THE CHILDHOOD OBESITY SURVEILLANCE INITIATIVE (COSI)

NATIONAL STUDY RESULTS IN THE REPUBLIC OF ARMENIA, 2019

ARABKIR
MEDICAL CENTRE

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YEREVAN

ARABKIR MEDICAL CENTRE-INSTITUTE OF CHILD AND ADOLESCENT HEALTH

2021

THE CHILDHOOD OBESITY SURVEILLANCE INITIATIVE (COSI)

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ARABKIR Medical Centre-Institute of Child and Adolescent Health

… and the most important – to all 3645 school children

who have participated in the survey.

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EXECUTIVE SUMMARY

The WHO European Childhood Obesity Surveillance Initiative (COSI) study aims to measure trends in overweight and obesity among primary school-aged children for monitoring of the policy response to the obesity pandemic and intercountry comparisons.

Armenia joined COSI fifth round survey in 2018. It is a highly important study to understand the weight status among primary school children describing weight, height, body mass index (BMI), prevalence of underweight, normal weight, overweight, and obesity, to evaluate nutritional habits of family and make recommendations for policy improvement and targeted programs.

Child and Family Survey findings

Weight status of children

As evidenced by the results, overweight and obesity has become major public health problem among Armenian children. The high percentage of overweight and obesity in the country compared to world average is very concerning. The COSI study of European countries in 2015/ 2016 revealed that the prevalence of overweight and obesity ranged from 17.6 percent to 41.9 percent for boys and from 20.1 percent to 38.5 percent for girls[1]. The rates for Armenia are similar to European countries.

COSI Armenia study indicates that 27.7 percent of surveyed children are overweight, and 12.6 percent are obese. The gender disaggregation analysis showed that *30 percent of boys* and *25.4 percent of girls* are overweight. Similar tendency is observed for obesity as well, for which boys are more obese than girls (15 percent and 10 percent respectively).

Armenia Demographic and Health Survey of 2015/ 2016 found out that 14 percent of children under age 5 are overweight. The COSI Armenia study of 2019 shows that the rate of overweight among 7 – 8 years old children is 27.7 percent, nearly two times higher within 3 years interval. Early prevention of overweight and obesity among children is necessary to stop these trends.

Overweight and obesity rates are found to be higher in urban and semi-urban areas. The same cannot be said for stunting and underweight, which has higher prevalence in rural areas. Acute malnutrition (wasting) is significantly more prevalent in rural areas rather than in urban ones. The highest percentage of overweight was found in Tavush region (37.2 percent), while Yerevan has the highest rate of obesity (16.1 percent).

Stunting and underweight can be observed with higher share among the poorest families as it was identified based on the wealth indexing[2] of households. Additionally, children from richest families consume more diverse food than the ones from poor families, thus the Minimum Dietary Diversity is commonly not met among poorest families.

Education levels of parents as well as the socio-economic status of the families are not directly correlated with healthy eating habits and nutritious food intakes of children of those families. Awareness raising and behaviour change activities are necessary for all levels of society to make a change and improve the dietary diversity and nutrition status of the children in the country.

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[1] Mapping the health system response to childhood obesity in the WHO European Region. An overview and country perspectives (2019).
[2] Wealth index calculation is in detail explained in "Wealth Index of Families" chapter.

The correlation of mother's weight and educational attainment with child weight was found. Interestingly, higher educational level of mothers is associated with overweight and obesity of children, while low-medium educational level is signalling about stunting and underweight.

Physical activity behaviour

Lifestyle characteristics of children including physical activity behaviour are very important to prevent the obesity and overweight in the country. In general, more than 90 percent of children are physically active at least one hour a day. More than 50 percent of children participate in structured physical activities outside of school. About 80 percent of pupils are actively playing for 3 hours a day or more on weekends. Majority of them walk to and from school, though 1 out of 3 children are taken to school by vehicles. In general, children living in rural areas are more physically active than in urban areas.

Though children are physically active both on weekends and weekdays, they also spend significant time watching TV or using electronic devices, in average at least 1.5- 2.5 hours daily. This phenomenon is more seen in rural areas.

Sleeping habits is an important factor for anthropometric variables of children. About 95 percent of pupils sleep at least 9 hours per night without any gender difference.

Although children meet the minimum required physical activity rates, the number of hours that people stay physically active during the day tends to reduce by age. Addressing the unhealthy eating habits, changing the social behavior related to nutritious food intakes will alleviate the weight related health issues for adolescents later.

Eating habits of children

Eating breakfast is very important for children to be energized and nourished from the morning, be able to function and utilize their full potential related to their daily activities. Breakfast consumption is rather low in Armenia (53.6 percent as per children reporting and 44 percent as per parents' response). This is an alarming question for Armenia which needs further actions to improve the situation and address the widespread habits of skipping breakfast and unhealthy eating.

Only 44 percent of children eat breakfast every day, while 11 percent of children never have breakfast as per parents' response. About 45 percent of children have breakfast 1-3 days or 4-6 days a week. Breakfast habits are also different based on the rural-urban classification. Children in rural areas are having breakfast less regularly than ones in urban areas (39.4 percent and 48 percent respectively). Many parents mentioned that their children refuse to eat breakfast (47 percent) or they just do not have enough time (12 percent) for having breakfast as reasons of skipping it. Some proportion of children does not eat breakfast at home as they have it at school (40 percent).

Majority of children, who eat breakfast on regular basis, consume sweets (35 percent), fruits (39.8 percent) and grains (32.5 percent) and drink tea (24.3 percent) at breakfast time every day. Fewer pupils are having butter (20 percent), dairy products (25.4 percent), vegetables (19.2 percent) for breakfast every day. Commonly children are having eggs for breakfast 2-3 days a week (42.4 percent) or 4-6 days a week (22.4 percent). Out of dairy products, children consume cheese the most (48 percent).

An analysis of eating habits of children revealed that in average 4 and more times a week they consume grains (56.4 percent), fats (70 percent), cheese (65 percent) and fruits (61 percent). About 42 percent of children are consuming meat and poultry 1-3 days a week, while 16.2 percent never eat

meat or eat less than once a week. The least common products in consumption are legumes and fish, which 43.8 percent and 50.8 percent of children respectively consume less than once a week or never.

About 43.4 percent of children consume sweet snacks at least 4 days a week and 22 percent are consuming soft drinks with the same frequency. Consumption of soft drinks and grains is higher in rural areas where children also eat significantly less fruits and meat. The proportion of children meeting recommended dietary guidelines related to fruits and vegetables is low. Only 22 percent consume vegetables rich in vitamin A and 41 percent eat fruits daily.

It was identified that among children who do eat breakfast in the morning, the intake of protein, iron rich foods are not enough. Many are consuming sweet and savoury snacks frequently, even for breakfast. Information campaigns, awareness raising and social behaviour changing activities are required for both children and parents to address the unhealthy eating habits, inform about nutritious food and importance of eating healthy, balanced and diversified diet.

Eating habits of parents

Eating habits of parents are very influencing and impactful on the eating habits of children. Only 31 percent of parents eat breakfast every day, while 12.3 percent don't have it at all. Having joint meals with family members is a very good way to intake nutritious food, though only 44 percent of families with higher education usually have joint dinners and 57.5 percent of families with low-medium education level do so.

The main source of information for healthy eating habits are medical workers (84.6 percent), school teachers, friends, relatives (about 70 percent) and most of the parents do trust those sources.

According to the parent's information, more than 86 percent of participated children were breastfed. About 39 percent of children received breastfeeding for 12-23 months. More urban and semi-urban children received breastfeeding for 6-11 months and for 12-23 months.

School Survey findings

All schools provide physical education classes according to the curriculum. Around 92% of participants mentioned that physical education classes were provided for all children twice a week, 7% mentioned 3 times a week. Outdoor playgrounds were reported by 91% of schools, indoor gyms were present in 89% of schools.

Information about healthy lifestyle lessons devoted to nutrition and physical activity promotion were conducted in 65% of participated schools. Mostly urban and semi-urban schools did not provide classes for healthy lifestyle.

More than half of participated schools (54.5 percent) were free from advertising of energy-dense foods and beverages, though 45.5 percent of schools do have advertisement of such food equal in urban and rural areas.

Canteens were present in 66 percent of schools mostly located in urban and semi-urban areas. In contrast, cafeterias were present only in 50 percent of schools and mainly in rural and semi-urban areas. Large number of schools had free potable water at schools (71.8 percent). More than half of the schools provided fruit juices with sugar both free and on a paid basis.

In 65.4 percent of cases when schools were providing free sweet snacks, schools had only canteens available, while for 26.9 percent of cases had both canteens and cafeterias. Similar picture is found also for fruit juices with sugar.

About 42 percent of schools offered sweet snacks and 19 percent had savoury snacks on a paid basis. Soft carbonated drinks were found only in 6 percent of schools. Hot drinks with sugar and tea without sugar were presented in 22 percent and 29 percent of schools respectively on a paid basis.

The study results are important and informative for all stakeholders, including Government, health institutions and international organizations. According to the COSI results the prevalence of obesity and overweight in Armenia is alarming.

To avoid the abovementioned preconditions and complications related to overweight and obesity among children, strategic actions and policies are required to reduce childhood obesity and overweight in the country. The regulations for physical activity as well as healthy lifestyle lessons should be strengthened in the schools to make them mandatory. The advertisement of sweets, junk foods in schools should be banned and the list of food available in the schools on a paid basis should be reviewed and reconsidered based on their healthiness and nutritious standards.

International best practices on this should be analysed further and applied in Armenian context as per relevance to prevent the worsening of the obesity pandemic. Public health measures including health messages, promotion of traditional and healthy food, banning of junk food in schools are among the possible actions towards the abovementioned goals.

INTRODUCTION

Obesity is one of the key public health priorities worldwide including for WHO European region. It has reached the epidemics and somewhere even pandemics level over the last decades. Nowadays it's an issue of concern in developed and developing countries affecting both adults and children. Particularly childhood obesity is associated with a wide range of serious health and social consequences including a higher risk for non-communicable diseases in children and premature death and disability in adulthood.

Environmental factors and lifestyle play crucial roles in the rising prevalence of obesity. There are supporting evidence that excessive sugar intake by soft drink, increased portion sizes, permanent decline in physical activity have been playing huge roles in the rising rates of obesity all around the world. Childhood obesity can affect children's physical health, social, and emotional well-being. It is also associated with poor academic performance, low self-esteem, and a quality of life. Many comorbid conditions like metabolic, cardiovascular, orthopaedic, neurological, hepatic, pulmonary, and renal disorders are also seen in association with childhood obesity.

Insert 1: Health related consequences of child overweight and obesity

- **Cardiovascular changes** that are linked to increased cardiovascular risk in adulthood. Two cardiovascular risk factors, hypertension, and dyslipidaemia, are components of the metabolic syndrome.
- **Endocrine comorbidities** of obesity in children and adolescents include impaired glucose tolerance, diabetes mellitus, hyperandrogenism in females, and abnormalities in growth and puberty.
- **Gastroenterological**. Non-alcoholic fatty liver disease — Obesity is associated with a clinical spectrum of liver abnormalities collectively known as non-alcoholic fatty liver disease (NAFLD), the most common cause of liver disease in children. Obesity is the most common cause of gallstones in children without predisposing conditions (e.g, haemolytic anaemia, history of parenteral nutrition).
- **Neural**. Idiopathic intracranial hypertension (pseudotumor cerebri) is uncommon in children and adolescents, but its prevalence is increased in those with obesity.

- **Orthopaedic comorbidities** of obesity include slipped capital femoral epiphysis (SCFE) and tibia vara (Blount disease). In addition, children with obesity have an increased prevalence of fractures, genu valgus, musculoskeletal pain (leg, back, leg, knee, ankle, and foot), impaired mobility, and lower extremity malalignment compared with nonobese children.
- **Psychosocial consequences** of childhood obesity are widespread. These include social isolation, distorted peer relationships, poor self-esteem, distorted body image, anxiety, and depression. The risk of psychosocial morbidity increases with increasing age and is greater among girls than boys. Pulmonary comorbidities of obesity in children and adolescents include obstructive sleep apnoea (OSA) and the obesity hypoventilation syndrome (OHS).

(William J Klish, MD, Joseph A Skelton, MD, MS. Overview of the health consequences of obesity in children and adolescents, UpToDate, Mar 12, 2021)

The WHO European Childhood Obesity Surveillance Initiative (COSI) is a collaborative study with focal institutions and principal investigators from more than 40 countries who cooperate in relation to survey content, methodology and timing, using a common European protocol. It is a unique system that since 2008 has been measuring trends in overweight and obesity among primary school aged children (6.0 – 9.9 years old) for routine monitoring and policy response development. This specific age group is selected on purpose: "adiposity rebound" onset of the second period of rapid growth in body fat – begins on average at the age of about 6 years, whereas an early age at adiposity rebound is known to be a risk factor for later obesity. It is further suggested that targeting prevention at children before the onset of puberty can reduce the incidence of obesity and promote remission.

COSI is particularly important for Armenia because the country had no relevant information about childhood obesity at the country level. Only Demographic Health Survey data about children aged 0-5 years and Health Behaviour in School-aged Children (HBSC) data with self-reported height and weight for adolescents aged 11-17 are present in Armenia at national level. According to HBSC 2017/18 survey, 9 percent of 15-year-old girls and 23 percent of 15-year-old boys are overweight. At the same time the rate of overweight and obesity among adult population is alarming. The STEPS survey of non-communicable disease (NCD) risk factors conducted in 2016-2017 revealed that 47.7 percent of adult population was overweight, and 25 percent were obese. Prevalence of diabetes among adults is 12.3 percent, proportion of 18-69-year-olds with 3 or more of the risk factors of NCDs is 35.7%.

Armenia joined COSI Fifth Round Survey in 2018 and ARABKIR Medical Centre -Institute of Child and Adolescent Health has been nominated by the Ministry of Health as a national focal point to conduct the study in 2018/2019.

WHO Armenian office and World Food Programme (WFP) Armenian office agreed to partner around COSI study in Armenia and join efforts in understanding prevalence of overweight and obesity among 7- and 8-year-old children, as well as factors affecting the overweight and obesity in the country. According the reached agreement between the WFP Armenia, WHO Regional Office for Europe, WHO Armenia and Principal Investigator of COSI in Armenia, during the 5th round of COSI data collection WHO supported conduction of the anthropometric measurements and abstain information on school nutrition and environment employing the child and school record forms, while WFP was responsible for the factors affecting the overweight and obesity utilizing the family record forms.

Some questions were added in the Family record form by the specialists from WFP Armenian office and ARABKIR MC-ICAH. Family record forms included questions about eating habits in family, physical activity, height and weight of parents, breakfast consumption by children and parents, screen time etc.

Eating habits are among important factors for children in becoming overweight and obese. Regularly eating breakfast, daily consumption of 5 servings of fruits and vegetables and limited consumption of foods such as savoury snacks, fast foods, processed meat products and sugary soft drinks reduce the risk of obesity. Physical activity patterns are closely linked to the energy imbalances that result in children becoming overweight and obese. The benefits of physical activity, which includes active play, walking, cycling and participation in sports,

are important for children's physical and mental health, and habitual physical activity is associated with lower levels of overweight in children. Concerns have been raised that the time children spent watching television or using electronic media (screen time) is displacing unstructured play and resulting in more sedentary time and less physical activity.

The core objective of COSI in Armenia is to measure weight status in primary school children by describing weight, height, body mass index (BMI), prevalence of underweight, normal weight, overweight, and obesity. Other objectives include evaluation of nutritional habits of family and children and make recommendations for policy improvement and targeted programs. The implementation of an effective and sustainable surveillance system is important in providing valuable information, enabling monitoring, and addressing the obesity epidemic in children, identifying groups at risk, and evaluating the impact of obesity preventative interventions.

METHODOLOGY

STUDY DESIGN AND SAMPLING

The COSI protocol and manual of procedures allow each participating country to develop a system that fits its local circumstances. Each country is responsible for national data collection and analysis and an institute in each country oversees overall national coordination and management. The methodology is standardized, allowing comparisons between countries and over time. Data is analysed both at national level and by the surveillance initiative team at WHO Europe, which conducts common cross-country analyses of the pooled dataset. The data management process is completed in collaboration with in-country teams and the information is disseminated through reports and scientific publications. Armenia's approach was compliant with this protocol and thus accepted for inclusion.

By its methodology COSI is a cross-sectional study among nationally representative sample of primary school children aged 6.0–9.9 years. Cluster sampling is used, whereby the cluster or primary sampling unit is the primary school or the class. A simple cluster random sample of primary schools (both public and private) was taken proportionally to the size. In each school one class was randomly selected for targeted age group. Sampling with replacement was considered to reduce bias due to non-response.

According to the estimated sample size overall 156 schools and 3845 children aged 7-8 years old (second grade) participated in the survey data collection. All 10 regions and the capital city of Yerevan have been included. For each participating school, one class was randomly selected for participation. Field work was done in April-May 2019. Totally, data of 3642 respondents have been analysed and information about 3610 respondents is included in the report as the number of children aged 6, 9 and 10 was very small. Three data collection forms were used: a mandatory "Child's record form", a mandatory "School record form" and a voluntary "Family record form". Children and school level data were recorded into the electronic data entry system "Open Clinica". "Family form data" collection was conducted in May-June 2019, then in several regions of Armenia in September-November 2019. About 2100 family forms were collected.

Ethical approval for the study was obtained from the Ethical Committee of the Yerevan State Medical University after M.Heratsi.

DATA COLLECTION

In March 2019, a 3-days Orientation meeting was conducted for national team in cooperation with the WHO Armenia Country office. Trainers from Latvia, Italy, and WHO European Office for the Prevention and Control of NCDs presented the methodology of the survey. About 35 participants (school nurses and teachers) were trained to collect information, measure children's height and weight, take survey from headmasters of schools. The questionnaires for children and headmasters were translated into Armenian, adopted, and

printed. During the third day all participants visited a pilot school and measured children of the relevant age group.

Scales and stadiometers for the survey were provided by the WHO European Office for Prevention and Control of Non-communicable Diseases. SECA stadiometers and scales were used to measure height and weight.

All surveyors (most of them were school nurses and teachers) attended the pre-survey orientation meeting in early April and received precise instruction. The training included anthropometric measurements and data collection in line with the protocol, standardized use of the forms, and support of children with anxieties. Approval from the Ministry of Education, Science, Culture and Sport and the Municipality of Yerevan was received before the survey implementation.

Weight was measured in kilograms to the nearest 100 grams (0.1 kg). The stadiometers were mounted at right angles between a level floor and against a straight, vertical surface (wall or pillar). Children's height was measured in centimetres rounded to the last complete millimetre (mm).

The collected data is anonyme and do not include any personal identifying information in it. Before the data collection each participating school and pupil were assigned a unique code to ensure the anonymity of the collected data. Country datasets were checked by the WHO Regional Office for inconsistencies and completeness in a standard manner.

For Family form, the questionnaires were piloted in one of the regions of Armenia before the actual data collection. WFP Armenia country office assisted in contacting headmasters of the schools in regions and parents from the selected schools.

SCHOOL INFORMATION

In total, 156 schools from all regions of Armenia participated in the study. Only 3 schools declined the participation and were replaced according to replacement sampling. Overall, 122 urban (50 schools from Yerevan, 72 schools from other cities) and 34 rural schools were selected. The participation rate of children was very high - up to 100 percent.

Figure 1: Distributions of schools by rural-urban classification
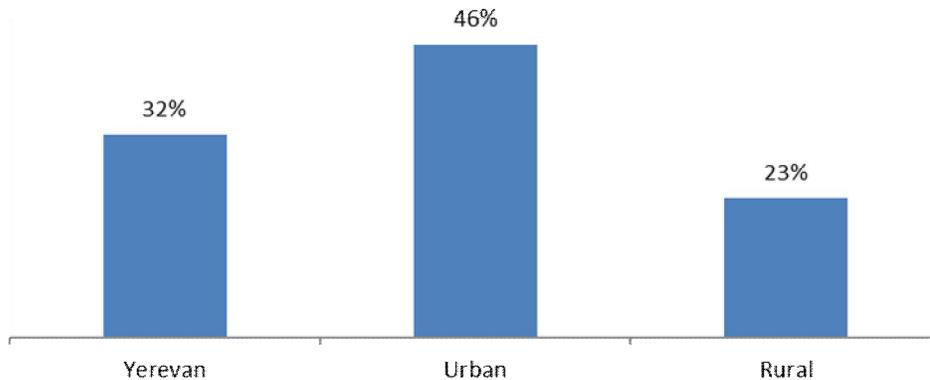
School plays an important role in health promotion during childhood and adolescence. Schools can promote healthy lifestyles both through the teaching curriculum and the school environment.

COSI data collection included a mandatory form for collection of information on the school environment. The School record form was completed by the school principal. A few school (environmental) characteristics were included in the questionnaire such as the frequency of physical education lessons, availability of playgrounds and gyms, access to a number of listed food items and beverages on the school premises, and current initiatives to promote a healthy lifestyle (healthy eating, physical activity). These aspects are potentially modifiable by local governments or by the schools themselves and thus there are opportunities for improving children's eating and physical activity patterns.

School survey revealed some positive outcomes. All schools provided physical education classes according to the national curriculum. Around 92 percent of participants mentioned that physical education classes were provided for all children twice a week, 7 percent mentioned physical education lessons 3 times a week.

Nutrition education or healthy lifestyle lessons devoted to nutrition and physical activity promotion were conducted in 65 percent of participated schools.

Figure 2: Availability of nutrition education lessons in schools and rural-urban classification
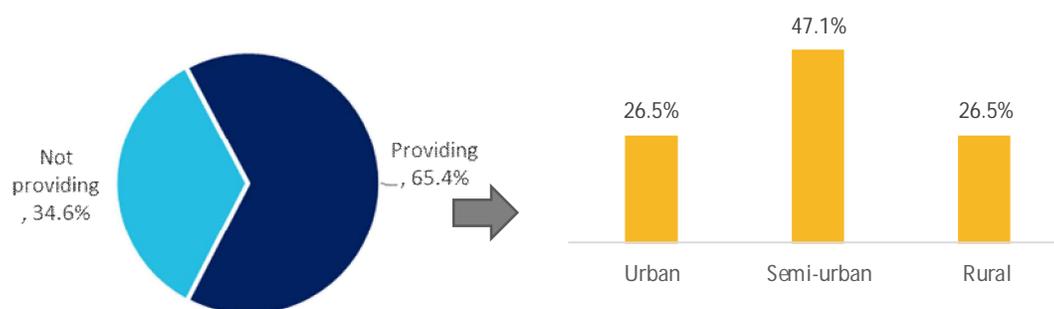
Presence of outdoor playgrounds was mentioned by 91 percent of schools, and in 89 percent of schools' indoor gyms were available.

All schools except one from a rural community were free from vending machines. More than half of participated schools (54.5 percent) were free from advertising of energy-dense foods and beverages. The equal number of schools from rural, urban, and semi-urban regions had advertisement of energy-dense food and beverages. Canteens were present in 66 percent of schools, mostly in urban areas. Only 50 percent of schools had cafeteria with prevalence in rural and semi-urban areas.

Figure 3: Presence of canteens and cafeteria in schools, rural-urban classification, %
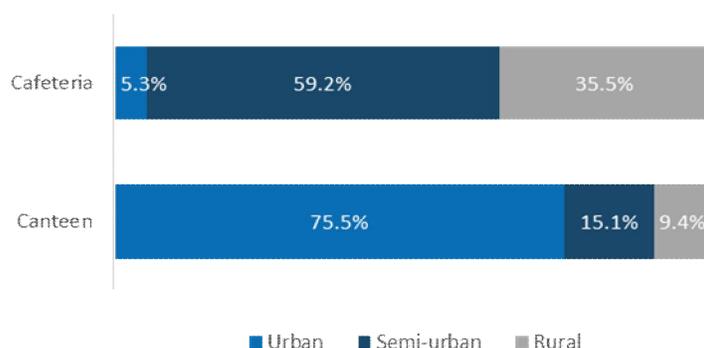
School nutrition environment included the availability of healthy food items like dairy products, fresh fruits and vegetables and unhealthy items like sweet and salty snacks.

Observation revealed that 71.8 percent of surveyed schools had potable water for free. Fruits were available in 29.5 percent of schools and vegetables in 34 percent of schools for pupils free of charge. More than half of schools provided fruit juices with sugar both free and on a paid basis. Dairy products were not available in many of the schools (78 percent). Fresh fruits and vegetables were not available for more than 60 percent of schools. About 42 percent of schools offered sweet snacks and 19 percent of schools had savoury snacks like salty crisps, nuts on a paid basis. Soft carbonated drinks were found only in 6 percent of schools. Hot drinks with sugar and tea without sugar were offered in 22 percent and 29 percent of schools on a paid basis respectively.

Analysis showed that more strict regulations are needed to improve availability of clean water, healthy food, and healthy snacks in schools as well as to ban junk food in school premises.

Table 1: Availability of food and beverages in schools

	Free (%)	Paid (%)	Not available (%)	Missing (%)
Water	71.8	22.4	4.5	1.3
Tea without sugar	28.8	5.8	61.5	3.8
Fruit juices	5.1	3.2	87.2	4.5
Fruit juices with sugar	19.2	25.6	53.2	1.9
Soft drinks, carbonated drinks	-	5.8	91	3.2
Hot drinks with sugar	22.4	6.4	70.5	0.6
Dairy	16.7	3.2	78.2	1.9
Fresh fruit	29.5	1.9	66.7	1.9
Vegetables	34	2.6	61	2.6
Sweet snacks	16.7	42.3	37.2	3.8
Savoury snacks	0.6	19.2	78.8	1.3

On average for 62.7 percent cases sweet snacks, fruit juices with sugar were more commonly suggested in schools where only canteens were available. Savoury snacks were usually sold in schools having only cafeterias (72.5 percent of cases).

Figure 4: Snacks and sugary juices available in schools on a free basis by infrastructure specifications
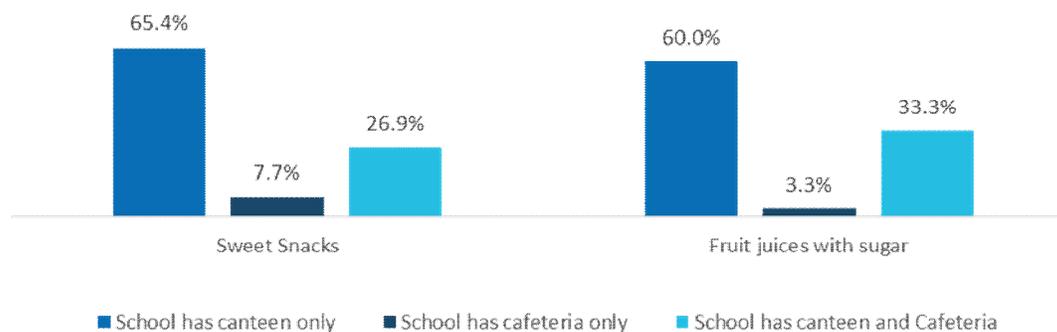
Figure 5: Availability of food and beverages on a paid basis in schools
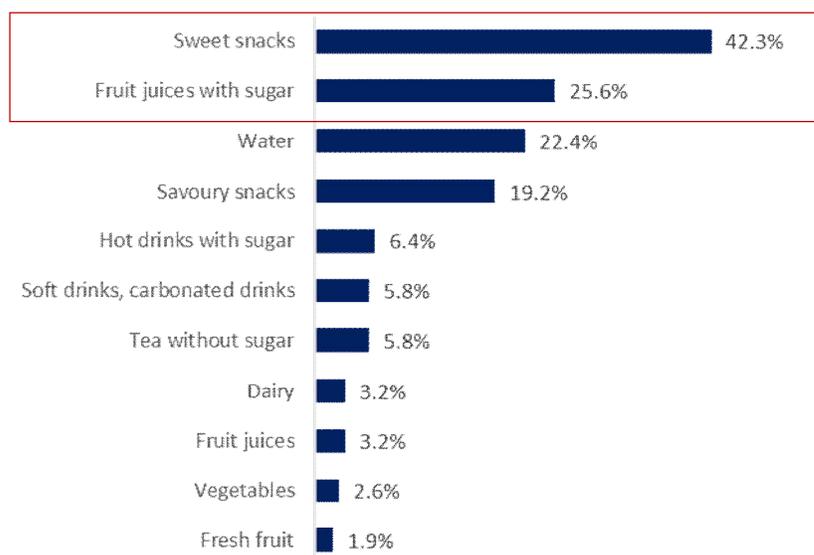
The widely available food items in schools on a paid basis were sweet snacks and fruit juices with sugar.

CHILD INFORMATION

ANTHROPOMETRIC FINDINGS

The cut-offs recommended by WHO in 2007 for school-aged children and adolescents were used to compute anthropometric indicators and to estimate the prevalence of thinness, underweight, stunting, overweight and obesity. Body mass index (BMI) was calculated using the formula: weight (kg) divided by height squared (m^2). According to WHO definitions, the prevalence estimates for overweight children include those who are obese.

To calculate a child's age, the following formula was used: (date of measurement − date of birth)/365.25. Descriptive statistical analyses and χ^2-tests were performed using MS Excel and SPSS. A p-value of less than 0.05 was considered significant with the confidence interval of 95%.

The interpretation of anthropometric measurements and calculation of the age-specific BMI (kg/m^2) was based on the WHO growth references indicated by age and sex (WHO 2007), according to which the BMI cut-offs should be interpreted as follows:

Stunting	*height-for-age below 2 Z scores*
Underweight	*weight-for-age below 2 Z scores*
Thinness	*BMI-for-age below 2 Z scores*
Overweight	*BMI- for-age above +1 Z scores*
Obesity	*BMI-for-age above +2 Z scores*
Normal or Healthy weight	*BMI-for-age between −2 Z and +1 Z scores*

Anthropometric indicators are BMI-for-age (BMI/A) Z-scores; height-for-age (H/A) Z-scores; weight-for-age (W/A) Z-scores.

Children with biologically implausible (or extreme) BMI for age values were excluded from the analysis. More specifically, implausible values are defined as follows: BMI–for-age values below –5 or above +5 Z-scores relative to the 2007 WHO growth reference median; height-for-age values below –6 or above +6 Z-scores relative to the 2007 WHO growth reference median; weight-for-age values below –6 or above +5 Z-scores relative to the 2007 WHO growth reference median.

Overall, data of 3610 children were analysed. Because number of children aged 6, 9 and 10 was very small, only data of 7- and 8-year old children is presented in current report.

Table 2: Distribution of pupils by age and sex, count

Age (years)	Boy	Girl	Total
6	1		1
7	1257	1121	2378
8	598	583	1181
9	19	30	49
10	1		1
Total	**1876**	**1734**	**3610**

Table 3: Distribution of pupils by regions and sex, %

Region	Boy (%)	Girl (%)	Total (%)
Aragatsotn	4.7	4.6	4.6
Ararat	9.6	9.1	9.4
Armavir	10.4	8.6	9.5
Gegharkunik	8.2	6.8	7.5
Kotayk	9.9	9.9	9.9
Lori	7.5	8.8	8.1
Shirak	7.1	8.8	7.9
Syunik	3.6	5.0	4.3
Tavush	4.0	3.9	4.0
Vayots Dzor	1.8	1.7	1.7
Yerevan	33.3	32.8	33.0
Total	100	100	100

Anthropometric measurements revealed that in Armenia the share of children who is overweight is 27.7 percent which is highly worrying. Among surveyed pupils, 3.4 percent of pupils were thin, 27.7 percent were overweight, 12.6 percent had obesity and 3.1 percent had severe obesity. Stunting was found in 3.8 percent of pupils, and underweight - in 3.7 percent of pupils.

Figure 6: Anthropometric variables and weight classification of pupils, %
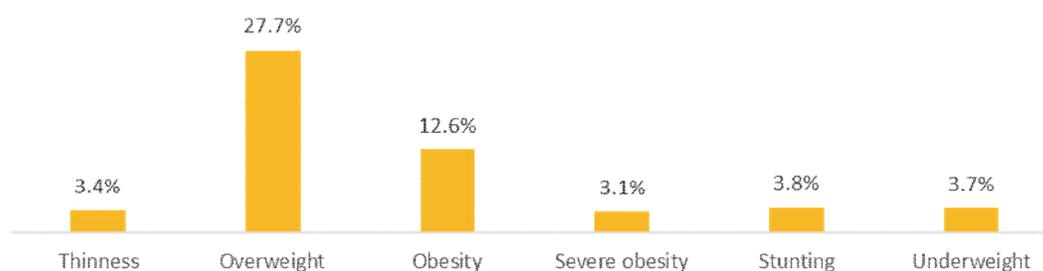
Overall, overweight, obesity and severe obesity is more common for boys than for girls. About 30 percent of boys and 25 percent of girls were overweight, 15 percent of boys and 10 percent of girls were obese. Severe obesity was more than 3 times prevalent among boys than girls.

Figure 7: Anthropometric variables and weight classification of pupils by gender, %
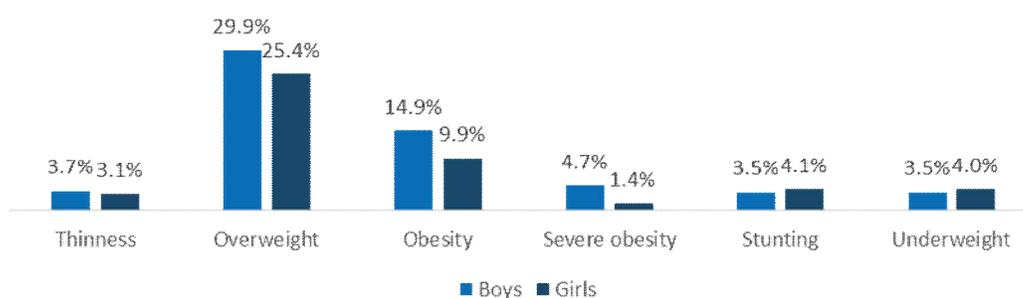
Some difference was noticed between age groups. Obesity and severe obesity among 8-year-old girls were a bit higher. Thinness rate was about the same for boys and girls: 3.7 percent and 3.1 percent respectively.

Table 4: Anthropometric variables and weight classification by gender and age groups, %

AGE (YEARS)		BOYS (%)	GIRLS (%)	TOTAL (%)
7	Thinness	3.4	2.7	3.1
	Overweight	29.8	24.7	27.5
	Obesity	15.2	9.5	12.6
	Severe obesity	4.9	0.9	3.0
	Stunting	3.3	3.4	3.3
	Underweight	3.3	3.5	3.4
	Wasting	2.0	2.1	2
8	Thinness	4.4	3.8	4.1
	Overweight	29.9	26.2	28.1
	Obese	14.3	11	12.7
	Severe obesity	4.4	2.5	3.5
	Stunting	3.7	5.1	4.4
	Underweight	3.8	4.9	4.4
	Wasting	4.0	2.8	3.4

Significant difference between regions of Armenia was noticed for obese and overweight children. The lowest percentage of overweight and obese children was observed in Gegharkunik marz: 12.6 percent and 6.3 percent respectively. The highest percentage of overweight (37.2 percent) was observed in Tavush region. In Yerevan, the percentage of overweight children was 31.9.

Table 5: Distribution of Anthropometric variables and weight classification by region, %

	Overweight (%)	Obesity (%)	Severe obesity (%)
Aragatsotn	30.8	13.8	5.3
Ararat	31.2	14.9	3.4
Armavir	26.8	13.4	3.5
Gegharkunik	12.6	6.3	2.6
Kotayk	27.5	8.6	1.8
Lori	22.2	9.7	1.9
Shirak	24.7	12.2	2.6
Syunik	22.3	6.3	1.8
Tavush	37.2	12.1	3.2
Vayots Dzor	24.6	5.3	-
Yerevan	31.9	16.1	3.9

Distribution by rural-urban classification revealed that overweight and obesity was higher in urban and semi-urban places. Underweight and stunting were higher in rural regions. Difference in distribution by rural-urban classification and by regions is statistically significant.

Table 6: Distribution of Anthropometric variables and weight classification by rural-urban classification, %

	Overweight (%)	Obesity (%)	Severe obesity (%)	Underweight (%)	Stunting (%)	Thinness (%)
Urban	31.9	16	3.9	2.3	3.5	1.7
Semi-urban	29.4	12	2.7	2.6	3.4	1.9
Rural	22.0	9.7	2.9	6.2	4.4	6.7

BMI was also associated with mother's educational attainment. Mothers with higher educational level had more children with overweight and obesity. Children with thinness, stunting and undernutrition are more common for mothers with low-medium educational level. There was no association between severe obesity and mother's educational attainment.

Figure 8: Anthropometric variables and weight classification by mother's educational attainment, %
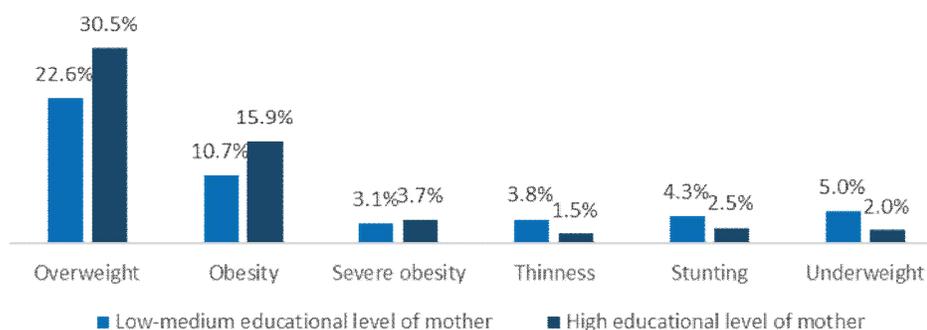
Very strong correlation between mother's weight and children's BMI was revealed. Prevalence of overweight, obesity and severe obesity of children was very high and statistically significant among pre-obese and especially obese mothers. Children with thinness were more prevalent for mothers with normal weight or underweight.

Table 7: Distribution of Anthropometric variables and weight classification by mother's weight status, %

	Under/normal weight of mothers	Pre-obese mothers	Obese mothers
Thinness	3.2	2.3	1.6
Underweight	4.0	4.5	0.4
Stunting	4.0	3.1	0.7
Overweight	21.2	31.1	46.8
Obesity	8.5	18.9	26.4
Severe obesity	1.6	6.4	9.4

Stunting, underweight, and acute malnutrition (wasting) in children

Stunting was revealed among 3.5 percent of boys and 4.1 percent of girls. 7-year-old boys and girls had the same rates of stunting (3.4 percent). There were some differences in the shares of stunting among boys and girls within the 8 years old age group: 3.7 percent of boys and 5.1 percent of girls were stunted. According to rural-urban classification 4.4 percent of rural children opposite to 3.5 percent of urban and semi-urban children were stunted. Level of mother's education had an impact on stunting as well. Mothers with low to medium education level are more prone to have stunted children (4.3 percent).

Underweight was revealed among 3,5 percent of boys and 4 percent of girls. Among 8-year old girls underweight is about 5 percent. Prevalence of underweight was more common for rural children.

Two indicators are recommended by the WHO for the diagnosis of acute malnutrition: weight-for-height Z-scores (with acute malnutrition defined as weight-for-height below -2 Z-score) and mid-upper arm circumference (< 12.5 cm). For this report weight-for-height was calculated and index between -3 and -2 Z-scores was used to define moderate malnutrition and severe malnutrition was defined as below -3 Z-score.

Overall prevalence of moderate malnutrition was 2.5 percent, with prevailing boys (CI 95%: 1.9-3.4). Severe malnutrition was detected among 25 cases (0.9 percent).

Figure 9: Moderate and severe malnutrition (wasting) by age groups, %
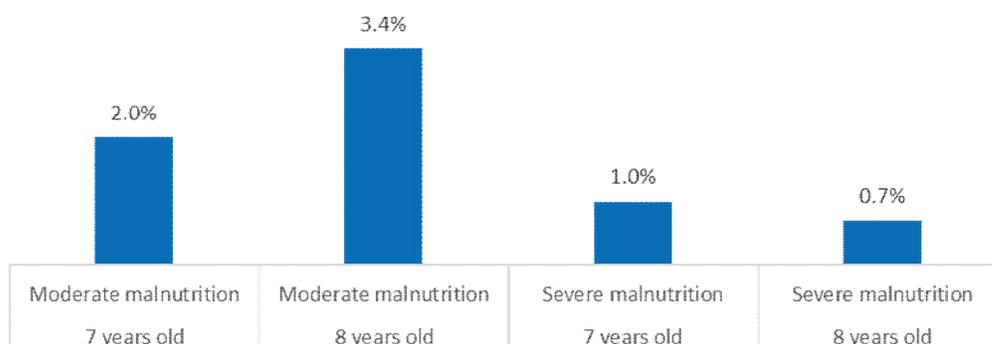
There were differences within age and gender groups for moderate and severe malnutrition. In case of severe malnutrition, the share of 7-year-old boys was almost twice higher than same age girls. For moderate malnutrition 8-year-old boys were about 1.5 times more moderately malnourished than same age girls.

Table 8: Distribution of cases of moderate and severe malnutrition (wasting), by age and sex

		Boy (%)	Girl (%)
Children aged 7	moderate malnutrition	2.0	2.1
	severe malnutrition	1.3	0.6
Children aged 8	moderate malnutrition	4.0	2.8
	severe malnutrition	0.4	1.0

Analysis by rural-urban classification showed that malnutrition was significantly more prevalent in rural areas in comparison with urban settings (4.8 percent vs. 1.2 percent). The majority cases of malnutrition were detected in Gegharkunik and Kotayk regions (6.8 and 5.6 percent accordingly).

Malnutrition was strongly associated with mother's and father's educational attainment. Children of parents with higher educational attainment were less prone to have malnutrition (0.9 percent vs. 2.9 percent of mothers with high and low-medium level of education accordingly). Interestingly, the prevalence of malnutrition was not correlated with the wealth status of the households.

DESCRIPTION OF HEALTHY HABITS OF CHILDREN

PHYSICAL ACTIVITY

The scientific evidence supports the findings that regular physical activity provides fundamental health benefits for children and youth. According to WHO Global Recommendations on Physical Activity for Health, for 5-17-year-olds, the recommended daily physical activity should be at least 60 minutes of moderate-to-vigorous exercise. Vigorous-intensity activities should be incorporated at least 3 times per week.

Information on how children are going to school and back and about the mode of transportation used was collected during the survey. Majority of pupils walked to and from school (66.6 percent and 78.2 percent accordingly), however many children used public transport or private cars to get there (33.3 percent). There was no difference on modes of transportation used to reach to school by gender.

Figure 10: Means of transportation to and from school, %
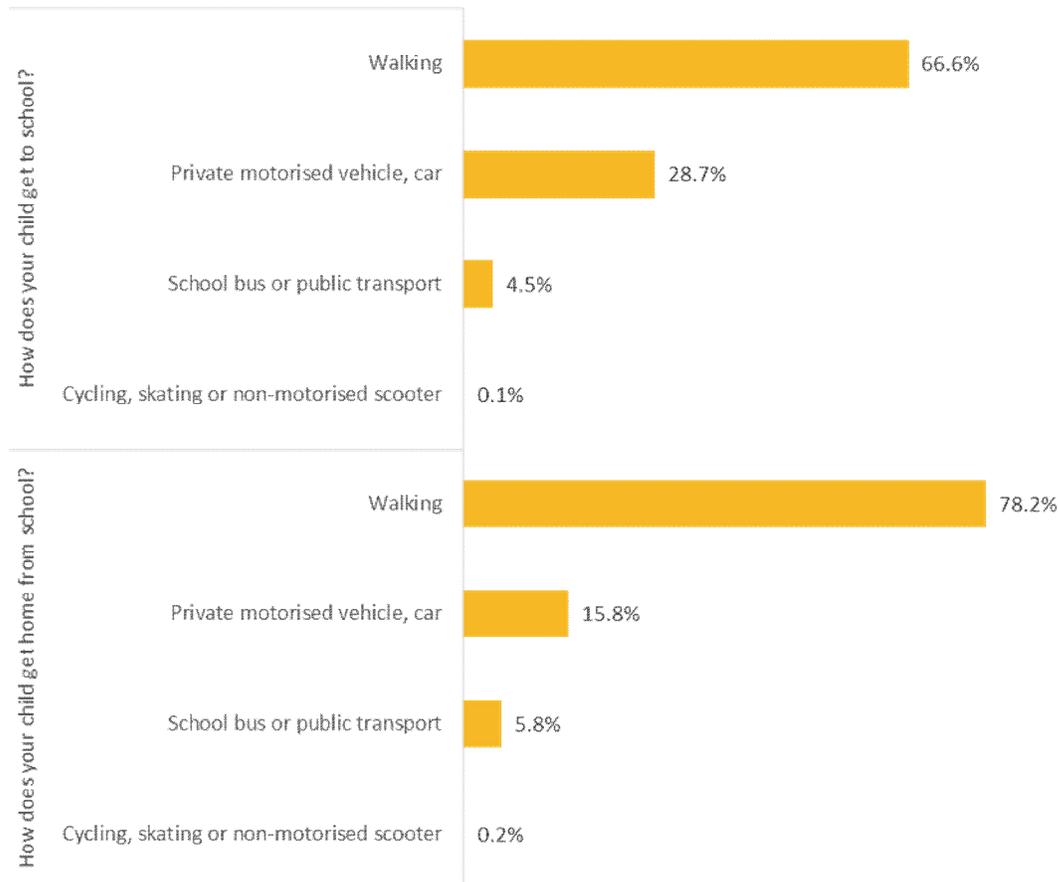
There were significant differences in those patterns within urban and rural areas of the country. More pupils walked or cycled to and from school in rural areas in comparison with urban areas (73.4 percent vs. 57.1 percent). This difference is partially explained with the fact that many rural areas were comparatively small and there were limited number of schools in each of them which usually was in a walking distance from homes for pupils.

Figure 11: Means of transportation to and from school, by rural-urban classification, %
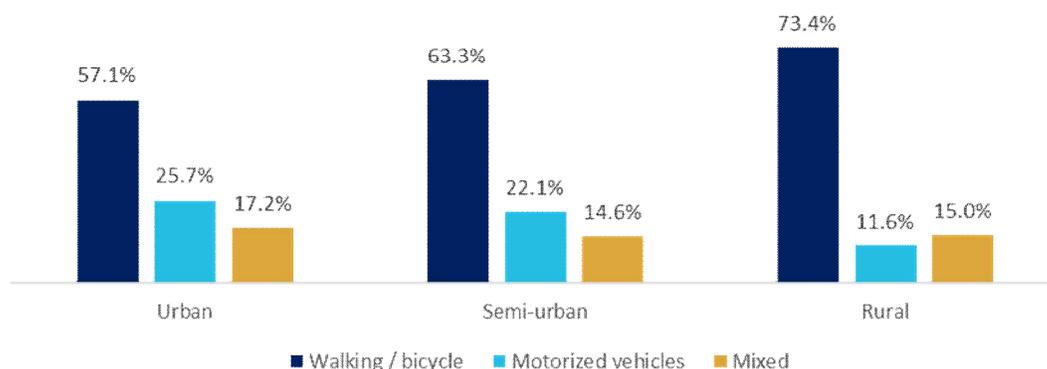
Similarly, to urban and rural differences, there were also differences within regions, how pupils were going to school and what kind of transportation modes they used. The highest score of walking and cycling was observed in Kotayk region (78.3 percent) while the lowest one was in Tavush region (50.4 percent).

Parents reported on participation of children in structured physical activities outside of school: engagement in a sport or dance classes. More than half of pupils participated in structured physical activities with a small difference by gender (53.8 percent of boys vs. 55.5 percent of girls). Significant difference was noted between rural and urban pupils. More children in urban areas participated in structured physical activities outside of school compared to rural areas: 65.3 percent and 43.5 percent accordingly.

Figure 12: Participation of children in structured physical activities outside of school by rural-urban classification, %
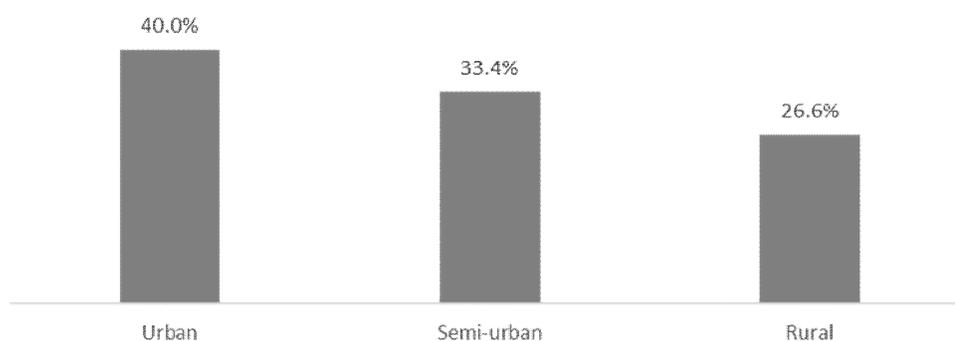
There was recorded large variation of structured physical activities outside of schools by regions. The highest rate was in Yerevan and Kotayk region (64-65 percent) and the lowest was in Gegharkunik region: 33.5 percent.

In average pupils practiced sports or dance about 3 hours a week (about 22 percent of respondents) and 13.6 percent were physically active 6 hours a week.

Parents responded to a question on how many hours a week their child usually plays outside or does in-door activities. In general, based on study results most of the children were active both on weekdays and weekends. About 92.6 percent and 98.7 percent of children were active for at least 1

hour a day on weekdays and weekends accordingly, and therefore met the recommended level of physical activity. In average about 80 percent of pupils were actively playing for 3 hours or more a day on weekends.

Figure 13: Proportion of children and the number of hours spent on in-door and outdoor activities on weekdays and weekends, by gender
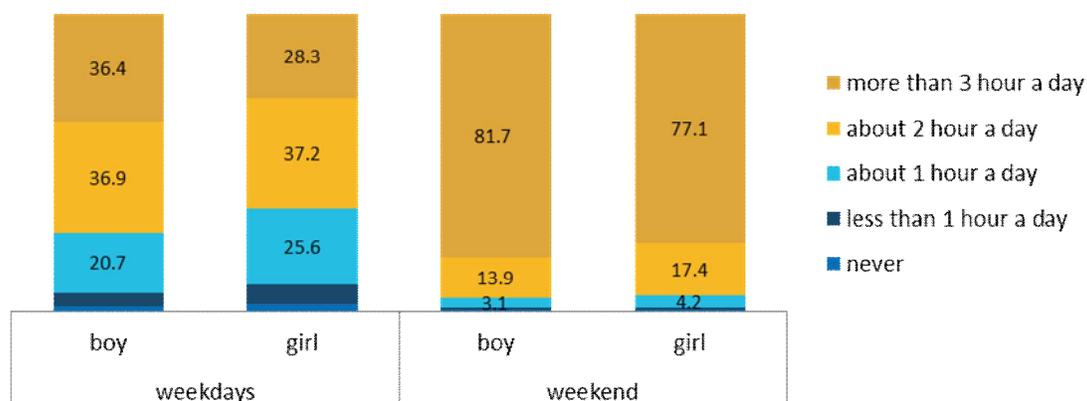
In contrast to participation in structured physical activities, in outside and in-doors activities rural children were more engaged than urban ones as they spent more time actively playing at home or outside. This difference might be due to limited offers of out of school physical activities in rural areas.

Table 9: Proportion of children and the number of hours spent on in-door and outdoor activities on weekdays and weekends, by rural-urban classification

		never	less than 1 hour a day	about 1 hour a day	about 2 hours a day	more than 3 hours a day
Urban	weekdays	3.0%	8.6%	25.9%	39.4%	23.2%
	weekend	0.9%	1.7%	4.8%	20.1%	72.5%
Semi-urban	weekdays	2.5%	5.6%	22.2%	38.6%	31.1%
	weekend	0.2%	0.9%	3.0%	13.9%	81.9%
Rural	weekdays	0.7%	1.9%	20.9%	33.2%	43.3%
	weekend	0	0	3.1%	12.6%	84.3%

Parents were asked about how many hours a day their children spent watching TV or using electronic devices on weekdays and weekends. It was calculated that in average mean number of hours spent with TV or electronic devices is 2 hours for boys and 1 hour for girls on weekdays and 3 hours for boys and 2 hours for girls on weekends accordingly. Some differences were recorded by rural-urban classification: more pupils watched TV and used electronic devices on weekdays in rural areas.

Table 10: Screen time including television and electronic devices use (distribution of median, 25th -75th percentiles)

		Median	P25-75
Weekday screen time (hours/day)	boys	2	1-2
	girls	1	1-2
Weekend screen time (hours/day)	boys	3	1-3
	girls	2	1-3

Sleeping habits is an important factor for anthropometric variables of children. Many studies have provided evidence that sleep patterns and sleep duration are associated with overweight and obesity. Parents reported on at what time their children usually go to sleep and wake up in the morning on weekdays. Based on their answers, the average number of hours slept per night during school week was calculated.

In average 95 percent of pupils slept at least 9 hours per night without any gender difference and 63 percent slept at least 10 hours. There was significant difference between urban and rural areas in relation to the duration of sleep. More pupils in rural areas slept at least 9 hours per night: 98 percent in comparison with 91 percent in urban settings. The highest rate of sleep duration was noted in Gegharkunik marz (99 percent), the lowest rate was in Yerevan (91,3%). Less than 1 percent of pupils went to bed after midnight.

Table 11: Sleep duration of pupils by rural-urban classification

	At least 9 hours per night
Urban	91.3%
Semi-urban	96.7%
Rural	98.1%

EATING HABITS OF CHILDREN

BREAKFAST CONSUMPTION

Healthy eating habits including regular breakfast and balanced diverse diet prevent different health issues and reduce a risk of chronic non-communicable diseases.

Survey participants were asked about children's eating habits and particularly whether they usually have breakfast in the mornings. Only 44 percent of children reported eating breakfast "every day", while 11 percent "never" have breakfast. The remaining 45 percent of children had breakfast 1-3 days per week or 4-6 days per week.

Figure 84: Breakfast consumption of children, %
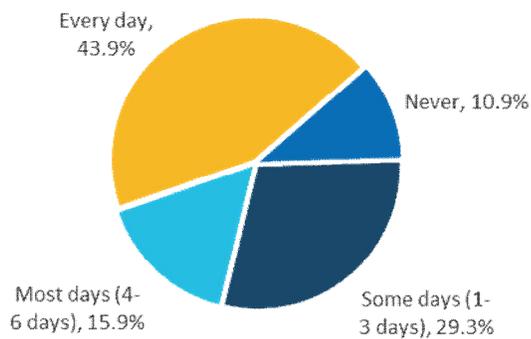
The difference by gender was insignificant, however there was a significant difference by rural-urban classification. In rural areas children had breakfast less regularly than in urban areas, 39.4 percent vs. 48 percent on daily basis.

Figure 15: Proportion of children regularly consuming breakfast, by rural-urban classification
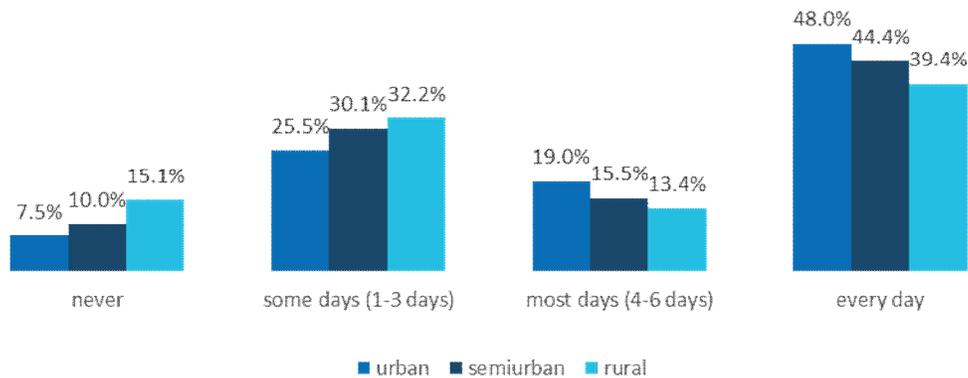
Survey showed that family size was correlated with the eating habits of the children. The larger was the household, the less often children eat breakfast daily. For example, in 54 percent of families with in average 3 members children had breakfast every day, while for families with more than 6 members the share of children having breakfast daily is only 42 percent.

The most common reason of not having breakfast was the refusal of children to eat breakfast (43 percent of girls, 51 percent of boys). In 12 percent of cases parents reported that child had no time for breakfast. About 40 percent of children did not have breakfast at home because they had regular breakfast at schools. In urban areas more children reported having no breakfast because of time constraints compared to rural areas 17.3 percent and 8.3 percent respectively. In contrast to parents' response, a child's response on having breakfast in the morning of survey day revealed that 38 percent of children didn't have breakfast at all.

The frequency of consuming different foods at breakfast during the previous week of the survey was also reported. Majority of children consumed sweets, fruits and grains and drink tea at breakfast on everyday basis. Fewer pupils (20-25 percent) ate dairy products, fats and butter, vegetables, eggs, and small proportion consumed meat, nuts and legumes and drank soft drinks at breakfast.

Table 12: Frequency of consumption of different foods at breakfast during last week

	Never	*One day/week*	*2-3 days/week*	*4-6 days/week*	*Every day*
Fruit	12.3%	5.8%	19.1%	23%	39.8%
Vegetables	28.5%	8.1%	23.8%	20.2%	19.2%
Grains	12.7%	8%	29%	17.8%	32.5%
Legumes	46.4%	26.5%	22.7%	3%	1.4%
Meat, poultry, and fish	26.5%	12.8%	28.6%	24.4%	7.7%
Eggs	11.7%	14%	42.4%	22.4%	9.5%
Milk, cheese and other dairy	12%	11.5%	28.1%	22.9%	25.4%
Nuts and seeds	48.6%	16.4%	22.9%	8.7%	3.5%
Oils	52.2%	6.3%	11%	8.6%	21.9%
Fats	33.8%	7.5%	15.4%	15.2%	28.1%
Butter	19.6%	12.2%	29%	19%	20%
Sweets	7.2%	8.5%	22.8%	26.3%	35%
Tea	19.7%	11.5%	23.6%	20.7%	24.3%
Soft drink	51.4%	6.6%	18.1%	14.6%	9.3%

There was no significant difference for food consumption patterns by gender. However, it was noted significant difference in consumption of various food items by rural-urban classifications and regions. In rural areas compared to urban areas children more often consumed grains (43 percent vs. 22 percent daily), vegetables, eggs, oils, and sweets at breakfast. For example, in Syunik region 63 percent of pupils didn't eat any legumes, 51.5 percent didn't eat any meat and 56.6 - vegetables at breakfast (the lowest rates).

Parents reported on frequency of consumption of hot meals by their children during a day. Most of families ate hot meals 2 or 3 times a day (38.1 and 39 percent accordingly). There was no major difference by gender, region, or rural-urban classification.

Figure 16: Frequency of hot meals consumption during a day by gender, %
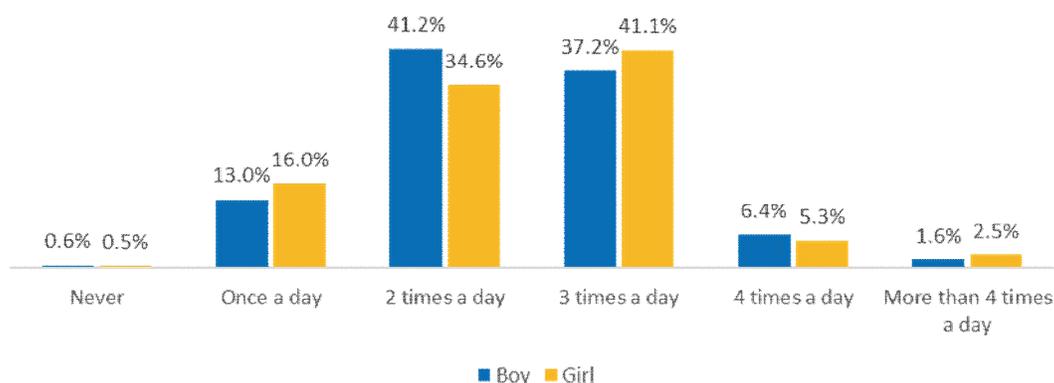
Parents reported on frequency of consumption of different foods by their children during usual week. Children consumed grains, oils/ fat or butter and fruits more often than other food products. From the list of dairy products, the most frequently consumed product was cheese and 48 percent of pupils ate cheese daily. Meat, poultry, and eggs were consumed in average several times a week: about 11 percent of children ate them on daily basis, whereas legumes and fish were consumed even less. More than 90 percent consume legumes and fish 1-3 times a week or less. Only 9.6 percent of children did not consume processed meat. Majority of children eat sweet snacks and about 22 percent drink soft drinks several times a week.

Table 13: Frequency of consumption of different foods by children during usual week

	Never	Less than once	Sometimes (1-3 days)	Often (4-6 days)	Every day
Grains	1.4%	4%	38.3%	26%	30.4%
Legumes	13.8%	30%	46.8%	7.5%	1.9%
Nuts and seeds	13.6%	29.3%	40%	12.6%	4.6%
Fats, oils, butter	3.4%	7%	19.2%	21%	49.4%
Low fat milk	50.5%	18.6%	19%	6.8%	5%
Whole milk	23.7%	18.7%	36.1%	12.8%	8.7%
Cheese	10%	7.2%	17.3%	17.7%	47.7%
Other dairy	6.8%	10.3%	35.9%	26.8%	20.1%
Meat and poultry	4.7%	11.5%	42.4%	29.6%	11.8%
Processed meat	9.6%	26.8%	39.3%	17.7%	6.6%
Fish	14.4%	36.4%	37.5%	9.5%	2.2%
Eggs	5.7%	12.3%	46.4%	24.5%	11%
Green leafy vegetables	30.7%	25.5%	25.4%	12.4%	6%

Fruits and vegetables rich in vit.A	5.1%	12.1%	33%	28%	21.8%
Other fruits	2.4%	4.2%	22.3%	29.8%	41.4%
Other vegetables	7.7%	12.7%	34%	24.7%	21%
Fruit juice	21.6%	27%	28.9%	13.7%	8.8%
Soft drink	28.3%	20.5%	29%	14.4%	7.8%
Salted snacks	12.7%	34%	32.6%	13.1%	7.6%
Sweet snacks	2.4%	13.6%	40.7%	27.1%	16.3%

The percentage of children meeting recommended dietary guidelines with respect to fruit and vegetables is poor. Only 21 percent consume vegetables and 41 percent consume fruits daily (it is recommended to eat at least 400g of vegetables and fruits a day). About 31 percent of pupils did not consume green leafy vegetables. About 50 percent consumed fruits and vegetables rich in vitamin A, and 71 percent ate other fruits at least several times a week. There was not any significant difference by gender, however there is some difference by urbanization grade.

Figure 17: Proportion of children consuming fruits and vegetables daily, by rural-urban classification
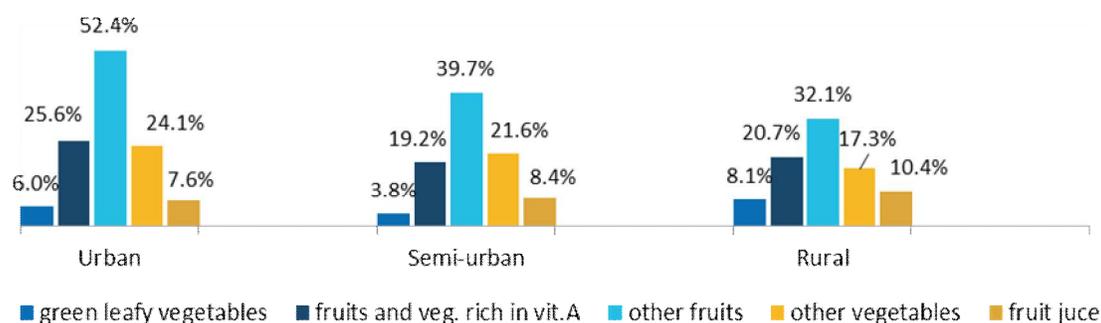
It was noted that rural children consumed soft drinks more frequently. They also eat grains and egg daily, consume salty snacks, leafy green vegetables, and drink fruit juice more often than urban children, but they eat significantly less fruits and meat (about 1/3 vs. 50 percent - every day or several times a week).

Large variation was detected in food habits by region. For example, in Armavir, Aragatsotn and Vayoz Dzor from 14 to 17 percent of children consumed soft drinks daily, whereas in Kotayk and Yerevan less than 5 percent did so. In Gegharkunik 29 percent of children never consumed soft drinks. In Vayots Dzor marz 29 percent of children "never" eat fish, but 21 percent ate eggs and 33.5 percent consumed dairy products every day. In Gegharkunik and Aragatsotn about 8 percent did not consume fish, and in Kotayk and Gegharkunik about 16-17 percent drank milk daily.

In Vayots Dzor more than 35 percent of children eat sweet snacks daily, whereas in Shirak - less than 10 percent. In Kotayk marz 53 percent eat grains daily whereas in Armavir marz and Yerevan – only 20-22 percent. In Syunik about 19 percent consume legumes on most of the days. In Vayots Dzor

almost 12 percent of children never eat meat and 19 percent – legumes. In Gegharkunik one out of 4 children never eats nuts. In Lori more than 45 percent never eat green leafy vegetables, but in Kotayk 1 out of 4 children eats them on most of the days. In Vayots Dzor 43 percent of children every day eat fruits and vegetables rich in vitamin A, whereas in Gegharkunik 11 percent didn't consume them. The highest proportion of children consuming other fruits daily was in Lori, 52 percent. In Vayots Dzor 41 percent of children consumed vegetables daily.

There was a correlation between consumption of certain food by children and mother's educational attainment (high level vs. low-medium level). Children, whose mother had higher educational level consumed significantly less salty snacks, sweets, and fruit juice, and ate more flesh meat, various fruits and vegetables.

MINIMUM DIETARY DIVERSITY

Minimum Dietary Diversity (MDD) is the consumption of four or more food groups from the seven food groups for higher dietary quality and to meet daily energy and nutrient requirements of the seven recommended food groups (grains, legumes and nuts, dairy products, flesh meat products, eggs, vitamin-A rich fruits and vegetables, other fruits and vegetables) [WHO, 2008].

For this report MDD was defined as a dichotomous indicator of whether children of 7 – 8 age group consumed at least four out of seven defined food groups over a typical or usual week. Any amount of consumption from the abovementioned food groups was counted in the analysis. The proportion of children reaching to this minimum requirement was considered to meet the minimum dietary diversity.

Overall 52.6 percent of children received foods from 4 and more food groups and therefore met the criteria of MDD consumption, while 47.4 percent didn't.

It was calculated the association of main findings of child nutrition status (thinness, underweight, stunting, and severe stunting, overweight, obesity) with MDD index. The analysis showed small differences in this regard among children with thinness: 3.8 percent of children with thinness did not consume diverse foods versus 2.2 percent of thin pupils with MDD. For those stunted (3.7 percent), underweight (about 4 percent), as well as overweight (about 26 percent) and pupils with severe obesity (3.4 percent) there was no association with MDD. 13.4 percent of children with obesity do not consume diverse foods, whereas 12.0 percent - do so (insignificant association).

A weak but significant correlation was noted between MDD and rural-urban classification. Urban pupils consumed more diverse food than rural inhabitants (35.1 percent vs. 31.2 percent). Also, parents' (both mother's and father's) educational attainments were significantly associated with MDD. Children of mothers and fathers with high educational attainment consumed more diverse food.

FAMILY FORM FINDINGS

Parallel to the anthropometric measurements of the children parents were also asked to assess the weight of their children, whether it was normal or not. About 77 percent of parents were considering the weight of their children normal while in the country we have 27.7 percent overweight and 12.6 percent obesity.

There was a significant difference between rural and urban settings: in rural areas more parents assessed the child's weight as normal (79.5 percent) or underweight (14.3 percent). By regions, in Aragatsotn marz less than 6 percent of parents thought that their child was overweight or obese.

Figure 98: Parents opinion about the weight of their child
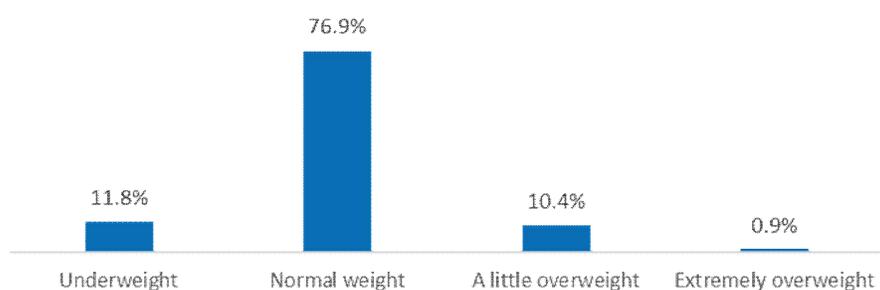
Awareness raising and informational campaigns will be required to change the perception of the parents and bring the understading of owerweight, obese, thinness close to their definitions.

Understanding the eating habits of the family and parents were one of the main goals of the family form. It is very important to know whether they eat breakfast or consume healthy food themselves or not. The analysis revealed that 12.3 percent of parents never eat breakfast. About 37 percent of parents eat breakfast some days while only 31 percent of parents reported that they eat breakfast every day.

Some difference was detected by place of residence: more parents in urban and semi-urban places skip breakfast, and the lowest number of regular breakfasts was recorded in Tavush marz -19 percent.

Table 14: Breakfast consumption of parents, by rural-urban classification

	Never	Some days (1-3 days)	Most days (4-6 days)	Every day
Urban	13.2%	34,1%	19,9%	32,9%
Semi-urban	15.2%	37,1%	20,1%	27,7%
Rural	8.7%	38,9%	18,6%	33,7%
Total	12.3%	36,8%	19,5%	31,4%

Only 2 percent of the respondents never had joint dinners, while more than half of families reported having joint dinners. More families from rural areas had joint dinners compared to urban areas, 61.4 percent and 46.3 percent respectively. The lowest shares of families having joint dinners were recorded in Syunik and Vayots Dzor regions, which was about 43 percent in both regions. The highest share was shown in Ararat and Armavir regions, 60 percent each.

There was a variation in frequency of family meals depending on mother's educational attainment. In families, where mother had high educational level, everyday family meals were mentioned by 44 percent of respondents vs. 57.5 percent - in families with low-medium educational level of the mother. Some variations were recorded also depending on mother's age.

DEMOGRAPHIC DATA, HOUSEHOLD CHARACTERISTICS AND WEIGHT STATUS OF PARENTS

Most of the children were from the households with 4, 5, 6 and more members. Only 7 percent of participated children lived in families with up to 3 members.

Among respondent families 61 percent of parents reported low-medium educational level, 39 percent reported high educational level.

Self reported data were collected about the parents' weight and height and the antropomentric indicators were calculated.

Figure 19: Anthropometric variables and weight classification of parents (self-reported)
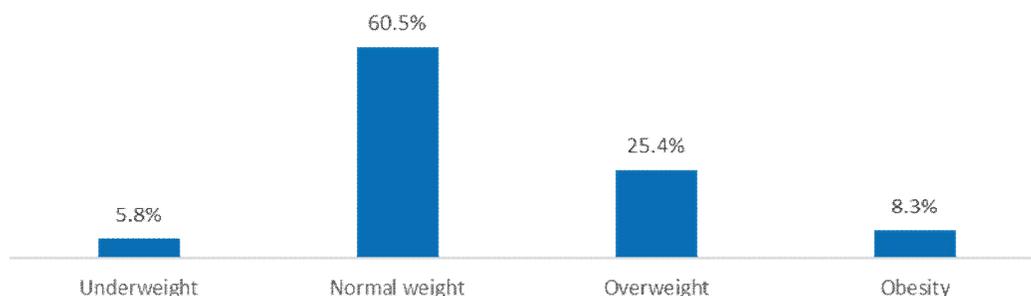
Among fathers 20.4 percent were obese and 40.4 percent were pre-obese. The opposite picture was recorded among monthes: 7.8 percent were obese and 25.2 percent were pre-obese. Presence of a family member with diabetes history was mentioned by 17.2 percent of respondents.

Parents responded to the question about main sources of information on child nutrition. The most frequent answer was "a medical worker" - 84.6 percent. Next common sources of information were "school teachers" (70.3 percent) and "friends & relatives" (70.2 percent), and in average most parents fully trusted the mentioned sources of information. Among other sources were mentioned "TV programs" (62.4 percent), "relevant web sites" (about 55 percent), "scientific publications" (48 percent), social media and information leaflets (about 30 percent), however a large proportion of respondents did not trust those sources of information.

BREASTFEEDING PRACTICES

It is well-known that breastfeeding is a significant protective factor against obesity in children. Parents responded to questions about their child's breastfeeding.

More than 86 percent of participated children were breastfed; about 8.5 percent were breastfed for less than 1 month. In case of gender distribution, 18 percent of boys and 20.4 percent of girls were breastfed during the period of 6-11 months. More children (around 39 percent) received breastfeeding for 12-23 months. Some difference was noticed connected to the rural-urban classification. More

urban and semi-urban children received breastfeeding for 6-11 months and for 12-23 months compared to rural areas. Prevalence of breastfeeding for at least 24 months was higher among rural families (19.8 percent opposite to 7.6 percent in urban area). Associations with mother's educational attainment and household status were not found.

WEALTH INDEX OF FAMILIES

Wealth index is measured using the data on asset ownership and housing characteristics of the household. It divides the households into five large groups / quintiles from poorest to richest ones based on their wealth rank. Regression analysis was conducted on nationwide level for Armenia to estimate the contribution of asset ownership and housing characteristics on the wealth of the households. Integrated Living Condition Survey (ILCS), 2019 database was used for this purpose [Household's Integrated Living Conditions Survey anonymized microdata database 2019, Armstat].

Having the results of the regression analysis on nationwide level the wealth index was predicted for the COSI 2019 database. Households were ranked into 5 groups based on their wealth index from poorest to richest ones.

Figure 20: Wealth index components by quintiles
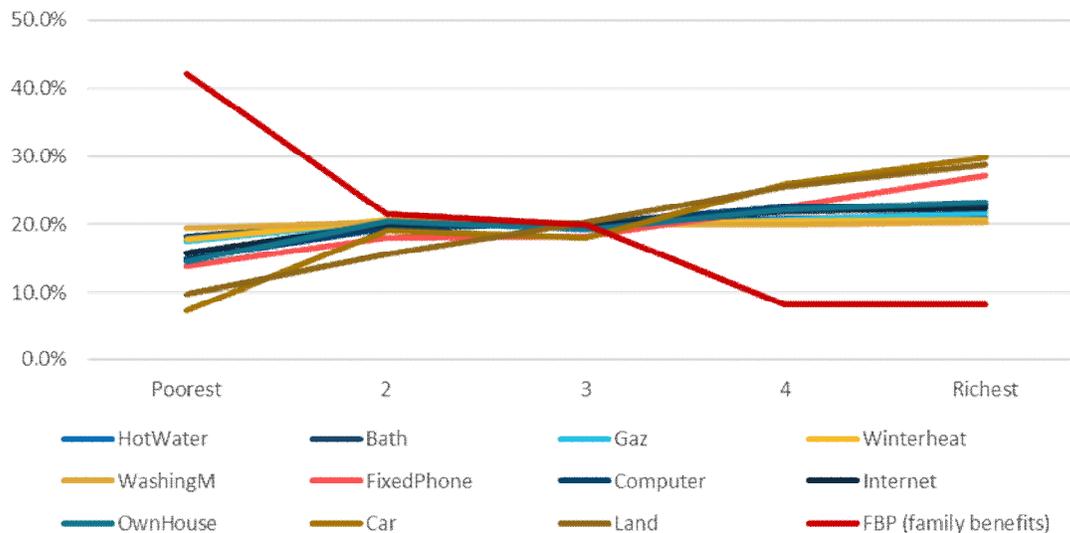
Among richest households, about 54 percent were from urban areas while poorest ones were more from semi-urban and rural areas. In terms of regional distribution, the poorest households were more concentrated in Lori and Shirak regions and the richest ones were high in Yerevan and relatively high in Aragatsotn and Gegharkunik.

A significant association of MDD index with the group of wealth has been detected: those pupils who belong to richer quintiles consumed more diverse foods than children from poor groups (26.2% in the richest quintile and 15% in the poorest quintile).

Table 15: Association of Minimum Dietary Diversity with Wealth Quintiles

Percentile Group of Wealth (% within MDD, Estimate)	Minimum Dietary Diversity		
	No	Yes	Total
Poorest	19.5	14.9	17.1
2	19.5	17.9	18.6
3	20.5	18.9	19.6
4	19.8	22.1	21.0
Richest	20.7	26.2	23.6

Figure 21: Association of Minimum Dietary Diversity with Wealth Quintiles
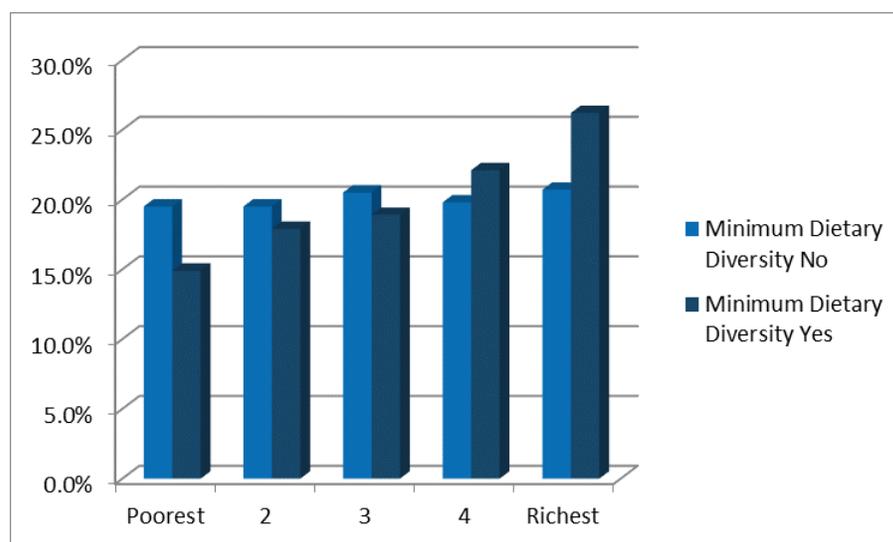
By household size the groups of wealth have been distributed in the following way: the richest groups were in households with 6 and more members, the poorest were from households with 3 or 4 family members. Thus, in average the wealthier households consist of at least 6 family members.

Table 16: Association of household size with Wealth Quintiles

Percentile Group of wealth (%)	Household size				
	Up to 3 family members	4 members	5 members	6 members	More than 6 members
Poorest	20.2	42.6	21.6	14.7	0.9
2	14.3	42.7	29.4	10.7	3.0
3	11.3	29.2	27.8	21.9	9.8
4	4.9	22.6	21.9	36.7	13.9
Richest	0	7.2	18.9	23.7	50.2

Association of wealth quintiles with parents' educational attainment was found: the higher educational level parents had, the wealthier were their households.

The cross analysis of anthropometric variables and wealth classification revealed that the weight classifications of children were mainly not correlated with the wealth status of the household. There were weak correlations of wealth status, stunting and underweight, where children from poorest families had higher share in this category compared to richest families.

CONCLUSIONS

In Armenia, as in many European countries the prevalence of overweight and obesity are in worryingly high level. Overweight and obesity in Armenian children is growing alarmingly: among 7-8 years old children it is considerably high with the prevalence in boys. Nutritional behaviour of parents is correlated with the anthropometric variables and wealth classification of children, thus the behavioural change among parents and families will respectively have positive impact also on their children. Awareness raising and informational campaigns will be required to change the perception of the parents and bring the understading of owerweight, obese, thinness close to their definitions.

School environment, nutrition knowledge and behaviour of parents, educational level of mothers, socioeconomic status of family play an important role in developing or aggravating the nutritional status of Armenian children. To tackle the arising problems, effective intersectoral collaboration is needed for the prevention of overweight and obesity in children.

COSI surveillance system is an important tool for targeting and monitoring the epidemics and actions aimed to reduce the obesity and overweight among children.

RECOMMENDATIONS

This surveillance system (COSI) should be regularly implemented in primary schools of Armenia providing comparable data on rates of overweight and obesity among children and their trends that might drive relevant policies and actions to reverse the pandemic trend of childhood obesity.

Among recommended actions for policy and practice in response to the challenges posed by childhood obesity are:

- Strengthen governance to ensure coherent actions and intersectoral collaboration at national, regional and local levels

- Develop comprehensive strategies and actions to promote healthy nutrition behaviour among children, parents, teachers, and whole population

- Ensure proper financing and improve national policies on food provision in schools

- Establish nutrition standards for healthy food and beverages provided in schools

- Establish monitoring mechanism to eliminate the provision of unhealthy food and beverages in schools

- Implement appropriate food labelling and marketing of food

- Implement an effective tax on sugar-sweetened beverages

- Provide school-based effective teaching interventions aiming at improved nutritional status of school children

- Create appropriate environment through healthy eating lessons, school gardening and cuisine lessons for pupils, availability of school meals, clean water

- Sensitize, orientate the general population, mass media towards healthy eating behaviour and physical activity promotion

- Promote active involvement of parents, communities, local government in the implementation of school nutrition programs

- Promote the traditions, values and health benefits of traditional diet

- Provide appropriate and context-specific healthy eating information for parents, teachers, schoolchildren, and public

- Implement effective social behaviour change activities for parents, teachers, children

- Increase access to healthy foods in communities

- Provide clear public health recommendations for physical activity, screen time, sleep duration and leisure activities

- Strengthen primary health care services and implement proper counselling for children at community level through adequately trained school-based services

- Improve infrastructure of schools to provide efficient physical education lessons, out-of-school sport, and active leisure for all children regardless of their health status (including for those with special needs)

- Provide opportunities to more active lifestyle and physical activity at community level

- Establish Surveillance system of children's eating habits, anthropometric measurements, and school nutrition environment to monitor policy and programs impact.

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ANNEX

Table 17: Child body weight (kg)

	Estimate	Confidence interval 95%
Boys	26.52	26.09-26.94
Girls	25.53	25.24-25.83
Overall	26.05	25.78-26.32

Table 148: Child height (cm)

	Estimate	Confidence interval 95%
Boys	125.02	124.70-125.34
Girls	123.99	123.67-124.32
Overall	124.53	124.29-124.78

Table 159: Body Mass Index (BMI, kg/m^2)

	Estimate	Confidence interval 95%
Boys	16.83	16.61-17.05
Girls	16.48	16.34-16.63
Overall	16.67	16.52-16.81

Table 20: Household size

	Boy	Girl	Total
Up to 3 members	6.0%	7.2%	6.6%
4 members	22.5%	21.4%	22.0%
5 members	23.1%	22.5%	22.8%
6 members	26.4%	25.0%	25.7%
More than 6 members	22.0%	23.9%	22.9%
Total	100%	100%	100%

Table 21: Respondents' educational attainment

	Boy	Girl	Total
Low-medium level	59.2%	62.4%	60.7%
High level	40.8%	37.6%	39.3%
Total	100%	100%	100%

Table 22: Respondents' age

	Father	Mother	Total
<=30 years	27.4%	30.8%	29%
31-35 years	42.9%	37%	40.1%
36-40 years	20.7%	23.1%	21.9%
>40 years	8.9%	9.1%	9%
Total	100%	100%	100%

Table 23: Child birth weight (gr.)

	Mean	Confidence interval 95%
Boys	3205	2900-3200
Girls	3060	2800-3100
Urban	3158	2850-3200
Semi-urban	3176	2900-3200
Rural	3076	2800-3100

Table 24: Breastfeeding

	Never breastfed	Breastfed for less than 1 month	Breastfed for 1-2 months	Breastfed for 4-5 months	Breastfed for 6-11 months	Breastfed for 12-23 months	Breastfed for at least 24 months	Total
Boy	5.0%	9.3%	3.5%	8.7%	18.0%	39.6%	15.9%	100%
Girl	6.1%	7.5%	3.8%	11.4%	20.4%	38.4%	12.4%	100%
Total	5.5%	8.5%	3.6%	10.0%	19.1%	39.0%	14.2%	100%