World Health Organization

European Region

Childhood Obesity Surveillance Initiative (COSI): Tajikistan

Report on the fourth (2016/2017) and fifth (2019) rounds of data collection

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Abstract

Nutritional surveillance data are essential to effectively design, implement and evaluate policies and strategies aimed at counteracting childhood obesity, which remains an important public health problem in the WHO European Region. The WHO European Childhood Obesity Surveillance Initiative (COSI) was established in 2007 as a systematic process of collection, analysis, interpretation and dissemination of descriptive information for use in monitoring excess bodyweight and in programme planning and evaluation. Tajikistan joined the WHO European COSI study in 2016 (fourth round). This report presents data on the fourth (2016/2017) and fifth (2019) rounds. COSI Tajikistan data collection was performed in five regions of Tajikistan (Districts of Republic Subordination, Dushanbe City, Gorno-Badakhshan Autonomous Oblast, Khatlon and Sughd) following the WHO European COSI study common protocol and data collection procedures. From 153 primary schools, a total of 3318 children aged 7 years were measured in 2016/2017 and 3454 in 2019. The COSI study allows better understanding of the progression of childhood overweight and obesity in each country and provides information on related factors, such as eating habits and patterns of physical activity. COSI Tajikistan should be repeated every three years to monitor trends over time, which is of particular importance given that obesity (1.5% in 2016/2017 and 1.4% in 2019) coexists alongside thinness (4.3% in 2016/2017 and 6.0% in 2018), and to support the country's need for ongoing or future interventions to promote healthier lifestyles among children and, consequently, ensure better health.

Keywords

CHILDHOOD OBESITY, CHILD, OVERWEIGHT, PUBLIC HEALTH SURVEILLANCE, NUTRITIONAL STATUS

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Abbreviations and acronyms

BMI	body mass index
COSI	Childhood Obesity Surveillance Initiative
DRS	Districts of Republican Subordination
GBAO	Gorno-Badakhshan Autonomous Oblast
Ministry of Health	Tajik Ministry of Health and Social Protection of Population
NCD	noncommunicable disease
RCHLS	Republican Centre for Healthy Lifestyle

Executive summary

Childhood obesity poses a serious and important public health challenge within the WHO European Region and, although the prevalence may be plateauing in some settings, more children are now living with overweight and obesity in low- and middle-income countries, particularly in urban areas *(1–3)*.

Prevention is recognized as the only feasible option for curbing the epidemic, and nutritional surveillance data are essential to effectively design, implement and evaluate policies and strategies aimed at counteracting obesity *(4)*.

In response to this need, in 2007 the WHO Regional Office for Europe established the WHO European Childhood Obesity Surveillance Initiative (COSI) – a systematic process of collection, analysis, interpretation and dissemination of descriptive information for use in monitoring excess body weight and in programme planning and evaluation *(5)*. The common COSI protocol establishes the main characteristics of study design and sampling strategy, but – by including a combination of mandatory and voluntary components – also affords participating countries some flexibility to adapt the system to their national context *(6)*. This enables the monitoring of trends in the epidemic as well as intercountry comparisons within the WHO European Region. The study was first initiated with 13 Member States of the Region in 2008 and was followed by four further rounds in 2010, 2013, 2016 and 2019.

Tajikistan joined the WHO European COSI in 2016, taking part in the fourth (2016/2017) and fifth (2019) rounds of the surveillance initiative. COSI Tajikistan data collection was performed, using the common protocol and the data collection procedures set out for COSI, in five regions of Tajikistan: the Districts of Republican Subordination (DRS), Dushanbe City, the Gorno-Badakhshan Autonomous Oblast (GBAO), Khatlon and Sughd.

From 153 primary schools, a total of 3318 children aged 7 years were assessed in 2016/2017 and 3454 in 2019, corresponding to a participation rate of 94.7% and 92.8% respectively. Anthropometric data, included weight, height, waist and hip circumferences, were collected by trained examiners. A family form was filled in by parents or guardians for participating children, and indicators of children's dietary intakes and physical activity patterns were collected. The family rate response was 93.5% (n = 3502) in 2016/2017 and 90.5% (n = 3368) in 2019.

Key findings

- COSI Tajikistan was conducted in a total of 153 schools in 2016/2017 (fourth round) and 2019 (fifth round). The fourth round assessed 3318 children (94.7% of the children invited to participate in the study) and 3273 returned the family form completed by their parents or guardians, with a family participation rate of 93.5%. In the fifth round, 3454 children were assessed (a participation rate of 92.8%) and 3368 family forms were completed (90.5%).
- In COSI Tajikistan 2016/2017, the prevalence of thinness was 4.3%, of overweight (including obesity) 7.6% and obesity 1.5% (based on 2007 WHO growth reference criteria). In COSI Tajikistan 2019, the corresponding figures were 6.0% thinness, 6.1% overweight (including obesity) and 1.4% obesity. The prevalence of all three indicators was slightly higher for boys than for girls in both rounds.

- Stunting and underweight prevalences were also obtained for both COSI Tajikistan rounds. The prevalence of stunting decreased from 10.1% in 2016/2017 to 8.6% in 2019. However, the prevalence of underweight increased between the two rounds, from 7.9% in 2016/2017 to 11.3% in 2019.

- In both COSI Tajikistan rounds, Sughd showed the highest prevalence of overweight (11.0% in 2016/2017 and 9.3% in 2019). DRS had the highest prevalence of thinness (5.3% in 2016/2017 and 7.8% in 2019). The highest prevalence of stunting was found in Khatlon in both rounds (11.1% in 2016/2017 and 9.0% in 2019). The highest prevalence of underweight was also found in Khatlon (8.7%) in 2016/2017 whereas in 2019 the highest figure was observed in DRS (13.8%).

- A comparison of rural and urban areas of residence in 2016/2017 found a higher prevalence of thinness in rural areas (4.7%) compared with urban areas (3.1%), whereas in 2019 the prevalence of thinness was higher among children from urban areas (6.4%) than in children from rural areas (5.8%). In both COSI Tajikistan rounds, a higher prevalence of overweight, including obesity, was observed in urban areas than in rural areas: 8.8% and 7.1%, respectively, in 2016/2017 and 7.3% and 5.7%, respectively, in 2019. There was a higher prevalence of stunting in rural areas in 2016/2017 (10.6%) than in urban areas (9.1%) and a similar profile was seen for the prevalence of underweight: 8.0% in rural areas compared with 7.5% in urban areas. However, the reverse was seen in COSI Tajikistan 2019, with a higher prevalence of stunting in urban areas (10.1%) compared with rural areas (8.0%) and of underweight (15.2% in urban areas and 9.7% in rural areas).

- Data from both COSI Tajikistan rounds showed that most mothers (88.7% in 2016/2017 and 83.4% in 2019) breastfed their children for more than seven months; of these, 65.1% (in the fourth round) and 42.9% (in the fifth round) breastfed for more than 13 months.

- Regarding eating habits, COSI Tajikistan 2019 showed a slightly higher percentage of children having breakfast every day (78.1%) compared with the 2016/2017 round (75.6%). Dushanbe City transitioned from having the lowest reported figures of children having breakfast daily in 2016/2017 (50.0%) to the region with the highest daily breakfast consumption, 91.1% in 2019.

- Daily consumption by children of healthy or fresh foods remained low: vegetables (43.1% in 2016/2017 and 45.0% in 2019), fresh fruit (33.6% in 2016/2017 and 43.5% in 2019) and fish (2.5% in 2016/2017 and 4.1% in 2019). Intake of dairy products was reported for fewer than three days per week by most of the participants in both COSI rounds, for example for low-fat/semi-skimmed milk (79.5% in 2016/2017 and 70.6% in 2019), yoghurt and other dairy (72.9% in 2016/2017 and 74.5% in 2019) and cheese (85.0% in 2016/2017 and 80.6% in 2019). Soft drinks containing sugar were reported to be consumed 1–3 days per week by 21.9% of children in 2016/2017 and by 37.3% in 2019. The consumption of soft drinks on more than four days a week decreased from 44.3% to 29.5% from the 2016/2017 round to the 2019 round. Consumption of less-healthy snacks at least once a week increased

for both savoury snacks (54.4% in 2016/2017 and 59.9% in 2019) and sweet treats such as candy bars or chocolate (68.6% in 2016/2017 and 73.4% in 2019).

- Data on indicators of physical activity were also collected. In both COSI Tajikistan rounds, the majority of children reported walking or cycling to school (94.0% in 2016/2017 and 97.5% in 2019).
- The reported participation in sports clubs or dancing activities was 17.3% in the 2016/2017 round and had fallen to 1.7% in the 2019 round. Even though most of the participating children were not members of sport or dancing courses, the majority of children spent time actively playing outside for at least one hour a day, both during weekdays (62.4% in 2016/2017 and 63.0% in 2019) and weekends (84.3% in 2016/2017 and 86.4% in 2019).
- As for sedentary habits (time spent watching television or using electronic devices), data from the COSI Tajikistan 2016/2017 round indicated that 47.3% of children spent 1–2 hours per day on such activities during the week, with an increase at weekends, when 52.9% spent two or more hours per day watching television or using electronic devices.
- As part of the WHO European COSI study, Tajikistan will be able to collect data on children's nutritional status and lifestyle characteristics, particularly those related to nutrition and patterns of physical activity, every three years. This will allow continuous monitoring of trends over time, as well as support the need for ongoing or future interventions to promote healthier lifestyles among children and, consequently, ensure better health.

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Introduction

Childhood obesity as a priority public health issue

Childhood obesity is a complex and multifactoral disorder and usually persists into adulthood, presenting greater risk for developing serious comorbidities such as cardiovascular diseases *(1,2)*. It affects children's health and quality of life and is associated with greater risk and earlier onset of chronic conditions such as dyslipidaemia and type 2 diabetes, as well as other metabolic and cardiovascular complications *(3–5)*. Furthermore, childhood obesity has adverse psychosocial consequences, including anxiety, depression and low self-esteem, and may result in lower academic performance *(3,5,6)*.

Childhood obesity presents a serious and important challenge within the WHO European Region. Although the prevalence may be plateauing in some settings, more children than ever are living with overweight and obesity in low- and middle-income countries, particularly in urban areas *(7–9)*.

The Sustainable Development Goals, set by the United Nations in 2015, established that prevention and control of noncommunicable diseases (NCDs) are fundamental priorities, with obesity representing a major concern. As part of the ongoing United Nations Decade of Action on Nutrition 2016–2025, there is a collective effort to set, monitor and achieve policy commitments to end malnutrition in all its forms, which includes undernutrition, inadequate vitamins or minerals, overweight, obesity and resulting diet-related NCDs *(10,11)*.

As emphasized by the Commission on Ending Childhood Obesity, many children are growing up in environments that enable weight gain and, consequently, obesity *(7)*. These unhealthy obesogenic environments are becoming more prevalent in all countries (regardless of income level) and impact children from all socioeconomic groups. Changes in food production, availability, affordability and marketing, as well as a decrease in physical activity with an intensification of screen-based and sedentary activities, are all endemic of obesogenic environments and deeply influence energy imbalance *(7,12,13)*. Marketing of foods and drinks high in saturated fat, free sugars and salt has also been identified as a major risk for the development of childhood overweight and obesity, particularly in the developing world *(7)*.

The Childhood Obesity Surveillance Initiative

In order to tackle childhood overweight and obesity, preventive measures are recognized as one key and feasible option *(14)*. Nutritional surveillance data are essential to effectively design, implement and evaluate policies and strategies aimed at counteracting obesity *(15)*.

The need to implement widely standardized and harmonized surveillance systems to support policy development and tackle the emerging obesity epidemic in the WHO European Region was recognized in 2006 at the WHO European Ministerial Conference on Counteracting Obesity held in Istanbul, Turkey, which adopted the European Charter on Counteracting Obesity *(16)*. The Charter addresses the growing challenge posed by the epidemic of obesity to health, economies and development and encourages the development of internationally comparable

core indicators for inclusion in national health surveillance systems in order that the resulting data could be used for advocacy, policy-making and monitoring purposes *(16)*. The importance of, and political commitment to, the surveillance system was reinforced in the Vienna Declaration on Nutrition and Noncommunicable Diseases in the Context of Health 2020, adopted in 2013 *(17)*, in the European Food and Nutrition Action Plan 2015–2020 adopted in 2014 *(18)* and in the Report of the Commission on Ending Childhood Obesity presented in 2016 *(7)*.

In response to this need, the WHO Regional Office for Europe and 13 Member States established the WHO European Childhood Obesity Surveillance Initiative (COSI) in 2007 to provide a systematic process for the collection, analysis, interpretation and dissemination of descriptive information to support monitoring of excess body weight and in programme planning and evaluation *(19)*. In addition to gathering comparable information on children's nutritional status, the COSI family and school forms also allow the collection of data on the behaviours that influence obesity, such as eating habits, physical activity and factors influencing sedentary behaviours *(14)*.

A common protocol provides the core characteristics of study design and sampling strategy and also includes a combination of mandatory and voluntary components to afford participating countries some flexibility for adapting the system to their national context *(20,21)*. Therefore, within the WHO European COSI, each country has the potential to develop a childhood nutrition surveillance system: a systematic network to collect, analyse, interpret and share descriptive information about the nutritional status of primary school children (6.0–9.9 years of age); this system produces data that are comparable between Member States of the Region and allows monitoring of childhood obesity every three years.

The first round (2007/2008) included 13 countries. the second round (2010) 17 countries, the third round (2013) 19 countries, the fourth round (2016/2017) 35 countries and the fifth round (2019/2020) 43 countries.

COSI Tajikistan

While communicable diseases, maternal, infant and child mortality and nutritional deficiencies account for a sizeable proportion of the overall number of deaths in Tajikistan, NCDs are by far the leading cause of death, accounting for 69% of all deaths according to the Nutrition Country Profile of Tajikistan from 2016 *(22)*.

The overall burden of NCDs continues to grow in parallel with a decrease in childhood diseases such as lower respiratory infections and preterm birth complications. According to the WHO Global Health Observatory, 14.8% of children and adolescents (5–19 years of age) in Tajikistan were living with overweight in 2016.

Additionally, as a result of growing urbanization and the globalization of the processed food supply, countries in the WHO European Region have experienced a nutritional transition in recent years. To better understand the urban food environment in Tajikistan, several street markets and other vending sites in the four districts of Dushanbe (Firdavsi, Ibn Sina, Ismail Somoni and Shohmansur) were analysed in the 2016 FEEDcities study *(23)*. These were chosen because they play a unique and important role in the food culture of Tajikistan. This

study found that fresh fruit was widely available, which ensured that urban residents had easy access to this essential part of a healthy diet. However, other available food and drink on offer could be improved in terms of the type and nutritional composition. For example, soft drinks such as soda were widely available, and both commercial and homemade foods had high levels of trans-fatty acids and sodium.

There are few data on nutritional status, dietary behaviour and food composition in Tajikistan. Nevertheless, national representative surveys indicate a steady increase in overweight and obesity, especially in urban areas, while the prevalence of childhood undernutrition (including wasting and stunting) has been decreasing or stabilizing *(24)*. The Government, therefore, adopted the National Health Strategy 2010–2020, which covers the prevention and control of NCDs and includes the promotion of healthy diets *(25)*.

The 2009 Tajikistan Micronutrient Status Survey observed an overweight prevalence of 6% among children under-5 years of age, and around 28% among women of reproductive age, with Dushanbe City having the highest prevalence; 42% of women of reproductive age who were assessed in Dushanbe City were overweight *(26)*. More recently, data from the Tajikistan Demographic and Health Survey in 2017 confirmed an overweight prevalence of 3% among children under-5 years of age. This survey also showed that 37% of women aged 15–49 years were living with overweight or obesity *(27)*.

Data on nutritional status of primary school children (6–10 years of age) were not available for Tajikistan as this group was not fully assessed or, even when assessed, the data were not published for several decades.

Prompted by this situation, Tajikistan joined the WHO European COSI in 2016, taking part in the fourth and fifth rounds of the surveillance initiative (2016/2017 and 2019, respectively). This was a remarkable opportunity to assess and track children's nutritional status, as well as dietary and sedentary behaviours, in order to reach a better understanding of this important public health challenge. Data on childhood obesity in Tajikistan will soon become available within a surveillance mechanism that allows standardized and comparable information about children's nutritional status among the Member States of the WHO European Region to be collected. These data will also contribute to a greater understanding of children's lifestyle characteristics, particularly those related to nutrition habits and patterns of physical activity. This is particularly relevant given the uptake in usage and marketing of processed foods alongside the increase in children's use of technology such as computers, smartphones and tablets.

This report presents data from Tajikistan collected in 2016/2017 and 2019 within the fourth and fifth rounds of the WHO European COSI study. The results illustrate the prevalence of thinness, overweight and obesity among primary school children alongside children's eating patterns, patterns of physical activity and sedentary habits. COSI Tajikistan allows an assessment of the situation within the country and a comparison of this with that in other countries in the Region. Such an initiative is fundamental for the further development of strategies and action plans to tackle the problem of childhood obesity.

1. Methodology

The fourth (2016/2017) and fifth (2019) rounds of the WHO European COSI study were implemented following a standardized methodological protocol and data collection procedures *(20,21)*.

The study has a semi-longitudinal design with repeated cross-sectional samples aimed at children aged 6.0–9.9 years (primary school age), a range selected based on the start of a period of rapid increase in body fat (the so-called adiposity rebound) in children above 6 years of age *(28)*. Additionally, this age range precedes puberty, and targeting prevention at these ages can reduce the incidence of obesity and promote remission.

1.1 Organizational structure and training procedures

COSI Tajikistan was approved by the Government of Tajikistan through Order No. 19957 (25-2) of 31 October 2016, which established the cooperation between the Ministry of Education and Science and the Ministry of Health and Social Protection for Population (Ministry of Health).

Through Order No. 858 of 16 November 2016, the Ministry of Health appointed two main national research coordinators: Dr Sanavbar Rakhmatuloev, Senior Specialist of the Ministry of Health's Department for Health Coordination, as the COSI Tajikistan Principal Investigator, and Dr Zulfiya Abdurakhmonova, Deputy Director of the Republican Nutrition Centre, as the COSI Tajikistan Regional Supervisor.

The National COSI team organized the preparatory work regarding sampling procedures and establishing national, regional and local staff from the primary care centres and the Republican Centre for Healthy Lifestyle (RCHLS) who would be responsible for data collection, working closely with the WHO Regional Office for Europe.

Representatives of the Tajikistan Ministry of Health participated in the WHO COSI meeting in Geneva in 2011 and visited Kazakhstan's National Centre for the Problems of Healthy Lifestyle Formation in 2014 to learn from their experience in implementing COSI. In November 2016, following the COSI country participation agreement between Tajikistan and the WHO Regional Office for Europe, an introductory workshop was organized for the national COSI coordinators. Three additional regional training events for the examiners were organized:

- Dushanbe (30–31 October 2016)
- Kulyab (2– 3 November 2016)
- Khujand (9–10 December 2016).

Each training event had 30 participants, comprising paediatricians, physicians, nurses and staff from the RCHLS.

Examiners were selected, based on the location of the relevant primary schools, from primary health-care staff (nurse or paediatrician) and staff of the RCHLS within the same district or city. This had the advantage of using examiners who were familiar with the local territory, school staff and local authority.

A similar approach was taken for the COSI Tajikistan fifth round. A national COSI training was held in Dushanbe on 27–29 April 2019 for 40 participants (paediatricians, nurses and staff from RCHLS); 30 would act as examiners for data collection in the regions and districts and 10 would provide national monitoring and supervision.

During the training, the COSI study was explained in detail based on the COSI protocol *(20)* and the Manual of Data Collection Procedures *(21)*, including the use of questionnaires.

The WHO COSI anthropometric measurement methodology was translated into Tajik and presented, demonstrated and practised during training. Portable anthropometric equipment (SECA stadiometers and digital scales) was procured in 2016 by the WHO Regional Office for Europe and used in both rounds by all the examiners during training and fieldwork.

After the theoretical training for the study, participants had the chance to practise measurements and perform calculations such as body mass index (BMI) and reference weight management. OpenClinica, the COSI online data entry and management system created by the WHO Regional Office for Europe in collaboration with Trial Data Solutions, was also introduced. All training participants received a certificate.

Data collection was coordinated by the primary health centres and local RCHLS centres working in close communication with school boards and teachers. National coordinators were responsible for organizing training, data collection and data entry. For online data entry and cleaning, COSI Tajikistan had the support of a national statistician provided by the WHO Regional Office for Europe.

Data collection was performed in five regions of Tajikistan: DRS, Dushanbe City, GBAO, Khatlon and Sughd.

1.2 Ethical considerations

The WHO European COSI methodological protocol was devised in accordance with the International Ethical Guidelines for Biomedical Research Involving Human Subjects *(29)*. The protocol was reviewed by the Department for Organization of Health Services to Children, Mothers, Adolescents and Family Planning at the Ministry of Health; a national ethical review was not deemed necessary as the WHO European COSI protocol considers all aspects of ethics.

Consent was required from parent/caregiver and child. Before data collection, informed active consent forms were distributed to families so that children's measurements and data could be ethically obtained.

The informed consent form was adapted to national context and all forms were in Russian and Tajik; back translation was carried out from Russian to Tajik and Tajik to Russian.

Parental informed consent forms were provided to all selected schools during the first visit of the examiners team. On the day of the measurements, verbal consent was obtained from each child.

1.3 Study design and sampling

The COSI Tajikistan study design and sampling followed the COSI protocol procedures for all countries involved *(20)*. In both rounds of data collection, Tajikistan targeted 7-year-old children and enrolled children in the study through the primary school system.

In the fourth round (2016/2017), children were selected using a two-stage stratified cluster sampling design, with primary schools as primary sampling units and first-grade classes as secondary sampling units. From the complete list of all primary schools in the country in the school year 2015/2016, 153 schools were selected with a probability proportional to size. A stratification by region and urbanization grade of the school location was applied at this stage. In each selected school, one first-grade class was randomly sampled, and all children enrolled in that class were invited to participate in the survey.

The same approach was applied in COSI Tajikistan 2019. A new sample of 153 primary schools and 153 first-grade classes was selected using the same sampling design (Table 1).

Table 1. Main features of the study and sampling design for COSI Tajikistan 2016/2017 and 2019

Setting of enrolment	Primary schools
Targeted age group	7 years
Sampling design	Two-stage stratified cluster sampling
Sampling unit definition	
Primary sampling unit	Primary school
Secondary sampling unit	First-grade class
Stratification	By region and urbanization grade of the school location
Sampling unit selected and participating proportions (%)	
Primary sampling unit	153 (100)
Secondary sampling unit	153 (100)
Child form response rate (%)	
2016/2017 round	94.7
2019 round	92.8
Family form response rate (%)	
2016/2017 round	93.5
2019 round	90.5

1.4 Data collection forms and fieldwork procedures

COSI Tajikistan included all three questionnaire forms (child, school and family forms) as outlined in the WHO European COSI Manual of Data Collection Procedures *(21)*. All questionnaires were translated and available in Tajik and provided in paper format.

The school form was either administered and filled in by the Chief of the Education Department for primary schools or by the teacher of the selected first-grade class two or three days before anthropometric measurements were taken. On the day of anthropometric measurements, school forms were gathered by the examiners.

Teachers were responsible for distributing the family forms and for collecting the informed family consent forms signed by the parent or guardian of the child. Refusal to participate in the survey was extremely rare, only two or three instances. Family forms were distributed at least three days before children's measurements were taken. If parents or guardians had questions, they were able to contact examiners by telephone or visit schools and complete the form alongside examiners the day before the children's measurements were taken.

Children's forms were provided and completed by the trained examiners according to the WHO Manual of Data Collection Procedures *(21)*.

1.4.1 Standardization of conditions

Examiners ensured the principles of confidentiality and privacy during the measurements. Measurements were taken only if the informed consent form was signed by the children's parents or caregivers. Children were also asked for consent on each occasion before measurements were taken.

Anthropometric measurements were carried out in a separate classroom (usually the auditorium of the selected school) by two examiners: one taking the child's measurements and the other recording the results. Local health and school staff helped to organize and facilitate data collection by preparing the children, arranging the room and verifying names and birth certificates. While girls were being measured, boys waited with their teacher, and vice-versa. As described in the Manual of Data Collection Procedures, measurements were taken at optimal room temperature with the child wearing light underwear.

During measurement, children were asked to remove their uniform, shoes, socks and any heavy or bulky items such as mobile phones, keys chains, watches, belts and hair or head accessories.

The clothes children wore at the time of measurement were indicated on the child forms in order to adjust each child's weight according to the estimated weight of their clothes, using figures provided by WHO.

1.5 Data analysis

Data were collected using paper forms in both rounds of data collection. Data entry clerks transferred data from the paper forms to the online OpenClinica.

Data were checked for inconsistencies and completeness in collaboration with the WHO Regional Office for Europe and following standard procedures. All critical data were double-checked by local teams. The final dataset followed the COSI guidelines on data processing and cleaning. For purposes of analysis, body weight was adjusted for weight of clothes worn.

Local researchers calculated the mean weight of commonly worn clothing items and provided these weights to the WHO Regional Office for Europe.

The 2007 WHO-recommended cut-offs for school-age children and adolescents were used to compute BMI for age Z-scores and to interpret anthropometric indicators *(30,31)*. These cut-offs define Z-scores (the standard deviation above or below the mean and adjusted for age and sex):

- **thinness**, the proportion of children with a BMI for age value below -2 Z-scores;
- **overweight**, the proportion of children with a BMI for age value above +1 Z-score; and
- **obesity**, the proportion of children with a BMI for age value of +2 Z-scores.

According to WHO definitions, the prevalence estimates for children living with overweight include those who are living with obesity. Children with biologically implausible (or extreme) BMI values were excluded from the analysis; this included those with a BMI for age values below -5 or above +5 Z-scores relative to the 2007 WHO growth reference median *(31)*.

Additionally, two other indicators were used:

- **underweight**, the proportion of children whose weight-for-age Z-score was below -2 standard deviations from the median of the reference population; and
- **stunting**, the proportion of children whose height-for-age Z-score was below -2 standard deviations from the median of the reference population.

Weighted data analyses were carried out in order to draw inferences for the whole population based on the results from the surveyed children and to produce unbiased estimates.

The main findings of these analyses are shown in the tables and figures included in the next sections. For completeness, the number of sampled children used to produce each finding is also reported. Tajikistan is organized in five regions: DRS, Dushanbe City, GBAO, Khatlon and Sughd. However, for GBAO, the number of observations was too small to be analysed separately. Therefore, regional estimates are provided only for the other four regions even though national estimates will include data from GBAO.

Data analyses were carried out using Stata Statistical Software, version 15.

2. Children's nutritional status

2.1 Participation rate

COSI Tajikistan 2016/2017 was conducted in 153 randomly selected primary schools, with all schools agreeing to participate. In terms of child participation, 3502 children were invited to participate in the study; of these, 3318 children were measured, corresponding to a participation rate of 94.7% (Table 2). For COSI Tajikistan 2019, out of the 3722 children initially invited to participate, 3454 children were measured, corresponding to a participation rate of 92.8% (Table 2).

Table 2. Participation of children in COSI Tajikistan 2016/2017 and 2019, by region

	2016/2017 round			2019 round		
	No. children invited to participate	Participated in measurement (%)	Completed family form (%)	No. children invited to participate	Participated in measurement (%)	Completed family form (%)
DRS	920	90.9	89.7	885	92.1	91.1
Dushanbe City	337	92.0	90.2	413	87.7	78.7
GBAO	41	95.1	95.1	57	100.0	96.5
Khatlon	1277	97.1	95.6	1367	93.8	92.7
Sughd	927	96.3	95.4	1000	93.6	91.3
Tajikistan	3502	94.7	93.5	3722	92.8	90.5

In the 2016/2017 round, 3502 family forms were issued and 3273 forms were completed by parents/guardians, corresponding to a response rate of 93.5%. In the 2019 round, the family response rate was 90.5% (3368 family forms were filled out of the 3722 issued) (Table 2).

2.2 Anthropometric indicators

Anthropometric measurements of height, weight and BMI are presented in Table 3, divided by sex and region. In the 2016/2017 round, boys presented slightly higher values than girls for all the indicators: height (119.6 cm vs 118.6 cm), weight (22.1 kg vs 21.2 kg) and BMI (15.4 kg/m^2 vs 15.1 kg/m^2). The same pattern was observed in the 2019 round, where the mean values of all anthropometric indicators were slightly higher for boys than for girls (122.6 cm vs 121.4 cm, 23.0 kg vs 22.1 kg and 15.2 kg/m^2 vs 14.9 kg/m^2, respectively). Dushanbe City had the highest mean value for height (120.2 cm in 2016/2017 and 123.6 cm in 2019) and Sughd had the highest average value for BMI (15.6 kg/m^2 in 2016/2017 and 15.3 kg/m^2 in 2019). Regarding weight, Sughd presented the highest mean value in 2016/2017 (22.2 kg) whereas in 2019 the highest mean value for weight was found in Dushanbe City (23.3 kg).

Table 3. Anthropometric indicators (height, weight and BMI) for children participating in COSI Tajikistan 2016/2017 and 2019, by sex and region

Indicators	Round and sex	DRS		Dushanbe City		Khatlon		Sughd		Tajikistan	
		No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)
Height (cm)	**2016/2017**										
	Boys	425	120.1 (5.3)	133	120.5 (5.9)	576	118.8 (5.8)	434	120.0 (5.4)	1586	119.6 (5.6)
	Girls	370	118.8 (4.9)	168	119.8 (4.7)	612	118.3 (5.3)	426	118.2 (5.3)	1596	118.6 (5.1)
	Total	795	119.5 (5.1)	301	120.2 (5.4)	1188	118.6 (5.6)	860	119.1 (5.4)	3182	119.1 (5.4)
	2019										
	Boys	425	122.6 (5.0)	196	124.1 (5.9)	635	122.3 (5.4)	464	122.8 (5.5)	1741	122.6 (5.4)
	Girls	355	121.2 (5.4)	142	123.1 (5.3)	646	120.8 (5.5)	429	122.0 (5.5)	1608	121.4 (5.5)
	Total	780	121.9 (5.2)	338	123.6 (5.6)	1281	121.6 (5.5)	893	122.4 (5.5)	3349	122.0 (5.5)
Weight (kg)	**2016/2017**										
	Boys	425	22.3 (3.1)	133	22.3 (3.1)	576	21.5 (2.7)	434	22.8 (3.0)	1586	22.1 (3.0)
	Girls	370	21.1 (2.7)	168	21.5 (3.2)	612	21.0 (2.9)	426	21.6 (3.1)	1596	21.2 (3.0)
	Total	795	21.7 (3.0)	301	22.0 (3.2)	1188	21.3 (2.9)	860	22.2 (3.1)	3182	21.7 (3.0)
	2019										
	Boys	425	22.8 (2.9)	196	23.6 (3.3)	635	22.7 (3.1)	464	23.4 (3.9)	1741	23.0 (3.3)
	Girls	355	21.8 (3.2)	142	22.9 (3.5)	646	21.8 (3.2)	429	22.7 (3.8)	1608	22.1 (3.4)
	Total	780	22.3 (3.1)	338	23.3 (3.5)	1281	22.2 (3.1)	893	23.1 (3.9)	3349	22.5 (3.4)
BMI (kg/m^2)	**2016/2017**										
	Boys	425	15.4 (1.9)	133	15.4 (1.5)	576	15.2 (1.5)	434	15.8 (1.4)	1586	15.4 (1.6)
	Girls	370	14.9 (1.4)	168	14.9 (1.5)	612	15.0 (1.5)	426	15.4 (1.5)	1596	15.1 (1.5)
	Total	795	15.2 (1.7)	301	15.2 (1.5)	1188	15.1 (1.5)	860	15.6 (1.5)	3182	15.3 (1.6)
	2019										
	Boys	425	15.1 (1.4)	196	15.3 (1.6)	635	15.1 (1.4)	464	15.5 (1.9)	1741	15.2 (1.6)
	Girls	355	14.8 (1.6)	142	15.1 (1.6)	646	14.9 (1.5)	429	15.2 (1.9)	1608	14.9 (1.7)
	Total	780	14.9 (1.5)	338	15.2 (1.6)	1281	15.0 (1.5)	893	15.3 (1.9)	3349	15.1 (1.6)

Table 4 shows waist and hip circumference measurements for participants in the two rounds. In 2016/2017 and 2019, the average waist circumference values for girls were 53.1 cm and 54.3 cm, respectively. The mean hip circumference values among girls were 59.8 cm in 2016/2017 and 61.6 cm in 2019. The average waist circumference values for boys were slightly higher in both rounds; 54.1 cm in 2016/2017 and 55.1 cm in 2019. In 2016/2017, boys also presented a slightly higher mean hip circumference value (60.0 cm), but in the 2019 round boys presented the same hip circumference value as girls (61.6 cm).

Table 4. Waist and hip circumferences of children participating in COSI Tajikistan 2016/2017 and 2019, by sex and region

Indicators	Round and sex	DRS		Dushanbe City		Khatlon		Sughd		Tajikistan	
		No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)
Waist circumference (cm)	**2016/2017**										
	Boys	445	52.6 (5.6)	137	53.8 (3.5)	601	54.8 (5.8)	453	54.9 (4.5)	1654	54.1 (5.4)
	Girls	391	51.7 (5.8)	173	52.7 (4.2)	639	53.8 (5.5)	440	53.7 (4.9)	1664	53.1 (5.3)
	Total	836	52.2 (5.7)	310	53.3 (3.9)	1240	54.3 (5.7)	893	54.3 (4.7)	3318	53.6 (5.4)
	2019										
	Boys	448	55.3 (3.4)	219	56.0 (3.9)	637	55.2 (3.6)	494	54.6 (4.0)	1819	55.1 (3.7)
	Girls	367	54.2 (3.9)	143	56.3 (4.6)	646	54.3 (3.7)	442	53.5 (4.3)	1634	54.3 (4.1)
	Total	815	54.7 (3.7)	362	56.2 (4.2)	1283	54.8 (3.7)	936	54.0 (4.2)	3453	54.7 (3.9)
Hip circumference (cm)	**2016/2017**										
	Boys	445	59.0 (5.6)	137	61.0 (3.7)	601	59.0 (8.4)	453	62.1 (4.3)	1654	60.0 (6.6)
	Girls	391	59.0 (4.9)	173	61.4 (5.0)	639	58.2 (9.4)	440	62.2 (4.9)	1664	59.8 (7.1)
	Total	836	59.0 (5.3)	310	61.2 (4.4)	1240	58.6 (8.9)	893	62.2 (4.6)	3318	59.9 (6.9)
	2019										
	Boys	448	61.9 (3.5)	219	61.7 (4.1)	637	60.9 (3.8)	494	62.3 (4.4)	1819	61.6 (3.9)
	Girls	367	61.8 (4.0)	143	62.6 (4.8)	646	60.8 (4.0)	442	62.2 (4.7)	1634	61.6 (4.4)
	Total	815	61.9 (3.8)	362	62.2 (4.5)	1283	60.8 (3.9)	936	62.2 (4.5)	3453	61.6 (4.2)

2.3 Prevalence of malnutrition

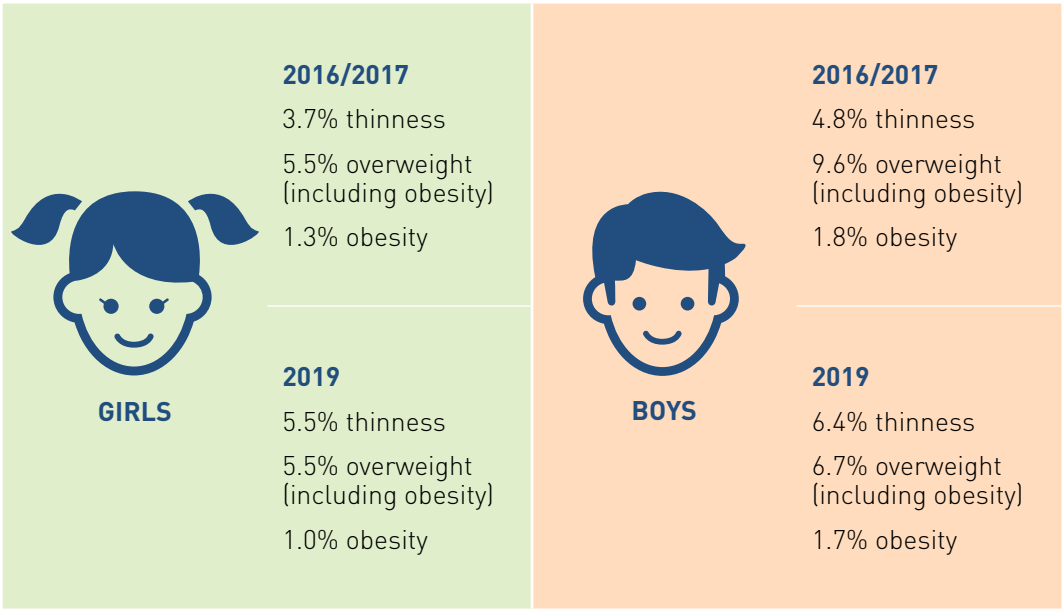
Malnutrition includes thinness, underweight, stunting, overweight and obesity. In the 2016/2017 round, the prevalence was 4.3% for thinness, 7.6% for overweight and 1.5% for obesity. The corresponding figures in the 2019 round were 6.0% for thinness, 6.1% for overweight and 1.4% for obesity (Table 5 and Fig. 1). In both COSI Tajikistan rounds, boys had the highest prevalence of all three indicators of nutritional status.

Table 5. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by sex (WHO criteria)

Sex	Thinness		Overweight (including obesity)		Obesity	
	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
2016/2017						
Boys	1586	4.8 (3.3–6.9)	1586	9.6 (7.7–12.0)	1586	1.8 (1.1–2.8)
Girls	1596	3.7 (2.7–5.0)	1596	5.5 (4.2–7.1)	1596	1.3 (0.8–2.0)
Total	3182	4.3 (3.1–5.8)	3182	7.6 (6.2–9.3)	3182	1.5 (1.1–2.2)
2019						
Boys	1741	6.4 (5.2–7.9)	1741	6.7 (5.5–8.2)	1741	1.7 (1.2–2.5)
Girls	1608	5.5 (4.3–7.1)	1608	5.5 (4.4–6.9)	1608	1.0 (0.5–1.8)
Total	3349	6.0 (5.0–7.2)	3349	6.1 (5.2–7.2)	3349	1.4 (1.0–2.0)

CI: confidence interval.

Fig.1. Nutritional status of girls and boys in COSI Tajikistan 2016/2017 and 2019 (WHO criteria)



Prevalences of stunting and underweight were also obtained for both COSI Tajikistan rounds. As shown in Table 6, prevalence of stunting decreased from 10.1% in 2016/2017 to 8.6% in 2019, whereas prevalence of underweight increased from 7.9% in 2016/2017 to 11.3% in 2019.

Table 6. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by sex (WHO criteria)

Sex	Stunting		Underweight	
	No.	% (95% CI)	No.	% (95% CI)
2016/2017				
Boys	1654	11.1 (9.2–13.4)	1587	8.2 (6.7–10.0)
Girls	1664	9.0 (7.6–10.7)	1596	7.5 (6.2–9.0)
Total	3318	10.1 (8.8–11.6)	3183	7.9 (6.7–9.2)
2019				
Boys	1818	8.3 (6.6–10.5)	1818	12.1 (9.4–15.4)
Girls	1633	8.8 (7.1–10.9)	1634	10.4 (8.6–12.6)
Total	3451	8.6 (7.3–10.1)	3452	11.3 (9.3–13.6)

CI: confidence interval.

In both COSI Tajikistan rounds, DRS showed the highest prevalence of thinness (5.3% in 2016/2017 and 7.8% in 2019). Thinness prevalence increased from round four to round five in all regions, except for Khatlon. Sughd showed the highest prevalence of overweight (11.0% in 2016/2017 and 9.3% in 2019). Between the two rounds, all regions seemed to have a decreased prevalence of overweight, except for Dushanbe City.

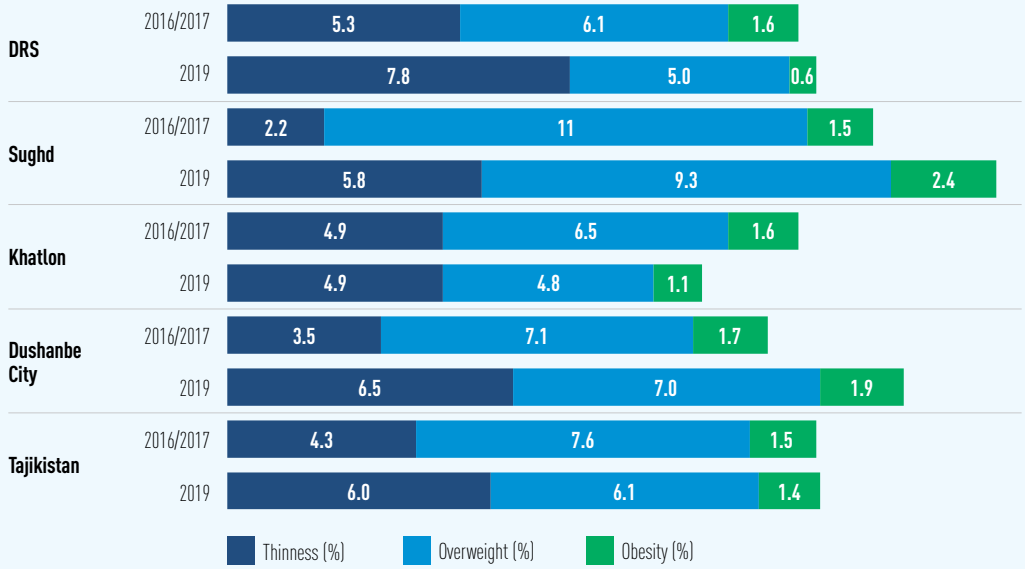
Obesity prevalence was similar among all regions of Tajikistan in 2016/2017 (1.5–1.7%) and slightly varying in 2019 from 0.6% in DRS to 2.4% in Sughd (Table 7 and Fig. 2).

Table 7. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by region (WHO criteria)

Round	Region	Thinness		Overweight (including obesity)		Obesity	
		No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
2016/2017	DRS	753	5.3 (3.7–7.6)	753	6.1 (3.6–10.0)	753	1.6 (0.6–4.2)
	Dushanbe City	290	3.5 (2.1–5.9)	290	7.1 (4.0–12.1)	290	1.7 (0.8–3.5)
	Khatlon	1128	4.9 (2.6–9.1)	1128	6.5 (4.2–9.9)	1128	1.6 (1.0–2.8)
	Sughd	844	2.2 (1.0–4.8)	844	11 (8.8–13.7)	844	1.5 (0.9–2.4)
	Tajikistan	3182	4.3 (3.1–5.8)	3182	7.6 (6.2–9.3)	3182	1.5 (1.1–2.2)
2019	DRS	780	7.8 (5.9–10.2)	780	5.0 (3.4–7.4)	780	0.6 (0.3–1.4)
	Dushanbe City	338	6.5 (4.2–10.0)	338	7.0 (4.6–10.5)	338	1.9 (0.9–4.2)
	Khatlon	1281	4.9 (3.5–6.9)	1281	4.8 (3.6–6.2)	1281	1.1 (0.7–1.7)
	Sughd	893	5.8 (3.8–8.9)	893	9.3 (7.1–12.2)	893	2.4 (1.3–4.6)
	Tajikistan	3349	6.0 (5.0–7.2)	3349	6.1 (5.2–7.2)	3349	1.4 (1.0–2.0)

CI: confidence interval.

Fig. 2. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by region (WHO criteria)



By region, the highest prevalence of stunting was found in Khatlon (11.1% in 2016/2017 and 9.0% in 2019). In 2016/2017, the highest prevalence of underweight was also found in Khatlon (8.7%), whereas in 2019 the highest figure was observed in DRS (13.8%) (Table 8).

Table 8. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by region (WHO criteria)

Round	Region	Stunting		Underweight	
		No.	% (95% CI)	No.	% (95% CI)
2016/2017	DRS	836	10.3 (7.9–13.3)	795	8.0 (6.0–10.6)
	Dushanbe City	310	7.3 (4.4–11.8)	301	7.1 (5.4–9.3)
	Khatlon	1240	11.1 (8.7–14.0)	1188	8.7 (6.9–11.0)
	Sughd	893	9.8 (7.6–12.7)	861	6.2 (6.5–9.0)
	Tajikistan	3318	10.1 (8.8–11.6)	3183	7.9 (6.7–9.2)
2019	DRS	815	7.3 (5.3–9.9)	815	13.8 (10.3–18.3)
	Dushanbe City	362	7.5 (3.1–16.9)	362	10.8 (3.9–26.2)
	Khatlon	1282	9.0 (7.1–11.3)	1282	9.6 (7.9–11.6)
	Sughd	935	8.7 (6.3–11.9)	936	11.3 (7.0–17.6)
	Tajikistan	3451	8.6 (7.3–10.1)	3452	11.3 (9.3–13.6)

CI: confidence interval.

When comparing residence in rural or urban areas, the prevalence of thinness was higher in rural areas (4.7%) than in urban areas (3.1%) among children participating in COSI Tajikistan 2016/2017. Conversely, in the 2019 round, the prevalence of thinness was higher among children from urban areas (6.4%) than in rural areas (5.8%). In both COSI Tajikistan rounds, a higher prevalence of overweight, including obesity, was observed for urban areas (2016/2017: 8.8% in urban areas vs 7.1% in rural areas; 2019: 7.3% in urban areas vs 5.7% in rural areas). Prevalence of obesity was similar in both residence areas and in both rounds: for urban areas it was 1.6% in 2016/2017 and 1.8% in 2019 and in rural areas it was 1.5% in 2016/2017 and 1.2% in 2019 (Table 9).

Table 9. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by residence area (WHO criteria)

Round	Urban vs rural residence area	Thinness		Overweight (including obesity)		Obesity	
		No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
2016/2017	Urban	903	3.1 (2.1–4.6)	903	8.8 (6.6–11.7)	903	1.6 (0.9–2.7)
	Rural	2279	4.7 (3.2–7.0)	2279	7.1 (5.5–9.2)	2279	1.5 (1.0–2.4)
	Tajikistan	3182	4.3 (3.1–5.8)	3182	7.6 (6.2–9.3)	3182	1.5 (1.1–2.2)
2019	Urban	953	6.4 (4.4–9.2)	953	7.3 (5.6–9.5)	953	1.8 (1.1–2.9)
	Rural	2395	5.8 (4.7–7.1)	2395	5.7 (4.7–6.9)	2395	1.2 (0.8–2.0)
	Tajikistan	3348	6.0 (5.0–7.2)	3348	6.1 (5.2–7.2)	3348	1.4 (1.0–2.0)

CI: confidence interval.

In the 2016/2017 round, the prevalence of stunting was higher in rural areas (10.6%) than in urban areas (9.1%) and the same trend was observed for underweight: 8.0% in rural areas and 7.5% in urban areas (Table 10). The opposite was observed in the 2019 round, where there was a higher prevalence of stunting in urban areas (10.1% vs 8.0% in rural areas) and underweight (15.2% in urban areas vs 9.7% in rural areas).

Table 10. Nutritional status of children participating in COSI Tajikistan 2016/2017 and 2019, by residence area

Round	Urban vs rural residence area	Stunting		Underweight	
		No.	% (95% CI)	No.	% (95% CI)
2016/2017	Urban	919	9.1 (6.9–12.0)	903	7.5 (5.8–9.5)
	Rural	2399	10.6 (9.0–12.3)	2280	8.0 (6.6–9.7)
	Tajikistan	3318	10.1 (8.8–11.6)	3183	7.9 (6.7–9.2)
2019	Urban	1043	10.1 (7.2–14.0)	1044	15.2 (10.0–22.5)
	Rural	2407	8.0 (6.8–9.4)	2407	9.7 (8.5–11.2)
	Tajikistan	3451	8.6 (7.3–10.1)	3452	11.3 (9.3–13.6)

CI: confidence interval.

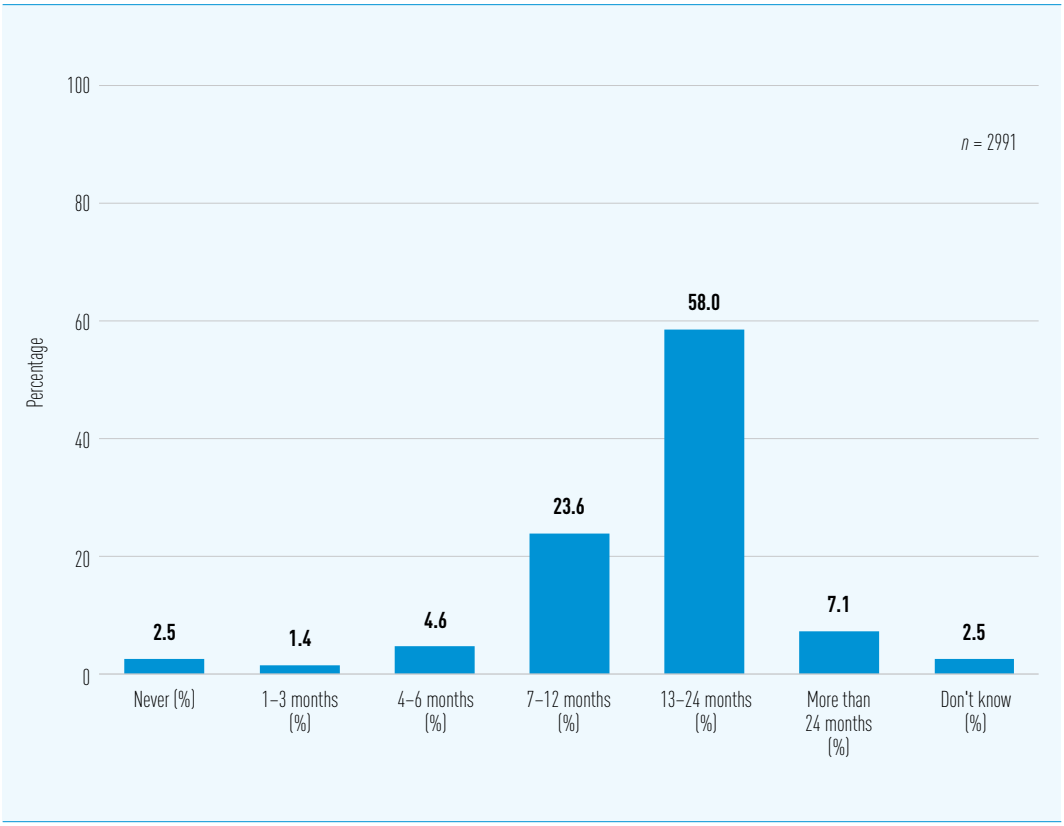
3. Health risk behaviours in children's eating habits and nutrition

3.1 Breastfeeding

WHO recommends exclusive breastfeeding until 6 months of age (meaning that the infant receives no other food or liquid aside from breastmilk), with continued breastfeeding supplemented by appropriate complementary foods up to 2 years of age or beyond *(32)*.

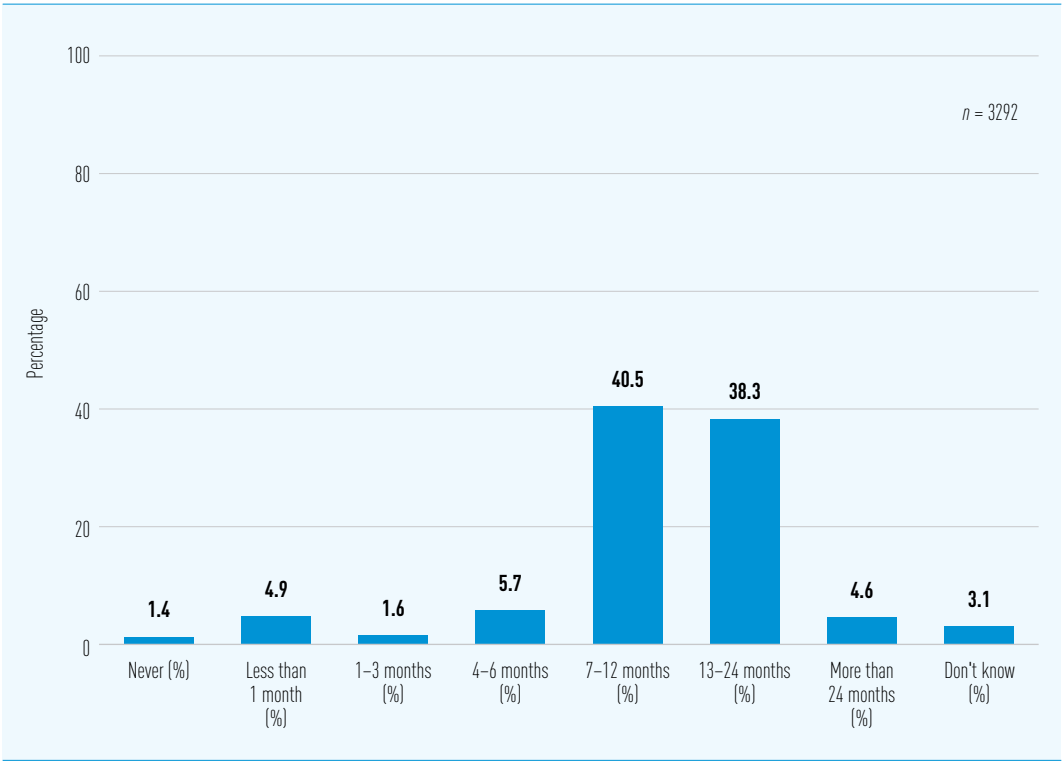
Data based on responses gathered from the family questionnaires in COSI Tajikistan 2016/2017 indicated that only 2.5% of mothers had never breastfed; 88.7% of mothers had breastfed for more than seven months and 58% of mothers had breastfed for 13–24 months (Fig. 3).

Fig. 3. Duration of breastfeeding of children participating in COSI Tajikistan 2016/2017



In the fifth round (2019), 1.4% of mothers reported as having never breastfed. Having breastfed for more than seven months was reported by 83.4% of mothers. Overall length for breastfeeding was most commonly for 7–12 months (40.5%) and 13–24 months (38.3%) (Fig. 4).

Fig. 4. Duration of breastfeeding of children participating in COSI Tajikistan 2019



The highest proportion of mothers who reported never having breastfed was in the DRS (4.4%). Rates for breastfeeding for more than seven months varied from 89.2% in DRS and Dushanbe City to 94% in Khatlon (Table 11).

Table 11. Duration of breastfeeding of children participating in COSI Tajikistan 2016/2017, by region

Region	No.	Frequency (%)						
		Never	1–3 months	4–6 months	7–12 months	13–24 months	More than 24 months	Don't know
DRS	758	4.4	1.7	4.6	31.1	46.5	5.5	6.1
Dushanbe City	261	1.7	2.5	6.7	23.7	53.0	12.5	0.0
Khatlon	1101	1.7	1.1	3.2	19.5	66.8	5.5	2.2
Sughd	832	2.0	1.3	6.6	22.0	58.7	8.7	0.6
Tajikistan	2991	2.5	1.4	4.9	23.6	58.0	7.1	2.5

In COSI Tajikistan 2019, DRS was also the region with the highest rate of non-breastfeeding mothers (2.8%). Results varied from 83.6% in DRS to 89.1% in Khatlon for mothers breastfeeding for more than seven months (Table 12).

Table 12. Duration of breastfeeding of children participating in COSI Tajikistan 2019, by region

Region	No.	Frequency (%)							
		Never	Less than 1 month	1–3 months	4–6 months	7–12 months	13–24 months	More than 24 months	Don't know
DRS	794	2.8	5.0	1.6	7.0	45.3	30.1	4.1	4.1
Dushanbe City	325	1.6	1.2	1.8	8.0	37.1	36.4	6.0	8.0
Khatlon	1225	0.8	4.2	1.8	4.2	30.8	50.6	6.6	1.1
Sughd	892	1.1	5.5	1.2	5.8	52.1	29.6	1.6	3.1
Tajikistan	3292	1.4	4.9	1.6	5.7	40.5	38.3	4.6	3.1

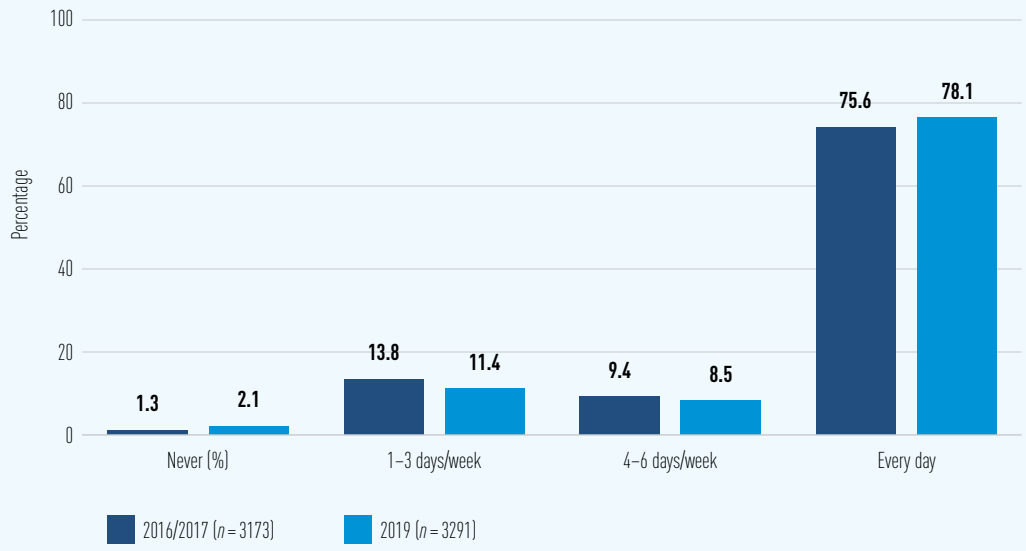
3.2 Eating habits

Eating behaviours are usually shaped in early childhood and are crucial factors affecting obesity *(33)*. In COSI, data on eating habits were gathered via family questionnaires, which collected information regarding daily or weekly food frequency consumption of varying items.

3.2.1 Breakfast

Of children participating in COSI Tajikistan 2016/2017, 75.6% had breakfast every day (Fig. 5). In the 2019 round, there was a slightly higher percentage of children having breakfast every day (78.1%) (Fig. 5).

Fig. 5. Frequency of breakfast consumption of children participating in COSI Tajikistan 2016/2017 and 2019



Data referring to the frequency of breakfast consumption among children is presented in Table 13. In the 2016/2017 round, 1.3% of children never ate breakfast and this increased to 2.1% in the 2019 round. In the 2016/2017 round, Sughd had the highest proportion of children who ate breakfast every day (83.0%), whereas in 2019 the highest proportion was found in Dushanbe City (91.1%). Dushanbe City transitioned from having the lowest reported figures of children's daily breakfast consumption in 2016 (50.0%), to the region with the highest daily breakfast consumption among children in 2019 (91.1%).

Table 13. Frequency of breakfast consumption of children participating in COSI Tajikistan 2016/2017 and 2019, by region

Region	No.	Frequency (%)			
		Never	1–3 days/week	4–6 days/week	Every day
2016/2017					
DRS	811	1.4	15.6	9.5	73.5
Dushanbe City	292	1.9	28.5	19.7	50.0
Khatlon	1181	1.5	12.3	5.9	80.3
Sughd	851	0.8	9.1	7.1	83.0
Tajikistan	3173	1.3	13.8	9.4	75.6
2019					
DRS	790	3.0	13.0	7.9	76.1
Dushanbe City	324	0.0	4.6	4.2	91.1
Khatlon	1223	2.3	13.1	9.3	75.3
Sughd	900	1.4	8.8	9.4	80.3
Tajikistan	3291	2.1	11.4	8.5	78.1

3.2.2 Consumption of food and beverages

Table 14 shows the frequency of food and beverage consumption for children in both round four (2016/2017) and round five (2019).

Table 14. Frequency of food and beverage consumption of children participating in COSI Tajikistan 2016/2017 and 2019

Food items	Round	No.	Frequency (%)				
			Never	Less than once a week	Some days (1–3 days)	Most days (4–6 days)	Every day
Vegetables (excluding potatoes)	2016/2017	3264	3.7	11.2	24.3	17.6	43.1
	2019	3332	5.7	7.6	19.2	22.5	45.0
Fresh fruit	2016/2017	3263	1.5	19.8	30.7	14.4	33.6
	2019	3334	3.9	7.7	23.2	21.7	43.5
Meat	2016/2017	3199	2.6	18.7	28.3	17.4	33.0
	2019	3320	3.3	11.4	28.4	23.7	33.3
Fish	2016/2017	3083	30.0	37.9	22.8	6.8	2.5
	2019	3302	26.0	35.5	25.5	8.9	4.1
Low- fat/semi-skimmed milk	2016/2017	2963	39.3	17.5	22.7	9.1	11.4
	2019	3277	14.0	26.8	29.8	17.3	12.0
Whole-fat milk	2016/2017	3012	17.0	19.5	28.5	12.8	22.2
	2019	3282	14.8	15.1	23.8	15.9	30.3
Yoghurt, milk pudding, cream cheese/quark or other dairy products	2016/2017	3061	15.3	21.5	36.1	15.7	11.4
	2019	3271	12.7	30.5	31.3	14.9	10.6
Cheese	2016/2017	2998	34.7	24.2	26.1	8.8	6.2
	2019	3302	34.6	25.5	20.5	11.0	8.3
Savoury snacks (e.g. potato crisps, corn chips, popcorn or peanuts)	2016/2017	3113	15.7	29.9	30.3	12.8	11.3
	2019	3309	6.5	33.6	35.3	15.9	8.7
Sweet treats (e.g. candy bar or chocolate)	2016/2017	3108	6.5	25.0	37.7	15.8	15.1
	2019	3314	4.5	22.1	42.4	21.1	9.9
Food such as biscuits, cake, doughnuts or pies	2016/2017	3060	12.1	29.3	37.1	14.5	7.1
	2019	n/a	n/a	n/a	n/a	n/a	n/a
Food such as pizza, French fries, fried potatoes, hamburgers, sausages or meat pies	2016/2017	3113	8.1	24.1	35.8	17.1	14.8
	2019	n/a	n/a	n/a	n/a	n/a	n/a
Fruit juice, 100%	2016/2017	3265	18.8	21.5	31.7	12.0	16.0
	2019	3301	17.3	28.7	29.4	15.2	9.5
Soft drinks containing sugar	2016/2017	3000	17.7	16.1	21.9	11.5	32.8
	2019	3308	9.9	23.3	37.3	17.1	12.4
Flavoured milk	2016/2017	2959	46.9	16.5	19.3	7.0	10.3
	2019	3285	29.4	27.6	20.6	13.7	8.8
Diet or "light" soft drinks	2016/2017	2930	44.3	18.9	21.0	8.8	7.0
	2019	3285	32.6	23.6	25.2	11.8	6.8

n/a: not included in the family form for 2019 round.

In 2016/2017, 43.1% of children were reported as eating vegetables (excluding potatoes) daily and 33.6% as eating fruit daily. Regarding animal foods, 78.7% of children consumed meat at least once a week and 33% consumed meat every day. However, 30% had never consumed fish while 37.9% had fish less than once a week.

An increase was observed in the 2019 round in comparison with the 2016/2017 round in daily intake of vegetables (45.0%) and fruit (43.5%). Meat consumption among children also increased; 85.4% reported eating meat at least once per week; the proportion of children who reported never having consumed fish decreased slightly to 26%, while 35.5% reported eating fish less than once a week.

With regard to dairy products, there was a decrease in the proportion of children who never consumed low-fat milk from 2016/2017 (39.3%) to 2019 (14.0%). In addition, 74.5% of children reported that they ate yoghurt and other dairy products fewer than three times per week, whereas in 2016/2017 this figure was slightly lower (72.9%).

Comparing the results from the 2016/2017 and 2019 rounds showed that children's consumption of whole-fat milk on three or fewer days per week was reported at 65% and 53.7%, respectively, and of cheese by 85% and 80.5%, respectively.

With regards to savoury snacks, 54.4% of children reported eating snacks such as potato crisps, corn chips or peanuts at least once a week in the 2016/2017 round, with 68.6% consuming sweet treats like candy bars or chocolate at least once a week. Food such as biscuits, cakes, doughnuts or pies were eaten weekly by 58.7% of participating children in 2016/2017 and 67.7% had pizza, French fries, fried potatoes, hamburgers, sausages, meat pies or similar at least once a week.

The 2019 round indicated that children's consumption of snacks slightly increased from the 2016/2017 round, with 59.9% of children having savoury snacks weekly and 73.4% having sweet treats at least once per week.

Regarding beverage consumption, in round four (2016/2017), 44.3% of children reported having soft drinks more than four days per week. Diet soft drinks and flavoured milk were less frequently consumed, with 17.3% and 15.8% of children, respectively, having these more than four days per week.

By 2019, children seemed to have decreased their consumption of soft drinks, with 29.5% reporting consumption on more than four days per week (compared with 44.3% in 2016/2017). However, there was a slight increase in consumption of flavoured milk and diet soft drinks, with 22.5% and 18.6% of children, respectively, having these more than four days per week.

4. Health risk behaviours around physical activity

WHO recommends that children and young people (aged 5–17 years) should take at least 60 minutes of moderate-to-vigorous physical activity daily *(34)*. Physical activity in children and young people provides fundamental health basics, such as improved musculoskeletal and cardiovascular health, and is crucial in maintaining a healthy body weight and hindering the advance of overweight and obesity. Additionally, physical activity has been associated with psychological benefits, such as increased control over symptoms of anxiety and depression and development of self-confidence, social interaction and integration. For children and young people, physical activity includes play, games, sports, active transportation, recreation, physical education or planned exercise, in the context of family, school and community activities.

4.1 Transportation to school

In Tajikistan, 94% of the children participating in COSI 2016/2017 travelled to school by bicycle or walked (Fig. 6). In Dushanbe City, many more children reported using motorized vehicles (17%), and combining motorized vehicles with walking or cycling when travelling to school was again high compared with other regions (6.4%) (Fig. 7).

In the 2019 round, 97.5% of the children travelled to school by bicycle or walked (Fig. 6). In Dushanbe City, use of motorized vehicles was greatly decreased (5.7%); similarly, 0.6% combined motorized vehicles with walking or cycling, a sizable reduction compared with the 2016/2017 data (Fig. 7).

Fig. 6. Type of transport used to go to school by children participating in COSI Tajikistan 2016/2017 and 2019

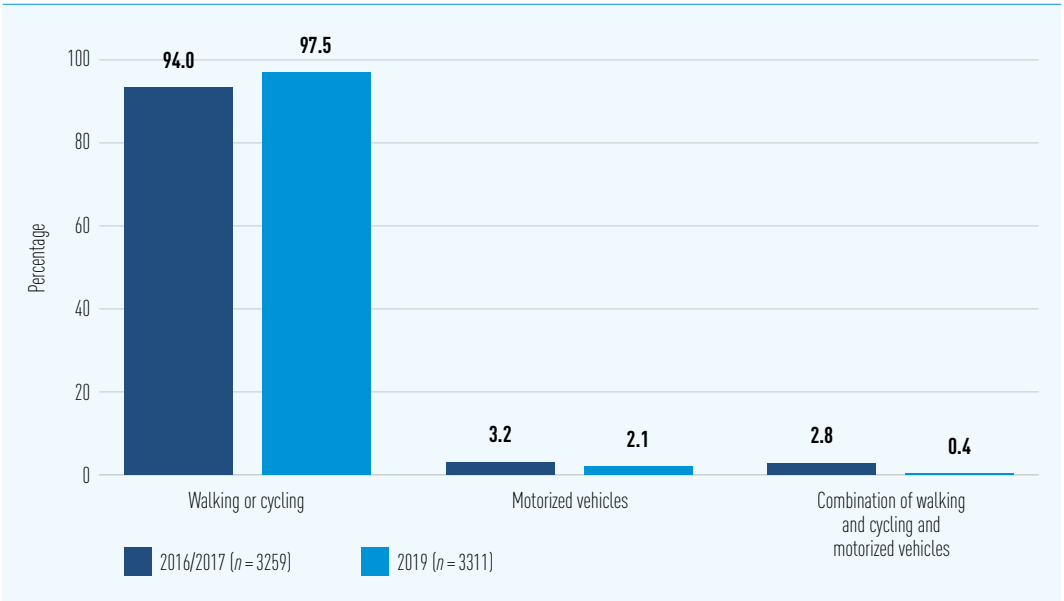
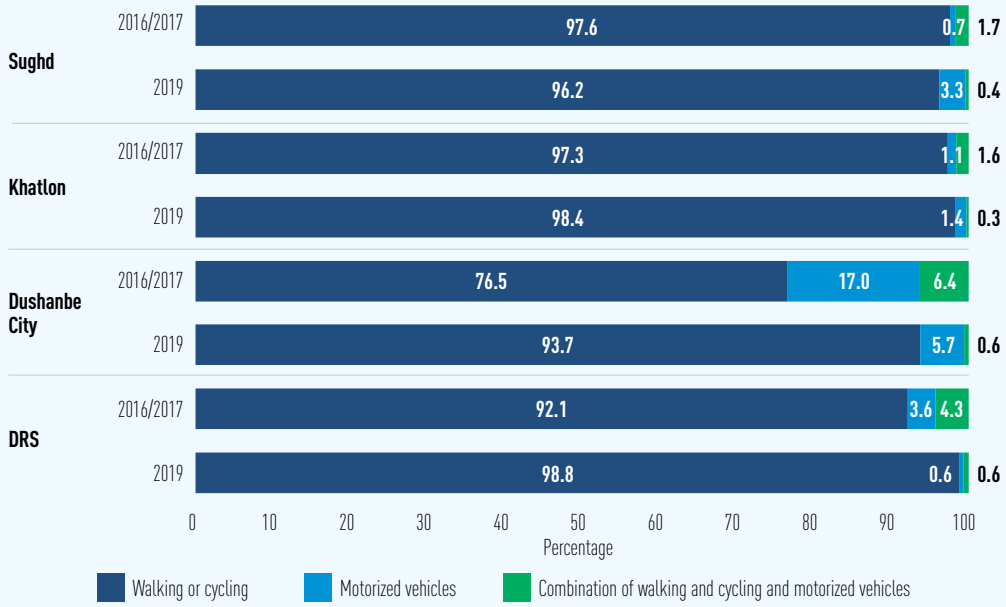


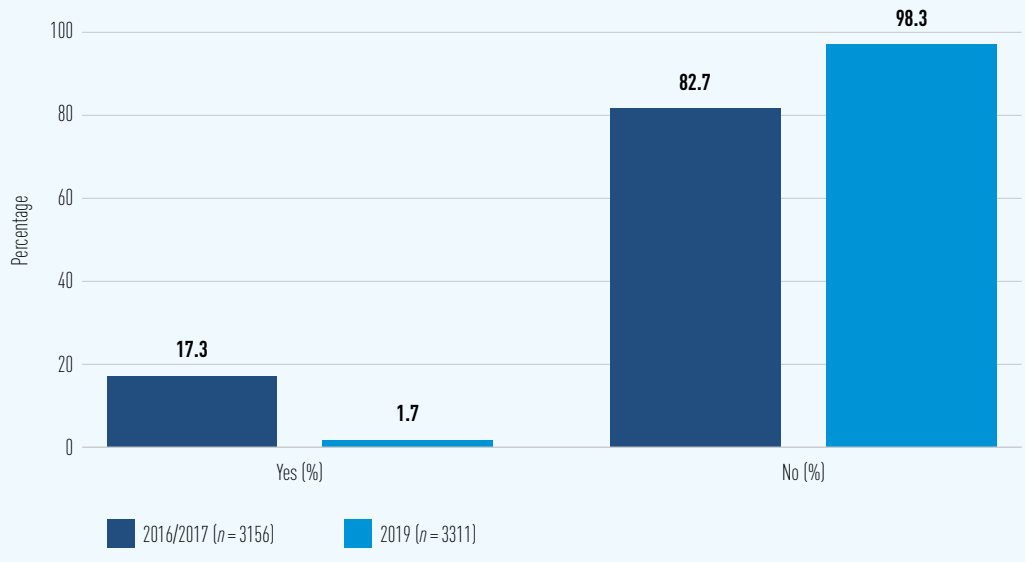
Fig. 7. Type of transport used to go to school by children participating in COSI Tajikistan 2016/2017 and 2019, by region



4.2 Sports and physical activities, in sport clubs or dancing courses

The majority of children participating in COSI Tajikistan 2016/2017 were not members of a sport club or dancing course (82.7%) and in 2019 this figure was even higher (98.3%) (Fig. 8).

Fig. 8. Children who were members of sport clubs or dancing courses in COSI Tajikistan 2016/2017 and 2019



Less than 6% of children practised regular physical exercise with any frequency (one or more hours per week) in 2016/2017, decreasing to less than 1% in 2019.

The highest proportion of children exercising for one hour per week was found in 2016/2017 in Dushanbe City (11%), but this fell to zero in 2019 (Table 15).

Table 15. Time spent on sports and physical activities in sport clubs or dancing courses by children in COSI Tajikistan 2016/2017 and 2019 rounds, by region

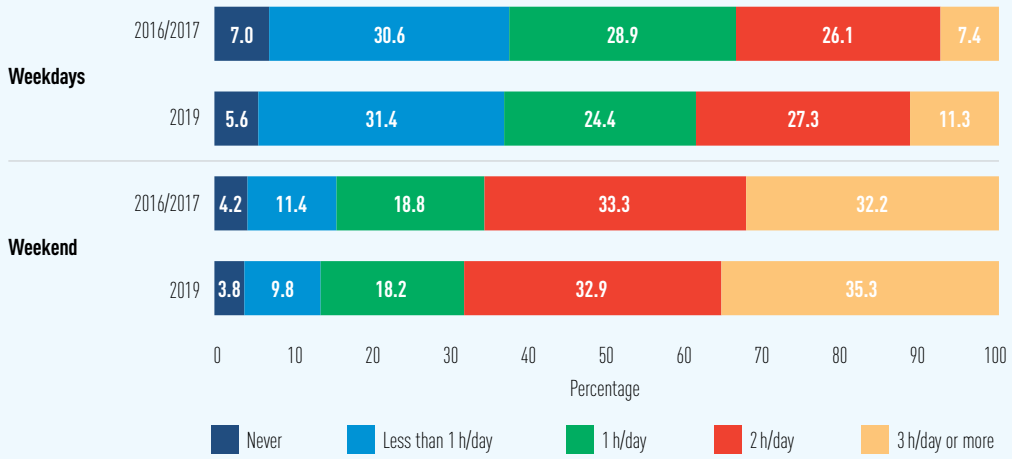
Region	Total No.	Frequency (%)			
		Not a member	1 h/week	2 h/week	3 h/week or more
2016/2017					
DRS	789	89.0	4.2	3.6	3.1
Dushanbe City	289	80.1	11.0	2.7	6.2
Khatlon	1175	81.4	6.8	7.5	4.5
Sughd	856	86.8	3.4	3.8	6.0
Tajikistan	3148	84.2	5.7	5.4	4.8
2019					
DRS	806	96.5	1.3	0.8	1.3
Dushanbe City	325	100.0	0.0	0.0	0.0
Khatlon	1267	98.4	0.9	0.3	0.4
Sughd	913	99.4	0.2	0.2	0.1
Tajikistan	3311	98.4	0.7	0.4	0.5

4.3 Time spent playing actively/vigorously outside

Even though most children were not members of sports clubs or other organized physical activities, 55% of the children participating in COSI Tajikistan 2016/2017 played actively outside for 1–2 hours a day (Fig. 9). During weekends, time spent on active play outside increased considerably, to 65.5% of children actively playing for 2–3 hours per day.

The data gathered on the number of children who spent their time actively playing outside showed little change from the 2016/2017 round to the 2019 round: in 2019, 51.7% of children played outside for 1–2 hours a day on weekdays and 68.2% played outside for 2–3 hours a day on weekends (Fig. 9).

Fig. 9. Amount of time spent playing actively/vigorously outside, during the week and at weekends, by children participating in COSI Tajikistan 2016/2017 and 2019



Comparing results across regions, the lowest proportion of children playing outside for at least one hour on weekdays was observed in Khatlon (54.5%; Fig. 10). At weekends, more children spent time playing actively outside and for longer (over two hours a day) in all regions (Fig. 11) in 2016/2017: DRS (58.7%), Dushanbe City (78.9%), Khatlon (58.1%) and Sughd (77.2%).

In the 2019 round, Khatlon remained the region with the lowest proportion of children playing outside for at least one hour on weekdays (58.9%) (Fig. 10). On weekends, children in all regions increased their time spent in active play and the prevalence of children who played outside for more than two hours per day was 74.6% for DRS, 66.8% for Dushanbe City, 68.7% for Khatlon and 63.5% for Sughd (Fig. 11).

Fig. 10. Amount of time spent playing outside on weekdays by children participating in COSI Tajikistan 2016/2017 and 2019, by region

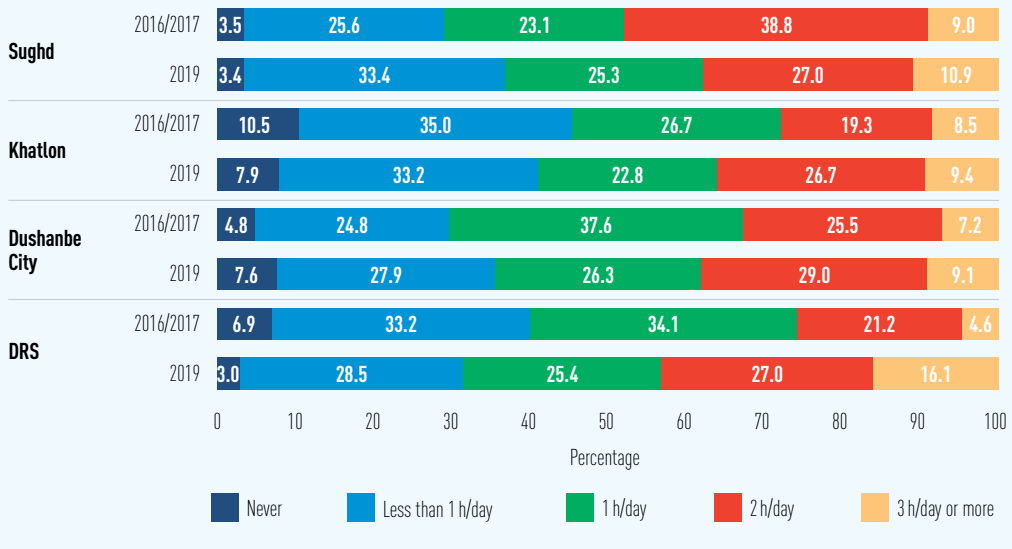
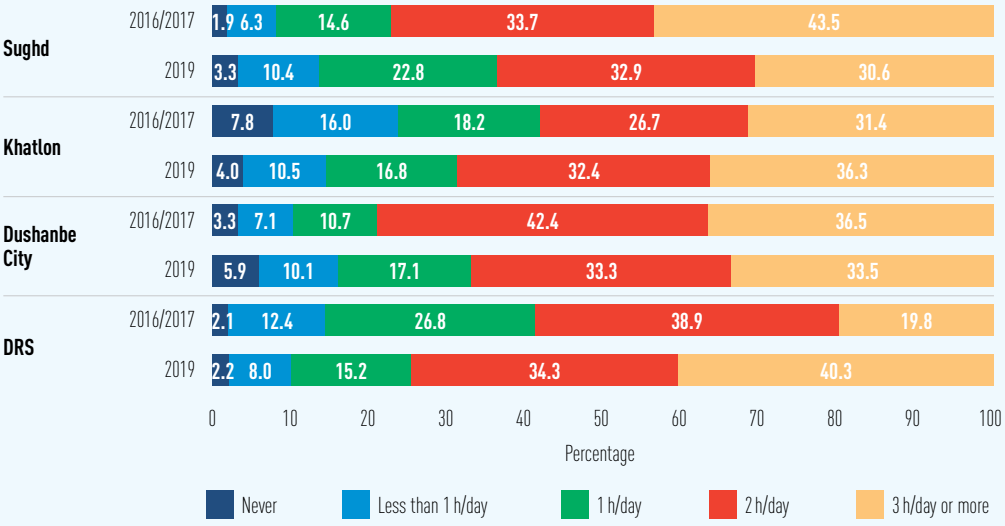


Fig. 11. Amount of time spent playing outside at the weekend by children participating in COSI Tajikistan 2016/2017 and 2019, by region

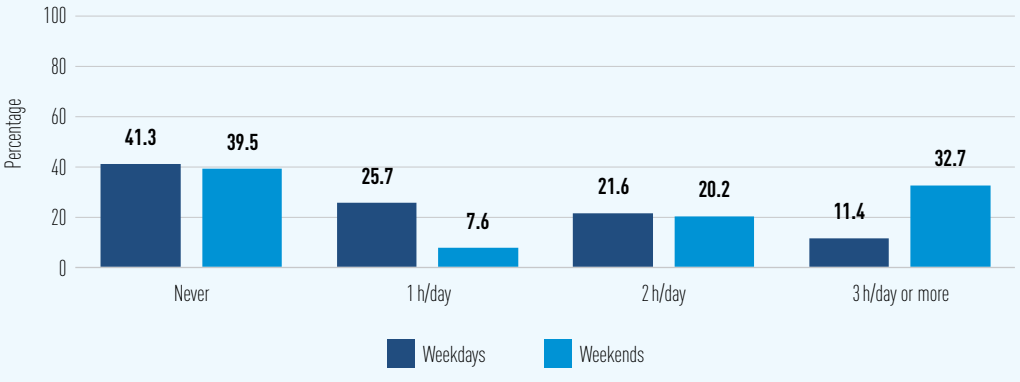


4.4 Time spent watching television or using electronic devices

In COSI Tajikistan 2016/2017, information on sedentary habits was represented by the total time spent on activities such as watching television or using electronic devices (Fig. 12). Exposure to screen media has several detrimental effects, giving rise to outcomes such as reduced physical activity, impairment of sleep patterns and increased energy intake, from both eating while viewing and from increased consumption encouraged by advertising *(35)*. And hence, may contribute to increased obesity in children.

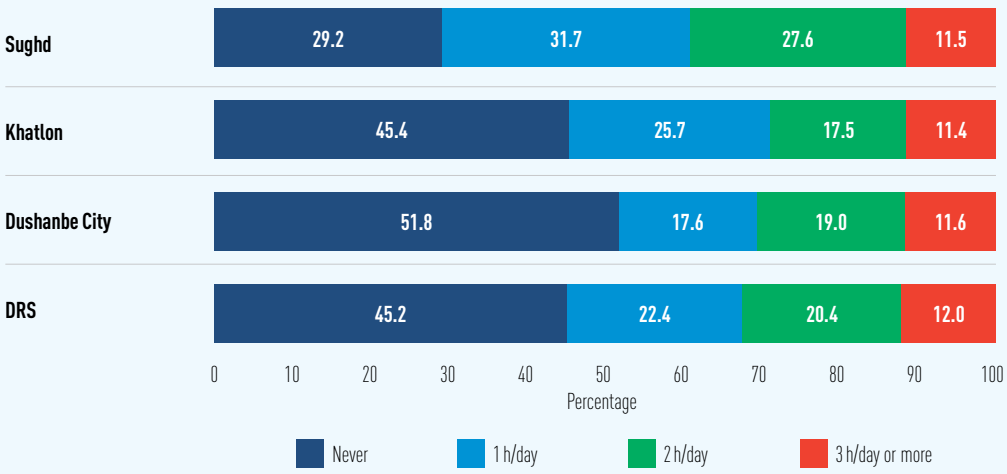
On weekdays, 41.3% of children never watched television or used electronic devices, but 47.3% spent 1–2 hours per day on these activities. At weekends, there was an increase in the percentage of children who spent three or more hours on these activities daily (11.4% on weekdays compared with 32.7% on weekends).

Fig. 12. Amount of time spent watching television or using electronic devices, on weekdays and at weekends, children participating in COSI Tajikistan 2016/2017



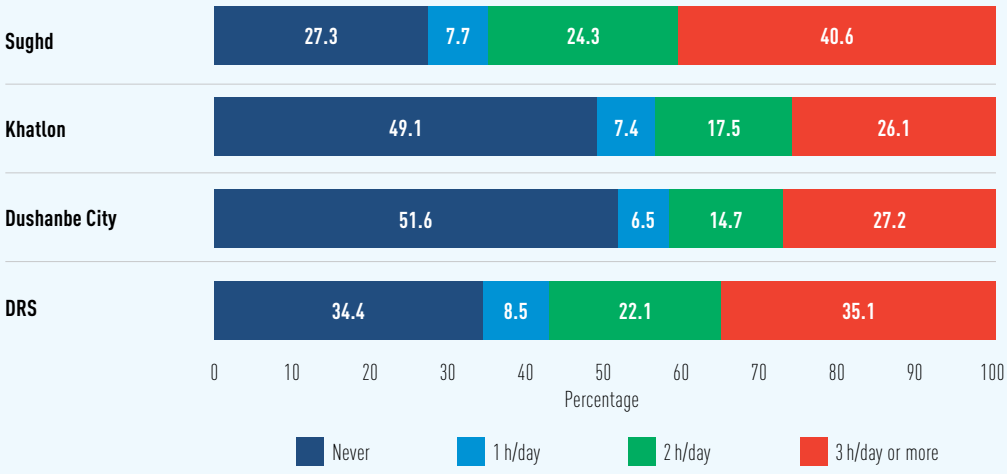
In terms of children who spent more than two hours per day on sedentary activities during weekdays, the regional figures were 32.4% in DRS, 30.6% in Dushanbe City, 28.9% in Khatlon and 39.1% in Sughd (Fig. 13).

Fig. 13. Amount of time spent watching television or using electronic devices on weekdays by children participating in COSI Tajikistan 2016/2017, by region



As would be expected, the time children spent watching television and using electronic devices increased in all regions at weekends. The proportion of children spending two or more hours in front of television or other screens ranged from 41.9% in Dushanbe City to 64.9% in Sughd (Fig. 14).

Fig. 14. Amount of time spent watching television or using electronic devices on the weekend by children participating in COSI Tajikistan 2016/2017, by region



5. Final remarks

Key findings from the two studies showed small but insignificant declines in overweight and obesity and stunting prevalence in school-aged children between 2016 and 2019. This may be the result of the active promotion of physical activity and healthy eating in the country in recent years. Nevertheless, the problems of overweight and stunting of children remain priority issues for the Ministry of Health in the country.

Yet why are there more cases of overweight among boys than among girls? One explanation may be that girls in this age group are already more involved in helping with household chores such as washing dishes, sweeping the yard and mopping the floors. Boys may be involved in helping with physical work only as they get bigger and stronger.

At the same time, there is a visible increase in the prevalence of undernutrition among the same group of children. This may, again, be the result of a simultaneous expansion of the population's access to unhealthy food and an increase in food prices. The points of sale for both sugary drinks such as cola and fast food prepared by street vendors, such as hot dogs and shawarma, have increased, which can lead to changes in children's tastes and habits. Children may stop eating family meals or homemade soups and second courses with fresh or cooked vegetables. Sugary drinks and salty crisps and croutons similarly can change children's tastes and preferences. This undoubtedly leads to disturbances in healthy nutrition and the perception and behaviour of children about a healthy diet.

5.1 Suggested actions

In light of the findings from the fourth and fifth rounds of the WHO European COSI study in Tajikistan set out in this report, the following suggested actions and initiatives are provided to the Government of Tajikistan.

Data collection and reporting

- Build capacity in the Health Statistics Centre for continued data collection, cleaning, analysis and reporting of obesity and its risk factors (including environmental factors) across the life course.
- Appoint a specific institution for the continual planning and implementation of COSI rounds and responsible for ensuring that the data is shared with the relevant decision makers in the country to inform policy action.

Schools

- Zone the national admissions system to encourage admission of children to schools nearer to home, thus supporting walking to and from school.
- Invite the heads of the local government administration to support physical activity in parks, areas of high building density and schools and through the renovation of sports

venues and sports fields. This need was initially observed in the Dushanbe City Mutual Evaluation Report.

- Strengthen national policies to restrict or control the sale of unhealthy food products inside schools. This is dependent on local government and school administration as vending facilities with unhealthy options are often still available in areas near to schools.
- Build capacity within government, school education and health authorities to develop national policies supporting school environments in promoting a healthy diet, physical activity and prevention of obesity as part of the National Programme to Promote a Healthy Diet and Prevent Obesity (2020–2024).
- Develop and improve the global water, sanitation and hygiene (WASH) programme to promote safe drinking-water. This will help both to and reduce the intake of sugar sweetened drinks and beverages as well as help to prevent diarrhoea, both important in addressing the double burden of malnutrition.
- Develop a programme to scale up access to free or subsidized fruits and vegetables in schools.
- Develop a programme within schools for all school-age children to ensure 2-3 sessions (each more than 35 minutes) of physical activity every week .

Health Systems

- Build capacity among health providers and within the health system to ensure that children who are living with overweight and obesity have access to high quality management of overweight and obesity in primary health care.
- Ensure implementation of the baby-friendly hospital initiative, to ensure that women, babies and families are given the support that they need to initiate early breastfeeding and to continue exclusive breastfeeding for six months and continued breastfeeding alongside complementary feeding for up to two years and beyond.

Policy environments

- Fiscal interventions are an effective policy-measure for reducing consumption of sugary drinks, which contribute to obesity. Sugary drinks taxes are a promising measure.
- It is also important for governments to implement restrictions on marketing of unhealthy products to children, including in digital environments.
- Product reformulation (including sugar and salt reduction) can contribute to healthier environments at the population level, as can implementation of front-of-pack labelling schemes, which enable consumers to make informed decisions about what they are eating.
- Implementation of the International Code of Marketing of Breastmilk Substitutes.
- Urban design policies to ensure that children have access to safe places for active play inside and outside of school hours, and opportunities for active transport.

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