paranoá ORIGINAL ARTICLE
TECHNOLOGY, ENVIRONMENT AND SUSTAINABILITY
2025
v.18, e53542

Water consumption in schools for people with disabilities

Consumo de água em unidades de educação para a pessoa com deficiência

Consumo de agua en unidades educativas para personas con discapacidad

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CRediT

Authorship Contribution: Conceptualization; Data Collection; Methodology; Writing – original draft and review: MATTOS, P. A. R.; Data Curation and Analysis; Software; Writing – editing: CRISTOFOLI, B. S.; Conceptualization, Analysis; Software; Supervision; Visualization; Writing – review and editing: KALBUSCH, A.; Methodology; Analysis; Software; Supervision; Visualization; Writing – review and editing: HENNING, E.

Conflict of Interest: The authors certify that there is no conflict of interest.

Funding: Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC) [2023TR000334] and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) [423090/2021-6].

Ethics Approval: Project approved by the Ethics Committee of Santa Catarina State University (CAAE n. 70209623.7.0000.0118).

I.A.: The authors certify that no artificial intelligence was used in the preparation of this work.

Editors: Daniel Sant'Ana (Editor-in-Chief); Ricardo Prado Abreu Reis (Guest Editor); Heber Martins de Paula (Guest Editor); Pedro G. Cardoso (Editorial Assistant).

Submitted on: 15 April 2024 | Accepted on: 11 April 2025.

Abstract

Water is a limited natural resource, essential for life. The sustainable management of water resources requires estimates of water consumption in the built environment. The objective of this paper is to determine the water consumption in units of the Associação de Pais e Amigos dos Excepcionais (APAE) in the state of Santa Catarina, Brazil. Twenty-nine units were selected for data analysis. The average per capita consumption ranged from 3.93 liters/student/day to 24.20 liters/student/day. The average consumption per unit varied between 7.10 m^3/school/month and 210.63 m^3/school/month. The results showed a positive correlation between monthly water consumption and the number of students, number of meals, number of restrooms, number of toilets, built area and age of the building variables. Furthermore, analyses have shown that per capita water consumption decreases as the number of students, the number of toilets and the area of buildings increase. The results of this study can motivate new research related to water consumption and people with disabilities in Brazil.

Key-words: Water consumption; Disabled person; Schools.

Resumo

A água é um recurso natural limitado, essencial para a vida e a gestão sustentável dos recursos hídricos requer estimativas sobre os indicadores de consumo no ambiente construído. O objetivo deste trabalho é determinar os indicadores de consumo de água em unidades da Associação de Pais e Amigos dos Excepcionais (APAE) do estado de Santa Catarina, no Brasil. Vinte e nove unidades foram selecionadas para realização da análise dos dados e determinação dos indicadores de consumo. O consumo médio per capita variou entre 3,93 e 24,20 litros/aluno/dia. O consumo médio mensal por unidade educacional variou entre 7,10 e 210,63 m^3/escola/mês. Os resultados mostraram que há correlação positiva entre o consumo total de água mensal das unidades educacionais e as variáveis número de alunos, número de refeições servidas, número de banheiros, número de bacias sanitárias, idade da edificação e área construída. Além disso, as análises mostraram que o consumo per capita de água diminui conforme aumentam o número de alunos, o número de bacias sanitárias e a área construída das edificações. Os resultados deste estudo podem servir de estímulo para novas pesquisas relacionadas ao consumo de água e a pessoa com deficiência no Brasil.

Palavras-chave: Consumo de água; Pessoa com deficiência; Escolas.

Resumen

El agua es un recurso natural limitado, esencial para la vida y la gestión sostenible de los recursos hídricos requiere estimaciones de los indicadores de consumo en edificios. El objetivo de este trabajo es determinar los indicadores de consumo de agua en unidades de la Associação de Pais e Amigos dos Excepcionais (APAE) en el estado de Santa Catarina, Brasil. Se seleccionaron veintinueve unidades para realizar análisis de datos. El consumo medio per cápita osciló entre 3,93 y 24,20 litros/estudiante/día. El consumo medio por unidad osciló entre 7,10 y 210,63 m^3/escuela/mes. Los resultados mostraron que existe una correlación positiva entre el consumo mensual de agua y las variables número de estudiantes, número de comidas, número de baños, número de sanitários, edad y área del edificio. Además, los análisis mostraron que el consumo de agua per cápita disminuye a medida que aumenta el número de estudiantes, el número de baños y la area de los edifícios. Los resultados de este estudio pueden servir como estímulo para nuevas investigaciones relacionadas con el consumo de agua y las personas con discapacidad en Brasil.

Palabras-clave: Consumo de agua; Persona con discapacidad; Escuelas.

1 Introduction

According to the Agência Nacional de Águas [National Water Agency] (ANA, 2022), water is a limited natural resource which is essential to life and, according to the United Nations Organization (UNO, 2022), with the fast population growth, its consumption has been constantly increasing. Therefore, supply crises are increasingly frequent (ANA, 2022). In Brazil, water management is regulated by the National Water Resources Policy, which has as one of its goals "to ensure current and future generations will have the necessary water availability, in quality standards appropriate to its respective uses" (Brazil, 1997). Sustainable water management requires accurate evidence-based estimates of per capita consumption (Hussien; Memon; Savic, 2016). These analyses may also be useful for better water system design (Farina *et al.*, 2011).

According to the Institute for Health Metrics and Evaluation (IHME, 2019), the world has more than 2.5 billion people with some kind of physical or intellectual disability. Every person uses water, both because it comprises from 50% to 70% of a person's body weight and, thus, needs to be part of the daily intake (Wenhold; Faber, 2019), and because it is consumed in daily life activities, such as in the use of a restroom (Greiman *et al.*, 2022). People with disabilities also use water in public spaces, such as schools. According to Haas *et al.* (2016), the number of students with disabilities in schools has increased in recent years.

In Brazil, people with disabilities are offered access to education, health care and social assistance by the Associação de Pais e Amigos dos Excepcionais (APAE) [Association of Parents and Friends of Exceptional People], a non-governmental, non-profit organization, according to the Federação Nacional das APAEs [National APAE Federation] (FENAPAES, 2023). APAE started in 1954 in Rio de Janeiro and has stood out in promoting comprehensive care for people with disabilities ever since (FENAPAES, 2023). Water consumption in schools for people with disabilities, such as the APAEs, is an under-addressed topic in the science field, but it should not be neglected (Sudoski; Monteiro, 2023).

In fact, the scientific literature has limited research on the needs and experiences of people with disabilities regarding environmental topics (Ivanova; Middlemiss, 2021). Ivanova and Middlemiss (2021) highlight the importance of the visibility of people with disabilities in environmental practice and policies, considering their specific needs and challenges in pursuit of a more sustainable future. Furthermore, Dassah and Bisung (2023) state that research must be performed on the relationship between water, sanitation and hygiene (WASH) and people with disabilities in school environments. In this context, the goal of this work is to estimate water consumption indicators in units of the APAE in the state of Santa Catarina, Brazil. Additionally, we seek to identify variables that have an effect on increasing or reducing water consumption in those units.

2 Methodology

This section describes the methodological procedures for the development of this work. The first phase involved data collection from the APAE units and from the water utilities. After data collection, an analysis was carried out to estimate the water consumption indicators, as follows.

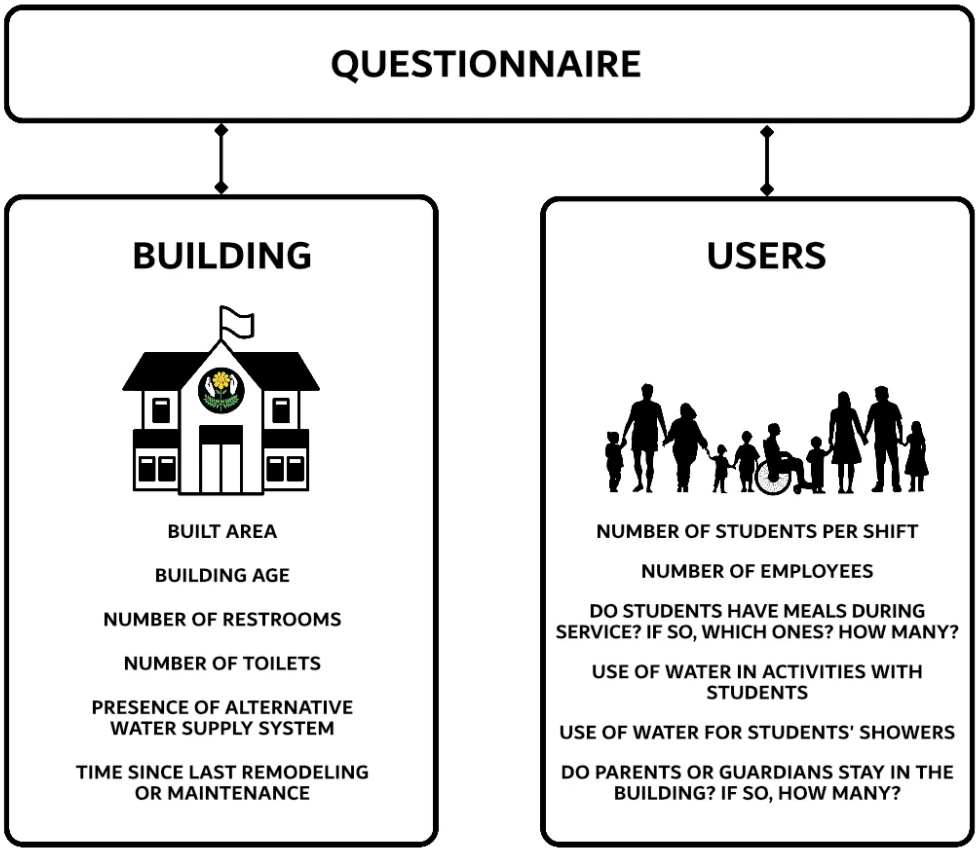
2.1 Object of Study

Data collection was performed at some Associação de Pais e Amigos dos Excepcionais (APAE) units. According to FENAPAES (2023), APAE is an organization that aims to promote integral attention to people with disabilities, providing educational and clinical care from early childhood to the old age. According to the Federation of APAEs from the state of Santa Catarina (FEAPAES-SC, 2022), in Santa Catarina, there are 198 APAE units which serve, approximately, 27,000 people with disabilities. In this paper, 29 units were selected for the analyses.

2.2 Data Collection

Information about the characteristics of the buildings and the students served by the association was collected using an on-line form (Figure 1) made available on the Microsoft Forms platform for those responsible for each institution, who were contacted with the assistance of the Federação das APAEs do Estado de Santa Catarina [Federation of APAEs from the state of Santa Catarina], through phone calls and contact on social media.

Figure 1: Outline of questions contained in the on-line form.



Monthly water consumption data were collected directly from the water utilities in each city, with the consent of FEAPAES-SC, for the period from March 2021 to March 2023 (24 months). After the water consumption data of the responding units were validated, units with no consumption or no consumption recorded during part of the studied period were excluded.

The number of consumers considered in this study is the number of students enrolled during the school year of 2023, as the number of students in each year could not be

obtained, which is a limitation of this study. The number of school days was calculated based on the business days from the national calendar minus the municipal holidays from 2021 to 2023 in the cities where the responding units are based. Months indicated in the form as vacation were disregarded.

2.3 Data Analysis

The water consumption data analysis was performed considering the monthly consumption of each APAE unit, as well as the per capita daily consumption. The per capita water consumption indicator was calculated using Equation 1.

$$C_{PC} = \frac{C_M}{N \times D} \quad (1)$$

Where:
$C\ P\ C$ = per capita water consumption (in liters per student per day);
$C\ M$ = monthly water consumption (in liters);
N = total number of students;
D = number of school days.

The analyzed water consumption indicators, therefore, regard the buildings' monthly water consumption (in m^3/school/month) and per capita consumption (in liters/student/day). The correlation analysis was performed to identify a possible relationship between the water consumption indicators and the following quantitative variables collected from the questionnaire: number of students; built area (in m^2); age of the building; number of restrooms; number of toilets and number of meals served. The intensity of the relationship between variables ranges from -1 to +1, being stronger when approaching those values and weaker when approaching zero (Mattos; Azambuja; Konrath, 2017). For the correlation analysis, the Pearson correlation coefficient was calculated (Barbetta; Reis; Bornia, 2024) between the normally-distributed quantitative variables, and Spearman's correlation coefficient was used when the variables' distribution was not normal (Miot, 2018). The Shapiro-Wilk test (Razali; Wah, 2011) was applied to assess data normality.

To complete the analyses, we evaluated if per capita consumption is different between schools of different sizes. For that purpose, data referring to the number of students were sorted into three categories: schools with fewer than 100 students; schools with between 100 and 300 students, and schools with more than 300 students. The ANOVA (analysis of variance) was applied to compare the averages from the three groups and determine whether at least one is statistically different from the others. Later, the Tukey multiple comparison test was applied to determine which specific groups are different from each other in terms of average water consumption (Sousa *et al.*, 2012). The statistical analysis was carried out with R (R Core Team, 2024), with a significance level α=5%.

3 Results and Discussions

The on-line questionnaire was responded by 38 units. After analyzing their corresponding water consumption, 29 were considered eligible for the study. Figure 2 shows the distribution of the APAE units in the sample by state region. The North and West regions had more respondents than the other regions of the state of Santa Catarina.

Figure 2: Distribution of the responding APAE units according to the region in the state of Santa Catarina.

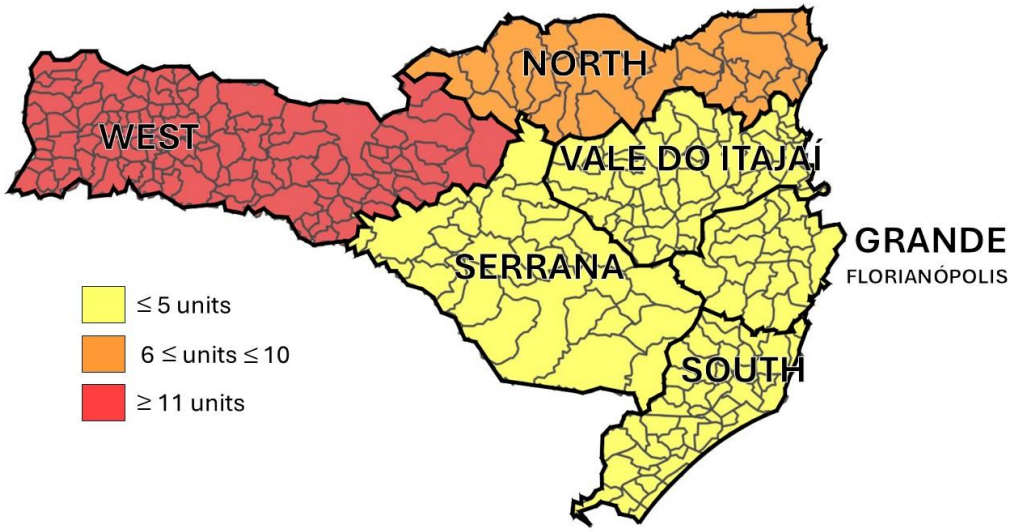


Table 1: Characterization of the APAE units in the sample.

Unit	Number of Students	Built area (m^2)	Age of building (years)	Toilet bowls	Use of water in activities with students	Alternative supply system	Number of employees	Last maintenance (years)
1	680	2,800.55	58	20	No	Yes	150	0
2	540	3,596.88	53	31	Yes	No	99	0
3	76	500.00	27	11	Yes	No	21	20
4	127	5,000.00	30	8	Yes	No	20	2
5	29	648.33	26	5	Yes	Yes	14	10
6	73	1,353.00	16	15	Yes	No	25	1
7	54	664.00	40	8	Yes	Yes	23	0
8	112	1,639.00	15	19	Yes	No	25	Never
9	113	1,200.00	25	9	Yes	No	28	0
10	356	3,741.25	19	20	Yes	Yes	72	5
11	361	2,500.00	40	22	Yes	Yes	70	8
12	92	1,144.62	33	8	Yes	Yes	33	10
13	22	94.33	10	6	Yes	No	15	6
14	146	648.50	14	8	Yes	No	37	0
15	55	916.25	15	7	No	No	18	15
16	74	1,500.00	25	8	Yes	No	22	1
17	145	832.00	10	11	No	Yes	28	4
18	80	2,881.00	25	18	Yes	No	31	1
19	171	1,068.00	50	12	No	No	15	0
20	137	629.74	44	7	No	No	29	0
21	86	1,032.00	30	10	Yes	No	29	30
22	160	1,250.00	36	14	Yes	Yes	40	1
23	38	780.00	21	7	Yes	No	29	20
24	59	565.96	15	6	Yes	No	23	Never
25	82	1,301.25	40	8	Yes	No	27	0
26	67	2,300	30	5	No	No	26	1
27	81	688.25	35	5	Yes	No	29	3
28	55	1070.29	20	13	Yes	No	26	10
29	513	3,609.34	20	43	No	No	102	1

Table 1 presents the characterization of the APAE units obtained from the answers to the questionnaire. Each unit was identified with Arabic numerals to ensure data confidentiality. All information in the table has been provided by the survey respondents

through the on-line form. The number of students corresponds to those who stay in the unit in the morning, afternoon and full-time periods.

One of the requested pieces of information is whether the APAE unit has any alternative water supply system. Specifically informing what kind of alternative water supply system is implemented was not mandatory. However, some units reported having an artesian well or a rainwater harvesting system. Another question was about how long it had been since the last water system maintenance was carried out in the building. Units presented in Table 1 with zero for this answer were carrying out maintenance during the questionnaire period or had done it within the last year. Two units reported that the system undergoes occasional repairs, which are not considered maintenance by the respective respondents.

Table 2: Descriptive statistics of per capita water consumption in the APAEs (liters/student/day).

Unit	Minimum	1st quartile	Median	Average	3rd quartile	Maximum	Standard deviation
1	7.63	13.37	16.31	15.37	17.42	20.58	3.48
2	4.07	6.21	7.01	8.85	12.08	16.86	3.55
3	3.28	8.88	13.15	14.16	17.49	39.47	8.74
4	1.02	7.02	9.94	10.69	13.73	27.55	6.62
5	4.49	16.86	22.41	24.20	28.30	44.97	9.99
6	5.36	8.49	11.64	13.34	16.80	26.54	6.09
7	0.91	3.75	5.67	6.03	7.04	18.80	3.88
8	1.16	7.44	8.92	8.53	9.66	13.97	2.96
9	3.07	9.66	11.64	11.44	14.09	17.69	3.89
10	0.36	1.39	4.28	3.93	6.10	7.78	2.50
11	1.56	3.78	4.78	4.95	6.24	8.17	1.72
12	5.43	11.12	16.79	19.67	27.66	48.20	12.02
13	6.99	17.85	21.15	21.32	24.64	32.69	6.29
14	5.60	7.16	7.93	8.74	9.74	15.41	2.42
15	8.18	12.41	15.31	14.65	16.81	19.19	3.18
16	5.80	9.06	11.60	12.47	14.77	23.15	4.76
17	3.28	5.34	7.58	8.51	9.94	16.47	4.16
18	7.03	12.68	15.32	16.41	18.78	34.28	6.52
19	3.50	6.61	17.79	15.15	22.49	30.86	9.04
20	4.86	9.12	9.87	13.80	20.10	28.81	6.90
21	1.16	11.93	16.27	17.11	19.46	48.17	10.67
22	6.25	8.69	12.23	11.26	12.81	17.01	2.84
23	8.91	17.40	20.51	21.22	23.60	36.78	6.74
24	1.69	9.70	12.48	15.61	15.18	55.93	13.03
25	0.53	2.97	4.49	4.22	5.00	11.66	2.40
26	3.52	6.54	10.69	10.95	13.59	19.19	4.86
27	3.08	8.50	13.52	18.96	18.90	69.75	16.41
28	7.11	12.91	17.35	17.73	22.39	31.57	6.50
29	5.85	8.25	10.45	14.82	16.79	39.50	9.63

Unit 1 has the largest number of students and the oldest building. Unit 4 is the largest in terms of built area, while 13 is the smallest, both in area and in number of students. It also has the newest building. In the fields reserved for comments from the respondents, two units expressed concern regarding water waste (units 19 and 22). Two other units reported that their consumption is considered low (units 19 and 28). However, both have an average per capita consumption higher than the average found in this study, which highlights that the comments only reflect the respondents' personal views. Furthermore, two respondents communicated the presence of leaks in the restrooms (units 18 and 23), with unit 23 showing the third highest per capita consumption among all. Two respondents reported waste: one mentioned that students flush the toilet unnecessarily (unit 21), while

the other highlighted that they forget to turn off the taps (unit 8). However, unit 8 has an average per capita consumption lower than the average found in this study.

Table 2 presents descriptive statistics of per capita water consumption (in liters per student per day), while Table 3 presents descriptive statistics of monthly water consumption in APAE buildings in Santa Catarina.

Table 3: Descriptive statistics of monthly water consumption in APAE buildings (m^3/school/month).

Unit	Minimum	1st quartile	Median	Average	3rd quartile	Maximum	Standard deviation
1	109.0	184.0	218.0	210.6	239.5	281.0	47.26
2	44.0	67.0	77.0	96.11	124.5	173.0	35.78
3	5.0	13.5	21.0	21.95	26.0	60.0	13.61
4	3.0	16.0	25.0	27.74	35.5	77.0	17.64
5	3.0	10.5	13.0	14.32	17.5	30.0	6.18
6	9.0	12.0	19.0	19.47	24.5	38.0	8.20
7	2.0	8.5	13.0	13.32	15.0	41.0	8.47
8	3.0	17.0	20.0	19.26	20.5	36.0	7.03
9	8.0	23.0	25.0	26.05	34.0	38.0	8.24
10	3.0	11.0	32.0	28.26	41.5	61.0	17.79
11	13.0	28.0	35.0	35.89	40.5	62.0	11.87
12	10.0	21.5	28.0	37.42	51.5	102.0	24.17
13	4.0	9.5	11.0	11.16	12.5	17.0	2.73
14	18.0	22.0	24.0	25.89	28.5	45.0	6.51
15	9.0	15.0	16.0	16.11	18.0	22.0	3.19
16	12.0	17.5	22.0	23.68	29.0	42.0	8.06
17	10.0	15.5	22.0	25.42	31.0	53.0	1.32
18	17.0	27.5	35.0	34.79	39.0	72.0	13.02
19	12.0	24.0	67.0	52.84	84.0	95.0	31.33
20	14.0	25.0	28.0	38.26	59.0	75.0	18.77
21	2.0	21.0	28.0	30.42	34.0	87.0	20.11
22	21.0	28.5	39.0	36.53	43.0	49.0	8.21
23	16.0	27.0	32.0	33.68	37.5	66.0	10.97
24	2.0	12.0	15.0	18.89	19.5	66.0	15.73
25	1.0	5.5	7.0	7.10	8.0	22.0	4.41
26	6.0	12.5	20.0	18.79	23.5	37.0	8.04
27	5.0	15.5	22.0	30.89	27.5	113.0	26.46
28	9.0	16.0	21.0	19.53	23.5	33.0	6.32
29	66.0	92.5	118.0	152.2	176.5	385.0	92.52

Table 4: Descriptive statistics on average water consumption (m^3/school/month), average per capita consumption (liters/student/day), number of students and age of the APAE buildings.

Variable	Minimum	1st quartile	Median	Average	3rd quartile	Maximum	Standard deviation
Per capita consumption (liters/student/day)	3.93	8.74	13.80	13.24	16.76	24.20	5.27
School consumption (m^3/school/month)	7.10	19.07	26.05	38.85	36.21	210.6	43.41
Students	26	76	105	163	146	680	164
Age of the building	10	19	26	28.34	36	58	12.86

Table 4 presents descriptive statistics of average monthly water consumption at the APAEs, the average per capita consumption, the number of students and the age of the building. The average consumption in the buildings is 38.85 m^3/school/month, ranging from 7.10 m^3/school/month (unit 25) to 210.6 m^3/school/month (unit 1). Schultt, Kalbusch and Henning (2021) found an average consumption of 111.45 m^3/school/month and a maximum of 300.25 m^3/school/month in a study on elementary and high school institutions in Joinville, Santa Catarina, Brazil. Pala and Mendes (2020) analyzed the water

consumption of the APAE unit in the city of Machado (state of Minas Gerais). They found that the average monthly consumption was 138 m^3 and the unit had 133 students.

The school units' average monthly consumption variation in the sample may result from several factors, such as the difference in built areas, number of users, age of the buildings, and availability of plumbing equipment. Unit 1, with an average water consumption of 210.6 m^3/school/month, has 680 students and 150 employees, 58 years of age, 2,800.55 m^2 of built area and 20 toilets. Unit 25, with an average water consumption of 7.10 m^3/school/month, serves 82 students and employs 27 people. The 1,301.25 m^2 building is 40 years old and has 8 toilets.

The results show that the average per capita consumption at the APAE units is 12.79 liters/student/day, ranging from 3.93 liters/student/day (unit 29) to 24.20 liters/student/day (unit 5). In a study carried out by Prado (2024), the water consumption of the APAE from Ribeirão Bonito (state of São Paulo) was calculated to be 14 liters/user/day, with users being the institution's students and employees. In a study conducted by Pala and Mendes (2020) at an APAE in the state of Minas Gerais, the average consumption, estimated according to the available data, was 34.59 liters/student/day. The average consumption found in this study (12.79 liters/student/day) is slightly higher than that from studies on public elementary and high schools by Schultt, Kalbusch and Henning (2021) in Joinville (state of Santa Catarina) and from a study on public schools by Antunes and Ghisi (2019) in Florianópolis (state of Santa Catarina), which found average per capita consumptions of 8.83 liters/student/day and 8.80 liters/student/day, respectively. Nunes *et al*. (2019) reported consumption indicators ranging from 1.0 liters/student/day to 103.5 liters/student/day in different types of schools in Recife (state of Pernambuco).

Water consumption in educational units for people with disabilities may differ from the consumption reported in other schools due to specific uses. Table 1 shows that, among the 29 units select for this work, 22 use water in pedagogical or clinical activities during service. Furthermore, in 10 units, respondents informed that students may eventually shower during the period when they are in the unit.

Figure 3 shows scatter plots between the monthly consumption in the APAE buildings in relation to the variables: number of students (Figure 3a); age of the building (Figure 3b); number of restrooms (Figure 3c); toilets (Figure 3d); built area (Figure 3e) and number of meals served (Figure 3f). Figure 4 shows the scatter plots between per capita consumption and the variables: number of students (Figure 4a); age of the building (Figure 4b); number of restrooms (Figure 4c); toilets (Figure 4d); built area (Figure 4e) and number of meals served (Figure 4f). Regarding distribution, only per capita consumption (p-value = 0.8647) and age of building (p-value = 0.1971) are normally distributed. All other variables, i.e.: number of restrooms (p-value = 0.0048); number of students (p-value < 0.0001); number of toilets (p-value < 0.0001); number of meals served (p-value < 0.0001); built area (p-value = 0.0003); and monthly water consumption in the buildings (p-value <0.0001) are not.

Figure 3: Scatter plots of monthly water consumption (m^3/school/month) and number of students, age of the building, number of restrooms, number of toilets, built area and number of meals served.

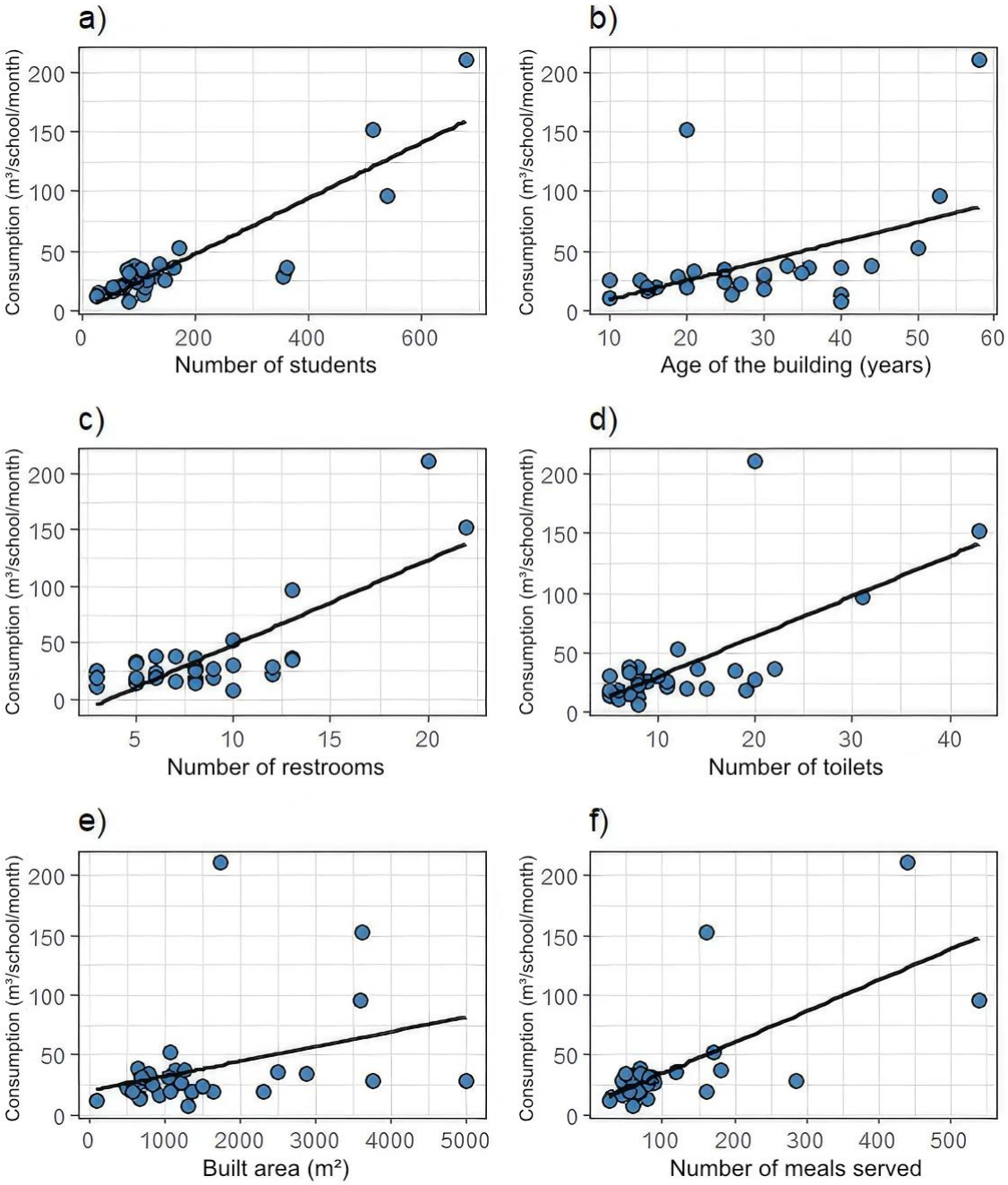


Figure 4: Scatter plots of per capita consumption (liters/student/day) and number of students, age of building, number of restrooms, number of toilets, built area and number of means served.

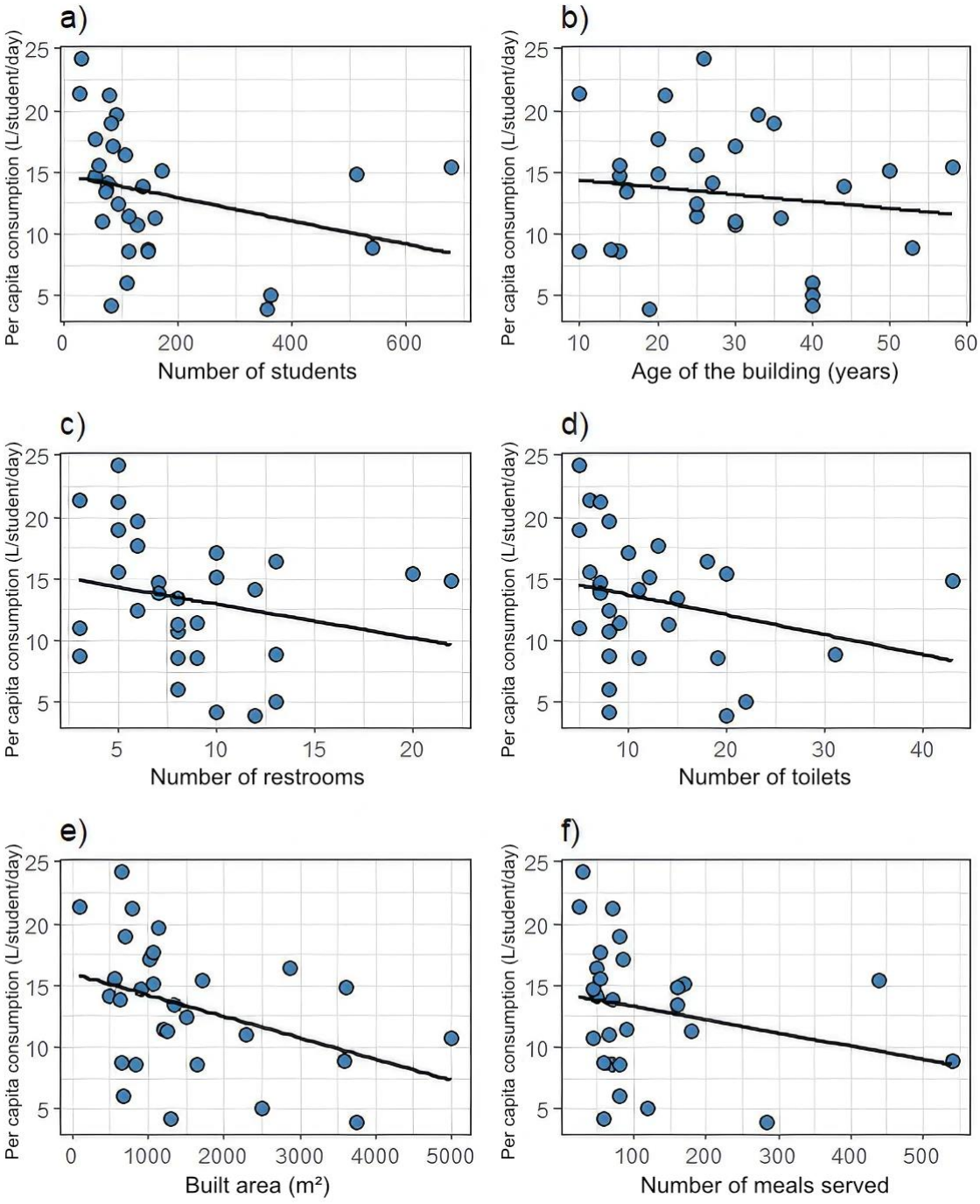


Table 5 shows the results of the correlation analysis. The number of students showed a strong positive correlation (0.7358) with monthly water consumption in the buildings. The age of the building, number of restrooms, number of toilets, built area and number of meals variables showed a significant positive correlation with the monthly water consumption in the APAEs. It can be inferred that the monthly consumption of the APAEs is higher in units with more students, located in older buildings, with a larger built area, a greater number of installed plumbing appliances and when more meals are served daily. Per capita consumption showed a significant moderate negative correlation with the number of students. The built area and number of toilets variables show a significant

negative correlation with per capita water consumption. Thus, the results of the correlation analysis showed that per capita water consumption (in liters/student/day) is lower in schools with a greater number of students, a larger built area and more toilets.

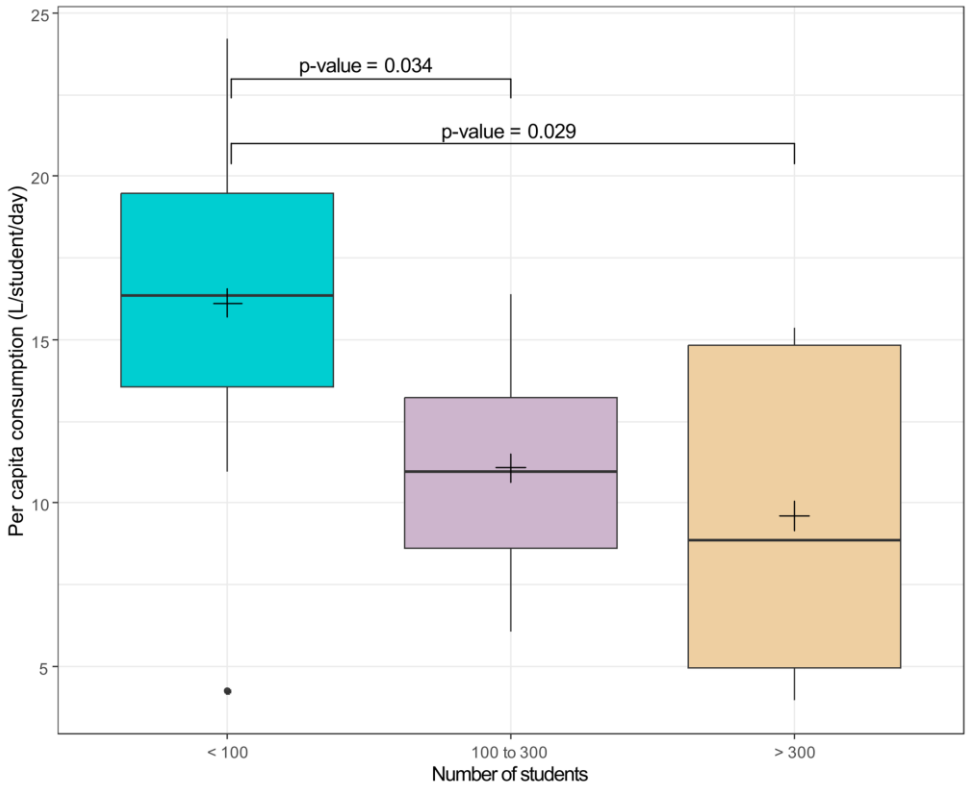
Table 5: Values of the correlation coefficients between the water consumption indicators and the other variables.

Variable	Monthly water consumption (m^3/school/month)	p-value	Water consumption per capita (liters/student/day)	p-value
Number of students	0.7358[b]	<0.0001	-0.5170[b]	0.0041
Age of the building	0.4727[b]	0.0096	-0.1401[a]	0.4684
Number of restrooms	0.4884[b]	0.0072	-0.3457[b]	0.0662
Number of toilets	0.5184[b]	0.0039	-0.3736[b]	0.0459
Number of meals served	0.6582[b]	0.0002	-0.3242[b]	0.0990
Built area (m^2)	0.3798[b]	0.0430	-0.4217[b]	0.0236

[a] Pearson Correlation Coefficient
[b]Spearman's Correlation Coefficient

Figure 5 presents boxplot graphs of per capita water consumption by number of students. The results from the ANOVA test indicate significant differences in consumption averages between at least two of the three categories (p-value = 0.0106). Furthermore, based on the results from the Tukey test, there are significant differences between schools with fewer than 100 students and the others.

Figure 4: Scatter plots of per capita consumption (liters/student/day) and number of students, age of building, number of restrooms, number of toilets, built area and number of means served.



The results from the ANOVA and Tukey tests corroborate those from the correlation analysis, which show that per capita water consumption is lower in APAE units with more students. These results also agree with those found by Morote *et al.* (2020), who evaluated

water consumption in schools in Alicante, Spain. The authors concluded that per capita consumption is lower in schools with more students.

The results indicate that the building's characteristics and its occupation affect the water consumption indicators differently. In APAE units with larger built areas and a higher number of toilets, the monthly water consumption in the building is higher, however, the per capita consumption is lower. This happens because the number of students presents a positive and significant correlation with the built area (p-value = 0.00295) and with the number of toilets (p-value < 0.0001). That means that APAE units with a larger number of students operate in larger buildings. A unit's monthly water consumption is expected to be higher where more students are served. Likewise, the per capita consumption tends to be lower when more users share the same building. This can be explained because water consumption for some activities related to cleaning and food preparation, for example, is divided between more users in schools with a larger number of students.

4 Conclusion

This research was carried out with the aim of identifying water consumption indicators in APAE units in the state of Santa Catarina, Brazil. 29 units were selected to carry out the analyses. The data collected from the APAE units and water utilities were used to achieve the proposed objective. Descriptive analyses were performed to determine data distribution and identify the average consumption in the APAE units. On average, the schools' per capita consumption is 12.79 liters/student/day, ranging from 3.93 liters/student/day (unit 29) to 24.20 liters/student/day (unit 5). The average monthly consumption in the buildings is 38.85 m^3/school/month, ranging from 7.10 m^3/school/month to 210.6 m^3/school/month.

The results showed a significant positive correlation between monthly consumption and the number of students, the age of the building, the number of restrooms, the number of toilets, the number of meals served and the built area. Furthermore, the correlation analysis showed that the per capita water consumption is lower in APAE units with more students, a larger built area and a higher number of toilets. The analysis of consumption indicators in schools for people with disabilities is a topic that has not been much explored, which implies an opportunity for future studies. Although this work presents the consumption of 29 APAE units, it can be replicated and the sample can be expanded. The results from this study can be a driving force for new research work related to water consumption and people with disabilities. One of this work's limitations is the lack of daily water consumption data. Likewise, only the number of enrolled students was available, with no information regarding how many attended the units on a daily basis. That is a limitation of our work, but, at the same time, an opportunity for future research.

Acknowledgements

The authors would like to thank the Federação das APAEs do Estado de Santa Catarina (FEAPAES-SC), the APAEs and the water utilities. This work was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) [423090/2021-6] and by Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC) [2023TR000334].

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