Food Waste in Schools of the Alytus Region:

Baseline Situation Analysis

Publication of the project “EBICOS: Every Bite Counts Schools”
D.2.1. Food Waste Analysis and Eligibility Report

EKT

ALYTAUS REGIONO
ATLIEKŲ TVARKYMO CENTRAS

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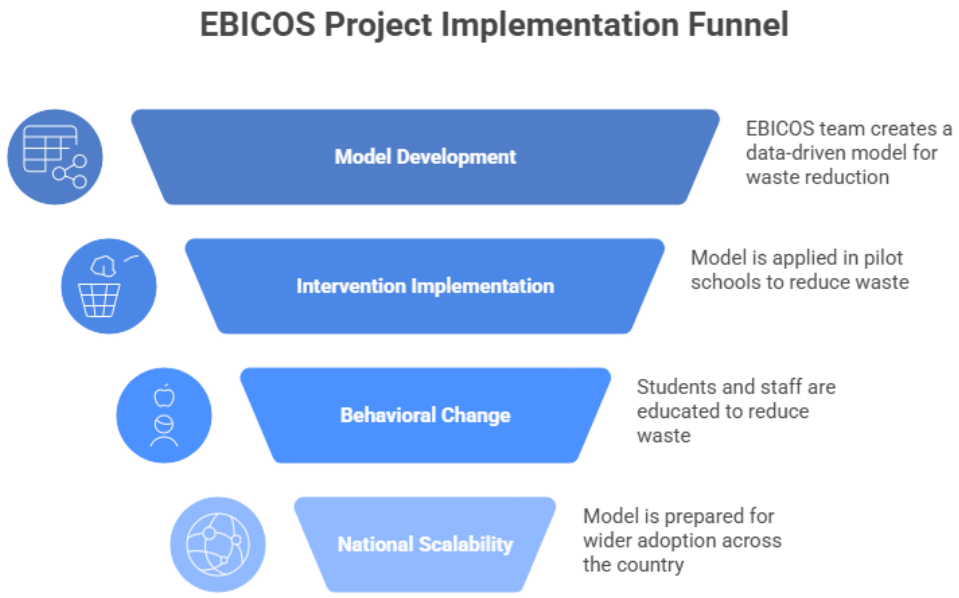
Content

1. What is EBICOS?

EBICOS („Every Bite Counts Schools“) – is a project co-funded by the European Union, aiming to reduce food waste within the catering systems of general education schools.

The project seeks to develop a **coherent, data-driven and practically applicable methodological model that supports educational institutions in reducing food waste** and improving the efficiency of school meal organisation.



The EBICOS team aims to ensure that the model developed during the project is easy to apply and can become a viable solution for all municipalities and schools across the country.

The EBICOS project contributes to the implementation of the UN Sustainable Development Goal No. 12 (*Responsible Consumption and Production*), the European Green Deal, and the EU *Farm to Fork* Strategy.

At the national level, the project serves as a practical example and a potential model for the *Sustainable School 2030* initiative, demonstrating how sustainability principles can be integrated into everyday school processes.

The project is implemented in the Alytus Region by a consortium of partners:

- Economic Consulting and Research Ltd. (UAB „Ekonominės konsultacijos ir tyrimai“, abbr. EKT) – project coordinator, responsible for analysis, methodology development, and impact assessment;
- Alytus Regional Waste Management Centre (Alytaus regiono atliekų tvarkymo centras, abbr. ARATC) – project partner responsible for food waste collection, measurement and treatment infrastructure, as well as the implementation of practical solutions.

Project objectives:

1) Reduction of food waste: to reduce food waste by at least 20% in the kitchens of pilot schools and by at least 10% in student plate waste in canteens, by identifying the main causes of waste generation, assessing process efficiency, and implementing interventions that reduce both unfinished portions and kitchen waste.

2) Optimisation of catering organisation and processes to improve portion planning and implement a kitchen efficiency programme, including optimisation of food preparation processes, reuse of leftovers, practical recommendations, and staff training.s.

3) Promotion of behavioural change among students to encourage behavioural change through educational tools that help students better understand the principles of healthy and responsible food consumption, increase their involvement in decision-making related to school meals, and ultimately reduce food waste through everyday choices.

The EBICOS project is implemented by a consortium of partners: EKT and ARATC, which manages the regional food waste collection infrastructure and possesses long-term operational data. The availability of these data enables high-precision analysis.

The partners carry out the following **key project activities**:

- **Baseline assessment**: analysis of waste quantities, evaluation of menus and catering organisation, and identification of municipal profiles;
- **Selection of pilot schools** where interventions will be implemented;
- **Identification of hotspots** in pilot schools using smart scales to determine where the largest amounts of food waste are generated (kitchens, student choices, etc.);
- **Development and implementation of interventions**: creation of a kitchen efficiency programme, preparation of a recipe book, development of educational toolkits for teachers and students, and design and application of interactive learning tools;
- **Education and engagement**: involvement of students, staff and the wider community in educational activities on sustainable food consumption;
- **Monitoring and impact assessment**: measurement of changes before and after interventions;
- **Preparation of recommendations and adaptation of the EBICOS methodology** for application in other municipalities across the country.

1.2. Why is a baseline situation assessment conducted?

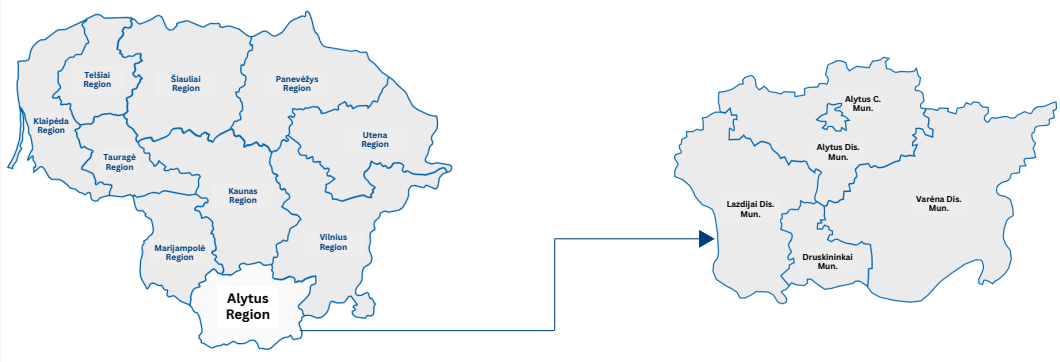
The baseline situation assessment forms the methodological backbone of the project. This stage enables the **objective identification of initial challenges, the actual scale of food waste, and its underlying causes**. A comprehensive and accurate diagnostic picture makes it possible to design interventions that genuinely reflect the real needs of schools at later stages of the project.

The assessment includes:

- **analysis of food waste quantities** based on actual data collected by ARATC;
- **analysis of student numbers** using data from the Education Management Information System (abbr. ŠVIS);
- **evaluation of catering organisation** based on questionnaires completed by schools and hygiene-related documentation;
- **comparison of academic years** to identify trends and anomalies;
- consideration of **the municipal context,** which may lead to significant differences between schools;
- **typological analysis of schools** (gymnasiums, lower secondary schools, combined schools, schools with pre-primary education, etc.).

The data are presented in this document. Their analysis provides the basis for selecting pilot schools in which the project's planned interventions will be implemented (such as the installation of smart food waste scales, the application of educational tools for staff and students, and other measures), as well as for measuring the project's impact at its conclusion.

2. What makes the Alytus Region distinctive?

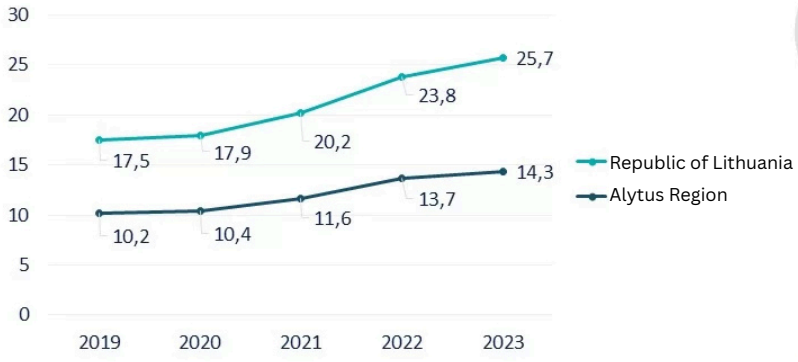


Located in southern Lithuania, the Alytus Region comprises **five municipalities**: Alytus City Municipality, Alytus District Municipality, Druskininkai Municipality, Lazdijai District Municipality, and Varėna District Municipality.

These municipalities differ in terms of both their level of urbanisation and their economic profiles. Alytus City Municipality stands out for its high population concentration, the dominance of industry and services, and more intensive consumption patterns. Druskininkai Municipality is characterised by its resort status and the importance of tourism and the service sector, which results in seasonal fluctuations in population numbers and consumption flows. Meanwhile, Alytus District, Lazdijai District, and Varėna District municipalities are more rural in nature, with lower population densities.

These differences have a direct impact on consumption habits, the quantities of waste generated, and the composition of that waste.

GDP per capita, at current prices, in Alytus Region and Lithuania 2019-2023 (thousand, EUR)



Alytus Region

2019-2023 m. GDP per capita growth

Lithuania

2019-2023 m. GDP per capita growth

Gap from the national average

In 2023, the regional indicator value was 1,8 times lower than the national average.

Fig.: Demographic and Economic Changes in the Alytus Region, 2019–2025.
Source: Alytus Region Development Council. https://alytausregionas.lt/alytaus-regionas/

Economically, the Alytus Region is considered one of the weaker regions in Lithuania. Although positive economic growth has been recorded in recent years, it remains slower than the national average. Gross domestic product per capita is significantly lower than the Lithuanian average, and the region's gap compared to the overall national economic level remains substantial, despite steady growth.

The region's economic structure is shaped by limited opportunities for high value-added activities, a relatively low concentration of the service sector, and a declining number of specialists prepared for the labour market. These trends are closely linked to demographic changes.

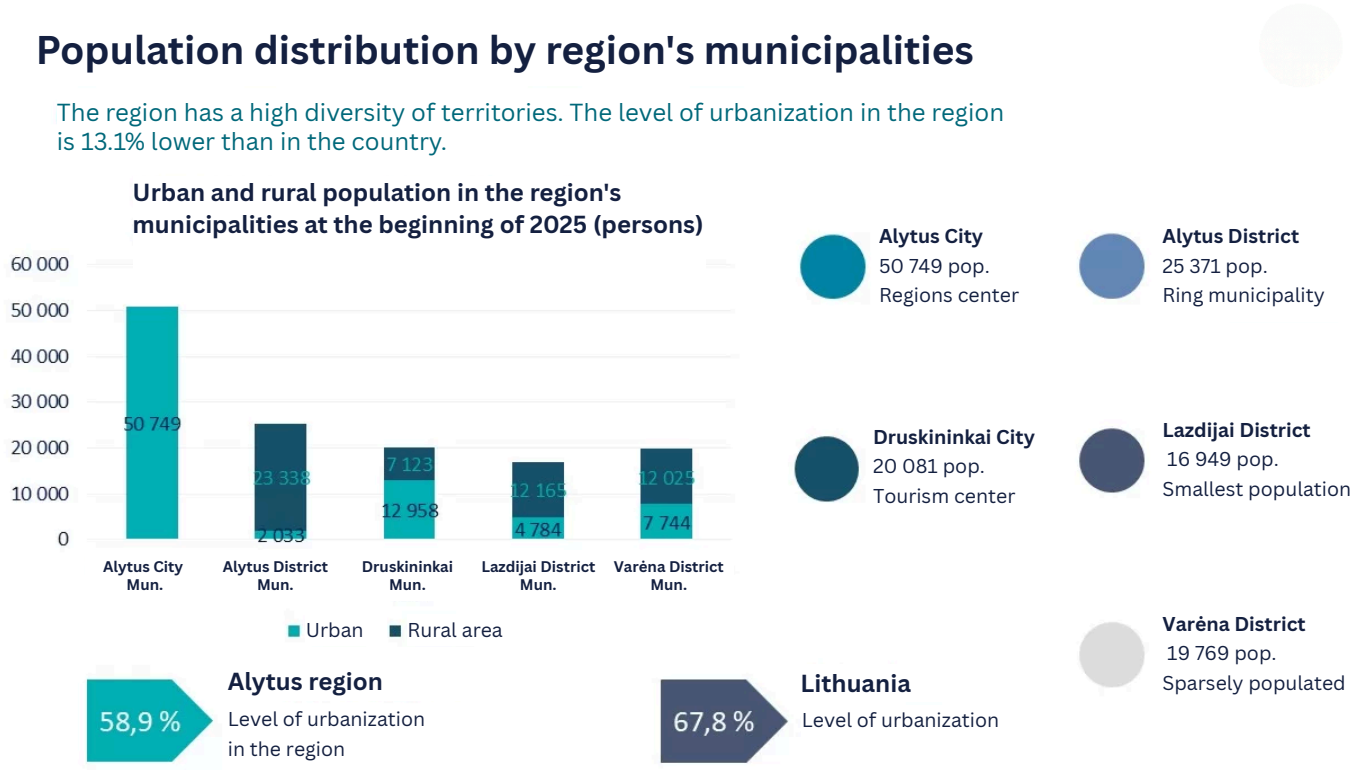


Fig.: Demographic and Economic Changes in the Alytus Region, 2019–2025.
Source: Alytus Region Development Council. https://alytausregionas.lt/alytaus-regionas/

Despite these economic challenges, the region has a well-developed infrastructure for training specialists. Alytus is home to a higher education institution—the Alytus Faculty of Kaunas University of Applied Sciences—as well as several vocational education and training institutions. The Alytus Vocational Education and Training Centre prepares the largest number of specialists required by industry and plays a key role in supporting the regional labour market.

These economic, demographic and territorial conditions shape consumption behaviour, the efficiency of resource use, and the specific characteristics of food waste generation in the region.

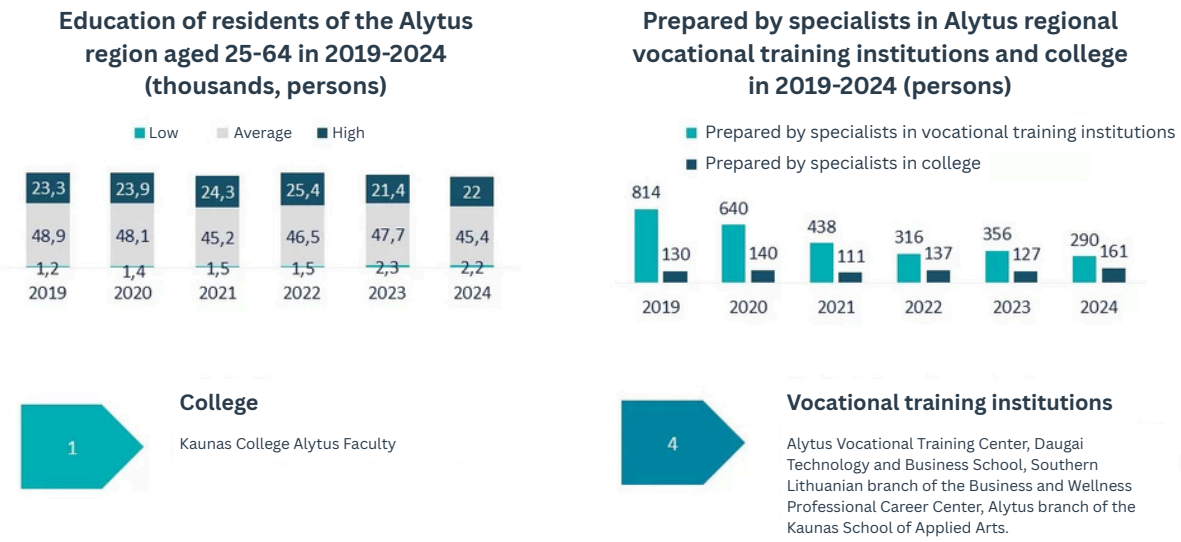


Fig.: Demographic and Economic Changes in the Alytus Region, 2019–2025.
Source: Alytus Region Development Council. https://alytausregionas.lt/alytaus-regionas/

2.1. The network of educational institutions in the Alytus Region

The region's general education system consists of **schools belonging to four main types: primary schools, lower secondary schools (progymnasiums), basic schools, and gymnasiums**. These types form the core structure of the regional education system.

In Alytus City Municipality, the education network is the largest and most specialised. The city hosts several progymnasiums and gymnasiums, as well as primary and basic schools. Educational stages are clearly separated, and each institution typically delivers programmes corresponding to a single educational level.

In the district municipalities (Alytus District, Lazdijai District and Varėna District), mixed-profile schools are more common. Due to smaller student numbers, multiple educational stages are often combined within a single institution—from pre-primary education to basic or upper secondary (gymnasium-level) education. While this structure allows services to be provided across wide geographical areas, it also increases the complexity of catering and organisational processes.

In Druskininkai Municipality, a compact yet diverse school network is in place, including gymnasiums, progymnasiums and basic schools, some of which also provide pre-primary or preschool education.

Overall, the Alytus Region is characterised by a clear distinction between the city and the surrounding districts: single-level institutions (gymnasiums and progymnasiums) dominate in the city, while multi-level schools are more prevalent in the districts, facing more complex

organisational and catering-related challenges.

2.2. Models of school meal organisation in the Alytus Region

School catering in the Alytus Region is organised in accordance with national regulations and municipal decisions; therefore, different schools may apply different food preparation and serving models.

The **main standards are set by the Ministry of Health of the Republic of Lithuania**, which defines the types of products, portion sizes and nutritional composition required for children's meals. **Compliance with these requirements is supervised by municipal Public Health Bureaus (PHBs).** They verify whether menus comply with legal regulations, assess the nutritional value of meals, advise schools on necessary adjustments, and may issue mandatory remarks if menus do not meet hygiene standards. As a result, PHB recommendations have a direct impact on which dishes are ultimately served in school canteens.

Food preparation in regional schools is carried out in two main ways. **In some schools, meals are prepared on site** using the school kitchen and staff employed directly by the school. **In other institutions, catering services are outsourced to external providers** under public procurement contracts.

Both systems are used in urban and rural schools alike, with the choice depending on school infrastructure, financial capacity, and other contextual factors.

Schools independently decide how the catering process is organised. School administrations determine whether a buffet-style system is applied, how student queues are managed, and which payment systems are used, such as cash payments, bank cards, student cards, or other methods.

While menus are regulated by law, the form of food service is not, resulting in varied practices. **Some schools use fixed portioning**, where canteen staff serve each student a pre-defined meal, **while others allow students to choose independently and/or select the amount of side dishes**. The number of **alternative dishes offered** within the same menu also varies. These differences are significant, as they may influence the generation of food waste.

The system of free school meals in Lithuania is mixed. **All pre-primary education children and students in grades 1–2 receive free lunches regardless of family income.** For older students, free meals are provided based on social support eligibility, determined by household income. These costs are covered by state and municipal budgets. As a result, multiple student groups are served simultaneously in schools: all younger primary students, certain socially supported students, and students who pay for their meals themselves. This affects catering logistics and queue planning.

In most schools, meal service takes place during breaks, most commonly during longer lunch breaks.

Some institutions allow students to bring food from home. This is particularly relevant for students with special dietary needs or in cases where school meals do not align with their preferences.

Differences in school infrastructure—such as canteen capacity, spatial layout, and kitchen staffing capacity—create varying abilities to manage flows and ensure smooth catering operations.

These legal, organisational and practical factors together form the regional context that directly influences food waste levels and the conditions under which the EBICOS project is implemented. Individual school catering models entail different levels of risk, making detailed analysis essential for understanding the causes of food waste generation and identifying the most appropriate settings for interventions.

2.3. Food waste management in the Alytus Region

In Lithuania, **food waste has been required to be collected separately** since 1 January 2024, following new legislation adopted as part of the transposition of the EU Waste Framework Directive. This means that all municipal actors—households, businesses and institutions—must organise the separate collection or composting of biodegradable waste, including food and kitchen waste.

In the Alytus Region, this requirement was addressed earlier through the activities of ARATC. **As early as 2018, the region became the first in Lithuania to introduce separate collection and treatment of food waste outside the mixed municipal waste stream**. Even earlier, in 2012–2013, residents of cities and towns were provided with 6,000 home composting bins (with a capacity of 600–900 litres) intended for composting suitable food waste and small quantities of green waste at home.

Currently, ARATC manages the region's municipal waste systems. In both urban and rural areas, food and kitchen waste is collected according to regular schedules from individual households, apartment buildings, businesses and institutions. Waste from households and institutions is collected separately using dedicated brown containers.

Collected food waste includes not only leftover meals, but also fruit and vegetable peelings, coffee grounds, and paper napkins used with food—in other words, the entire biodegradable kitchen fraction. **Household fats and oils** are collected through a different system: they must be stored separately (e.g. in plastic beverage bottles or food containers) and delivered to sorting centres or biological treatment facilities.

Under the service model, ARATC provides customers with containers and sorting instructions, sets collection schedules, and empties containers—more frequently during the warmer season. In some municipalities of the Alytus Region, households that use food and kitchen waste containers and/or compost food and green waste at home are eligible for a reduced local waste management fee, which can be as low as EUR 9 per year.

ARATC **receives and processes food waste** at the Takniškiai Waste Management Technology Park, where it is treated anaerobically. The **resulting biogas is used for energy production**, while the remaining material is processed into compost, which is successfully sold to residents.

This system ensures that **biodegradable food and kitchen waste does not enter the mixed municipal waste stream and is instead recovered as a valuable resource**.

Fig.: Takniškės Waste Management Technology Park.
Source: Alytus Regional Waste Management Center.

3. Where are we now? Analysis of the situation in educational institutions in the Alytus Region

The analysis focuses on 41 general education institutions, as this is the number of schools served by one of the project consortium partners—ARATC—which holds long-term data on food waste collection from these institutions.

In addition to institutions located in the Alytus Region, one educational institution from Prienai District Municipality is also included in the analysis. This decision was made in recognition of the fact that, although Prienai District is not formally part of the Alytus Region, some of its institutions (specifically, one institution) are serviced by ARATC. From the project team's perspective, the inclusion of this institution allows the scope of the analysis to be broadened by adding the perspective of a municipality with similar characteristics but belonging to a different regional administrative system.

To assess the current situation, **two types of indicators were analysed**:

- food waste indicators (kg per student per academic year);
- selected organisational variables (e.g. catering organisation, price, etc.).

The food waste indicator was constructed based on the quantity of food waste, using the total annual amounts of animal by-products and other food waste handed over by institutions to ARATC's waste collection operator.

Food waste quantities were recalculated on a per-student basis.

Student numbers in each institution were assessed using official data from the Education Management Information System, based on the number of enrolled students as of 1 September.

Three academic years were analysed **(2022–2023, 2023–2024, and 2024–2025**).

In addition, **a questionnaire containing both quantitative and qualitative questions** was developed to assess organisational aspects of catering processes in the analysed schools. The questionnaire was distributed in September 2025, and full or partial responses were received from 30 of the 41 analysed institutions.

At an early stage of the analysis, it was decided to exclude the Alytus Vocational Education and Training Institution operating across three branches, as the age of its students extends beyond school-age youth, which is the target group of the EBICOS project. As a result, the **evaluation of the analysis reflects data from 38 institutions:**

	Educational institution	Municipality	Questionnaire data (1-yes, 0-no)	Food waste		
				2022-2023 acad.yr., KG/student	2023-2024 acad.yr., KG/student	2024-2025 acad.yr., KG/student
1	Alytaus „Vilties“ school-kindergarden	Alytus C.	1	8,363	8,252	65,763
2	Senamiesčio elementary school	Alytus C.	1	961	1,147	2,296
3	„Sakalėlio“ elementary school	Alytus C.	1	7,871	659	4,823
4	Dzūkijos school	Alytus C.	1	1,935	993	1,423
5	Piliakalnio progymnasium	Alytus C.	1	1,983	95	2,748
6	Dainavos progymnasium	Alytus C.	0	1,229	1,647	2,031
7	Šaltinių progymnasium	Alytus C.	0	3,854	368	322
8	Vidzgirio school	Alytus C.	0	5,915	1,871	425
9	Vidzgirio school „Drevinuko“ department	Alytus C.	1	18,337	20,713	1,912
10	„Volungės“ progymnasium	Alytus C.	1	2,079	1,785	1,863
11	Panemunės progymnasium	Alytus C.	0	2,301	609	806
12	Likiškėlių progymnasium	Alytus C.	1	242	1,212	1,141
13	Alytaus Adolfo Ramanausko-Vanago gymnasium	Alytus C.	1	147	616	2,305
14	Alytaus Jotvingių gymnasium	Alytus C.	0	95	431	408
15	Alytaus Šv. Benedikto gymnasium	Alytus C.	1	2,561	217	448

	Educational institution	Municipality	Questionnaire data (1-yes, 0-no)	Food waste		
				2022-2023 acad.yr., KG/student	2023-2024 acad.yr., KG/student	2024-2025 acad.yr., KG/student
16	Butrimonių gymnasium	Alytaus Dis.	1	3,354	4,966	1,492
17	Pivašiūnų gymnasium (now — Butrimonių gymnasium's Pivašiūnų primary education department)	Alytaus Dis.	0	5,577	3,309	6,744
18	Alytaus Dis. Daugų Vlado Mirono gymnasium	Alytaus Dis.	1	4,502	4,036	4,412
19	Alytaus Dis. Daugų Vlado Mirono gimnazijos Alovės pagrindinio ugdymo skyrius	Alytaus Mun.	1	11,744	9,639	8,221
20	Simno gymnasium	Alytaus Dis.	1	209	2,659	1,232
21	Simno gymnasium's Simnas's Special Education Department	Alytaus Dis.	1	11,818	8,435	1,391
22	Miroslavo gymnasium	Alytaus Dis.	1	1,758	1,582	2,468
23	Alytaus Dis. Krokialaukio Tomo Noraus- Naruševičiaus gymnasium	Alytaus Dis.	1	2,492	2,257	2,603
24	Druskininkų „Ryto“ gymnasium	Druskininkai	0	1,157	1,593	3,262
25	Druskininkų „Atgimimo“ school	Druskininkai	1	2,773	5,242	5,152
26	Druskininkų „Saulės“ primary school	Druskininkai	1	10,454	9,177	8,589
27	Druskininkų Mun. Viečiūnų progymnasium	Druskininkai	1	10,316	1,734	1,907
28	Druskininkų Mun. Leipalingio progymnasium	Druskininkai		5,101	10,544	11,733
35	Jiezno gymnasium (now — Prienų Dis. Dzūkijos gymnasium Jiezno Department)	Prienai Dis.	1	1,272	1,381	4,568
36	Varėnos „Ąžuolo“ gymnasium	Varėna Dis.		3,442	1,086	1,454
37	Varėnos Dis. „Merkio“ gymnasium Merkinės Vinco Krėvės department	Varėna Dis.	1	4,599	4,962	5,356
38	Senosios Varėnos Andriaus Ryliškio primary school	Varėna Dis.	1	3,688	1,765	1,967

3.1. Overall level of food waste generation

The level of food waste in the analysed educational institutions of the region is as follows:

- **Average**: **6.64 kg per student**
- **Median: 2.63 kg per student**

The difference between the average and the median indicates that **a share of the analysed institutions generate significantly higher amounts of food waste than the majority of schools**. As a result, the overall average is sensitive to a small number of high values, while the median (2.63 kg per student) better reflects the food waste level of a typical educational institution.

At this stage, this allows for the identification of potential “hotspots”; however, it does not yet allow conclusions to be drawn regarding the underlying causes of their occurrence.

Municipality	Average (kg per student)	Median (kg per student)
Druskininkai District.	8.1	8.59
Alytus City	8.04	1.79
Lazdijai District	7.2	7.46
Alytus District	4.53	3.33
Varėna District	3.15	3.44
Prienai District	2.41	1.38

Druskininkai Municipality stands out with the highest indicators in the region. Both the average (8.10 kg per student) and the median (8.59 kg per student) are high, indicating that elevated levels of food waste are not limited to isolated institutions but are characteristic of a broader share of the school network in Druskininkai Municipality. This allows for the assumption that structural factors—such as catering organisation models, menu planning practices, or infrastructure characteristics—may be at play. The influence of these factors should be examined in more detailed stages of the analysis. Consequently, Druskininkai Municipality is identified as one of the priority municipalities for food waste prevention interventions.

The average value for institutions in **Alytus City Municipality** (8.04 kg per student) appears very high and is comparable to that of Druskininkai Municipality; however, the median is only 1.79 kg per student. This pronounced **gap between the average and the median indicates a**

high dispersion of values and suggests that the overall average does not reflect the situation of the majority of city schools. Instead, it is strongly influenced by one or a small number of institutions with exceptionally high levels of food waste (e.g. Alytus "Vilties" School-Kindergarten, where food waste reaches approximately 80 kg per student). Therefore, the waste profile of the municipality should be assessed in a differentiated manner, taking into account the structural characteristics of individual institutions.

In Lazdijai District Municipality, the average level of food waste reaches 7.20 kg per student, with a median of 7.46 kg per student. The relatively close values of the average and the median suggest that **food waste levels are fairly uniform across the network of schools in Lazdijai District**. This allows for the assumption that common organisational or contextual factors may influence food waste generation; however, this assumption should be tested through a more detailed analysis of processes.

In **Alytus District Municipality**, moderate and relatively balanced levels are observed: the average is 4.53 kg per student and the median is 3.33 kg per student. A small number of hotspots can be identified (e.g. a branch of Daugai Vladas Mironas Gymnasium); however, the overall municipal **profile can be described as medium-level**.

Varėna District Municipality stands out with lower indicators: an average of 3.15 kg per student and a median of 3.44 kg per student. Food waste levels are relatively stable and comparatively low, making this municipality one with the fewest challenges in the area of food waste.

In **Prienai District Municipality**, only one educational institution was analysed; therefore, reliable conclusions about the municipality as a whole cannot be drawn. The institution's average food waste level is 2.41 kg per student, with a median of 1.38 kg per student.

3.2. Level of food waste generation in target institutions

Following the initial analysis, **nursery-schools and institutions exclusively serving students with special educational needs were excluded from further assessment**.

This decision was based on the fact that these institutions operate under fundamentally different catering structures: they serve younger age groups, provide a significantly higher number of meals per day, and involve much more intensive food preparation processes.

As a result, food waste quantities per child in these institutions are 2 to 10 times higher than in schools (primary schools, progymnasiums and gymnasiums). Including them in the analysis would distort municipal averages and make the regional system appear worse than it actually is within the school segment.

For example, in Alytus City, the “Vilties” School-Kindergarten inflates the municipal average by 60–70%, while in Lazdijai District, two nursery-schools increase the municipal average by more than 35%.

To align with the logic of the EBICOS project, which focuses on schools, it was therefore decided to analyse schools separately.

The level of food waste in the region’s target institutions, after excluding Alytus “Vilties” School-Kindergarten, Lazdijai nursery-schools “Kregždutė” and “Vyturėlis”, and the Simnas Special Education Unit of Simnas Gymnasium, is as follows:

- **Average**: **4.28 kg per student**
- **Median: 2.31 kg per student**

Municipality	Average (kg per student)	Median (kg per student)
Druskininkai District	8.1	8.59
Alytus District	4.53	3.33
Lazdijai District	4.49	2.4
Varėna District	3.15	3.44
Alytus City	3.09	1.54
Prienai District	2.41	1.38

After excluding nursery-schools, the region’s waste profile changes. Alytus City and Lazdijai District lose their extreme values and shift to a medium-level profile, while Druskininkai Municipality remains the most significant systemic hotspot of food waste generation.

3.3. The impact of catering organisation on food waste levels

Based on questionnaire data provided by schools, **a clear relationship is observed between catering organisation practices and the recorded levels of food waste**.

Institutions that fully apply a buffet-style system generate an average of 2.7 kg of food waste per student, which is approximately 2.5 times less than in schools where meals are served in fixed portions (12.6 kg per student). Schools that partially apply a buffet-style approach show intermediate waste levels—around 6.4 kg per student. Median values confirm the same trend.

The analysis also indicates that **menu flexibility has a significant impact on food waste levels. Schools where students are able to choose portion sizes reported approximately 40% lower waste levels, while those offering the option to choose meal composition or an alternative dish reported reductions of up to 55%.** This suggests that flexible, choice-based catering models effectively reduce unwanted food surplus.

Menu adjustment practices reported by schools in the questionnaires are also associated with waste levels. Where menus are not adjusted, the average food waste reaches 7.06 kg per student, whereas in schools with regularly reviewed and adjusted menus, the level drops to just 1.31 kg per student. Even occasional menu adjustments result in a noticeable effect (4.34 kg per student). This indicates that periodic menu analysis and adjustments support more accurate food quantity planning and better alignment with actual demand.

Based on information provided by schools regarding catering expenditure, it is possible to preliminarily estimate that **food waste results in substantial economic costs.** Calculations show that the 21 schools that completed the financial section of the questionnaire incur annual losses of approximately EUR 180,000–270,000 due to discarded food. The loss per student amounts to around EUR 50–70 per year, meaning that food waste reduction delivers direct financial benefits. These calculations are indicative in nature and based on self-reported data from schools and should therefore be treated as approximate rather than precise financial losses.

Finally, it was found that around half of the schools simply dispose of unused food. Only one fifth reported having alternative solutions, such as composting, transferring food to farmers, or distributing it within the community. A positive example is Dzūkija Progymnasium in Alytus City, where uneaten soup is distributed to students after the sixth lesson.

Nevertheless, these results reflect correlational relationships and, at this stage, do not allow for definitive conclusions regarding causality, as other factors—such as school size, student age structure, or management practices—may also influence food waste levels.

4. Selection of pilot schools

4. 1. Logic behind the selection of target municipalities

In the EBICOS project, the selection of pilot educational institutions was based on a combination of two principles:

1. territorial representation, and
2. objective, data-driven indicators of food waste generation.

The analysis revealed significant differences between municipalities, allowing the identification of areas where interventions are likely to have the greatest impact, while also ensuring that the pilot model is applicable in both urban and rural contexts.

Based on this approach, four target municipalities were selected.

1. Druskininkai Municipality – the clearest food waste hotspot in the region

Average: **8.10 kg per student** (highest in the region)
Median: **8.59 kg per student** (highest in the region)

Data from Druskininkai Municipality stand out in that high levels of food waste are characteristic of the majority of schools, rather than being limited to a few exceptional cases. This points to a structural pattern of food waste generation, potentially related to menu planning, portion sizes, catering organisation, and kitchen processes.

Why Druskininkai was selected:

- interventions have the highest potential impact here;
- results of change are easiest to observe and measure;
- the municipality represents a high-waste system where EBICOS can generate the greatest added value.

2. Lazdijai District Municipality – high and consistent indicators typical of rural schools

Average: **4.49 kg per student**
Median: 2.40 kg per student

Even after excluding extreme values (nursery-schools), food waste levels in Lazdijai District remain high. This distinguishes Lazdijai from Alytus City, where the high average was driven by a single institution (the “Vilties” School-Kindergarten).

In Lazdijai District, food waste indicators are consistent across the entire school network, pointing to everyday organisational challenges rather than isolated cases.

Why Lazdijai District was selected:

- it represents a typical rural municipality with systemic catering challenges;
- it allows EBICOS solutions to be tested under real regional school conditions;
- results will be readily transferable to other district municipalities across Lithuania.

3. Varėna District Municipality – low but stable food waste indicators

Average: 3.15 kg per student
Median: 3.44 kg per student

Varėna shows some of the lowest indicators in the region, which are also stable and evenly distributed across institutions. This suggests that challenges are not extreme and that the system operates in a typical rural district context.

Varėna provides a unique opportunity to test how EBICOS solutions perform in a relatively sustainable and stable school network.

Why Varėna District was selected:

- it represents a low-to-medium food waste municipality;
- it allows assessment of intervention effects in a “typical” rural school setting;
- it may become a best-practice example if indicators improve further.

4. Prienai District Municipality – a control case for testing regional methodology

Average: **2.41 kg per student**
Median: 1.38 kg per student

Although only one educational institution was analysed in Prienai District Municipality, it was decided to include it in the pilot sample. Prienai presents a unique situation: most of its educational institutions are not serviced by ARATC. Data from the single analysed institution indicate relatively low food waste levels.

However, due to limited data availability, these figures are not representative of the municipality as a whole. For this reason, Prienai serves as a strategically important control case, allowing assessment of:

- how universal and adaptable the methodology and interventions are, regardless of waste management infrastructure;
- whether regional recommendations are applicable to districts outside the ARATC system.

Prienai enables comparison of EBICOS impacts across three distinct contexts:

- high-waste municipalities (Druskininkai),
- moderately waste-generating rural districts (Lazdijai and Varėna),
- a district with waste management practices differing from the rest of the region (Prienai).

This makes Prienai District a methodologically valuable control case, supporting the testing of solution adaptability across a broader Lithuanian municipal context.

Following the selection of institutions in Druskininkai, Lazdijai, Varėna and Prienai municipalities, an optimally balanced pilot sample is obtained:

Municipality	Level of food waste	Nature of the data	What it represents
Druskininkai	Very high	systemic problem	city and structural food waste trends
Lazdijai District	High	consistent waste generation	rural district with real catering challenges
Varėna District	Low-middle	stable values	typical district profile and potential for sustainable improvement
Prienai District	n/a	n/a	control case

This selection ensures that municipalities with different food waste profiles are included, making it possible to assess the effectiveness of EBICOS across diverse contexts and to develop universal recommendations applicable to the entire region and Lithuania as a whole.

4.2. Selection of schools in pilot municipalities

In line with the project logic and the EBICOS objective of **testing interventions in different types of schools, one educational institution is selected in each pilot municipality**.

Schools are grouped into three categories based on the age structure of students, as this directly affects the complexity of catering organisation and the risk of food waste generation:

1. **Gymnasiums** (educating only upper secondary students; no primary or pre-primary children);
2. **Institutions with pre-primary / preschool children** (schools of any structure that include groups aged 3–6; typically the highest-risk type due to menu acceptability for younger children);
3. **Mixed-age schools without pre-primary children** (institutions with primary and/or lower secondary levels but without 3–6 age groups).

Group I – Gymnasiums *(lowest risk of menu rejection; homogeneous student population)*

No.	Municipality	School	Median (kg / student)	Average (kg/student)
1	Druskininkai	Druskininkai “Ryto” Gymnasium	1.593	2.004
2	Varėna District	Varėna “Ąžuolas” Gymnasium	1.454	1.994

Both gymnasiums demonstrate low and relatively similar levels of food waste.

Druskininkai “Ryto” Gymnasium is selected as a pilot school because it reflects the municipality’s overall waste profile and is part of the region’s most structurally significant food waste challenge.

Group II – Schools with preschool / pre-primary children *(highest-risk segment, as younger children are associated with higher levels of menu rejection)*

No.	Municipality	School	Median (kg / student)	Average (kg/student)
1	Lazdijų raj.	Šeštokai School	10.83	8.482
2	Druskininkai	Leipalingis Progymnasium	10.544	9.126
3	Druskininkai	“Saulė” Secondary School	9.177	9.407
4	Varėnos District	Merkinė V. Krėvė Branch	4.962	4.972
5	Lazdijai District	Šventežeris School	1.494	2.631
6	Lazdijai District	Seirijai A. Žmuidzinavičius Gymnasium	1.145	4.011

The institutions are highly heterogeneous: in some, food waste levels are extremely high, while in others they are moderate or low. Seirijai Antanas Žmuidzinavičius Gymnasium stands out due to a year-on-year increase in food waste of +8.86 kg per student—the largest increase observed in the entire region. This makes the school a priority candidate for pilot intervention.

Group III – Mixed-age schools without pre-primary children *(medium-risk type, representing a typical district profile)*

No.	Municipality	School	Median (kg / student)	Average (kg/student)
1	Druskininkai	Viečiūnai Progymnasium	17.34	15.575
2	Druskininkai	“Atgimimas” School	5.152	4.389
3	Lazdijai District	Veisiejai Sigitas Geda Gymnasium	2.991	2.851
4	Varėna District	Old Varėna A. Ryliškis School	1.967	2.473

Old Varėna Andrius Ryliškis School shows the lowest and most stable indicators within the group, with a change of only approximately +0.20 kg per student over three years. This makes it an optimal institution representing the low-waste segment.

Taking into account municipal profiles, student age structures, and three-year waste trends, the selected pilot institutions represent the full spectrum of the region:

1. Druskininkai “Ryto” Gymnasium – homogeneous upper secondary student segment

- educates only upper secondary (gymnasium-level) students;
- low but increasing food waste levels in recent years;
- suitable for analysing how interventions function in an older-student environment.

2. Seirijai Antanas Žmuidzinavičius Gymnasium – full-risk structure

- includes pre-primary children, primary students, lower secondary and upper secondary students;
- shows the largest increase in food waste across the entire region (+8.86 kg per student);
- suitable for examining how interventions can stabilise a rapidly deteriorating situation.

3. Old Varėna Andrius Ryliškis School – stable low-waste profile

- a mixed-age school without pre-primary children;
- the lowest and most stable indicators in the group (median: 1.967);
- required as a control case representing low food waste levels.

This combination allows EBICOS to test interventions across three essential contexts—stability, rapid deterioration, and prevention—ensuring that the resulting outcomes are methodologically applicable across the entire Alytus Region.

As noted earlier, P**rienai District Municipality serves as a control case within the regional context**. It enables assessment of how EBICOS measures perform in an environment where waste management systems, data reporting practices, and the managing authority (waste management centre) differ from those in the rest of the Alytus Region.

From this municipality, **“Žiburys” Gymnasium was selected as the pilot institution.** “Žiburys” Gymnasium represents the upper secondary school catering profile in a low food waste district. This allows for analysis of.

- which solutions work well in low-waste municipalities;
- which practices can be transferred to other districts as examples of good practice;
- how EBICOS measures function in an environment where the primary goal is not to reduce extremely high quantities, but to maintain sustainability and strengthen prevention.

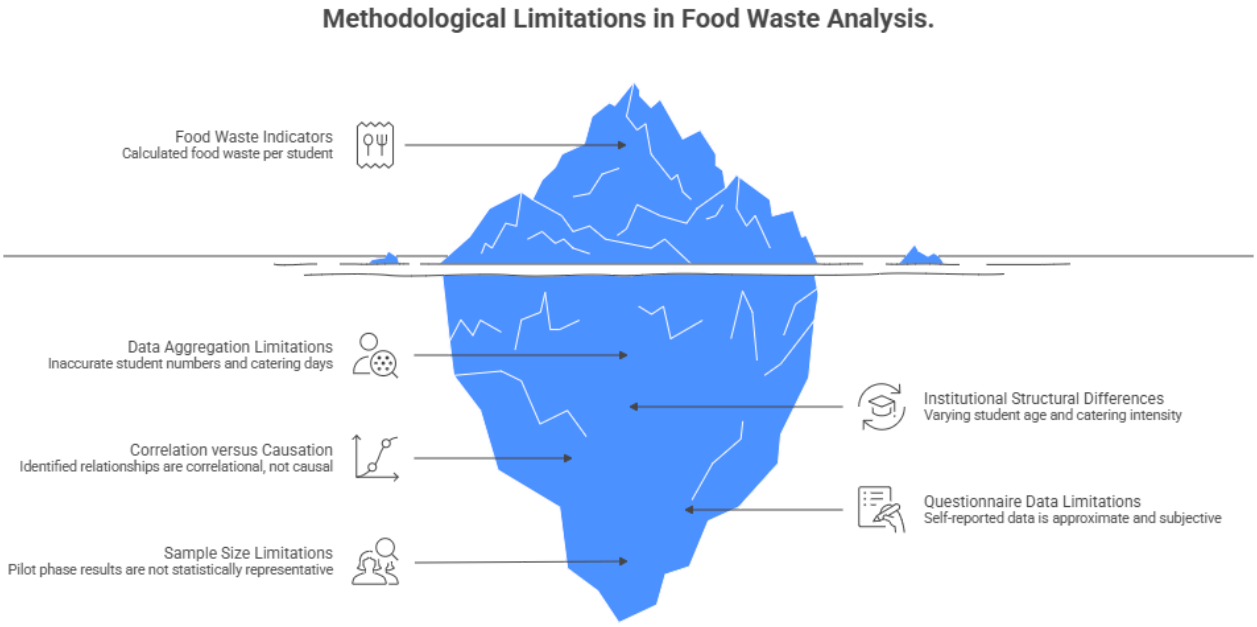
The gymnasium has also been identified as one of the most willing institutions to cooperate: it has expressed a clear commitment to participating in pilot activities and has strong administrative support. In research contexts, such motivation is critical, as it ensures smooth data collection, responsible implementation of interventions, and the ability to generate reliable results.

For these reasons, “Žiburys” Gymnasium logically complements the list of pilot institutions as a stable, low-waste and highly motivated control case, essential for comprehensive testing of the regional methodology.

Profile	School	What it represents
Low and stable	Old Varėna Andrius Ryliškis School	good practice potential; baseline control level
Rapid deterioration	Seirijai Antanas Žmuidzinavičius Gymnasium	testing the impact of interventions in a crisis situation
Moderate increase	Druskininkai “Ryto” Gymnasium	preventive stabilisation context
Low waste–generating profile	Prienai “Žiburys” Gymnasium	strong motivation and engagement potential

5. Methodological limitations

When conducting the analysis, it is important to identify the main methodological limitations that must be taken into account when interpreting the results and formulating conclusions.



Limitations of data aggregation

Food waste indicators were calculated based on the total annual amount of food waste collected from educational institutions, recalculated per student using student numbers as of 1 September. This approach does not account for the actual number of students receiving meals, potential changes in student numbers during the academic year, variations in the number of catering days, or differences in the number of meals served per day. As a result, some distortion of indicators may occur.

Impact of institutional structural differences

The analysed educational institutions differ significantly in terms of student age structure, catering intensity, and organisational complexity. Nursery-schools, special education units, or institutions with mixed structures naturally generate higher levels of food waste. Including such institutions in aggregated analyses can have a substantial impact on average values.

Correlation versus causation

At this stage, the identified relationships between catering organisation practices and food waste levels are correlational in nature. While they allow for the identification of potential associations and the formulation of hypotheses, they do not permit definitive conclusions regarding causal effects without additional controlled and qualitative research.

Limitations of questionnaire data

Questionnaire data were collected from only a subset of educational institutions and are based on self-reported information provided by schools. Consequently, some indicators—particularly those related to financial aspects or organisational practices—are approximate and may vary depending on interpretation or accounting methods.

Sample size limitations at the pilot stage

The selection of pilot schools was designed to represent different situations and profiles rather than to achieve statistical representativeness. Therefore, the results of the pilot phase are suitable for testing the methodology and analysing processes, but they cannot be directly generalised to the entire region without further expansion.

Acknowledging these limitations ensures transparent interpretation of results and provides a solid foundation for subsequent, more in-depth stages of analysis within the EBICOS project.