nutrition labels (24). A positive correlation between parental nutrition literacy and children's diet quality, parental age, education, and income, and a negative correlation with parent's BMI was also found (26).

Some studies indicate that parental nutrition and health literacy are not associated with children's weight status, but other research found that children's health literacy is significantly related to BMI (26, 27). Children with a medium level of nutrition literacy may have a lower BMI, and low health literacy levels may result in excess body weight (27, 28).

Middle-aged children gain their knowledge about food and nutrition mostly from their parents, therefore nutrition programs targeting not only children's but parents' behaviors and knowledge may be more effective (27).

Educational institutions play a crucial role in improving children's nutritional knowledge, while social influences, including peers and media exposure, also contribute to shaping their dietary understanding and behaviors (4, 24, 25).

1.1.5. Physical activity

Physical activity in childhood supports skeletal and cardiometabolic health, contributes to healthy body growth and to development of muscle, reduces body fat, and improves motor and cognitive abilities. The WHO recommends that children between 5-17 years should do moderate- to vigorous-intensity aerobic physical activity at least an average of 60 minutes per day throughout the week. Aerobic activities of vigorous intensity, as well as muscle- and bone-strengthening activities, should be included on at least three days per week (29).

Physical inactivity in school-aged children can lead to obesity, hypertension, cardiovascular disease, type 2 diabetes, and poor mental health (29,30,31,32).

1.1.6. Sleep time

Children between 6-12 years should sleep 9-11 hours daily (33). Insufficient sleep has been associated with increased risk of overweight, obesity, increased screen time, and impaired neurocognitive development, affecting children's emotional and behavioral regulation (29,34,35). Furthermore, it has been linked with unhealthy eating patterns, like skipping breakfast, regular fast-food, and sweets/candy consumption (35).

1.1.7. Screen time

School-aged children are advised to limit the amount of recreational screen time. Evidence suggests that a higher duration of screen time is associated with unfavorable measures of physical fitness, adiposity, cardiometabolic, and mental health in children and adolescents (29).

1.1.8. Social isolation, COVID-19

In 2020-2021, due to the rapid spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), states of emergencies, lockdowns, social distancing, and public space closures were implemented (36).

Social isolation, school closure, and other restrictions during the COVID-19 pandemic had several consequences on the physical and mental health of children. A decrease in physical activity level, increase in sleep duration, screen times, and changes in dietary

habits and nutritional status of school-age children have been reported in many studies (36,37, 38).

Healthy and less healthy dietary behaviors have also been confirmed during the pandemic (36, 38, 39). In WHO European region, children 7-9 years old consumed more fresh fruits and vegetables, and dairy products, but the consumption of savory snacks and sweets has also increased. Children ate more home-cooked meals, shared family meals more frequently, and were more frequently involved in cooking (36).

The prevalence of overweight and obesity among school-aged children increased, which can be explained by the combination of several modifications in physical activity, screen time, nutrition, behaviors and feelings, and food insecurity (40).

1.2. Children's nutritional status

Several standardized international and national references are available for evaluating the nutritional status of children (41, 42,43, 44). The most commonly used anthropometric indicators assessing growth and development are height and weight. Body mass index (BMI) is calculated from these variables: weight in kilograms divided by the square of height in meters. BMI is a practical, easily assessed, widely applicable tool which correlates with body fat (45, 46).

In addition to BMI, physical examination (e.g., face, hair, eyes, lips, tongue, teeth, skin, nails, gums, mucous membranes), body composition measurement (muscle mass, fat mass), and knowledge of genetic and lifestyle variables (e.g., physical activity) are also necessary for health professionals to obtain the most accurate nutrition status of the individual (43,47).

In Hungary, three classification systems are most commonly used to determine the nutritional status of children and young people: Hungarian standards from the 2nd National Growth Survey (ONV2) (43), WHO Growth Reference (42), and the International Obesity Task Force (IOTF or Cole-IOTF) cut-offs (41).

The national BMI reference values for Hungary were determined based on the 2nd National Growth Survey (ONV2). A total of 25181 children aged 3–18 years participated in the cross-sectional study conducted between 2003 and 2006 from the capital and nineteen counties of the country (thirty-seven cities and eighty municipalities). The internationally accepted age-specific BMI cut-off values developed by Cole et al. were

used for the classification into nutritional status categories estimated based on body mass index (43, 47, 48).

The second most commonly used method was first published by Cole et al. in 2000 and is also recommended by the International Obesity Task Force (IOTF). Representative cross-sectional surveys from six countries (United Kingdom, United States, Brazil, Netherlands, Hong Kong, and Singapore) were analyzed, involving 97876 boys and 94851 girls. The BMI cut-off points for adults recommended by the WHO were taken into account in determining the BMI cut-off points for children aged 2–18 years. Thus, the BMI percentiles for children correspond to the BMI cut-offs for adults, namely thinness below 18.5 kg/m^2, overweight above 25 kg/m^2, and obesity above 30 kg/m^2 (41,47, 49).

The WHO growth reference published in 2007 is based on a revision of the 1977 growth reference, supplemented by data on the growth standards of children under 5 years of age. A total of 30018 children's data from six countries (United States, Brazil, Ghana, India, Norway, and Oman) were used to determine BMI cut-off points. The WHO method converts BMI to an age- and sex-adjusted Z-score, which is calculated from the child's current BMI and the median and standard deviation of the BMI of the reference population. Accordingly, a Z-score of less than -2 Z-score indicates thinness, more than +1 Z-score indicates overweight, and more than 2 Z-score indicates obesity (42, 47).

The need for age- and sex-specific BMI reference values for children makes it difficult to compare prevalence rates of nutritional status across studies; different methods used on the same sample can lead to different prevalence rates in children's nutritional status (47).

1.3. The prevalence of thinness, overweight, and obesity among children

In 2022, 190 million children aged 5 to 19 years were living with thinness, while over 390 million were overweight, including 8% of children, 160 million, being obese. The prevalence of overweight and obesity has increased from 8% in 1990 to 20% in 2022. Both boys and girls were similarly affected: 19% of girls and 21% of boys were overweight (50, 51).

Similar results have been reported by NCD Risk Factor Collaboration. Globally, the prevalence of thinness among school-aged children and adolescents decreased from 10.3% in 1990 to 8.2% in 2022 in girls and from 16.7% to 10.8% in boys. The prevalence

of obesity increased from 1.7% in 1990 to 6.9% in 2022 in girls and from 2.1% to 9.3% in boys. (52)

In the WHO European region, between 2022-2024, 25% of children aged 7–9 years were overweight and obese. The prevalence of overweight among boys was 26% (12% obese), and among girls 23% (8% obese).

In Hungary, according to the latest results of the WHO European Childhood Obesity Surveillance Initiative (COSI), 27% of children are living with overweight, including 12% who are obese. The prevalence of overweight (including obesity) is similar for boys (27.7%) and girls (27.0%), while obesity is more common among boys (13%) than among girls (11%) (53).

In 2022, the Health Behaviour in School-aged Children (HBSC) study had similar trends among 11-year-old Hungarian pupils. The prevalence of overweight was 18.1%, and obesity 7.1% among boys. 12.5% of girls were classified as overweight, while 4.3% were obese. The prevalence of thinness was 15.3% among boys, while 19.8% of the girls were living with thinness (54).

1.4. Nutritional health programs

1.4.1 Nutrition initiatives worldwide

Besides parental influence, schools, the surrounding environment, and community behavior and norms play an important role in the modification of 6-12-year-old children's eating habits. Comprehensive strategies for creating environments supporting healthy eating and regular physical activity are needed to ameliorate poor nutritional status of school-aged children.

Several international networks are dedicated to reduce childhood obesity (World Obesity Federation, European Childhood Obesity Group, EPODE International Network), and global strategies have been approved to eliminate malnutrition.

The **Decade of Action on Nutrition**, co-led and monitored by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), is a commitment of the United Nations Member States to achieve global nutrition targets (ex. no increase in childhood overweight, reduce and maintain childhood wasting to less than 5%) and diet-related non-communicable diseases (NCD) targets. To achieve these

aims, the implementation of national policies, programs and increased investments in nutrition are needed (55).

School Food and Nutrition – Global Action Plan 2022–2026

In 2019, the Food and Agriculture Organization of the United Nations (FAO) adopted a comprehensive framework for integrated action on school food and nutrition (SFN) to improve nutrition and to support the transformation of the agrifood system. For better, healthy, and culturally appropriate school food and for improved dietary behaviors, the FAO has been supporting countries in the development and implementation of policies, legislation, and school-based food and nutrition education programs. The Global Action Plan determines priority and outputs to be achieved by 2026 under four action areas: promote a holistic approach to SFN; design, implement, and monitor effective SFN interventions; strengthen policy and legal frameworks; and mobilize resources (56).

Stepping up effective school health and nutrition is a partnership of the United Nations and the FAO, WHO, the Global Partnership for Education (GPE), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF), the United Nations Standing Committee for Nutrition, the World Bank Group, and the World Food Programme (WFP) to improve the health and nutrition of school-aged children and adolescents. Their shared vision is "Healthy, well-nourished and educated children and young people achieve their full potential, and their countries achieve better social and economic growth". School health and nutrition represents a multi-sectoral strategy aimed at developing and implementing coordinated, comprehensive initiatives and services that are integrated within the education system. School health and nutrition programs are highly cost-effective strategies for great education outcomes (57).

The **School Meal coalition** is an initiative to ensure that every child can receive a healthy, nutritious meal in school by 2030. Currently, the network has 108 member countries, 143 partners, and 52 governments have established national commitments to achieving their objectives, including an increase in the effectiveness and quality of school health and nutrition programs worldwide by 2030 (58).

The **EU School Scheme** supports the provision of milk, fruits, and vegetables to children from nursery to secondary school across the European Union. Besides the distribution of healthy food, the implementation of educational activities about healthy eating behavior

(e.g., tasting classes, cooking workshops, school gardens) is also recomended (59). Hungary has joined the scheme, providing fruit and vegetables to 6-14-year-olds, and milk from nursery till the end of elementary school. Educational activities include visits to milk, fruit, and vegetable producers and milk, fruit and vegetable products tasting classes, complemented by interactive education about healthy eating and lifestyle (60).

The **School4Health project**, funded by the European Union, is a 3-year program (2023-2025) targeting children and staff from primary and secondary schools. Working with educational institutions to analyze and implement best practices around healthy nutrition, physical activity, and mental health contributes to the key principles of the **Health Promoting School (HPS) approach**. Hungary has also joined the program, prior to which it adopted several initiatives supporting the HPS approach (61). A comprehensive school health promotion program was implemented, and a digital school health development toolkit helps teachers with materials on topics for primary schools: physical activity, nutrition, healthy environments, the digital world, social relationships, health services, and harmful habits (such as smoking) from 5th grade (62).

In Hungary, policies like the Act CXC of 2011, Decree No. 20/2012 of the Minister of Education, Decree No. 37/2014. regulate daily physical education classes, healthy food retailers, and school catering (63,64, 65).

1.4.2. EPODE

In 2004, the EPODE (Ensemble Prévenons l'Obésité Des Enfants) was first launched in France and aims to prevent childhood obesity through community-based interventions. The target group are children aged 0–12 years and their families. EPODE methodology follows a four-pillar approach: political commitment, sufficient resources, support services, and evidence of the delivery and outcomes of EPODE (66).

The Epode European Network (EEN) and the EPODE International Network (EIN) have been established to support the global implementation of community-based interventions. The EPODE approach is an evidence-based and effective strategy for preventing childhood obesity. In 2020, 28 countries worldwide have been using its approach (67).

1.4.3. GYERE®-Children's Health Program

The GYERE® program was developed in 2014 by the Hungarian Dietetic Association

and implemented in cooperation with Semmelweis University, Faculty of Health Sciences, the National Institute of Child Health, and the State Secretariat for Healthcare, in close partnership with local public and private stakeholders—including municipalities, schools, and the healthcare system. It aims to prevent childhood overweight and obesity in Hungary by focusing on the behavior of the whole family, changing its environment and community norms by involving the entire population of the town.

The three-year pilot program, using the EPODE methodology (66), was first launched in Dunaharaszti, followed by Szerencs (2015) and Diósgyőr (2018). The GYERE® Program's target group was all children aged 0-18 years, their parents, and teachers.

As a health education program, thematic lectures about healthy eating (grains, fruits and vegetables, hydration, meat and fish, dairy products and eggs, fat and salt, sweets, the Hungarian dietary guideline the OKOSTÁNYÉR®) were held by dietitians in all schools and kindergartens within the town. The importance of physical activity was also emphasized. For each topic, educational materials were developed for professionals and informational materials for parents and teachers. Parents of children under 3 years of age were reached with the help of local health visitors and materials related to the given topic were regularly sent to them.

The program used various communication channels, e.g., in-class lectures, workshops, drawing and recipe competitions, GYERE® menu in school catering, GYERE® day, articles (online and in the local press), and nutrition counseling to increase family involvement (6,38,68). During the coronavirus epidemic, the professionals couldn't visit children in person; therefore, in Diósgyőr, the most important messages of the last two topics were sent via videos.

2. Objectives

While numerous nutrition educational programs target school-aged children, few of them monitor and evaluate the impact of these programs from different perspectives. The majority of studies come from Western, high-income countries (61,66), while data about nutrition educational initiatives from Central and Eastern Europe, particularly from socioeconomically disadvantaged regions, remains limited in the international literature. The aim of my thesis was to explore the multiple factors contributing to the effectiveness of the GYERE® program, providing a comprehensive understanding of children's eating behavior and changes in their nutritional status. Thus, we set out the following hypotheses in my theses:

1. The GYERE® program succeeds in reducing childhood overweight and obesity.
2. 2-years of nutrition education significantly improves children's knowledge.
3. Social isolation due to the COVID-19 pandemic has a negative impact on the body weight and lifestyle of children.
4. The socioeconomic status of parents and the family's food security influence children's consumption of vegetables, fruits, fruit juices, and soft drinks.

3. Methods

3.1. Data collection

Data collection was carried out with the approval of the Scientific and Research Ethics Committee of the Health Science Council of the Ministry of Health (TUKEB permit number: 52769/3260/2015/EKU).

Nutritional status survey

Parental consent for the children's anthropometric measurements was obtained in writing, and the participation was voluntary and anonymous for the pupils. The children's height and weight were measured and recorded by local health visitors in the medical examination room of the educational institutions. Data collection was performed at the beginning (Dunaharaszti November-December 2014; Szerencs January-February 2016; Diósgyőr October-November 2018) and at the end of each program (Dunaharaszti 2017 February-March 2017; Szerencs February 2018; Diósgyőr October-November 2020). Weight was measured in light clothing, without shoes, on an Omron BF 511 body composition monitor, with an accuracy of 0.1 kg, and height was documented by a Seca 206 instrument, with an accuracy of 0.1 cm. Anthropometric data recording was done according to Organising the Collection of Height/Weight Data of Children in EPODE Towns (69). Based on body mass index international (IOTF and WHO) and national (ONV2) references were used to classify children into nutritional status categories (41,42,43).

Nutritional knowledge survey

Children's knowledge level was determined using a questionnaire of single and multiple choice questions about healthy eating (vegetable and fruit, whole grain, fluid, meat and fish, milk and dairy products, sweets and desserts, fat and salt consumption, OKOSTÁNYÉR® recommendation). The questionnaire was distributed at the beginning and the end of the program in Szerencs (November 2016 and March 2018) and Diósgyőr (November 2018 and January 2021). In Dunaharaszti, this survey was not conducted. Every correct answer meant 1 point, and wrong responses 0 points. The maximum score on the test filled out among children living in Szerencs was 19, and in Diósgyőr 17. Some modifications were made to the first questionnaire (Szerencs); some questions were removed, or modified. Therefore, to evaluate the two assessments together, I transformed

scores into ratios (percentage score= each child's score divided by the maximum score and multiplying by 100) and ran statistical analyses on them.

The impact of social isolation due to the COVID-19 pandemic on children's body weight – survey

The study aimed to assess the impact of restrictions and school closures on the lives of children who were participating in the GYERE® program in Diósgyőr.

The online questionnaire, consisting of 20 closed questions offering single and multiple choices, was sent to parents of primary school children by teachers. The questions addressed children's demographic characteristics and changes (increase, decrease, or no change) in body weight, food intake, sleep duration, screen time, physical activity, and mental health compared to before the lockdown.

Data collection was carried out between 16 and 26 June 2020.

The association of socioeconomic status and food security with children's fruit and vegetable consumption, and fruit juice/soft drink intake– survey

A questionnaire consisting of closed questions on household food security and socioeconomic status was completed electronically between 23 November 2020 and 19 January 2021 by parents of children participating in the GYERE® Diósgyőr program. The basis of the questionnaire was the Epode for the Promotion of Health Equity (EPHE) parental questionnaire from which questions about socioeconomic status and dietary behavior have been used (70). Food security was assessed with the USDA 6-item U.S. Household Food Security Survey Module (71).

Demographic and socioeconomic determinants, such as the parents' age, educational level, perception and source of income, and employment status were rated on Likert-type scales.

Socioeconomic status was defined by maternal educational level, employment status (because 92.1% of the respondents were mothers), and the income position of the family. The educational level (low-high) was determined using the median years of education (12-14 years) as the cut-off. Employment status was dichotomized into employed and unemployed categories. The classification of income position was done as follows: coping and living comfortably on present income was defined as a good income position, and finding it difficult on present income as not good. Socioeconomic score was

calculated by the sum of the determinant's scores, and the median was used as a cut-off for SES categories (high-low).

The frequency of fruit and vegetable consumption was assessed on an 8-point Likert scale (1=Never – 8=Every day, more than twice a day), and the intake of soft drinks on a 7-point Likert scale (1=Never – 7=Every day, more than once a day). Social determinants, including parental demand (telling their child to eat fruit/vegetable every day), allowance (allows their child to eat as much fruit/vegetable as (s)he likes at home), communicating health beliefs (telling their child that fruit juices/soft drinks make him/her fat), rewarding/comforting practices (give fruit juices/soft drinks to their child as a reward or comfort), physical environmental factors, including home availability (in my home, there are usually different kinds of fruits/vegetables available), and situation-specific habit (restrain themselves from fruit juice intake because of the presence of their own child) were examined on a 5-point Likert-type scales (0=Never – 4=Always).

The questionnaire was pilot-tested in October 2020 with 11 parents participating in the GYERE® Szerencs program to identify potential errors and assess comprehensibility. Following this pilot study, minor revisions were made.

3.2. The sample

Nutritional status survey

The target group was all 6-12-year-old children living in Dunaharaszti, Szerencs, and Diósgyőr. Thus, twelve kindergartens, ten elementary schools, and one secondary school were involved – all institutions where children in the relevant age group attend.

The sample frame at the beginning of the program was 3893 children, and at the end, 3984 children. Children's data who were younger than 6 years and older than 12 years were removed. At the first measurement the net sample size was n=3496, with a mean age of 8.93 (±1.92), and the proportion of boys was 50.3% (1760 pupils).

Follow-up the net sample size was n=3264, with a mean age of 8.88 (±1.941) (*Table 1*), and the proportion of boys was 48.6% (1585 students).

Table 1. Net sample sizes and proportions by children's age groups

Age (year)	Baseline		Follow-up	
	N	**Percent**	**N**	**Percent**
6	450	12.9	450	13.8
7	521	14.9	517	15.8
8	579	16.6	510	15.6
9	562	16.1	482	14.8
10	501	14.3	479	14.7
11	444	12.7	441	13.5
12	440	12.6	385	11.8
All	3496	100.0	3264	100.0

Nutritional knowledge survey

The target group, selected at random, consisted of 5th-grade children aged 10–12 years. Thus, in Szerencs, at the baseline, 106 children, follow-up 125 children completed the questionnaire. In Diósgyőr, in the baseline survey, 212 children, and at follow-up, 202 children took part. In the total sample, the proportion of boys was 49.0% at baseline and 50.5% at follow-up.

The impact of social isolation due to the COVID-19 pandemic on children's body weight– survey

The target group was parents of children aged 6 to 12 years living in Diósgyőr. Parents of five elementary school students were interviewed through an electronic questionnaire. 387 parents responded, from which data from 87 parents were excluded because their children were older than 12 years.

The association of socioeconomic status and food security with children's fruit and vegetable consumption, and fruit juice/soft drink intake– survey

The target group was parents of children aged 6 to 9 years living in Diósgyőr. This age group was selected to enable comparison of Hungarian data with the EPHE study, in which the target population comprised parents of children aged 6–8 years (70). To achieve a minimum sample size of 150 children, the age range was extended to include 9-year-olds as well. A total of 156 (mean age 7.75±1.04) children's parents voluntarily and

anonymously completed the questionnaire. Data from 16 parents were excluded due to missing information concerning employment status and/or educational level.

3.3. Statistical analysis

Data processing was performed in IBM SPSS (Statistical Package for the Social Sciences) Version 23.

Data are presented as absolute (*n*) and relative (%) frequencies for categorical variables, medians and quartile ranges for ordinal data, and mean ± standard deviation (SD) for continuous variables. Shapiro-Wilk test was used for the assessment of the normality for continuous data, and Levene's test for homogeneity of variances.

Independent-samples t-test and one-way analysis of variance (ANOVA) were used to compare mean BMI between baseline and follow-up. Z-test was performed to check for differences in nutritional status, expressed in percentages, between baseline and follow-up results. Cohen's kappa (K) was run to determine if there was agreement between international and national references on the classification of nutritional status.

Differences and associations between body weight change and lifestyle habits during COVID-19 confinement were evaluated with the Fisher's exact test and the correlation between the factors with Spearman's correlations.

Mann-Whitney U test was used to assess differences in nutritional knowledge between baseline and follow-up, as well as between socioeconomic status/ food security and energy-balance-related behavior.

The results obtained were interpreted at a 95% confidence interval at a significance level of 0.05.

4. Results

4.1.Body mass index (BMI)

Baseline results show BMI means are growing with age in both sexes (boys: F=43.302; df=6; p<0.001; girls: F=37.009; df=6; p<0.001), statistically significant differences can not be observed between boys' and girls' BMI means within age group (*Table 2*).

Table 2. Means (M) and standard deviations (SD) of BMI by gender and age in the baseline sample (n=3496)

Age (year)	Boys		Girls		All	
	M (kg/m^2)	**SD**	**M (kg/m^2)**	**SD**	**M (kg/m^2)**	**SD**
6	16.10	2.44	16.73	2.99	16.40	2.73
7	17.17	3.20	16.73	2.95	16.94	3.07
8	17.65	3.15	17.48	3.27	17.57	3.21
9	17.98	3.42	18.28	3.66	18.13	3.54
10	19.63	4.35	19.02	3.89	19.33	4.14
11	19.57	3.94	19.87	4.11	19.70	4.01
12	20.52	5.20	20.42	4.50	20.47	4.85
Total	18.33	3.98	18.28	3.86	18.30	3.92

* * Significant difference (p<0,005) between baseline and follow-up mean BMI

The follow-up results further confirm that mean BMI increases with age in both sexes (boys: F=43.814; df=6; p<0.001; girls: F=38.780; df=6; p<0.001), statistically significant differences can be observed between 10 years old boys' and girls' BMI means (F=5.111; df=1; p=0.024) (*Table 3*).

Table 3. Means (M) and standard deviations (SD) of BMI by gender and age in the follow-up sample (n=3264)

Age (year)	Boys		Girls		All	
	M (kg/m^2)	**SD**	**M (kg/m^2)**	**SD**	**M (kg/m^2)**	**SD**
6	16.39	2.85	16.09**	2.78	16.23	2.82
7	16.77	3.22	16.46	3.13	16.61	3.17

8	16.87**	3.21	17.13	3.60	17.00**	3.41
9	18.17	4.12	18.09	3.73	18.13	3.92
10	19.54*	4.49	18.75*	3.89	19.14	4.21
11	20.14	4.58	19.80	4.47	19.96	4.52
12	20.39	4.48	20.01	4.24	20.20	4.36
Total	18.24	4.17	17.95	3.96	18.09**	4.07

* The mean difference is significant at the 0.05 level.

* * Significant difference (p<0.005) between baseline and follow-up mean BMI

The independent samples t-test revealed that children had significantly lower mean BMI at the end of the program (18.09 ± 4.07) compared to the beginning of the program (18.30 ± 3.92), t(6679)=2.249, p=0.025, which resulted in a moderate Cohen's *d* effect size (d=0.54).

BMI means decreased after follow-up in every age group, except for 11-year-olds, where an increase was observed (*Figure 1.*). Significant differences in mean BMI were found among 6-year-old girls (baseline BMI: 16.73 ± 2.99; follow-up BMI: 16.09 ± 2.78; t(444)=2.360, p=0.019), 8-year-old children (baseline BMI: 17.57 ± 3.21; follow-up BMI: 17.00 ± 3.41; t(1087)=2.804, p=0.005), and 8-year-old boys (baseline BMI: 17.65 ± 3.15; follow-up BMI: 16.87 ± 3.21; t(544)=2.850, p=0.005) (*Table 2 and 3).*

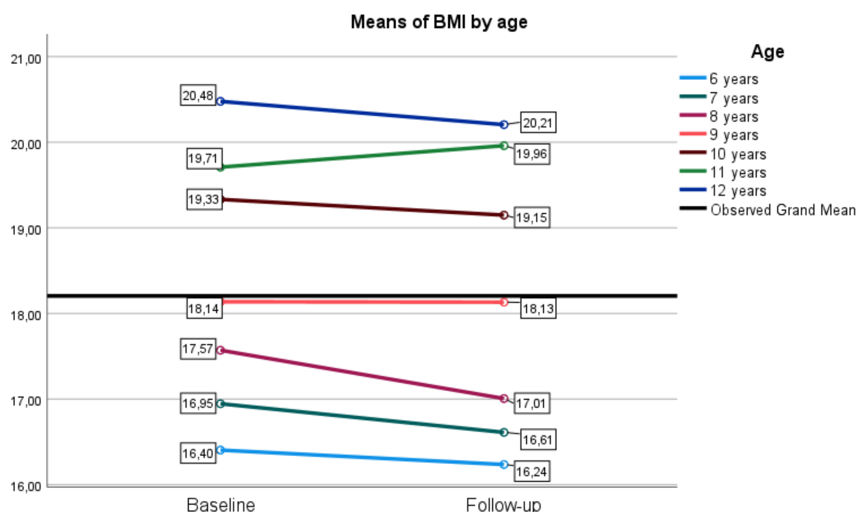


Figure 1. Changes in means (M) of BMI by age between the baseline (n=3496) and follow-up sample (n=3264)

4.2.Nutritional status according to IOTF cut-offs

In the first sample (n=3496) the percentage of normal BMI was 61.7%. The proportion of overweight was 19.0%, while that of obese was 10.1%. The percentage of undernourished children was also notable: 9.2% (*Figure 2.*). There are no significant differences between sexes, while the percentage of overweight children is significantly higher in older age groups. An association between age and nutritional status was observed, $\chi^2(36)=92.636$, $p<0.001$.

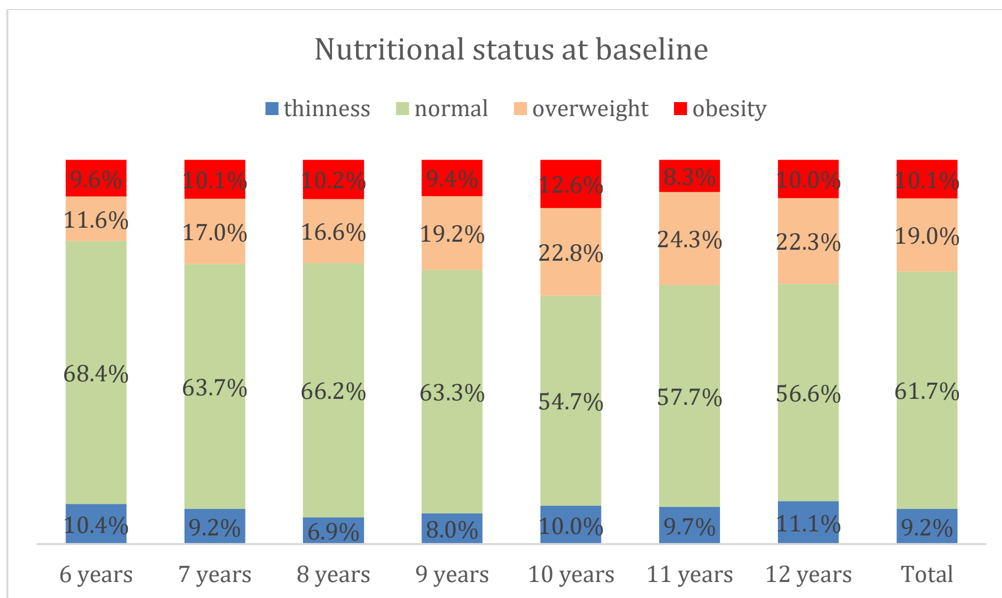
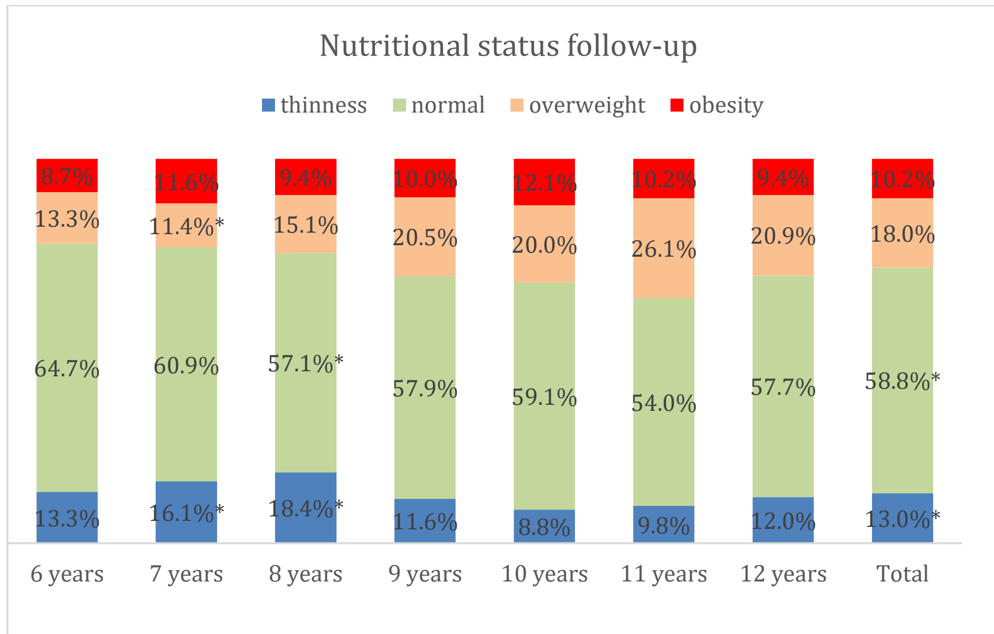


Figure 2. Nutritional status of all children by age at baseline (n=3496)

In the second sample (n=3264) the proportion of the normal weight was 58.8%. The prevalence of overweight among children was 18.0%, while 10.2% were classified as obese.

The proportion of thin children increased to 13.0% at follow-up. There are no significant differences between sexes, while the prevalence of overweight children is notably higher in older age groups (*Figure 2.*).



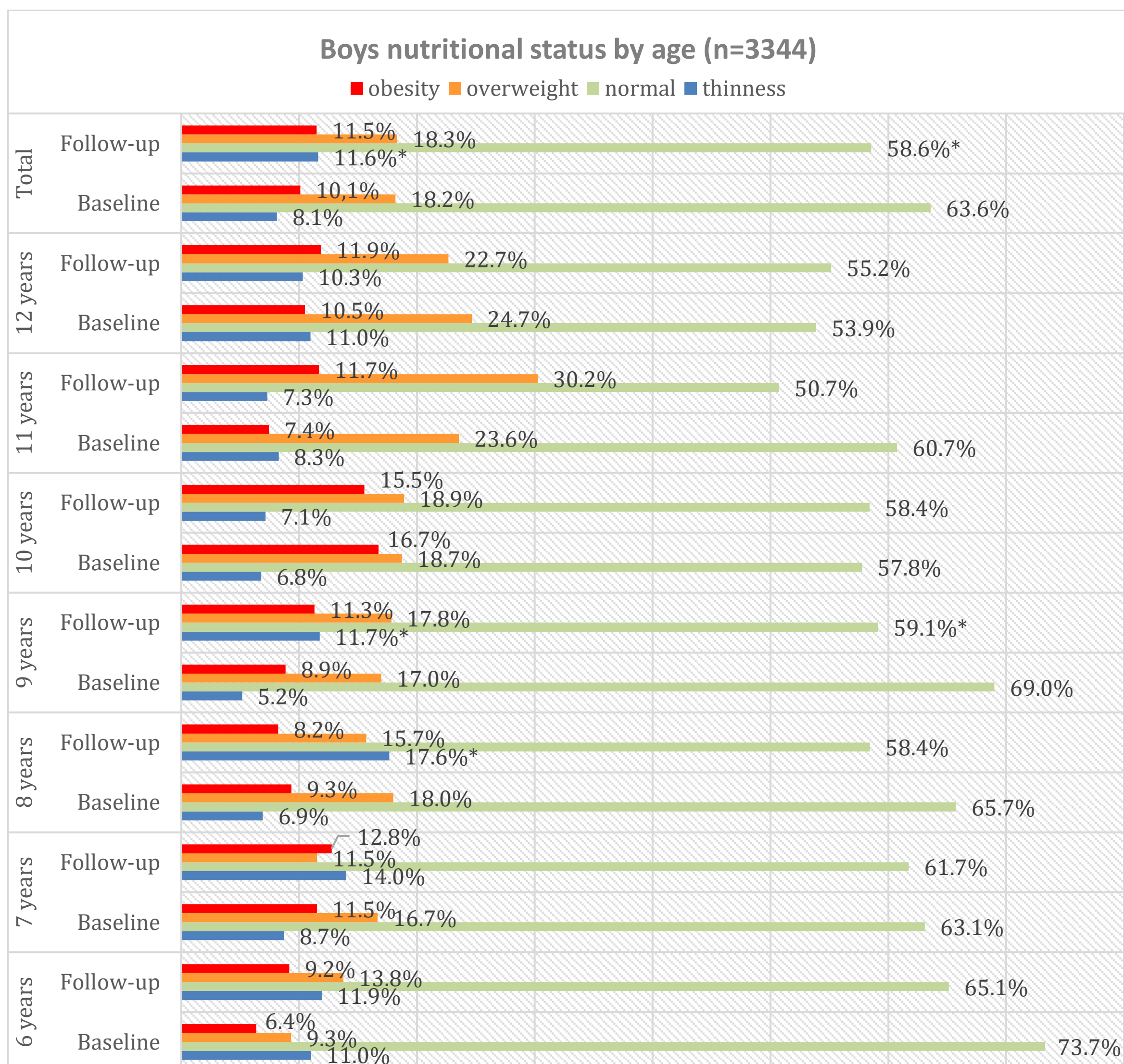
*Proportions differ significantly from baseline data at the 0.05 level (z-test).

Figure 3. Nutritional status of all children by age at follow-up (n=3264)

A significant association was found between nutritional status and survey time point (baseline vs follow-up) among 7-year-olds ($\chi(3)=16.332$, $p=0.001$), 8-year-olds ($\chi(3) = 33.280$, $p<0.001$), and in the total sample ($\chi(3) = 25.399$, $p<0.001$) after adjusting Bonferroni method.

Examining boys and girls separately, significant differences among age groups were found in boys, while girls showed differences similar to those in the total sample.

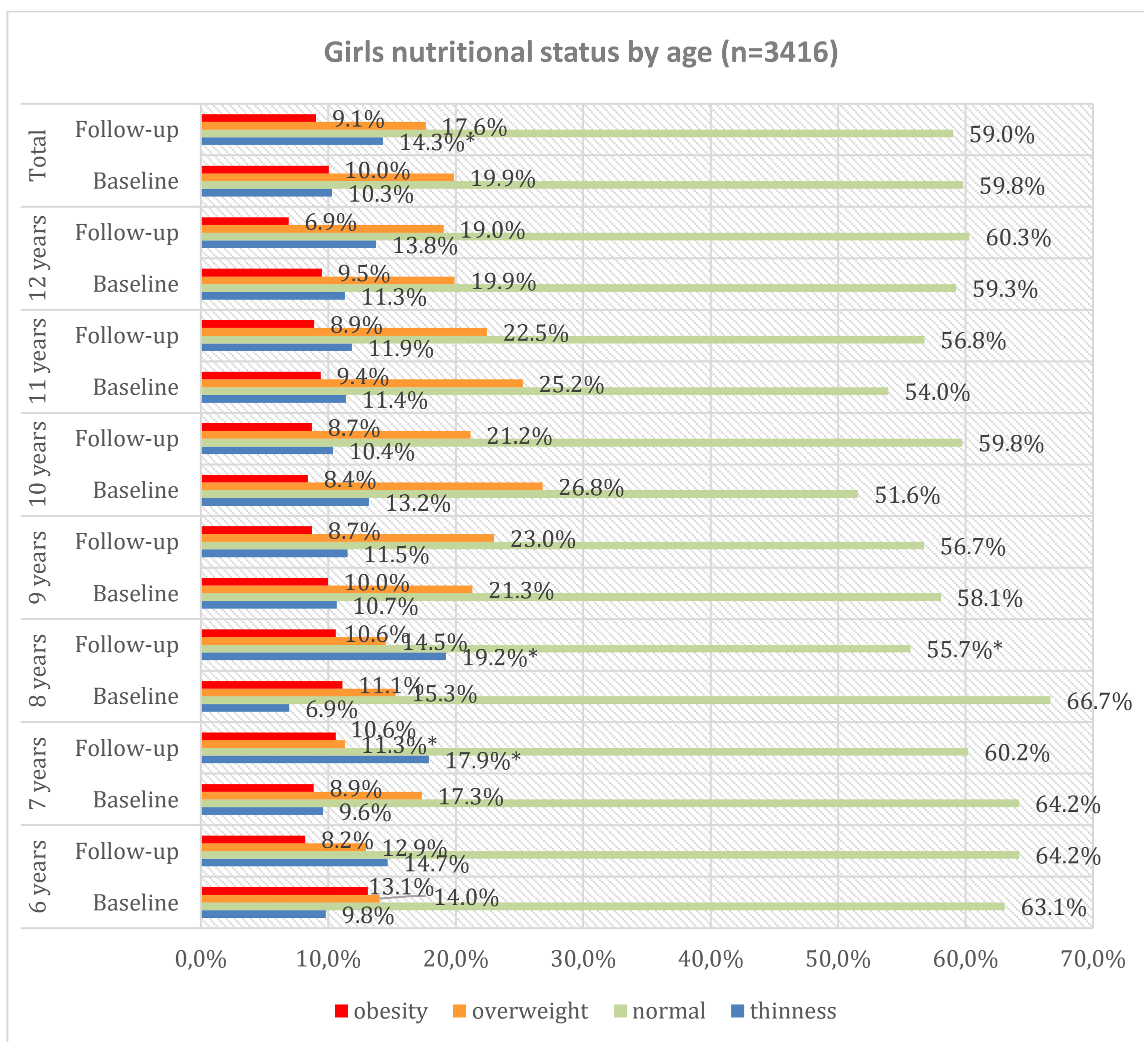
A significant association was detected between the nutritional status of boys and survey time point among 8-year-olds ($\chi(3)=14.822$, $p=0.002$), 9-year-olds ($\chi(3) = 9.249$, $p=0.026$) and in the total sample ($\chi(3)=15.350$, $p=0.002$). Among boys, the prevalence of thinness significantly increased, from 8.1% to 11.6%, for the disadvantage of normal nutritional status (from 63.6% to 58.6%) ((*Figure 4.*).



* Significant difference (p<0.005) between baseline and follow-up proportions (z-test).

Figure 4. Nutritional status of the boys at baseline and follow-up (n=3344)

A significant association was found between the nutritional status of girls and survey time point among 7-year-olds ($\chi(3)=11.030$, $p=0.012$), 8-year-olds ($\chi(3)=18.766$, $p<0.001$) and in the total sample ($\chi(3)=14.265$, $p=0.003$). The prevalence of overweight and obesity decreased by 2.3% and 0.9 %, but this was not significant. The proportion of thinness significantly increased by 4.0% (*Figure 5.*).



* Significant difference (p<0.005) between baseline and follow-up proportions (z-test).

Figure 5. Nutritional status of the girls at baseline and follow-up (n=3416)

4.3.Nutritional status according to WHO and Hungarian references

The prevalence of thinness and obesity among 6-12-year-old children was the highest according to the WHO classification. The prevalence of overweight was similar using different references. The Hungarian cut-offs show the lowest prevalences of thinness and obesity. Significant differences (p<0.001) were detected among classifications. There was moderate agreement between IOTF and WHO standards, K=0.500 (95% CI, 0.300 to 0.886), p<0.001, and IOTF and Hungarian references K=0.561 (95% CI, 0.300 to 0.886), p<0.001. Fair agreement was found between WHO and Hungarian classifications K=0.357 (95% CI, 0.300 to 0.886), p<0.001 (*Table 4.*).

Table 4. The nutritional status of 6-12-year-old children at baseline and follow-up, according to international and national references (n=6760)

	IOTF	WHO	Hungarian
thinness baseline	9.2 %	12.0 %	8.0 %
thinness follow-up	13.0 %	16.2 %	11.9 %
normal baseline	61.7 %	51.9 %	66.6 %
normal follow-up	58.8 %	49.4 %	63.3 %
overweight baseline	19.0 %	19.2 %	19.2 %
overweight follow-up	18.0 %	18.1 %	18.0 %
obesity baseline	10.1 %	16.9 %	6.2 %
obesity follow-up	10.2 %	16.3%	6.8 %

4.4. Nutritional knowledge assessment

The Shapiro-Wilk test for normality reported significant results ($p < 0.001$), indicating that the data were not normally distributed; therefore, a nonparametric test was performed to assess differences between baseline and follow-up performance.

Mann-Whitney U test indicated that follow-up test results in the whole sample had significantly greater score ratios than at baseline ($z=-4.96$, $p<0.001$). A significant difference between boys and girls was found at follow-up ($z=-3.27$, $p=0.001$). Study performance was significantly higher at the end of the program among boys ($z=-2.31$, $p=0.021$) and girls ($z=-4.83$, $p<0.001$) (*Table 5.*)

Table 5. Means (M) and standard deviations (SD) of nutritional knowledge score ratio by gender at baseline and follow-up

	Baseline			**Follow-up**		
	Boys (n=156)	Girls (n=162)	All (n=318)	Boys (n=164)	Girls (n=163)	All (n=327)
Mean (SD)	60.61 (12.88)	62.10 (12.42)	61.37 (12.65)	64.03* (15.03)	69.67* (14.02)	66.84* (14.79)
Median	63.15	63.15	63.15	64.70	70.58	68.42
Minimum	23.52	29.41	23.53	23.52	35.29	23.53
Maximum	94.11	89.47	94.12	94.73	100.00	100.00

*Significant at P < 0.05 level using Mann-Whitney U test

4.5. The impact of social isolation due to the COVID-19 pandemic on children's body weight

Parents reported an increase in their children's sleep time (58.3%) and food intake (39.0%), as well as a decrease in physical activity (60.0%) and emotional well-being (44.0%) during the lockdown. Fisher-exact test showed that sleep time (p=0.030), physical activity (p=0.006), food intake (p<0.001), and emotional status (p=0.015) were significantly associated with body weight change. A positive correlation was found between body weight change and sleep time (r=+0.126, p=0.029) and food intake (r=+0.397, p<0.001). Body weight change inversely correlated with physical activity (r=-0.152, p=0.008) (*Table 6.*).

Table 6. 6-12-year-old children's body weight changes in association and correlation with lifestyle habits during the first COVID-19 lockdown (n=300)

		Body weight change			**Total sample (n=300)**	**p-value (Fisher-exact test)**	**Spearman correlation coefficient (p-value)**
		decreased (n=7)	no change (n=154)	increased (n=139)			
Gender	Male	2.0%	49.0%	49.0%	51.0%	0.658	
	Female	2.7%	53.7%	43.5%	49.0%		
Age	6-9 years	1.3%	51.3%	47.4%	52.0%	0.475	
	10-12 years	3.5%	51.4%	45.1%	48.0%		
Sleep time	decreased	16.7%	50.0%	33.3%	4.0%	0.030	0.126 (p=0.029)
	no change	2.7%	56.6%	40.7%	37.7%		
	increased	1.1%	48.0%	50.9%	58.3%		
Physical activity	decreased	3.3%	42.8%	53.9%	60.0%	0.006	-0.152 (p=0.008)
	no change	1.4%	65.8%	32.9%	24.3%		
	increased	0.0%	61.7%	38.3%	15.7%		
Food intake	decreased	13.5%	59.5%	27.0%	12.3%	<0.001	0.397 (p<0.001)
	no change	1.4%	67.1%	31.5%	48.7%		
	increased	0.0%	29.1%	70.9%	39.0%		
Screen time (online education and leisure activities)	decreased/ no change	6.7%	46.7%	46.7%	5.0%	0.490	-0.031 (p=0.599)
	1–5 h	1.3%	51.3%	47.4%	51.3%		
	6–10 h	2.5%	51.7%	45.8%	39.3%		
	11–16 h	7.7%	53.8%	38.5%	4.3%		

Emotional status	decreased	4.5%	43.2%	52.3%	44.0%	0.015	-0.040 (p=0.493)
	no change	0.9%	61.9%	37.2%	37.7%		
	increased	0.0%	49.1%	50.9%	18.3%		
Daily routine	no	2.2%	45.1%	52.7%	30.3%	0.354	-0.083 (p=0.153)
	yes	2.4%	54.1%	43.5%	69.7%		

4.6. The association of socioeconomic status and food security with children's fruit and vegetable consumption, and fruit juice/soft drink intake

The majority of the mothers were over 40 years old (60.7%), employed (86.4%), and highly educated (79.3%). Regarding family composition, 72.9% of households included two adults, and 53.6% had two children. 90.0% of the parents reported that they were living comfortably/coping on their present income, and 84.3% of the households were food secure (*Table 7.*). Pearson correlation analysis showed a moderate positive correlation between food security and SES ($r = 0.461$, $p < 0.001$).

Table 7. Socio-demographic characteristics of the households by food security and socioeconomic status (n=140)

		SES			Food security			Total
		High (n=118)	Low (n=22)	p-value	Security (n=118)	Insecurity (n=22)	p-value	
Age of the mother	25-30 years	2.5%	9.1%	0.278	2.5%	9.1%	0.288	3.6%
	31-35 years	16.9%	18.2%		18.6%	9.1%		17.1%
	36-40 years	20.3%	9.1%		17.8%	22.7%		18.6%
	>40 years	60.2%	63.6%		61.0%	59.1%		60.7%
Adults in the household	1 adult	12.7%	27.3%	0.209	11.0%	36.4%	0.003*	15.0%
	2 adult	74.6%	63.6%		78.0%	45.5%		72.9%
	3 or more adults	12.7%	9.1%		11.0 %	18.2%		12.1%
Children in the household	1 child	31.4%	22.7%	0.555	31.4%	22.7%	0.679	30.0%
	2 children	52.5%	59.1%		53.4%	54.5%		53.6%
	3 children	11.0%	18.2%		11.0%	18.2%		12.1%
	4 children	5.1%	0.0%		4.2%	4.5%		4.3%
Food security	insecurity	8.5%	54.5%	<0.001*			-	15.7%
	security	91.5%	45.5%					84.3%

*Significant at P < 0.05 level using Fisher-exact test

Association between socioeconomic status and children's consumption of fruits, vegetables, fruit juice, and soft drinks

Significant differences in fruit ($p=0.003$), salad/grated ($p=0.002$), and raw vegetable consumption ($p=0.021$) were observed between the high- and low-SES groups. Children whose parents had lower socioeconomic status consumed fruits and vegetables significantly less frequently than those from the high category.

Parental demand for fruit ($p=0.007$), home availability of vegetables served with dinner ($p=0.001$), and eating vegetables with the child ($p=0.014$) were significantly more frequent among high SES groups.

Socioeconomic status was not associated with children's fruit juice and soft drink consumption nor with price influence (sensitivity to the price of food purchased for children) (*Table 8.*).

Association between food security and children's consumption of fruits, vegetables, fruit juice, and soft drinks

Household food security was associated with children's fruit ($p=0.001$), salad/grated ($p=0.001$), raw ($p=0.007$), cooked vegetable ($p=0.001$) consumption. 6-9-year-old children from food-insecure households consumed fruit and vegetables less frequently than their counterparts from food-secure households.

Results confirm an association between food security status and parental demand ($p<0.001$), allowance ($p=0.004$), and home availability of fruits ($p=0.033$). Furthermore, children from food-secure households are more frequently allowed to eat as much vegetables as they like ($p=0.005$), and home availability of vegetables served with dinner (or lunch) is more frequent ($p=0.001$) among them. Parents from food-secure households drink fruit juices together with their children less often than parents from food-insecure households ($p=0.042$).

Food security has a significant impact on the price of food purchased for children ($p=0.032$), parents from food-insecure households sometimes do not give their children certain foods because they cost too much (*Table 8.*).

Table 8. Rounded median values and quartiles (Q1-Q3) for weekly fruit, vegetable, soft drink consumption, and parental determinants for socioeconomic status and food security categories

Parental determinants	**Food consumption (frequency/week)**	**SES** (n=140)			**Food security status** (n=140)		
	Fruit consumption	High	Low	p-value	Security	Insecurity	p-value
	Fruit consumption[1]	5 (4-6)	4 (3-5)	0.003*	5 (4-6)	4 (3-5)	0.001*
Parenting practices	Parental demand[2]	3 (2-4)	2 (1-3)	0.007*	3 (3-4)	2 (1-3)	<0.001*
	Parental allowance[2]	4 (3-4)	4 (3-4)	0.172	4 (3-4)	3 (3-4)	0.004*
Home availability	Home availability[2]	4 (3-4)	3.5 (3-4)	0.508	4 (3-4)	3 (2-4)	0.033*
Vegetable consumption							
	Salad/grated vegetable consumption[1]	4 (3-4)	3 (2-4)	0.002*	4 (3-4)	3 (2-4)	0.001*
	Raw vegetable consumption[1]	4 (2-4)	3 (2-4)	0.021*	4 (2-4)	3 (2-3)	0.007*
	Cooked vegetable consumption[1]	4 (4-5)	4 (3-5)	0.380	4 (4-5)	3 (3-4)	0.001*
Parenting practices	Parental allowance[2]	4 (3-4)	4 (3-4)	0.266	4 (3-4)	3 (2-4)	0.005*
Parental knowledge	Parental knowledge on recommendations for vegetable consumption [3]	5 (4-6)	4 (4-5)	0.611	5 (4-6)	4 (3-5)	0.308
Performing EBRB with the child	We often eat vegetables with the whole family together [4]	1 (1-2)	1 (1-1)	0.014*	1 (1-2)	1 (1-1)	0.103
Home availability	Home availability of different kinds of vegetables[2]	3 (3-4)	3 (3-3)	0.077	3 (3-4)	3 (2-4)	0.051
	Home availability of vegetables served with dinner (or lunch)[2]	3 (3-4)	2.5 (2-3)	0.001*	3 (3-4)	2 (2-3)	0.001*

Fruit juice consumption							
Parenting practices	Communicating health beliefs [2]	0.5 (0-2)	0 (0-2)	0.511	1 (0-2)	0 (0-2)	0.418
	Avoid negative modeling [2]	0 (0-2)	0 (0-2)	0.541	0 (0-2)	0 (0-2)	0.426
	Rewarding/comforting practice[2]	0 (0-1)	0 (0-1)	0.939	0 (0-1)	0 (0-1)	0.465
Performing EBRB with the child	Drink fruit juices together with your child [5]	2 (2-4)	3 (2-4)	0.160	2 (2-4)	3 (2-4)	0.042*
Soft drink consumption							
	Soft drinks consumption[1]	2 (1-3)	2 (2-3)	0.129	2 (1-3)	2 (2-4)	0.084
Parenting practices	Parental allowance (If my child asks for a soft drink. I will give it to him/her) [2]	1 (0-2)	1 (1-2)	0.135	1 (0-2)	1 (1-2)	0.054
	Communicating health beliefs [2]	2 (0-3)	2 (1-3)	0.321	2 (0-3)	1 (0-3)	0.583
	Rewarding/comforting practice [2]	0 (0-0)	0 (0-1)	0.574	0 (0-0)	0(0-1)	0.535
Performing EBRB with the child	Drink soft drinks together with your child [5]	2 (1-2)	2 (1-2)	0.343	2 (1-2)	2 (2-3)	0.053
Price influence							
Dietary behaviour	I do not give my child certain foods because they cost too much[4]	0 (0-1)	1 (0-1)	0.283	0 (0-1)	1 (0-1)	0.032*

*Significant at $p<0.05$ level using Mann-Whitney U test

[1]Never (1) - Every day, more than twice a day (8)

[2]Never (0) – Always (4)

[3]None (1) - 5 or more pieces/portions per day (8)

[4]Not true (0) - True (2)

[5]Never (1) - Every day, several times (7)

5. Discussion

5.1. Body mass index (BMI)

The results about BMI change show a decrease in BMI means between baseline and follow-up measurements in all age groups, except for 11-year-olds, where a slight increase can be detected. Differences were significant in 6-years-old girls, 8-years-old boys, 8-years-old children and the total sample. The decrease in overall mean BMI was -0.21 kg/m² among 6-12-year-old children after 2 years of follow-up. Similar results have been reported in school-based interventions, where only nutrition education or nutrition education combined with physical activity was applied. The meta-analysis of nine combined interventions (nutrition education and physical activity) revealed an overall mean BMI reduction of -0.30 kg/m². Eight school-based interventions that included a home component indicated a mean decrease in BMI of -0.25 kg/m². The meta-analysis assessed studies involving children aged 2 to 18 years, with follow-up periods of six months or longer (72).

An overview of European community-based initiatives on childhood obesity reported a mean BMI reduction of up to -1.0 kg/m² among children aged 6 to 12. Only community-based programs with a minimum duration of one year were included.

In the systematic reviews, interventions focusing exclusively on physical activity showed no significant or unclear effect on BMI reduction (72,73).

5.2.Nutritional status

At baseline, according to IOTF cut-offs, the prevalence of thinness among 6-12-year-olds was 9.2%, 19.0% of children were living with overweight, and 10.1% with obesity. National data about the prevalence of thinness among school-aged children are scarce, the 2016-2017 Childhood Obesity Surveillance Initiative (COSI) reported that 12.6% of children aged 7 years were classified as thin (74). The prevalence of thinness was lower (9.2%) among 7-year-olds in the GYERE® program, compared to national outcomes.

Overweight affected 15.1% of the children between 6-8 years old, whereas in the COSI survey, 12.6% were overweight. The prevalence of obesity was also higher among the 6-8-year-old study population (10.0%) compared with nationally representative findings (8.7%) (75).

A lower prevalence of normal nutritional status and a higher prevalence of overweight can be observed among 10-12-year-old children. The prevalence of overweight (24.3%) and obesity (8.3%) among 11-year-olds were significantly higher than the prevalences reported by the HBSC survey (13.7% overweight, 2.2% obese) in 2014. 9.7% of 11-year-olds were classified as thin, which was notably lower than the national thinness prevalence of 16.1% (76).

Follow-up results showed a significant increase in the prevalence of thinness among 8-year-old boys (from 6.9% to 17.6%), 9-year-old boys (5.2% to 11.7%), as well as among boys overall (from 8.1% to 11.6%). The prevalence of thinness significantly increased among 7-year-old girls (9.6% to 17.9%), 8-year-old's (6.9% to 19.2%) and among girls overall (from 10.3% to 14.3%). Overweight rates significantly decreased among 7-year-old girls (from 17.3% to 11.3%) and among 7-years-olds overall (from 17.0% to 11.4%). Overweight (13.3%) and obesity rates (9.9%) were slightly lower among 6-8-year-olds, compared to national outcomes (14.0% overweight, 10.0% obese) (77).

The GYERE® program is effective in reducing childhood overweight and obesity because overweight and obesity prevalence rates among 6-8-year-old children did not follow the national increasing tendency. At the beginning of the program, overweight and obesity rates among 6-8-year-old children were higher than the national averages and decreased below Hungarian levels after 2 years.

The prevalence of overweight and obesity decreased after follow-up among 10-year-olds and 12-year-olds, but an increase can be found among 11-year-olds. Overweight (26.1%) and obesity (10.2%) prevalence rates were higher among 11-year-olds than the national averages reported by the HBSC survey (15.5% overweight, 6.5% obese). The prevalence of thinness (9.8%), as at baseline, was lower than the national level (15.2%) (78).

After 2 years, follow-up outcomes indicate that the prevalence of thinness in school-aged children significantly increased by 3.8%, and the proportion of normal nutritional status significantly decreased by 2.9%. Changes concerning overweight and obesity were not significant: overweight decreased by 1%, and the prevalence of obesity has plateaued (10.1% and 10.2%) in the total sample. The prevalence of thinness at follow-up is in concordance with Hungarian data, where national surveys documented that 13.0-15.2% of children were affected by thinness between 2018-2019 (77,78). An increase in thinness rates can be observed in the COSI (in 2010: 10.8%; in 2019: 13.0%) and HBSC surveys

(in 2014: 16.1%; in 2022:17.5%) among Hungarian 6-11-year-olds. An increasing tendency in overweight and obesity prevalence has also been documented (54, 74, 77).
The Global Health Observatory (GHO) data between 2014-2020 shows an increase in thinness, overweight and obesity in Hungary. According to WHO cut-offs, the prevalence of thinness was higher in both studies (12.0% and 16.2%) compared to GHO data (from 2.3% to 2.7%) among 5-9-year-olds. Overweight (19.2% and 18.1%) and obesity (16.9% and 16.3%) prevalence in the study population was also higher than the national estimates (overweight:15.5-16.3%; obesity:13.0-16.0%) (79).
Previous literature findings of community-based initiatives have shown mixed results for overweight and obesity outcomes. An overview reported a 0-6% decrease in the percentage of overweight, after one year follow-up (73). "Jongeren Op Gezond Gewicht" (JOGG, Youth at Healthy Weight), an EPODE adaptation in the Netherlands, found a 9.09% decrease in overweight prevalence in JOGG areas after 5 years. Overweight prevalence among 9-12 years children living in short-term (i.e., 3 years) and non-JOGG areas remained almost consistent, while in long-term JOGG areas (i.e., 6 years) decreased by 13.88% (80). The Australian Obesity Prevention and Lifestyle (OPAL) community-based intervention reported no significant differences in the proportion of primary school children (9–11 years) with overweight (baseline:18%, v final: 19%) or overweight and obesity (baseline 24%, final: 23%) or between the intervention and comparison communities (overweight: 16% and 18%; overweight and obesity: 20% and 24%) over the 2-3-year intervention period (81).
Overall, after two years of the GYERE® intervention, a significant decrease in ovarall mean BMI, an increase in the prevalence of thinness (following the national tendency), a slight, but not significant, decrease in overweight, and stable obesity rates can be observed.

5.3.Nutritional knowledge assessment

Nutritional knowledge assessment is often used as a component to test the effectiveness of health education programs (82,83). Nutrition education performed by local teachers or by dietitians in short term (8 months) or in a longer period (2 years) can significantly enhance knowledge (83). The present study resulted in improved nutritional knowledge among 10-12-years-olds after 2-years of GYERE® intervention. A significant increase was found at follow-up in the total sample ($p<0.001$), and in both gender groups (boys:

p=0.02; girls: p<0.001) compared to baseline results. While at baseline, no significant difference was found in nutritional knowledge between girls and boys, at follow-up, girls performed significantly better than boys (p=0.001).

5.4. The impact of social isolation due to the COVID-19 pandemic on children's body weight

In line with literature findings (36, 40), in the Diósgyőr sample, 46.3% of the parents reported an increase in their children's body weight during the confinement. Body weight change was significantly associated with sleep time (p=0.030), physical activity (p=0.006), food intake (p<0.001), and emotional status (p=0.015). Body weight change positively correlated with sleep time (p=0.029), food intake (p<0.001), and inversely with physical activity (p=0.008). Increased sleep time, food intake, and decreased physical activity were characteristic of children with increased body weight. Iacopetta et al. (2024) suggested that sedentary lifestyles, such as lower physical activity, increased screen time, changes in dietary habits, family and individual stress, have contributed to weight gain among children and adolescents during the COVID-19 pandemic (40). We did not find significant association or correlation between body weight change and screen time.

Modifications in eating habits have also been captured among children living in Diósgyőr. Positive changes (e.g., ate more vegetables, fruits, cooked food) were reported by 58.9% of parents, while 47.0% indicated that the confinement negatively influenced (e.g., increased snack and sugary soft drink intake) their children's dietary habits. A significant association was identified between body weight change and lack of breakfast, snacking, sugary soft drink intake, fruit and vegetable consumption (38).

The prevalence of behavioral changes, increased sleep (58.3%) and screen time (95%), decreased physical activity (60.0%), and emotional distress (44.0%) among Hungarian school-aged children was notably higher compared to European levels. In a report by the WHO European Region sleep patterns showed a minimal change (sleep time increased for 15% of children during weekdays and for 17% during weekends), time spent playing actively/vigorously decreased on weekdays in 28% of children and on weekends in 23%, sedentary recreational screen time increased among 36% of the children on weekdays and 34% of the children on weekends. Perceived sadness and loneliness was more frequent in 20% and 24% of the children during the pandemic period (36).

5.5. The association of socioeconomic status and food security with children's fruit and vegetable consumption and fruit juice/soft drink intake

In the EU, including Hungary, several initiatives have been implemented to improve the nutritional status of children and to promote healthy eating behavior (59-65).

The Hungarian dietary guidelines, OKOSTÁNYÉR®, for children between 6-17 years was developed in 2017, by the Hungarian Dietetic Association, with the recommendation of the Food Science Scientific Committee of the Hungarian Academy of Sciences and the National Institute of Pharmacy and Nutrition. For school-aged children, it recommends at least four portions of vegetables and fruits intake daily and at least eight glasses (8x1.5 to 3 dl) of fluids daily, with a minimum of five glasses being water. The reduction of added sugar is also highlighted (84).

Socioeconomic status is generally defined by educational attainment, employment status (7,9), but other determinants may be used, like family perceived wealth (9), household possessions (7,11,13), food insecurity (7), household composition (number of siblings) (7, 11) living conditions (11). In a cohort of European children, the authors found an association between maternal educational level and 6-8-year-old children’s fruit, vegetable, fruit juice, and soft drink consumption. Children with mothers of high educational level consumed fruits and vegetables significantly more frequently than children from the low-education category. On the other hand, fruit juice and soft drink consumption was higher for children of the low-education groups (85).

Unhealthy food habits, such as not eating fresh fruit and vegetables every day were associated with lower parental education and lower family perceived wealth in the WHO European Childhood Obesity Surveillance Initiative (COSI 2015/2017) study. Consuming sugar-containing soft drinks more than 3 days a week was more frequent among children with low parental education and low family perceived wealth. The study found no association between less healthy food habits and parental employment status (9). In contrast, a significant association between maternal employment and children’s soft drink intake was found among 6-9-year-old children in Diósgyőr (6).

In the study sample, a significant association between SES and food security, children's fruit, salad/grated, and raw vegetable intake can be detected. The children of the low SES groups consumed fruit, salad, or grated and raw vegetables significantly less frequently

than pupils from the high SES category. This is in line with the results of maternal education in association with children's fruit and vegetable consumption (6, 85).

Although, variations in fruit and vegetable consumption frequencies can be observed between Hungarian and other European countries. Hungarian children from low SES ate fruits 2-4 days a week, compared to Portuguese children of the same category, who consumed fruit every day (85). The COSI 2015/2017 survey found that children from the lower education group and from families with lower perceived wealth were less likely to eat fresh fruit every day than those from the higher education group (OR 1.48, 95% CI: 1.29–1.70) or with a higher level of perceived wealth (OR 1.83, 95% CI: 1.64–2.04) (9). Hungarian pupils from low SES consume salad/grated, raw and cooked vegetable one day per week, while their European counterparts do so 2-4 days a week (85). If the parents had low education and low perceived wealth, the children were less likely to eat vegetables every day (OR 1.36, 95% CI: 1.18–1.57 and OR 1.37, 95% CI: 1.20–1.57) (9). Socioeconomic status is associated with parenting practices for fruit and vegetable consumption among school-aged children (6,85, 86). Parental demand for fruit, home availability of vegetables served with dinner, and eating vegetables with the child (performing EBRB) were significantly more frequent among high SES groups. The same results were revealed in this population, in association with high maternal educational level (6). The findings of the EPHE study confirmed a significant relationship between educational level and parental demand (only for fruit), allowance, parental knowledge of recommendations (only for vegetables), performing EBRB together with the child (only for vegetables), and home availability (85).

No significant association was identified between socioeconomic status and children's fruit juice and soft drink consumption, nor with price influence. Pupils with employed mothers or high educational level, consumed soft drinks significantly less frequently. Regarding parenting practices, highly educated mothers drink less fruit juice/soft drinks with their children, furthermore they allow less frequent soft drink intake for their children (6). Similarly, the frequency of soft drink consumption was significantly lower for European children with mothers of high education. Parenting practices, such as rewarding/comforting, communicating health beliefs, performing EBRB together with the child for fruit juices, and parental allowance, avoiding negative modeling, performing

EBRB together with the child for soft drinks, were associated with maternal educational level (85).

Children from food-insecure households are more likely to have unhealthy dietary habits, to drink more sugar-sweetened beverages, and to consume fewer fruits and vegetables (6, 87,88,89).

The results about household food security partly confirmed the aforementioned, an association between food security and children's fruit and vegetable consumption was found, but not with soft drink intake. School-aged children from food-secure households consumed fruit, salad/grated, raw, and cooked vegetables more frequently than their peers from food-insecure households. Favorable consumption frequencies were found among Portuguese children, where pupils from both, food-secure and insecure, households ate fruit and cooked vegetables every day (90). On the other hand, Hungarian children from food-secure households consumed fruits 5-6 days per week, and cooked vegetables 2-4 days per week; those from the insecure category ate fruit 2-4 days per week and cooked vegetables only one day per week.

In line with literature findings, a relationship between food security and parenting practices was detected (90, 91,92). Mostly restrictive feeding practices are described among food-insecure households (91,92), and little is known about other parental determinants influencing children's dietary habits.

In the present study, food security was associated with parental demand, allowance, and home availability of fruits. The frequencies of these determinants were significantly lower in food-insecure households compared to food-secure ones. Children from food-insecure households were less frequently allowed to eat as much vegetables as they liked, and home availability of vegetables served with dinner (or lunch) was less frequent among them.

Soft drink intake was associated with food security among Portuguese children, where an inverse association was identified (90).

Performing EBRB with the child, concerning fruit juice consumption, was associated with food security. Parents from food-insecure households drink fruit juices with their children more often than those from food-secure households.

Food security was significantly associated with the economic determinant, such as the price of food purchased for children. Parents from food-insecure households reported that

they were more likely not to give their children certain foods because they cost too much. Financially driven food changes in association with food insecurity have been indicated among women in the United Kingdom (89). Price is a key factor in determining food choices, even for adolescents (93).

Fruit and vegetable incentive programs have been recommended to increase fruit and vegetable consumption and to reduce food insecurity in low-income households (94,95).

5.6.Strenghts and limitation

One of the strengths of the GYERE® program evaluation is that it examines program effectiveness from multiple perspectives. This is the first Hungarian nutrition education program that, in addition to anthropometric data, also considers children's nutrition-related knowledge, parental socioeconomic status, household food security, and the impact of the COVID-19 pandemic during program implementation.

Most nutrition education programs focus primarily on anthropometric outcomes, and many report only BMI without providing detailed information on changes in nutritional status (72,73).

The GYERE® program represents the first Hungarian adaptation of the EPODE initiative and follows the methodology and pillars of this international framework. The program was implemented in one Central Hungarian city with favorable socioeconomic characteristics and in two socioeconomically disadvantaged cities in Northeast Hungary, uniquely involving all children aged 0–18 years and their parents in educational activities. Its objective is to curb the rising prevalence of childhood obesity; however, the program does not focus exclusively on overweight and obese individuals. Rather, it aims to reduce obesity at the population level. Therefore, between 2014 and 2020, body weight and height were measured every two years in all children aged 6–12 years whose parents provided written consent. Therefore the final assessment also included children (e.g., 6–7-year-olds) who did not participate in the baseline measurement. This approach allowed for the collection of more comprehensive data on the nutritional status of children living in the participating cities. Moreover, there is a lack of age-specific, measurement-based anthropometric data (as opposed to self-reported data) on the nutritional status of Hungarian children aged 6–12 years.

One of the limitations of the study is that the BMI and nutritional status of children who participated in the baseline measurement (e.g., 6-year-olds in 2018) were not compared with their own follow-up data but with data from the same age groups assessed at follow-up (e.g., 6-year-olds in 2020). The evaluation of program effectiveness could have been more precise if the nutritional status of the same children had been assessed at both baseline and follow-up and if changes in BMI had been presented by nutritional categories.

In addition, the inclusion of control towns with similar socioeconomic characteristics would have strengthened the study design. Monitoring parents' nutritional status and more closely following children with thinness, overweight, and obesity—although free dietetic counselling was available during the program—and referring them to healthcare institutions might have revealed additional factors.

The nutrition knowledge survey could have been complemented with dietary recall or food frequency questionnaires, which might have provided deeper insight into changes in children's eating habits.

In the socioeconomic status survey, the small sample size and the high proportion of highly educated mothers may have affected the accuracy of estimated relationships and limited the representativeness of the Diósgyőr sample.

6. Conclusion

Several international (e.g., FAO, WHO, GPE, UNESCO, UNICEF, WFP) and national organizations (e.g., MDOSZ, NNGYK) and networks are committed to improve children’s nutritional status, and a number of initiatives have been implemented to achieve this goal.

The GYERE®-Children's Health program is a community-based intervention that aims to prevent childhood overweight and obesity in Hungary. Starting from 2014 till 2020, in Dunaharaszti, Szerencs, and Diósgyőr dietitians were recruited to educate children and their parents of the town’s population. In 2022, an online version of the program was developed, and educational videos and materials were sent to teachers who were responsible for delivering nutritional education to the children.

This research was conducted among 6-12-year-old children participating in the GYERE® program between 2014 and 2020. This is the first Hungarian study to our knowledge to explore the effectiveness of a community-based program on the nutritional status, nutritional knowledge of children. New findings also include the association between social isolation during COVID-19 and children’s weight change, and between parental determinants and children’s energy-balance-related behaviors.

After 2 year follow-up, the GYERE® program succeeded in reducing overall mean BMI by -0.21 kg/m² among children. Significant differences in the BMI were detected among 6 years old girls, 8 years old boys, 8 years old children and in the total sample.

The prevalence of thinness in the cohort increased and approached the national average. The prevalence of overweight decreased by 1%, and obesity rates remained stable, which is in contrast to the nationally and globally increasing rates of pediatric overweight and obesity. Community-based programs in the long term may be more effective (80), as children’s dietary behaviors do not develop or change within a short-term period, and several other factors may interfere with their results.

Nutrition education programs should target all children and be implemented in school curricula to help them make informed food choices and sustain healthy dietary behavior. Two years of nutrition education in the GYERE® program significantly improved children's knowledge. Findings are promising (27,28), but further research is needed to

explore how nutritional knowledge is implemented in practice and how does it influence children's eating habits, and their nutritional status in the short term and adulthood.
Near the end of the GYERE® program in Diósgyőr, the outbreak of the COVID-19 pandemic had a negative impact not only on children's lifestyles, but also on the framework and outcomes of the program. Because of the restrictions and lockdowns, the last two educational topics were sent via videos (instead of the personal involvement of dietitians), the sports month, the GYERE® Day, and the GYERE® menu were canceled. Nearly half of the children (46.3%) gained weight during social isolation, which was significantly associated with sleep time, physical activity, food intake, and emotional status of the pupils. Nutrition education programs require enhanced adaptability to meet diverse circumstances, therefore the online version of the GYERE® program was developed.
Besides community and environmental influences, parental factors play a significant role in shaping children's dietary habits. Significant association between socioeconomic status and food security, children's fruit and vegetable intake, parenting practices was confirmed in the study. School-aged children with parents of high socioeconomic status and pupils from food-secure households consumed fruit and vegetables more frequently than their peers from low SES groups or food-insecure households. Parental demand for fruit, home availability of vegetables served with dinner, and eating vegetables with the child (performing EBRB) were significantly more frequent among high SES groups. Food security was associated with parental demand for fruits, allowance and home availability of fruits and vegetables, and also with the price of food purchased for children. No significant associations were detected between children's soft drink intake and food security or socioeconomic status of the parents.
In conclusion, long-term, highly adaptable nutrition education programs are needed for school-aged children from different socioeconomic backgrounds to improve their dietary habits, nutritional status, and health outcomes.

7. Summary

The age period from six to twelve years is a transition period from early childhood into adolescence, with physical and psychological development that affects later life outcomes. Individual and environmental factors influence children’s eating behavior and nutritional status. This research evaluates the effectiveness of the community-based GYERE®-Children's Health program on the nutritional status of 6-12-year-old children. After 2 year follow-up, a decrease in overall mean BMI by -0.21 kg/m^2 was detected. The prevalence of thinness increased, approaching the national average. The prevalence of overweight decreased by 1%, and obesity rates remained consistent- contrary to the upward trends observed nationally and globally.

The second objective was to compare children’s nutritional knowledge before and after the program. The results show a significant improvement in pupil's knowledge.

We assumed that toward the end of the GYERE® program in Diósgyőr, the COVID-19 pandemic had a negative impact on the nutritional status and the lifestyle of children. 46.3% of the children gained weight during social isolation, which had a high association with sleep time, physical activity, food intake, and emotional status of the pupils.

The fourth objective was to assess the association of socioeconomic status of parents and food security with children's consumption of vegetables, fruits, fruit juices, and soft drinks. The children of the high SES groups and from food-secure households consumed fruit and vegetables significantly more frequently than their counterparts from the low categories. Parental demand, allowance (only for food security) and home availability (only for food security) of fruits, home availability of vegetables served with dinner, and eating vegetables with the child (only for SES) were significantly more frequent among high SES and food-secure groups. No significant associations were detected between children’s soft drink intake and food security or socioeconomic status of the parents.

In summary, implementing long-term and adaptable nutrition education programs for school-aged children from diverse socioeconomic levels is essential for promoting healthier eating behaviors, better nutrition, and improved health outcomes.

8. References

1. United Nations. Department of Economic and Social Affairs, Population Division (2024). *World population prospects 2024, online edition* [cited 2025 Feb 22].

2. Voss, M. L., Claeson, M., Bremberg, S., Peterson, S. S., Alfvén, T., & Ndeezi, G. (2023). The missing middle of childhood. *Global Health Action, 16*(1), 2242196. https://doi.org/10.1080/16549716.2023.2242196

3. DelGiudice, M. (2017). Middle Childhood: An Evolutionary-Developmental Synthesis. In: Halfon N, Forrest CB, Lerner RM, et al., editors. *Handbook of Life Course Health Development* [Internet]. Cham (CH): Springer; 2018. Available from: https://www.ncbi.nlm.nih.gov/books/NBK543719/ doi: 10.1007/978-3-319-47143-3_5

4. Scaglioni, S., De Cosmi, V., Ciappolino, V., et al. (2018). Factors influencing children's eating behaviours. *Nutrients*, 10:706. doi:10.3390/nu10060706

5. Rigo, M., Mohebbi, M., Keast, R., et al. (2023). An investigation into food choices among 5–12 years children in relation to sensory, nutritional, and healthy product cues. *Food Quality and Preference*, 111, 104990. https://doi.org/10.1016/j.foodqual.2023.104990

6. Bartha, K. O., Kubányi, J., Lichthammer, A., Veresné Bálint, M., Erdélyi, A., & Szűcs, Z. (2026). Associations of food security and maternal education with 6–9-year-old children's dietary habits. *Journal of Hunger & Environmental Nutrition*, 1–17. https://doi.org/10.1080/19320248.2025.2612585

7. Avvisati, F., & Wuyts, C. (2024). The Measurement of Socioeconomic Status in PISA. *OECD Education Working Papers*, No. 321. https://doi.org/10.1787/0c5b793c-en

8. OECD. (2023). *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*. OECD Publishing. https://doi.org/10.1787/53f23881-en

9. Fismen, A.-S., Buoncristiano, M., Williams, J., et al. (2021). Socioeconomic differences in food habits among 6- to 9-year-old children from 23 countries—WHO COSI. *Obesity Reviews*, 22(S6):e13211. https://doi.org/10.1111/obr.13211

10. Buoncristiano, M., Williams, J., Simmonds, P., Nurk, E., Ahrens, W., Nardone, P., Rito, A. I., Rutter, H., Bergh, I. H., Starc, G., Jonsson, K. R., Spinelli, A., Vandevijvere, S., Mäki, P., Milanović, S. M., Salanave, B., Yardim, M. S., Hejgaard, T., Fijałkowska, A., … Breda, J. (2021). Socioeconomic inequalities in overweight and obesity among

6- to 9-year-old children in 24 countries from the World Health Organization European region. *Obesity Reviews, 22*(Suppl 6), e13213. https://doi.org/10.1111/obr.13213

11. Patel, A. B., Bann, C. M., Garces, A. L., et al. (2020). Development of the Global Network for Women's and Children's Health Research's socioeconomic status index. *Reproductive Health*, 17(3):193. PMID:33334359

12. Patel, A. B., Bann, C. M., Kolhe, C. S., et al. (2022). The Global Network Socioeconomic Status Index as a predictor of stillbirths, perinatal and neonatal mortality. *PLOS ONE*, 17(8):e0272712. https://doi.org/10.1371/journal.pone.0272712

13. Badura, P., Eriksson, C., García-Moya, I., et al. (2024). A focus on adolescent social contexts in Europe, Central Asia and Canada: HBSC 2021/2022 survey. *World Health Organization*. https://iris.who.int/handle/10665/379486

14. Committee on World Food Security. (2012). *Coming to Terms with Terminology: Food Security, Nutrition Security, Food Security and Nutrition, Food and Nutrition Security*. Rome: FAO.

15. Manikas, I., Ali, B.M., & Sundarakani, B. (2023). A systematic literature review of indicators measuring food security. *Agric & Food Secur*, 12, 10. https://doi.org/10.1186/s40066-023-00415-7

16. Moradi, S., Mirzababaei, A., Mohammadi, H., et al. (2019). Food insecurity and undernutrition risk in children and adolescents. *Nutrition*, 62, 52–60. https://doi.org/10.1016/j.nut.2018.11.029

17. Gallegos, D., Eivers, A., Sondergeld, P., & Pattinson, C. (2021). Food insecurity and child development: A review. *IJERPH*, 18(17):8990. doi:10.3390/ijerph18178990

18. Bidopia, T., Carbo, A. V., Ross, R. A., & Burke, N. L. (2023). Food insecurity and disordered eating in children and adolescents. *Eating Behaviors*, 49:101731. https://doi.org/10.1016/j.eatbeh.2023.101731

19. Landry, M. J., van den Berg, A. E., Asigbee, F. M., et al. (2019). Child-report of food insecurity and diet quality. *Nutrients*, 11(7):1574. https://doi.org/10.3390/nu11071574

20. Frongillo, E. A., Adebiyi, V. O., Boncyk, M. (2024). Meta-review of child/adolescent food insecurity experiences. *Global Food Security*, 41:100767. https://doi.org/10.1016/j.gfs.2024.100767

21. Ruzicka, E., Darling, K., & Sato, A. (2020). Controlling child feeding practices and child weight. *Obesity Reviews*, 22(3):e13135. https://doi.org/10.1111/obr.13135

22. Yee, A. Z. H., Lwin, M. O., & Ho, S. S. (2017). Parental practices and food consumption behaviors in children. *IJBNPA*, 14, 47. https://doi.org/10.1186/s12966-017-0501-3

23. Maia, C., Braz, D., Fernandes, H. M., et al. (2025). Impact of parental behaviors on children's lifestyle. *Children*, 12(2), 203. https://doi.org/10.3390/children12020203

24. Zhu, H., Zhao, K., Huang, L., et al. (2024). Eating behavior in overweight Chinese children from family system perspective. *Front. Pediatr.*, 12:1305770. https://doi.org/10.3389/fped.2024.1305770

25. Silk, K. J., Sherry, J., Winn, B., et al. (2008). Increasing nutrition literacy via print, website, and game modalities. *J Nutr Educ Behav*, 40, 3–10.

26. Gibbs, H. D., Kennett, A. R., Kerling, E. H., et al. (2016). Parental nutrition literacy and child diet quality. *J Nutr Educ Behav*, 48(7):505–509.e1. https://doi.org/10.1016/j.jneb.2016.04.006

27. Kanellopoulou, A., Katelari, A., Notara, V., et al. (2021). Parental health status and child nutrition literacy in Greece. *Mediterr J Nutr Metab*, 14(1):57-67. https://doi.org/10.3233/MNM-200470

28. Michou, M., Panagiotakos, D. B., & Costarelli, V. (2018). Low health literacy and excess body weight: A review. *Cent Eur J Public Health*, 26(3):234–41.

29. World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour*. https://www.who.int/publications/i/item/9789240015128

30. Soares, P., & Rodrigues, G. (2021). Physical inactivity and cardiometabolic risk in students. *Int J Cardiovasc Sci*, 34. https://doi.org/10.36660/ijcs.20210100

31. Suchert, V., Hanewinkel, R., & Isensee, B. (2015). Sedentary behavior and mental health in children. *Preventive Medicine*, 76, 48–57. https://doi.org/10.1016/j.ypmed.2015.03.026

32. Hanifah, L., Nasrulloh, N., & Sufyan, D. L. (2023). Sedentary behavior in Indonesian children. *Children (Basel)*, 10(8):1283. https://doi.org/10.3390/children10081283

33. Hirshkowitz, M., Whiton, K., Albert, S. M., et al. (2015). National Sleep Foundation's sleep time recommendations. *Sleep Health*, 1, 40–43. https://doi.org/10.1016/j.sleh.2014.12.010

34. Bruni, O., Breda, M., Nobili, L., et al. (2024). Management of sleep onset insomnia and melatonin use. *Eur J Pediatr*, 183, 2955–2964. https://doi.org/10.1007/s00431-024-05556-w

35. Tambalis, K. D., Panagiotakos, D. B., Psarra, G., & Sidossis, L. S. (2018). Sleep duration, diet, screen time, and obesity. *J Clin Sleep Med*, 14(10):1689–1696. https://doi.org/10.5664/jcsm.7374

36. World Health Organization. Regional Office for Europe. (2024). *Impact of COVID-19 on school-aged children's daily routine and behaviors*. https://www.who.int/europe/publications/i/item/WHO-EURO-2024-9702-49474-74016

37. Wicaksono, A. G. L. (2022). COVID-19 effects on children's nutrition and physical activity. *J Gizi dan Pangan*, 17(3), 139–148. https://doi.org/10.25182/jgp.2022.17.3.139-148

38. Bartha, K. O., Csengeri, L., Lichthammer, A., et al. (2022). Impact of COVID-19 lockdown on children's lifestyle. *Acta Alimentaria*, 51(3), 382–389. https://doi.org/10.1556/066.2022.00056

39. Woods, N., Seabrook, J. A., Schaafsma, H., et al. (2024). Dietary changes in youth during the COVID-19 pandemic. *J Nutr*, 154(4), 1376–1403. https://doi.org/10.1016/j.tjnut.2024.02.022

40. Iacopetta, D., Catalano, A., Ceramella, J., et al. (2024). COVID-19's ongoing impact on pediatric obesity. *Pediatric Reports*, 16(1), 135–150. https://doi.org/10.3390/pediatric16010013

41. Cole, T. J., & Lobstein, T. (2012). Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity*, *7*(4), 284–294. https://doi.org/10.1111/j.2047-6310.2012.00064.x

42. de Onis, M., Onyango, A. W., Borghi, E., Siyam, A., Nishida, C., & Siekmann, J. (2007). Development of a WHO growth reference for school-aged children and adolescents. *Bulletin of the World Health Organization*, *85*(9), 660–667. https://doi.org/10.2471/blt.07.043497

43. A Belügyminisztérium egészségügyi szakmai irányelve a tápláltsági állapot szűréséről a gyermek-alapellátásban. (2022). *Egészségügyi Közlöny*, *72*(10), 1621–1748.

44. Ogden, C. L., Kuczmarski, R. J., Flegal, K. M., et al. (2002). Centers for Disease Control and Prevention 2000 growth charts for the United States: Improvements to the

1977 National Center for Health Statistics version. *Pediatrics*, *109*(1), 45–60. https://doi.org/10.1542/peds.109.1.45

45. Llorca-Colomer, F., Murillo-Llorente, M. T., Legidos-García, M. E., Palau-Ferré, A., & Pérez-Bermejo, M. (2022). Differences in classification standards for the prevalence of overweight and obesity in children: A systematic review and meta-analysis. *Clinical Epidemiology*, *14*, 1031–1052. https://doi.org/10.2147/CLEP.S375981

46. Alves Junior, C. A., Mocellin, M. C., Gonçalves, E. C. A., Silva, D. A., & Trindade, E. B. (2017). Anthropometric indicators as body fat discriminators in children and adolescents: A systematic review and meta-analysis. *Advances in Nutrition*, *8*(5), 718–727. https://doi.org/10.3945/an.117.015446

47. Bartha, K. (2024). Hat–tizennégy éves gyermekek tápláltsági állapotának határértékei a referenciák tükrében. *Új Diéta*, *4*, 10–15.

48. Bodzsár, É., & Zsákai, A. (2012). *Magyar gyermekek és serdülők testfejlettségi állapota. Országos Növekedésvizsgálat 2003–2006* [updated 2012; cited 2024 September 30]. https://antropologia.elte.hu/onv_e.html

49. Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey. *BMJ*, *320*(7244), 1240–1243. https://doi.org/10.1136/bmj.320.7244.1240

50. World Health Organization. (2024, March 1). *Malnutrition*. https://www.who.int/news-room/fact-sheets/detail/malnutrition

51. World Health Organization. (2025, May 7). *Overweight and obesity*. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

52. Phelps, N. H., et al. (2024). Worldwide trends in underweight and obesity from 1990 to 2022: A pooled analysis of 3,663 population-representative studies with 222 million children, adolescents, and adults. *The Lancet*, *403*(10431), 1027–1050. https://doi.org/10.1016/S0140-6736(24)00496-1

53. World Health Organization, Regional Office for Europe. (2024, November 27). *Brief review of results from Round 6 of COSI (WHO European Childhood Obesity Surveillance Initiative) 2022–2024* [Technical document]. WHO Regional Office for Europe.

54. Németh, Á. (2022). *Iskoláskorú gyermekek egészségmagatartása 2022* [Health behaviour of school-aged children 2022]. ELTE PPK.

https://hbsc.ppk.elte.hu/dstore/document/10668/Nemeth_Iskolaskoru_gyermekek_egeszsegmagatartasa_0526.pdf

55. United Nations. (n.d.). *About the Decade of Action on Nutrition*. Retrieved June 6, 2025, from https://www.un.org/nutrition/about

56. Food and Agriculture Organization of the United Nations. (2022). *School food and nutrition: Global action plan 2022–2026*. FAO. https://doi.org/10.4060/cc0919en

57. UNESCO, UNICEF, FAO, GPE, UNSCN, WFP, World Bank, & WHO. (2020). *Stepping up effective school health and nutrition: A partnership for healthy learners and brighter futures* [Technical brief]. UNESCO. https://www.unicef.org/media/94001/file/Partnership-for-Stepping-up-effective-SHN.pdf.pdf

58. School Meals Coalition. (n.d.). *About the School Meals Coalition*. Retrieved June 8, 2025, from https://schoolmealscoalition.org/about

59. European Commission. (n.d.). *School scheme explained: The EU school fruit, vegetables and milk scheme*. Retrieved June 8, 2025, from https://agriculture.ec.europa.eu/common%20agricultural%20policy/market%20measures/school%20fruit%20vegetables%20and%20milk%20scheme/school%20scheme%20explained_en

60. Agrárminisztérium. (2023). *Magyarország iskolaprogram stratégiája: 2023/2024–2028/2029. tanév (GPF/58/2023)*. Budapest: Agrárminisztérium.

61. EuroHealthNet, & European Commission. (n.d.). *Schools4Health project*. EU4Health. Retrieved June 8, 2025, from https://schools4health.eu

62. Nemzeti Népegészségügyi Központ. (n.d.). *Egészségtudatosság-fejlesztés 7–18 éves korosztály részére (EFOP 1.8.0) – Játszótér*. Retrieved June 8, 2025, from https://efop180.antsz.hu/jatszoter/

63. Act CXC of 2011 on National Public Education [A köznevelésről szóló 2011. évi CXC. törvény]. (2011). *Magyar Közlöny*, *162*, 39622–39694.

64. 20/2012. (VIII. 31.) EMMI rendelet a nevelési-oktatási intézmények működéséről és a köznevelési intézmények névhasználatáról. (2012). *Magyar Közlöny*, *115*, 19493–19641.

65. 37/2014. (IV. 30.) EMMI rendelet a közétkeztetésre vonatkozó táplálkozás-egészségügyi előírásokról. (2014). *Magyar Közlöny*, *61*, 8915–8929.

66. Borys, J. M., Le Bodo, Y., Jebb, S. A., Seidell, J. C., Summerbell, C., Richard, D., De Henauw, S., Moreno, L. A., Romon, M., Visscher, T. L., Raffin, S., Swinburn, B., & EEN Study Group. (2012). EPODE approach for childhood obesity prevention: Methods, progress and international development. *Obesity Reviews*, *13*(4), 299–315. https://doi.org/10.1111/j.1467-789X.2011.00950.x

67. Slot-Heijs, J. J., Collard, D. C. M., Pettigrew, S., Vinck, J., Edell, D., Barriguete, A., & Visscher, T. L. S. (2020). The training and support needs of 22 programme directors of community-based childhood obesity interventions based on the EPODE approach: An online survey across programmes in 18 countries. *BMC Health Services Research*, *20*(1), 870. https://doi.org/10.1186/s12913-020-05709-1

68. Hungarian Dietetic Association. (n.d.). *GYERE® Program*. Retrieved June 10, 2025, from https://mdosz.hu/#

69. EPODE. (2010). *Organising the collection of height/weight data of children in EPODE towns*. http://www.epode-european-network.com/en/ressources-center/epode-in%20france.html

70. Mantziki, K., Vassilopoulos, A., Radulian, G., et al. (2014). Promoting health equity in European children: Design and methodology of the prospective EPHE (Epode for the Promotion of Health Equity) evaluation study. *BMC Public Health*, *14*, 303. https://doi.org/10.1186/1471-2458-14-303

71. Economic Research Service, U.S. Department of Agriculture. (2024, May). *U.S. household food security survey module: Six item short form* [PDF]. https://ers.usda.gov/sites/default/files/_laserfiche/DataFiles/50764/short2024.pdf?v=77152

72. Wang, Y., Cai, L., Wu, Y., Wilson, R. F., Weston, C., Fawole, O., Bleich, S. N., Cheskin, L. J., Showell, N. N., Lau, B. D., Chiu, D. T., Zhang, A., & Segal, J. (2015). What childhood obesity prevention programmes work? A systematic review and meta-analysis. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity, 16*(7), 547–565. https://doi.org/10.1111/obr.12277

73. Bemelmans, W. J., Wijnhoven, T. M., Verschuuren, M., & Breda, J. (2014). Overview of 71 European community-based initiatives against childhood obesity starting between 2005 and 2011: General characteristics and reported effects. *BMC Public Health, 14*, 758. https://doi.org/10.1186/1471-2458-14-758

74. Kovacs, V. A., Bakacs, M., Kaposvari, C., Illes, E., Erdei, G., Martos, E., & Breda, J. (2018). Weight status of 7-year-old Hungarian children between 2010 and 2016 using different classifications (COSI Hungary). *Obesity Facts, 11*(3), 195–205. https://doi.org/10.1159/000487327

75. Erdei, G., Bakacs, M., Illés, É., Kaposvári, C., Martos, E., & Kovács, V. A. (2018). Substantial variation across geographic regions in the obesity prevalence among 6–8 years old Hungarian children (COSI Hungary 2016). *BMC Public Health, 18*, 611. https://doi.org/10.1186/s12889-018-5530-6

76. Németh, Á., & Költő, A. (2014). *Egészség és egészségmagatartás iskoláskorban* [Health behaviour in school aged children] (WHO-HBSC national report). Magyar Tudományos Művek Tára. https://mek.oszk.hu/16100/16119/16119.pdf

77. Nemzeti Népegészségügyi és Gyógyszerészeti Központ (NNGYK). (2023). *COSI 2019 Kutatási jelentés* [Research report]. Országos Gyógyszerészeti és Élelmezés-egészségügyi Intézet. https://ogyei.gov.hu/dynamic/cosi2019_kutatasi_jelentes_v3.pdf

78. Németh, Á., Szabó, A., Demetrovics, Z., Kun, B., Király, O., & Várnai, D. (2019). *HBSC 2018: Kamaszéletmód Magyarországon* [Adolescent lifestyle in Hungary] (HBSC-national study report). ELTE PPK. https://hbsc.ppk.elte.hu/media/17/94/4208962f2a6648f7346f79299947a252c7e7538a00dfbd0707d017dbe804/HBSC_2018_Kamasz%C3%A9letm%C3%B3d_Magyarorsz%C3%A1gon.pdf

79. World Health Organization. (n.d.). *Body mass index among children*. WHO Global Health Observatory. Retrieved June 14, 2025, from https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/bmi-among-children

80. Kobes, A., Kretschmer, T., & Timmerman, M. C. (2021). Prevalence of overweight among Dutch primary school children living in JOGG and non-JOGG areas. *PLOS ONE, 16*(12), e0261406. https://doi.org/10.1371/journal.pone.0261406

81. Bell, L., Ullah, S., Leslie, E., Davies, C., Miller, M., & Golley, R. (2019). Changes in weight status, quality of life and behaviours of South Australian primary school children: Results from the Obesity Prevention and Lifestyle (OPAL) community intervention program. *BMC Public Health, 19*, 1338. https://doi.org/10.1186/s12889-019-7710-4

82. Andrade, J., Lotton, J., & Andrade, J. (2018). Systematic review: Frameworks used in school-based interventions, the impact on Hispanic children's obesity-related outcomes. *Journal of School Health, 88*(11), 847–858. https://doi.org/10.1111/josh.12693

83. Dhanjani, S., Allen, H., Varman, B., Callender, C., Dave, J. M., & Thompson, D. (2024). Community-based participatory obesity prevention interventions in rural communities: A scoping review. *Nutrients, 16*(14), 2201. https://doi.org/10.3390/nu16142201

84. Hungarian Dietetic Association. (2024). *OKOSTÁNYÉR®.* https://www.okostanyer.hu/wp-content/uploads/2024/06/gyerek-okostanyer-2024-A4-EN.pdf

85. Mantziki, K., Vassilopoulos, A., Radulian, G., Borys, J.-M., du Plessis, H., Gregório, M. J., ... & Brug, J. (2015). Inequities in energy-balance related behaviours and family environmental determinants in European children: Baseline results of the prospective EPHE evaluation study. *BMC Public Health, 15*, 1203. https://doi.org/10.1186/s12889-015-2540-5

86. Lehto, E., Ray, C., te Velde, S., Petrova, S., Duleva, V., Krawinkel, M., Behrendt, I., Papadaki, A., Kristjansdottir, A., Thorsdottir, I., Yngve, A., Lien, N., Lynch, C., Ehrenblad, B., Vaz de Almeida, M. D., Ribič, C. H., Simčič, I., & Roos, E. (2015). Mediation of parental educational level on fruit and vegetable intake among schoolchildren in ten European countries. *Public Health Nutrition, 18*(1), 89–99. https://doi.org/10.1017/S136898001300339X

87. Dush, J. L. (2020). Adolescent food insecurity: A review of contextual and behavioral factors. *Public Health Nursing, 37*(3), 327–338. https://doi.org/10.1111/phn.12708

88. Lee, J., Kubik, M. Y., & Fulkerson, J. A. (2019). Diet quality and fruit, vegetable, and sugar-sweetened beverage consumption by household food insecurity among 8- to 12-year-old children during summer months. *Journal of the Academy of Nutrition and Dietetics, 119*(10), 1695–1702. https://doi.org/10.1016/j.jand.2019.03.004

89. Turnbull, O., Homer, M., & Ensaff, H. (2021). Food insecurity: Its prevalence and relationship to fruit and vegetable consumption. *Journal of Human Nutrition and Dietetics, 34*(5), 849–857. https://doi.org/10.1111/jhn.12866

90. Borys, J.-M., Graça, P., Gregorio, M. J., De Henauw, S., De Bourdeaudhuij, I., Visscher, T. L. S., ... & Swinburn, B. (2015). *EPODE for the promotion of health equity*. Lavoisier.

91. Berge, J. M., Fertig, A. R., Trofholz, A., Neumark-Sztainer, D., Rogers, E., & Loth, K. (2020). Associations between parental stress, parent feeding practices, and child eating behaviors within the context of food insecurity. *Preventive Medicine Reports, 19*, 101146. https://doi.org/10.1016/j.pmedr.2020.101146

92. Berge, J. M., Fertig, A. R., Trofholz, A., Tate, A. D., & Loth, K. (2023). Real-time predictors of food parenting practices and child eating behaviors in racially/ethnically diverse families. *International Journal of Behavioral Nutrition and Physical Activity, 20*, 86. https://doi.org/10.1186/s12966-023-01476-4

93. Bartha, K. (2025). Középiskolások tápláltsági állapota és táplálkozási szokásainak felmérése. *Új Diéta*, *1*, 17–22.

94. Stein, R., Finnie, R. K. C., Harmon, S., Peng, Y., Pritchard, C., Vecsey, H., Emmons, K. M., Hargarten, S., Simon, M. A., Blanck, H. M., Harris, D. M., Bellows, L., Coleman-Jensen, A., Fleischhacker, S., Koenings, M. M., Odoms-Young, A., Seligman, H. K., Grant, C., Powell, A., & Community Preventive Services Task Force. (2025). Impact of fruit and vegetable incentive programs on food insecurity, fruit and vegetable consumption, and health outcomes: A Community Guide systematic review. *American Journal of Preventive Medicine, 68*(3), 627–637. https://doi.org/10.1016/j.amepre.2024.11.016

95. Saxe-Custack, A., LaChance, J., Jess, J., & Hanna-Attisha, M. (2021). Influence of a pediatric fruit and vegetable prescription program on child dietary patterns and food security. *Nutrients, 13*(8), 2619. https://doi.org/10.3390/nu13082619

9. Bibliography of the candidate's publications

Publications related to the thesis:

1. Bartha, K. O., Kubányi, J., Lichthammer, A., Veresné Bálint, M., Erdélyi, A., & Szűcs, Z. (2026). Associations of food security and maternal education with 6–9-year-old children's dietary habits. *Journal of Hunger & Environmental Nutrition*, 1–17. https://doi.org/10.1080/19320248.2025.2612585

2. Bartha, K. (2025). Középiskolások tápláltsági állapota és táplálkozási szokásainak felmérése. *Új Diéta*, *1,* 17–22.

3. Bartha, K. (2024). Hat–tizennégy éves gyermekek tápláltsági állapotának határértékei a referenciák tükrében. *Új Diéta*, *4,* 10–15.

4. Bartha, K. O., Csengeri, L., Lichthammer, A., et al. (2022). Impact of COVID-19 lockdown on children's lifestyle. *Acta Alimentaria*, *51*(3), 382–389. https://doi.org/10.1556/066.2022.00056

5. Bartha, K. (2021). Effects of COVID-19 lockdown on children's lifestyle. *Obesitologia Hungarica, 19*(Suppl. 2), 42.

Publications not related to the thesis:

1. Sárga, D., Bartha, K., Csonka, V. Gy., Kubányi, J. (2025). Okos Snack gyermekedukációs program hosszútávú hatékonyságának vizsgálata [Evaluation of the long-term effectiveness of the Smart Snack child education program]. *Obesitologia Hungarica*, *23*(2), 19–25.

2. Erdélyi-Sipos, A., Bartha, K., Dobák, Z., & Szűcs, Zs. (2022). A dietetikai tevékenység értékelése a személyi minimumfeltételek teljesülése tükrében, mi változott hat év alatt. *Új Diéta, 4*, 2–5.

3. Bartha, K. (2020). A borsmentaolaj hatása az irritábilisbél-szindrómára: Összesített klinikai adatok meta-analízise. *Új Diéta, 2*, 2–3.

4. Bartha, K. (2018). Élelmiszerek, tápanyagok és a kardiometabolikus egészség. *Új Diéta, 4*, 11–13.

5. Erdélyi-Sipos, A., & Bartha, K. (2017). A dietetikai tevékenység értékelése fekvőbeteg-ellátó intézményekben a személyi minimumfeltételek teljesülése tükrében. *Új Diéta, 4*, 2–5.

6. Bartha, K., & Pásztor, M. A. (2016). Táplálási nap az Ortopédiai Klinikán. *Új Diéta, 1*, 30–32.

7. Szűcs, Zs., & Bartha, K. (2015). Személyi minimumfeltételek megvalósulása a fekvő- és járóbeteg-szakellátásban. *Új Diéta, 5*, 5–7.

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Appendices

1. Nutritional knowledge assessment questionnaire in Szerencs

GYERE® – Gyermekek Egészsége Program

Kérdőív 5. osztályos gyermekek számára

1. **Mi a nemed? (Karikázd be a megfelelő választ!)**

   a) fiú b) lány

2. **Hány éves vagy?** ....

3. **Gondold végig, egy héten (hétfő, kedd, szerda, csütörtök, péntek, szombat vasárnap) Te hányszor eszel, iszol a táblázatban szereplő ételekből, italokból? Tegyél egy X-et oda, ami rád igaz!** Egy hét alatt eszek, iszok:

	soha nem eszek	nem minden héten	hetente 1-szer	hetente 2-4 szer	hetente 5-6 szer	minden nap egyszer	minden nap többször
gyümölcsöt							
zöldségféléket (saláták, főzelékek, reggelire, vacsorára pl. paradicsom, paprika, retek)							
édességek (csokoládék, cukorka, sütemény)							
üdítők, szörpök, cukrozott, mézes tea							
rágcsálni valók (ropi, chips, sós kekszek, pop corn)							
rágcsálni valók (répa, karalábé, dió, sózatlan mogyoró)							
tej, kakaó, joghurt, kefir, sajt, túró							
barna kenyér							
hal							

4. **Az első óra előtt reggelizel otthon vagy az iskolában? (1 válasz lehetséges. Karikázd be, amelyik igaz rád!)**

   a) Igen, minden nap reggelizem.

   b) Igen, többségében reggelizem. (3, 4szer egy héten)

   c) Nem minden nap, de néha reggelizem. (1szer, 2szer egy héten)

   d) Nem, soha, vagy csak nagyon ritkán reggelizem-hétköznapokon.

5. **Karikázd be azokat az élelmiszereket, amelyekben liszt van! (Többet is bekarikázhatsz!)**

   a) kenyér b) sült krumpli c) főtt tészta d) paprika

   e) paradicsom f) sajt g) kivi h) kifli

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6. Az egészséges táplálkozás alapján melyik élelmiszerből fontos minden nap enni? (Csak egyet karikázz be!)

a) fehér zsemle b) barna kenyér (teljes kiőrlésű lisztből készült kenyér)

c) müzli szelet d) túrós pite

7. Melyek azok a folyadékok, amelyekben nincs hozzáadott cukor? (Több választ is bekarikázhatsz!)

a) víz b) 12%-os gyümölcsital c) energiaital d) kakaó

e) szénsavas üdítő f) natúr gyümölcstea g) tej h) hagyományos ízesített tea

8. Mennyi folyadékot ajánlott meginni egy nap? (1 pohár 2dl) (1 válasz lehetséges. Karikázd be a helyes választ!)

a) 3-5 pohár b) 10-15 pohár c) 8-10 pohár

9. Hányszor jó egy nap zöldséget és gyümölcsöt fogyasztani? (1 válasz lehetséges. Karikázd be a helyes választ!)

a) nem kell minden nap b) elég, ha egy nap egyszer- kétszer c) naponta 4-5 alkalommal

10. Miért javasolt naponta tejet, natúr joghurtot, kefirt vagy túrót, sajtot enni, inni? (Csak egyet karikázz be!)

a) Kalcium tartalma segíti a csontok fejlődését, növekedését.
b) Sok rostot tartalmaz.
c) Sok C-vitamin van benne.

11. Karikázd be soronként, amiben kevesebb cukor van!

1. a, 2dl kakaó b, 2dl jégkása
2. a, 1db közepes banán b, 1db közepes alma
3. a, 1 szelet túrótorta b, 1 db nagyobb nyalóka

12. Melyik napi menü illik legjobban az egészséges étrendbe? (Csak egyet, vagy az a, vagy a b vagy a c-t karikázd be!)

a) Reggeli: kolbász, sajt, vaj, barna kenyér, paprika
Tízórai: joghurt, tepertős pogácsa
Ebéd: Krumplileves, oldalas, zöldborsó főzelék, dobostorta
Uzsonna: alma
Vacsora: majonézes kukoricasaláta, virsli

b) Reggeli: sonka, sajt, margarin, barna kenyér, paprika
Tízórai: joghurt, kifli
Ebéd: Krumplileves, sült csirke, zöldborsó főzelék, túróspite
Uzsonna: alma
Vacsora: joghurtos kukoricasaláta, virsli

c) Reggeli: sonka, sajt, vaj, fehér kenyér paprika
Tízórai: kakaó, kakaós csiga
Ebéd: Krumplileves, rántott hús, zöldborsó főzelék, brownie vagy fánk
Uzsonna: alma, krumplichips
Vacsora: joghurtos kukoricasaláta, virsli

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13. Miért jó, ha eszel húst? (Több választ is bekarikázhatsz!)

a) Mert rengeteget lehet belőle enni.

b) Segíti az izmok, a védekező rendszer erősítését.

c) Mert sok rostot tartalmaz.

d) Mert a benne lévő vas jól felszívódik és fontos szerepet játszik az oxigén szállításában, így a fáradékonyság leküzdésében.

14. Karikázd be azt az egyet, ami igaz a halakra! (Csak egyet karikázz be!)

a) A hal, mint állati hús sok vasat tartalmaz és segít, hogy a sötétben jól lássunk.

b) A tengeri halak és az édesvízi busa és kecsege a szívünk és ereink védelméhez fontos zsiradékot (omega3) tartalmaz.

c) Az egészséges táplálkozásban minden nap kell halat enni.

15. Van-e olyan étel, amit tilos enni, ha egészségesen táplálkozol? (Csak egyet karikázz be!)

a) Nincsen, mindent szabad enni, csak van, amit ritkábban és kevesebbet.

b) Igen, cukrot, rántott húst nem szabad enni.

c) Igen, üdítőt, gyümölcslevet, fehér kenyeret nem szabad enni.

16. Karikázd be a helyes választ! (Csak egyet karikázz be!)

a) Az egészséges táplálkozásban csak növényi eredetű olajokat, zsírokat lehet enni például: olaj, kókuszzsír, margarin.

b) Az egészséges táplálkozásban lehet vegyesen enni vajat, margarint, olajat és állati zsiradékot is csak nem egyenlő mértékben.

c) Az egészséges táplálkozásban nem szükséges zsiradékot (vajat, olajat, sajtot/zsiradékot tartalmaz/) enni.

17. Karikázd be egy hét alatt hány nap mozogsz a tornaórán kívül legalább 1 órát (ha délelőtt és délután is mozogtál fél órát, azt is számold pl.: biciklizés, rollerozás, gördeszkázás, úszás, focizás, pingpongozás stb.)!

a) nem mozgok
b) 1 nap
c) 2 nap
d) 3 nap
e) 4 nap
f) 5 nap
g) 6 nap
h) minden nap

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2. Nutritional knowledge assessment questionnaire in Diósgyőr

1. Mi a nemed?

- **a.** fiú
- **b.** lány

2. A következő állítások közül melyek igazak a zöldségekre, gyümölcsökre? (1 választ karikázz be)

- **a.** magas kalcium- és D-vitamin-tartalmuk miatt erősítik a csontjainkat
- b. magas rosttartalmuk segíti az emésztőrendszerünk működését
- c. teljes értékű fehérjéket tartalmaznak, amelyek többek között az izmaink működéséhez szükségesek

3. Miben különböznek a teljes kiőrlésű kenyerek/ pékáruk a fehér liszttel készült termékektől? (1 választ karikázz be)

- **a.** semmi lényegesben, csak más az ízük és a színük
- **b.** nincs bennük szénhidrát
- **c.** magasabb a rost-, vitamin- és ásványianyag-tartalmuk

4. A gabonafélék vagy a belőlük készült élelmiszerek közül melyik fontos, hogy minden nap szerepeljen az étrendünkben? (1 választ karikázz be)

- a. 1 db fehér zsemle vagy kifli
- b. 1 adag zabpehely
- c. 1 adag tészta
- d. 1 adag teljes értékű vagy teljes kiőrlésű gabona

5. Mely húsokat, húskészítményeket fogyasszuk gyakrabban? (1 választ karikázz be)

- **a.** válasszuk gyakrabban azokat, amelyek kevesebb zsírt tartalmaznak
- **b.** válasszuk gyakrabban a zsírosabbakat
- **c.** mindegy, amelyik ízlik, a zsírtartalom nem lényeges

6. Szerinted szükséges, hogy húsok/halak/ tojás/ tej és tejtermékek is szereljenek az étrendünkben? (1 választ karikázz be)

- **a.** igen szükséges, mert teljes értékű fehérjéket, jól felszívódó vasat, kalciumot és B12 vitamint is tartalmaznak
- **b.** igen szükséges, mert magas rosttartalmuk segíti az emésztőrendszerünk működését és sok C-vitamint is tartalmaznak
- **c.** nem szükséges, mert nem tartalmaznak a szervezetünknek hasznos tápanyagokat

7. Mely halak tartalmaznak értékes ómega-3 zsírsavakat? (1 választ karikázz be)

- **a.** a ponty és a harcsa
- **b.** a tengeri halak és a busa, kecsege, illetve pisztráng

c. a keszegfélék

8. **Mit tartalmaznak a tejek és tejtermékek? (1 választ karikázz be)**
   a. magas a C-vitamin-tartalmuk
   b. magas a kalcium- és D-vitamin-tartalmuk
   c. magas a rosttartalmuk
   d. nem tartalmaznak a szervezetünknek hasznos tápanyagokat

9. **Szükséges tejet és tejtermékeket fogyasztanunk? (1 választ karikázz be)**
   a. nem, mert egészségtelenek
   b. igen, napi 1adag tej és tejtermék elfogyasztása ajánlott
   c. igen, napi 3 adag tej és tejtermék elfogyasztása ajánlott
   d. igen, egy héten 1-2 alkalommal szükséges

10. **Mennyi édességet, desszertet fogyaszthatunk? (1 választ karikázz be)**
   a. minden nap egy keveset pl. 1 szelet csoki
   b. napi maximum 1-2 alkalommal
   c. heti maximum 2-3 alkalommal
   d. egyáltalán nem szabad fogyasztani

11. **Mennyi sót fogyaszthatunk egy nap (beleszámítva az élelmiszerekben található sót és a kézi sózást is)? (1 választ karikázz be)**

   a. összesen körülbelül 1 teáskanálnyi mennyiséget
   b. összesen 2-3 teáskanálnyi mennyiséget
   c. bármennyit, mert úgyis kiizzadjuk
   d. egyáltalán nem szabad sót fogyasztanunk

12. **Melyek azok a folyadékok, amelyekben nincs hozzáadott cukor? (Több választ is bekarikázhatsz!)**
   a. víz
   b. 12%-os gyümölcsital
   c. energiaital
   d. kakaó
   e. natúr gyümölcstea
   f. tej
   g. hagyományosan ízesített tea
   h. 100%-os gyümölcslé

13. **Minimum hány pohár (1,5-3dl) folyadékot ajánlott fogyasztani naponta? (1 választ karikázz be)**
   a. 3-4 pohár, ebből minimum 2 pohár ivóvíz legyen
   b. 8 pohár, ebből minimum 5 pohár ivóvíz legyen
   c. 4-5 pohár, ebből minimum 3 pohár ivóvíz legyen

14. **Szerinted fontos, hogy minden nap reggelizzünk? (1 választ karikázz be)**

a. nem kell minden nap, csak ha éhesek vagyunk reggel
b. nem fontos, az a lényeg csak, hogy minden nap ebédeljünk
c. igen, nagyon fontos

15. Mit mutat meg nekünk az OKOSTÁNYÉR®? (1 választ karikázz be)

a. hogy milyen élelmiszercsoportokat kell kizárnunk teljesen az étrendünkből
b. hogy milyen arányban kell az egyes élelmiszercsoportoknak szerepelnie naponta az étrendünkben
c. hogy szénhidrátot nem szabad fogyasztanunk

3. The impact of social isolation due to the COVID-19 pandemic on children's body weight questionnaire

Tisztelt Szülő, Gondviselő!

A Magyar Dietetikusok Országos Szövetsége a 2018 óta Diósgyőrben működő GYERE® – Gyermekek Egészsége Program keretében azzal a kéréssel fordul Önhöz, hogy a COVID-19 vírus miatti megszorítások gyermekük életmódjában bekövetkezett változásait kérdőív segítségével felmérje.
Az Önök által megadott válaszokkal hozzásegítik szakmai szervezetünket a további ismeretek birtokában a projekt jövőbeni működéséhez szükséges intézkedések megfogalmazásához.
A kérdőív kitöltése névtelen, és önkéntes. A gyűjtött adatokkal kizárólag egészségügyi szakemberek fognak dolgozni a fenti célok megvalósítása érdekében.
Amennyiben nem jelezzük, hogy több válasz is adható, kérjük, minden esetben a legjellemzőbb válaszlehetőséget jelöljék meg.
A kitöltött kérdőívet legkésőbb június 26-ig kérjük visszaküldeni.
Segítő együttműködésüket előre is köszönjük!

1. Milyen típusú településen él a család?
város, község, falu, tanya

2. Szüksége volt-e Önnek (szülőnek, gondviselőnek) plusz segítségre a megváltozott helyzet kapcsán?
Igen
Nem

3. Ha igen, akkor milyen területen? (több válasz is lehetséges)
ételreceptek
ételrendelés
segítés a tanulásban a gyermeknek
a saját számítógépes ismereteim bővítésében
tájékozódásban a gyermek sportolási lehetőségei kapcsán

egyéb szabadidős tevékenység
konfliktuskezelés
egyéb, éspedig …

4. Milyen forrásból kapott Ön (szülő, gondviselő) segítséget? (több válasz is lehetséges)
iskola
önkormányzat
barátok/rokonok
nyomtatott sajtó
internetes közösségi oldalak
internetes szakmai oldalak
televízió
egyéb: ...

5. Milyen nemű a GYERE® programban részt vevő gyermek, akiről a megadott válaszok szólnak?
(Amennyiben több gyermeke is részt vesz a GYERE® programban, kérjük, válasszon közülük egy főt)
fiú
lány

6.Hány éves a gyermek, akiről a válaszát írja?
6;7;8;9;10;11;12;13;14

7. Hol és kivel volt a gyermek a COVID-19 járvány ideje alatt?
szülővel otthon
nagyszülővel otthon
testvérrel/testvérekkel otthon
otthon egyedül
nagyszülővel máshol
változó helyszíneken, felügyelettel

ügyeletben-intézményben
egyéb: ...

8. Hogyan változott a gyermek alvási szokása a megváltozott helyzetben?
nem változott
többet tudott aludni
kevesebbet tudott aludni

9. Hogyan változtak a gyermek sportolási/mozgási szokásai?
nem változott
többet sportolt/mozgott
kevesebbet sportolt/mozgott

10. Ha többet, akkor milyen formában? (több válasz is lehetséges)
több otthoni (lakásban) sport/mozgás,
több szabadtéri sport/mozgás
több családtagokkal együtt történő sport/mozgás
online sport foglalkozások
egyéb: ...

11. Az Ön meglátása szerint az on-line oktatás/tanulás összesen hány órával emelte meg gyermeke esetében a napi összes képernyőhasználati (mobil, tablet, TV, számítógép) időt?
1 órával
2 órával
3 órával
4 órával
5 órával
6 órával
7 órával
8 órával
nem emelte meg

12. Az Ön meglátása szerint a szabadidős tevékenység miatt gyermeke naponta összesen hány órával töltött több időt a képernyő (mobil, tablet, TV, számítógép) előtt?

1 órával

2 órával

3 órával

4 órával

5 órával

6 órával

7 órával

8 órával

nem töltött több időt (szabadidős tevékenység miatt képernyő előtt, mint korábban)

kevesebb időt töltött (szabadidős tevékenység miatt képernyő előtt, mint korábban)

13. Hogyan változtak a gyermek étkezési szokásai?

nem változtak

kevesebbet evett

többet evett

14. Amennyiben egészségesebb irányban történt a változás miben nyilvánult meg? (több válasz is lehetséges)

hetente többször reggelizett

naponta többször fogyasztott zöldséget, gyümölcsöt

kevesebbet nassolt

több vizet, cukormentes folyadékot ivott

többször evett főtt ételt

egyéb: ...

15. Amennyiben kevésbé egészséges irányba történt a változás, akkor miben nyilvánult meg? (több válasz is lehetséges)

hetente kevesebb alkalommal reggelizett

naponta kevesebb zöldséget, gyümölcsöt fogyasztott
többet nassolt
több cukrozott üdítőitalt ivott
kevesebb főtt ételt evett
egyéb: ...

16. Hogyan változott a gyermek napi időbeosztása a járvány ideje alatt?
pozitívan, kialakult a napi rendszer
nem sikerült napi rendszert kialakítani

17. Változott-e a gyermek testtömege az elmúlt három hónapban?
nem, nem változott
nőtt a testtömege (hízott)
csökkent a testtömege (fogyott)

18. Ön hogyan látja, a COVID helyzet okozta változások milyen módon hatottak gyermeke lelki életére?
nem befolyásolta
negatívan befolyásolta
pozitívan befolyásolta

19. Ha pozitív, akkor milyen okok miatt? (több válasz is lehetséges)
esetleges iskolai konfliktusok csökkentek/megszűntek
ingázás miatti időveszteség csökkenése
magányosabb személyiség, ezért jobban érzi otthon magát
több minőségi időt tud a családdal tölteni
egyéb: ...

20. Ha negatív, akkor milyen okok miatt? (több válasz is lehetséges)
szociális, társas kapcsolatok hiánya
online bullying (zaklatás, nem fizikai bántás, kiközösítés)
kedélyállapot romlás

elszigeteltség
bizonytalanság, nem értette mi történik körülötte
aggodalom a betegség (saját vagy családtag/barát) miatt
szorongás a megváltozott oktatási módszerek miatt
családi konfliktusok, problémák
egyéb: ...

4. The association of socioeconomic status and food security with children's fruit and vegetable consumption, and fruit juice/soft drink intake questionnaire

Szülői kérdőív

A Magyar Dietetikusok Országos Szövetsége a GYERE®–Gyermekek Egészsége Program keretében szeretné felmérni a háztartásokat meghatározó társadalmi-gazdasági tényezőket, amelyeket összefüggésbe hozták számos krónikus betegséggel, többek között a gyermekkori elhízás előfordulásával. Célcsoportunk elsősorban a 6-9 éves gyermekek szülei. A kérdőív kitöltése 5-10 percet vesz igénybe, az Ön személyes adatai nem kerülnek rögzítésre, a kérdőív anonim. Kérjük segítse munkánkat azzal, hogy válaszaival hozzájárul a minél szélesebb körű elemzés megvalósításához. A kérdőív 2020. december 9-ig érhető el. Közreműködését ezúton is nagyon köszönjük!

1. Ki tölti ki a kérdőívet? *

- ☐ Anya
- ☐ Nevelőanya
- ☐ Apa
- ☐ Nevelőapa
- ☐ Nagymama
- ☐ Nagypapa
- ☐ Gondozó

2. Ön hány éves? *

- ☐ 18-20 év közötti
- ☐ 20-24 év közötti
- ☐ 25-30 év közötti
- ☐ 31-35 év közötti
- ☐ 36-40 év közötti
- ☐ 40 év feletti

4. Hány éves a kérdőív célcsoportjába tartozó gyermeke (célcsoport 6-9 év)? *

- ☐ 6 éves
- ☐ 7 éves
- ☐ 8 éves
- ☐ 9 éves

5. Hány gyermek (18 év alatti) él a háztartásban? *

- ☐ 1 gyermek
- ☐ 2 gyermek
- ☐ 3 gyermek
- ☐ 4 gyermek
- ☐ Több mint 4 gyermek

6. Melyik iskolába jár az Ön gyermeke? *

- ☐ Diósgyőri Nagy Lajos Király Általános Iskola
- ☐ Miskolci Könyves Kálmán Általános Iskola és Alapfokú Művészeti Iskola
- ☐ Miskolci Könyves Kálmán Általános Iskola és Alapfokú Művészeti Iskola Kaffka Margit Általános és Alapfokú Művészeti Tagiskolája
- ☐ Diósgyőri Szent Imre Római Katolikus Általános Iskola
- ☐ Miskolc-Diósgyőri Református Általános Iskola

7. Hány évig tanult Ön és a partnere, az általános iskolát is beleértve? *

	Én	Házastárs/partner
Kevesebb mint 6 év	☐	☐
6-8 év	☐	☐
9-11 év	☐	☐
12-14 év	☐	☐
15-17 év	☐	☐
Több mint 17 év	☐	☐
Nincs házastársam/partnerem	☐	☐

8. Hogyan jellemezné az Ön és a partnere jelenlegi munkaviszonyát? *

	Én	Házastárs/partner
Munkahelyen alkalmazott, illetve családi vállalkozásban fizetés nélküli munkát végez, továbbá gyakornok vagy fizetett szakmai gyakorlaton vesz részt	☐	☐
Munkanélküli	☐	☐
Véglegesen leszázalékolt/Tartós beteg	☐	☐
Kötelező katonai- vagy közszolgálatot teljesít	☐	☐
Háztartásbeli	☐	☐
Egyéb inaktív személy	☐	☐
Nincs házastársam/partnerem	☐	☐

9. Az alábbi állítások közül melyik az ami a legjobban jellemzi az Ön háztartásának jelenlegi jövedelmét? (a háztartásban élő minden felnőtt jövedelme beletartozik) *

☐ Kényelmesen megélünk a jelenlegi jövedelemből.

☐ A jelenlegi jövedelem éppen elégséges, fizetéstől-fizetésig kitart.

☐ Szűkösen élünk meg a jelenlegi jövedelemből.

☐ Nagyon nehezen élünk meg a jelenlegi jövedelemből, nem mindig tart ki a következő fizetésig.

10. Mi a fő jövedelemforrás az Ön háztartásában? Kérjük, vegye figyelembe a háztartás összes tagjának a jövedelmét és az egyéb bevételeket is, amelyeket a háztartás kap. *

- ☐ Munkabér
- ☐ Önálló vállalkozási tevékenységből származó jövedelem (a gazdálkodás kivételével)
- ☐ Gazdálkodásból származó jövedelem
- ☐ Nyugdíj
- ☐ Munkanélküliségi segély/végkielégítés
- ☐ Szociális járadék vagy támogatás
- ☐ Befektetésből, megtakarításból, biztosításból származó jövedelem
- ☐ Egyéb forrásból származó bevétel

11. Kérjük jelölje, hogy az alábbi két állítás mennyire jellemző az Ön háztartására (az elmúlt 12 hónapban)! *

	Gyakran igaz	Néha igaz	Soha nem igaz	Nem tudom vagy nem válaszolok
Az élelmiszer amit vásároltam/vásároltunk elfogyott és nem volt elegendő pénzem/pénzünk, hogy vegyek/vegyünk még.	☐	☐	☐	☐
Én/mi nem engedhetem/engedhetjük meg a kiegyensúlyozott étrendet.	☐	☐	☐	☐

12. Kérjük jelölje mi jellemző az Ön háztartására (az elmúlt 12 hónapban)! Ön vagy a közös háztartásban élő felnőtt csökkentette az étkezésének az adagját vagy hagyott ki étkezést azért, mert anyagi helyzete nem tette lehetővé? *

- ☐ Igen
- ☐ Nem (ha ezt a választ jelöli, kérjük a 12. kérdést hagyja ki)
- ☐ Nem tudom (ha ezt a választ jelöli, kérjük a 12. kérdést hagyja ki)

13. Ha az előző kérdésre igennel válaszolt, akkor milyen gyakran fordult ez elő? *

- ☐ Majdnem minden hónapban
- ☐ Néhány hónapban, de nem minden hónapban
- ☐ Csak 1-2 hónapban
- ☐ Nem tudom

14. Kérjük jelölje, hogy az alábbi két állítás mennyire jellemző az Ön háztartására? (az elmúlt 12 hónapban)! *

	Igen	Nem	Nem tudom
Kevesebbet evett mint kellett volna, mivel anyagi probléma miatt a rendelkezésre álló keret nem volt elegendő élelmiszerre.	☐	☐	☐
Éhes volt, de nem evett, mivel tudta, hogy nincs elegendő pénz élelmiszerre.	☐	☐	☐

15. Milyen gyakran eszik az Ön gyermeke ... *

	Soha	Kevesebb, mint heti 1 nap	Heti 1 nap	Heti 2-4 nap	Heti 5-6 nap	Minden nap egyszer	Minden nap kétszer	Minden nap több mint kétszer
Friss gyümölcsöt	☐	☐	☐	☐	☐	☐	☐	☐
Salátát vagy darabolt, reszelt zöldséget	☐	☐	☐	☐	☐	☐	☐	☐
Egyéb nyers zöldséget	☐	☐	☐	☐	☐	☐	☐	☐
Főtt zöldséget (ideértve a zöldséglevest is)	☐	☐	☐	☐	☐	☐	☐	☐

16. Ön vagy a házastársa/partnere figyelmezteti a gyermeket, hogy minden nap egyen gyümölcsöt? *

- ☐ Igen, mindig
- ☐ Igen, legtöbbször
- ☐ Néhányszor
- ☐ Alkalmanként
- ☐ Soha

17. Otthon többféle gyümölcs, zöldség áll rendelkezésre? *

	Igen, mindig	Igen, legtöbbször	Néha	Ritkán	Soha
Gyümölcs	☐	☐	☐	☐	☐
Zöldség	☐	☐	☐	☐	☐
Ebéd/vacsora/szendvics mellé kínált zöldség	☐	☐	☐	☐	☐

18. Otthon a gyermek bármennyi gyümölcsöt vagy zöldséget ehet? *

	Igen, mindig	Igen, legtöbbször	Néhányszor	Alkalmanként	Soha
Gyümölcs	☐	☐	☐	☐	☐
Zöldség	☐	☐	☐	☐	☐

19. Az egészséges étrend részeként, mit gondol, hány adag zöldséget kell a gyermekének elfogyasztania?(1 adag = 1 tálalókanálnyi mennyiségnek felel meg) *

☐ Nem kell zöldséget enni.

☐ Hetente 1-3 adagot

☐ Hetente 4-6 adagot

☐ Naponta 1 adagot

☐ Naponta 2 adagot

☐ Naponta 3 adagot

☐ Naponta 4 adagot

☐ Naponta 5 vagy annál több adagot

20. Mennyire igaz Önökre, hogy gyakran eszik együtt a család zöldséget? *

☐ Igaz

☐ Részben igaz

☐ Nem igaz

21. Amennyiben az Ön gyermeke gyümölcslevet fogyaszt, hány pohárral, dobozzal iszik naponta? *

- ☐ 1 pohár/kis doboz (250 ml)
- ☐ 2 pohár/kis doboz (500 ml)
- ☐ 3 pohár/ kis doboz (750 ml)
- ☐ 4 pohár/kis doboz (1 l)
- ☐ 5 vagy annál több pohár/ kis doboz (1,25 l-)
- ☐ nem fogyaszt

22. Kérjük válassza ki melyik igaz Önre! *

	Mindig	Gyakran	Néha	Ritkán	Soha
Milyen gyakran mondja azt a gyermekének, hogy a gyümölcslé hizlal?	☐	☐	☐	☐	☐
Ha gyümölcslevet szeretnék inni, a gyermekem jelenlétében türtőztetem magam.	☐	☐	☐	☐	☐
Jutalomként vagy vigasztalásképpen gyümölcslevet adok a gyermekemnek.	☐	☐	☐	☐	☐

23. Milyen gyakran fogyaszt az Ön gyermeke üdítőitalt? *

- ☐ Soha
- ☐ Kevesebb, mint heti 1 nap
- ☐ Hetente 1-szer
- ☐ Heti 2-4 nap
- ☐ Heti 5-6 nap
- ☐ Minden nap egyszer
- ☐ Minden nap többször

24. Amennyiben az Ön gyermeke üdítőitalt fogyaszt, hány pohárral, dobozzal, üveggel iszik naponta? *

	Egyet sem	1	2	3	4	5 vagy annál több
Pohár vagy kisebb doboz (250 ml)	☐	☐	☐	☐	☐	☐
Doboz (330 ml)	☐	☐	☐	☐	☐	☐
Üveg (500 ml)	☐	☐	☐	☐	☐	☐

25. Kérjük válassza ki melyik igaz Önre! *

	Mindig	Gyakran	Néha	Ritkán	Soha
Ha gyermekem üdítőitalt szeretne inni, adok neki.	☐	☐	☐	☐	☐
Milyen gyakran mondja azt a gyermekének, hogy az üdítőital hizlal?	☐	☐	☐	☐	☐
Jutalomként vagy vigasztalásképpen üdítőitalt adok a gyermekemnek.	☐	☐	☐	☐	☐

26. Milyen gyakran iszik Ön vagy partnere gyümölcslevet/üdítőitalt együtt a gyermekével? *

	Soha	Kevesebb, mint heti 1-szer	Hetente 1 alkalommal	Hetente 2-4 alkalommal	Hetente 5-6 alkalommal	Minden nap, naponta 1 alkalommal	Minden nap, naponta több alkalommal
Gyümölcslé	☐	☐	☐	☐	☐	☐	☐
Üdítőital	☐	☐	☐	☐	☐	☐	☐

27. Mennyire igaz Önre a következő állítás? Bizonyos ételeket nem adok a gyermekemnek, mivel azok túl drágák. *

☐ Teljes mértékben igaz.

☐ Részben igaz.

☐ Nem igaz.

Küldés