Mismatch between Classroom Furniture and Anthropometric Measures in Children Aged 3 to 6 Years: Case Study of the South-West Region of Kosovo

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Appropriate seating environments and comfort during educational activities at worktables are prerequisites for educational institutions in general. In this regard, special attention should be given to children enrolling in early childhood and kindergarten education within the pertinent institutions. Many researchers have concluded that a bad posture among children can be indicative of health problems and stagnation in the education process. The main purpose of this study is to determine whether the chairs and tables are suitable ergonomically for children aged 3 to 6. Also, in the study, the dimensions of children were analyzed and calculated to design ergonomic chairs and tables for this age group. The research was carried out within early childhood and kindergarten institutions in the southwest region of the Republic of Kosovo. Measurements were taken of 210 children in public and private institutions. According to (ISO 7250-1: 2017), field measurements include 12 body parts needed to determine furniture dimensions. The study's findings indicate a significant mismatch between anthropometric measurements and the dimensions of furniture across all the institutions examined.

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INTRODUCTION

Furniture is not designed to accommodate the specific dimensions of individual users (Panero and Zelnik 1979; Shah *et al*. 2013). This phenomenon is also present in children aged 3 to 6, and it is quite widespread in many countries of the world: Croatia, North Macedonia and Bulgaria (Iliev *et al*. 2023); Kosovo (Sejdiu *et al*. 2023, 2024); Greece (Gouvali and Boudolos 2006); Indonesia (Yanto *et al*. 2008); Chile (Castellucci, *et al*. 2010); Turkey (Acar *et al*. 2018; Kaya and Erkarslan, 2019); China (Miao *et al*. 2024); United Arab Emirates (Bendak *et al*. 2013); Saudi Arabia (Ramadan 2011), South Korea (Lee and Yun 2019); Nigeria (Fidelis and Ogunlade 2022); India (Savanur *et al*. 2007); New Zealand (Trevelyan and Legg 2010), *etc*. To realize such ergonomic designs, it is necessary to know the dimensions of the body of potential users during the design and production phase of the products. With small changes in dimensions and design, they can have a significant impact on the comfort, productivity (Alibegović *et al*. 2020; Žunjić *et al*. 2015), safety, and health of people in general (Barli *et al*. 2000).

In a study of British schools, a significant association was found between school furniture design and neck, upper back, and low back pain among children aged 11 to 14 years (Murphy *et al*. 2007). Among 11 to 14-year-old children in New Zealand, there are significant associations between the occurrence of neck and low back symptoms and chair attributes (Trevelyan and Legg 2006). Furthermore, other studies (Bejia *et al*. 2005) have reported that sitting posture and satisfaction with school furniture were linked to the occurrence of low back pain among school children.

Furniture in kindergartens is an integral factor in the general conditions of preschool facilities (Domljan *et al*. 2015). The design and the dimension of furniture has an impact on the psycho-physical development and sitting habits of children (Yeats 1997).

There is general agreement at the international level that Early Childhood Care and Education (ECCE) refers to the comprehensive attention provided to children from birth to eight years of age, different terms are used in different countries for ECCE services (Kim and Umayahara 2010). The European Pillar of Social Rights, in 11th principle out of 20 principles "Childcare and support to children" states (European-Commission 2021) that "children have the right to affordable early childhood education and quality care". Most children in Europe start primary education around the age of six. Currently, 31 million children under this age live in the European Union and are potential users of ECCE. However, not all of them are able to access this provision. On average, 34% of 14.7 million, or approximately 5 million children under the age of three attend ECCE.

According to the definitions of ISCED (International Standard Classification of Education) early childhood care and education system in Kosovo is structured on two levels (UNESCO, 2011) International Standard Classification of Education (ISCED) | UNESCO UIS (accessed date 04/2024):

- Level 01 (Early childhood education): It presents the early development and education of children from the age of 0 to under 3 years (UNESCO, 2011). (International Standard Classification of Education) early childhood educational development (code 010) and pre-primary education (code 020).

- Level 02 (Preschool education): education from the age of 3 to under 6 years

Recently, Kosovo has made progress in the level of inclusion in early childhood education and preschool education. Inclusion in early childhood education has been achieved mainly through the opening of private institutions. Greater inclusion has been achieved in preschool education, for the age group of 5 to 6 years, with 92.4% (Ministry of Education, 2018) (Ministry of Education, Science, Technology and Innovation of Kosovo (MESTI 2018), accessed date 04/2024).

In general, in the Balkan countries (including Republic of Kosovo) there is a lack of information and state guidelines for the furniture of preschool education institutions. Previous studies in countries such as Croatia, Bulgaria, and North Macedonia (Iliev *et al*. 2023) have encountered discrepancy in furniture dimensions in comparison to children's anthropometric measurements.

Regarding the Western Balkans, although such a manual already exists in the Republic of Croatia (Domljan *et al*. 2015), in other countries, including the Republic of Kosovo, there is a lack of basic data regarding furniture design according to ergonomic dimensions for the age groups included in the study. These limitations, including insufficient specifications of the furniture criteria and the fact that the Municipalities do not have the same financial resources, made them focus on one criterion, that of the lowest price of furniture and other equipment. This financial focus led to the neglect of ergonomic, qualitative, or contemporary methods in the educational process (Iliev *et al*. 2019).

Number of Children Enrolled in Early Preschool Education Institutions

Throughout Kosovo, there are 43 public and 88 private preschool institutions in operation. The number of children in public and private preschool institutions is 25,966, of whom, 3,809 children in the age group 0 to 5 years and 22,157 in the age group 5 to 6 years. The number of children in private preschool institutions is 3,020, of whom 2,083 are in the age group of 0 to 5 years and 937 are in the age group of 5 to 6 years (Ministry of Education, 2018).

In the region of Prizren, about 4,200 children attend preschool education in respective institutions. As for the gender structure in preschool education, 54% males and 46% females are involved (Ministry of Education 2018).

Table 1. Number of Children Enrolled in Pre-primary Education System in the District of Prizren

Municipality	Male	Female	Total
Dragash	148	156	304
Malishevë	594	542	1136
Mamushë	33	23	56
Prizren	932	882	1814
Suharekë	402	405	807
Total	2109	2008	4117

Source: Ministry of education, science technology and innovation of Kosovo (Statistics of education in Kosovo 2021/2022)

Table 2. Standards for Dimensions of Children's Seat and Table Height (Ministry of Education 2018)

No	Age	Table height	Seat height
01	Age 1-4	50.8 to 55.88 cm	25.4 to 30.48 cm
02	Age 5-7	55.88 to 63.5 cm	30.48 to 35.56 cm

It is intended to highlight the dimensions of children and furniture that are used in preschool institutions for children aged 3 to 6 years in the Municipality of Prizren.

Based on body dimensions, the compatibility level of furniture (chairs and tables) will be analyzed according to ergonomic requirements (seat height, seat width, seat depth, backrest height, and table heigh). The anthropometric dimensions of these furniture for the respective age group will also be calculated.

In Kosovo, there are guidelines for determining table and chair dimensions for the aforementioned categories (Fig. 1).

The above-mentioned objectives will be realized through measurements of 210 children from the region of southwest of Kosovo. In accordance with international standard (ISO 7250-1 2017), twelve parts of children's bodies were measured to determine the dimensions for ergonomic furniture. The primary objective of this paper is to determine the ergonomic dimensions of the chair and table according to the body size dimensions of children aged 3-6 years. Field measurements were used to calculate the discrepancy between furniture and anthropometric dimensions of the children.

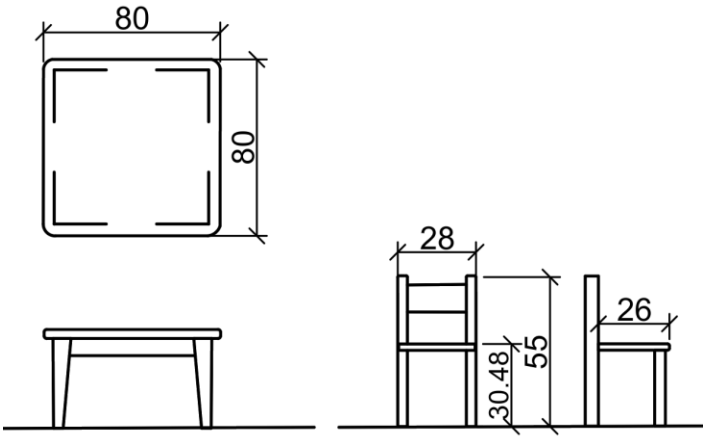

Fig. 1. Table and chair for children (Source: Guidelines for norms and standards of preschool facility space (page 47), MESTI, 2018)

Objectives of the Study

The study analyzed the level of (mis)match of furniture dimensions to the anthropometric characteristics of children aged 3 to 6 in preschool education institutions in the Region of Prizren, Republic of Kosovo and aims to answer the research questions:

1. Are the chairs and tables suitable for the classrooms where children aged 3 to 6 attend preschool education?
2. What are the suitable dimensions of the chair and table for children of these ages?

EXPERIMENTAL

Participants

The participants in the study are children from four different settlements in the territory of Prizren Municipality (Fig. 2).

Fig. 2. Regions where the samples were taken

The sample size was calculated through Slovin's formula (Newman and Newman 2017).

$$n = N/(1 + N[e]\text{^}2\ ) \quad (1)$$

where n is sample size, N is the population, and e is the level of precision. The level of accuracy is e = ±7 %. According to statistics of Municipality of Prizren, the total number of children between 3 and 6 years old is 11261 (N= 11261). According to the equation above, it is calculated that the sample size is 200. The number of children included in this study was 210. The study includes boys and girls from preschool institutions in the Municipality of Prizren.

Table 3. Number of Children Taken in the Study According to Institutions, Age, and Gender

School	Frequency	%
1	31	14.76
2	24	11.42
3	16	7.61
4	23	10.95
5	20	9.52
6	32	15.23
7	8	3.80
8	15	7.14
9	7	3.33
10	34	16.9
Total	210	100
Gender	Frequency	%
F	110	52.38
M	100	47.62
Total	210	100
Age	Frequency	%
3	39	18.57
4	44	20.95
5	65	30.95
6	62	29.53
Total	210	100

Procedures

Permission to conduct the research was obtained from the authorities of the Directorate of Education in Prizren. Institutions that refused to participate were replaced by other institutions in the same study area. The study encompasses children enrolled at educational level 02 (Preschool education). According to the Kosovo Law on Primary and Secondary Education (no. 2002/2, 2006), this level encompasses children aged 3 to 6 (Ministry of Education, Science, 2006). Respective institutions were selected randomly (seven in the city of Prizren and three in rural settlements). Within each of the five schools and five kindergartens selected (out of 51 schools and 8 licensed kindergartens in the Municipality of Prizren, (Ministry of Education, 2018), 210 children were randomly selected including approximately 20 children for each institution.

Anthropometric measurements were collected while the children were in a seated position on a chair, with knees bent at 90°, and with the soles not touching the floor.

According to researchers, including those in this study, the body dimensions of children were measured using traditional tools (Taifa and Desai 2017), including several instruments: chair (designed for this purpose), anthropometer, caliper, tape measure, and angle gauges.

Anthropometric measurements of the children were conducted between June and September 2022. Throughout the measurement process, the children were barefoot, and 2.5 cm was added for shoes (Dianat *et al*. 2013; Pheasant and Haslegrave 2018). In accordance with international norms of anthropometric standards (ISO 7250-1:, 2017), 12 body parts were measured, but only 6 measurements that are needed for the design of the chair and table are used in this study (Table 6).

Fig. 3. a. and c. Classroom furniture, b. and d. The process of measuring (Source: Photographs taken by the authors during process of measurements)

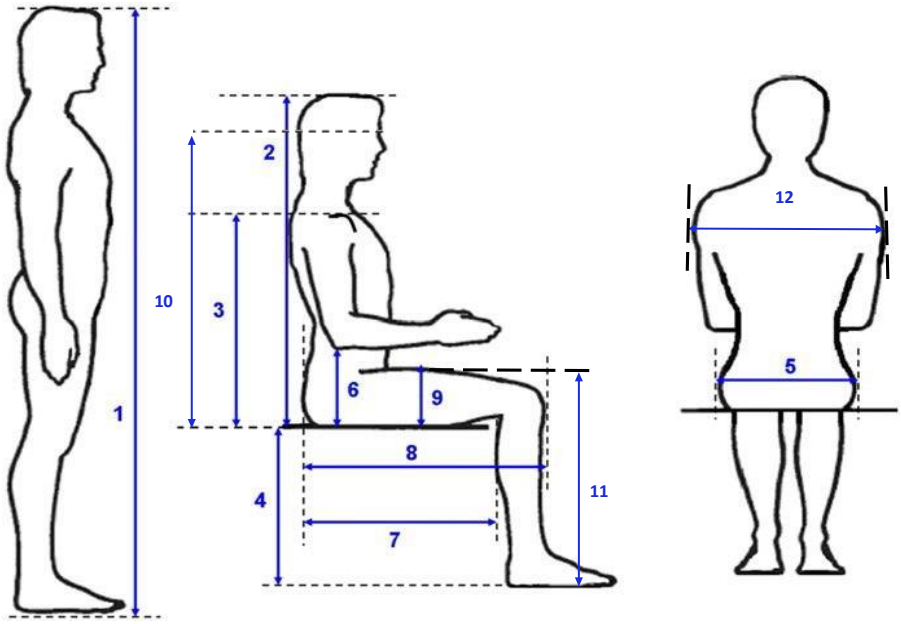

Fig. 4. Anthropometric measurements according to ISO 7250-1:2017 (for the purposes of the study, measurements Shoulder height, Popliteal height, Hip breadth, Elbow height, Buttock popliteal length, Thigh clearance were taken into account): 1. Stature, 2. Sitting height, 3. Shoulder height, 4. Popliteal height, 5. Hip breadth, 6. Elbow height, 7. Buttock-popliteal length, 8. Buttock-knee length, 9. Thigh clearance, 10. Eye height, 11. Knee height, 12. Shoulder width Source: (Dianat *et al*. 2013).

Data Evaluation

The internal consistency between the measurements was determined through 'Cronbach Alpha' (Tavakol and Dennick 2011), which determines the internal consistency of the collected data and the analyzed data were high in consistency (0.841), as shown in Table 4.

Table 4. Consistency between the Measurements (Kocak *et al*. 2014; Arof *et al*. 2018)

Coefficient of Cronbach's Alpha	Reliability level
More than 0.9	Excellent
0.8 to 0.89	Good
0.7 to 0.79	Acceptable
0.6 to 0.69	Questionable
0.5 to 0.59	Poor
Less than 0.59	Unacceptable

Reliability statistics	
Cronbach Alfa	No. of dimensions
0.841	10

Mismatch Criteria

To determine the anthropometric criteria of the furniture, in addition to the collected data, the degree of their compatibility or incompatibility was calculated by the following equations,

Popliteal Height (PH) (Seat Height Criteria (SH)): $(PH + 2{,}5)COS30^0 \leq SH \leq (PH + 2{,}5)COS5^0$ (2)

Hip Width (HB) (Seat Width Criteria (SW): $110\%HB \leq SW \leq 130\%HB$ (3)

Buttock Popliteal Length (BPL) (Seat Depth Criteria (SD): $80\%BPL \leq SD \leq 95\%BPL$ (4)

Shoulder height (SH) (Backrest height criteria (BH): $60\%SH \leq BH \leq 80\%SH$ (5)

Minimum table height (MTH): $hE = hEv + U[(1-1) + 1(1-1)] = hEv$ (6)

Minimum table height: $hE = hEv + U[(1 - cos\varphi) + cos\varphi(1 - cos\beta)] = hEv + U[(1 - 0{,}9063) + 0{,}9063(1 - 0{,}9397)] = hEv + U(0{,}1483) = hEv + 0{,}1483hS - 0{,}1483hEv = 0{,}8517hEv + 0{,}1483Hs$, (7)

$$since\ U = hS - hEv.$$

The theoretical and practical principles of ergonomics were taken into account in the calculation of the data. Using the combination of equations, the minimum and maximum limits were determined. Any dimension that falls within these values was considered appropriate (Gouvali and Boudolos 2006).

The collected data were analyzed by means of descriptive statistics. In the study, the values for the minimum (min), maximum (max), standard deviation (SD), 5th, 50th, and 95th percentiles were taken into account.

RESULTS AND DISCUSSION

Table 5 presents the dimensions of the bodies of 83 children aged 3 and 4 years measured in the region of Prizren. Table 6 presents the dimensions of the chair and table calculated according to Eqs. 2 through 7. Based on the calculations in Table 6 and the recommendations of researchers (Panero and Zelnik 1979; Yanto *et al*. 2008), who emphasize that the seat heights should be designed for the 5th percentile of population group, the recommended seat height for children of these ages should be between of 18.8 and 21.6 cm; adding 2.5 cm for shoes, the seat height should be between 21.3 and 23.1 cm.

The width of the seat for children aged 3 and 4 years is calculated taking into account hip width, computations derived from Eq. 3 and the recommendations of other researchers (Aralar *et al*. 2016), who recommended that the width of the seat should be designed for the population group that fall in 95th percentile, then it is recommended that the chairs designed for children aged 3 and 4 years should have a width of the seat with dimensions 28.1 and 33.3 cm.

Another fundamental consideration in chair design is the depth of the seat. If the seat depth is too deep, the front surface or edge of the seat will press into the area just behind the knee, cutting off circulation to the legs and feet. In this regard, according to the dimensions of buttock popliteal length, computations derived from Eq. 4 and researchers' recommendations (Panero and Zelnik 1979; Ansari *et al*. 2018), the depth of the seat should be designed for the population of the 5^{th} percentile. Therefore, the recommendations from the study suggest that the depth of the chair fall within the range of 20.4 and 24.2 cm.

Backrest height should be determined based on researchers' recommendations, which suggest considering both the 50^{th} (Nohsc 1991) and 5^{th} percentile (Aralar *et al*. 2016). In this regard, the recommendations for children aged 3 and 4 years old for the population group that falls in the 5^{th} percentile and based on dimensions of shoulder height and the calculation of Eq. 5, the backrest height should be between 16.0 and 21.4 cm; and for 50^{th} percentile it should be 21.8 and 29.1 cm.

Another important characterization of furniture in classrooms is table height. Regarding this issue, researchers recommend the table height to be set to the 95^{th} percentile to fit the respective population (Rosyidi *et al.* 2016). In this regard, the height of table for children aged 3 and 4 is calculated based on dimensions of shoulder height and elbow height. Based on calculation of Eq. 6, the height of table is recommended to range between 44.7 and 46.3 cm.

Table 7 presents the dimensions of the bodies of 127 children aged 5 and 6 years measured in the region of Prizren.

As shown in Table 8, based on dimensions of popliteal height, computation from Eq. 2, and recommendations of researchers (Panero and Zelnik 1979; Yanto *et al*. 2008), the height of the chair for children aged 5 and 6 is considered to fall between the values (for 5th percentile) 22.9 and 26.3 cm. Then, adding 2.5 cm for shoe height, the seat height should be between 25.4 and 28.8 cm.

Table 5. Dimensions of Body Parts for Children Aged 3 and 4

		Stature (cm)	Shoulder height (cm)	Popliteal height (cm)	Hip breadth (cm)	Elbow height (cm)	Buttock popl. Length (cm)	Thigh clearance (cm)	Knee height (cm)
N	Valid	83	83	82	83	82	82	83	83
	Missing	0	0	1	0	1	1	0	0
Mean		104.4	36.5	25.5	22.1	14.6	29.5	7.3	32.7
Median		104.5	36.4	25.6	22.0	15.0	29.6	7.2	33
Mode		103.5	34.4a	25.6a	22.0	15.2	30.5	7.2	33.9
Dev. Std.		5.6	2.8	2.0	1.7	1.7	2.1	0.7	2.3
Variance		31.1	7.9	4.1	2.8	2.9	4.5	0.5	5.3
Range		24.8	14.2	9.7	7.0	8.8	9.3	3.2	10.8
Minimum		92.4	31.4	20.0	19.0	10.6	24.8	6.0	26.7
Maximum		117.2	45.6	29.7	26.0	19.4	34.1	9.2	37.5
Percentile	5%	94.9	32.6	21.7	19.6	11.4	25.5	6.2	28.4
	50%	104.5	36.4	25.6	22.0	15.0	29.6	7.2	33.0
	95%	113.0	41.3	28.5	25.6	17.3	32.8	8.5	36.6
a. Multiple modes exist. The smallest value is shown									

Table 6. Calculation of Dimensions for Furniture (Chair and Table) for Children Aged 3 and 4 Years

		Max. seat height (cm)	Min. seat height (cm)	Min. seat depth (cm)	Max. seat depth (cm)	Min. backrest height (cm)	Max. backrest height (cm)	Min. table height (cm)	Max. table height (cm)	Max. seat breadth (cm)	Min. seat breadth (cm)
N	Valid	82	82	82	82	83	83	82	82	83	83
	Missing	1	1	1	1	0	0	1	1	0	0
Mean		25.4	22.1	23.6	28.0	21.9	29.2	40.2	41.7	28.8	24.3
Median		25.5	22.2	23.7	28.1	21.8	29.1	40.2	42.0	28.6	24.2
Mode		25.5a	22.2a	24.4	29.0	20.6a	27.5a	40.2	42.0a	28.6	24.2
Std. Deviation		2.01	1.75	1.71	2	1.68	2.25	3.1	3.2	2.18	1.8
Variance		4.0	3.0	2.9	4.1	2.8	5.0	9.7	10.1	4.7	3.4
Range		9.7	8.4	7.4	8.8	8.5	11.4	16.8	16.7	9.1	7.7
Minimum		19.9	17.3	19.8	23.4	18.8	25.1	32.3	33.9	24.7	20.9
Maximum		29.6	25.7	27.3	32.4	27.4	36.5	49.1	50.6	33.8	28.6
Percentiles	5%	21.6	18.8	20.4	24.2	16.9	21.4	34.6	36.2	25.5	21.6
	50%	25.5	22.2	23.7	28.1	21.8	29.1	40.2	42.0	28.6	24.2
	95%	28.4	24.7	26.2	31.2	24.8	33.0	44.7	46.3	33.3	28.1
a. Multiple modes exist. The smallest value is shown											

Table 7. Dimensions of Body Parts for Children Aged 5 and 6 Years

		Stature (cm)	Shoulder height (cm)	Popliteal height (cm)	Hip breadth (cm)	Elbow height (cm)	Buttock popl. Length (cm)	Thigh clearance (cm)	Knee height (cm)
N	Valid	127	127	127	126	126	127	125	127
	Missing	0	0	0	1	1	0	2	0
Mean		117.1	36.0	29.8	23.4	12.8	32.7	8.0	37.8
Median		117.2	37.2	29.9	23.0	12.7	32.7	8.0	37.9
Mode		120.0	36.9a	29.4	22.4	10.3a	33.8	8.2	37.9
Std. Dev.		5.8	4.6	2.0	2.1	2.1	2.2	1.0	2.4
Variance		34.0	20.9	4. 0	4.2	4.3	4.9	1.0	5.7
Range		31.9	21.4	9.7	11.7	10.1	17.1	5.7	11.4
Minimum		103.3	24.6	24.9	19.6	8.5	22.8	6.0	32.2
Maximum		135.2	46.0	34.6	31.3	18,6	39.9	11.7	43.6
Percentiles	5%	107.5	26.7	26.4	20.6	9.6	29.7	6.6	34.0
	50%	117.2	37.2	29.9	23.0	12.7	32.7	8.0	37.9
	90%	126.5	41.5	33.3	27.6	16.8	36.7	10.1	41.8
a. Multiple modes exist. The smallest value is shown									

Table 8. Calculation of Dimensions for Furniture (Chair and Table) for Children aged 5 and 6 Years According to Authors Recommendations

		Max. seat height (cm)	Min. seat height (cm)	Min. seat depth (cm)	Max. seat depth (cm)	Min. backrest height (cm)	Max. backrest height (cm)	Min. table height (cm)	Max. table height (cm)	Max. seat breadth (cm)	Min. seat breadth (cm)
N	Valid	126	126	127	126	126	126	125	127	126	126
	Missing	1	1	0	1	1	1	2	0	1	1
Mean		29.7	25.8	26.2	31.1	21.6	28.8	42.5	45.0	30.4	25.8
Median		29.8	25.9	26.2	31.1	22.3	29.7	42.5	44.7	29.9	25.3
Mode		29.3	25.5	27.0	32.1	22.1[a]	29.5[a]	41.6[a]	37.2[a]	29.1	24.6
Std. Dev.		2.0	1.7	1.8	2.1	2.7	3.7	3.1	3.1	2.7	2.3
Variance		4.0	3.0	3.1	4.4	7.5	13.3	9.8	9.8	7.1	5.1
Range		9.7	8.4	13.7	16.2	12.8	17.1	17.0	16.7	15.2	12.9
Minimum		24.8	21.6	18.2	21.7	14.8	19.7	34.8	37.2	25.5	21.6
Maximum		34.5	30.0	31.9	37.9	27.6	36.8	51.8	54.0	40.7	34.4
Percentiles	5%	26.3	22.9	23.8	28.3	19.6	24.1	36.9	39.6	26.8	22.7
	50%	29.8	25.9	26.2	31.1	22.3	29.7	42.5	44.7	29.9	25.3
	95%	33.2	28.9	29.3	34.8	24.9	33.2	47.4	49.9	35.9	30.3
a. Multiple modes exist. The smallest value is shown											

The width of the seat for children aged 5 and 6 years was determined, taking into account hip width, computations derived from Eq. 3, and the recommendations of researchers (Panero and Zenik 1979; Castellucci *et al*. 2010), who recommended that the width of the seat should be designed for the population group of the 95th percentile. Based on this analysis, it is recommended that the chair width designed for children aged 5 and 6 years should be between the dimensions of 30.3 and 35.9 cm. Then, adding 2.5 cm for shoe height, the seat height should be between 32.8 and 38.4 cm.

Regarding seat depth, according to (Pheasant and Haslegrave 2018), an ideal seat depth must support the ischial tuberosities. A deep seat depth causes problems for the target population standing up and sitting down. Hence, recommendations are to use the dimensions of the population that falls in the 5th percentile (Castellucci *et al*. 2016; Rosyidi *et al*. 2016).

Based on the dimensions of buttock popliteal length, computations derived from Eq. 4, and recommendation of researchers, we recommend that the depth of the chair for children aged 5 and 6 years old should be between the values of 23.8 to 28.3 cm.

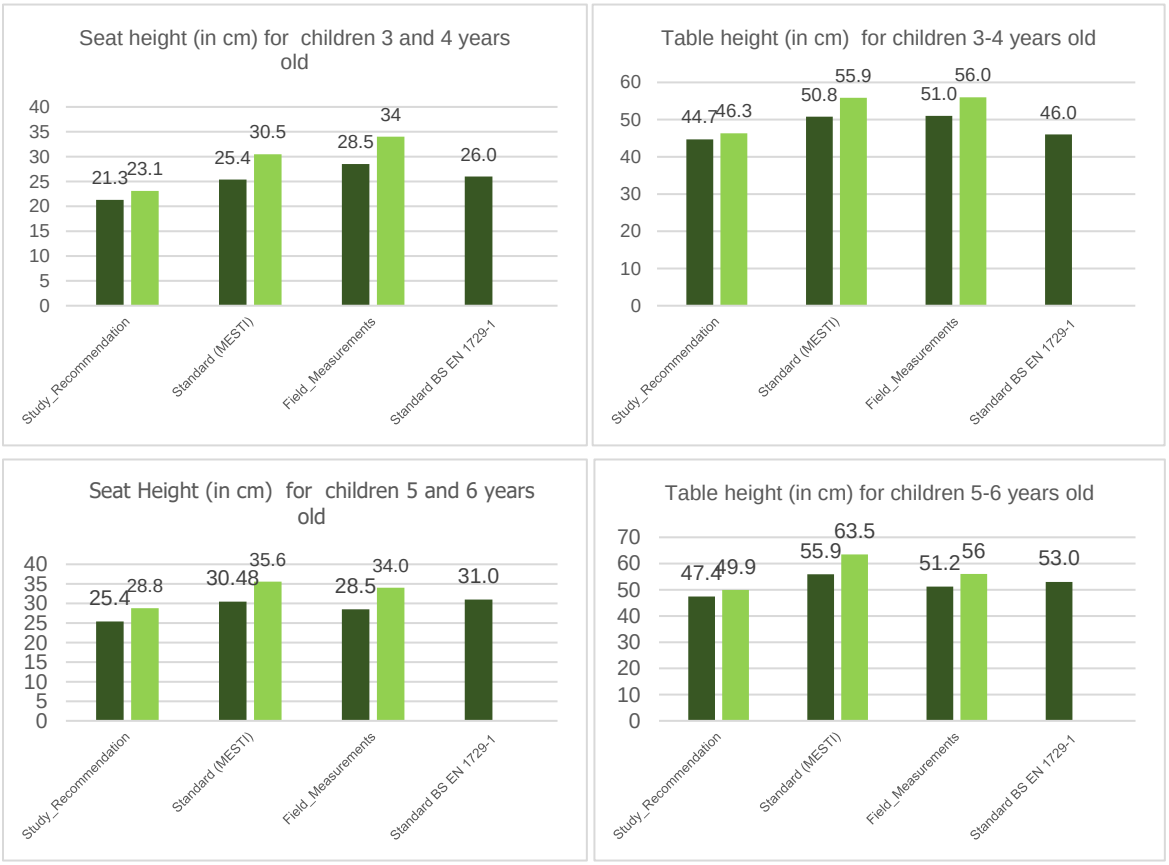

Fig. 5. Differences among study recommendations, standard according to the Ministry of Education (Ministry of Education, 2018), measurements in the field and standard BS EN 1729-1 (BS-EN 1729-1:2015) (cm).

Backrest height should be determined based on researchers' recommendations, which suggest considering both 50th (Nohsc 1991) and 5th percentiles (Aralar *et al*. 2016). In this regard, the recommendations for children aged 5 and 6 years old for the population group that falls in the 5th percentile. Based on dimensions of shoulder height and calculations from Eq. 5, the backrest height for the 5th percentile should be between 16.0

and 21.4 cm; and for the 50th percentile, 22.3 and 29.7 cm.

To accommodate table height for children who are aged 5 and 6 years, the dimensions of the 95th percentile were considered. The height of table is calculated based on dimensions of shoulder height and elbow height. Based on the calculation of Eq. 6, the height of table is recommended to fall within the range of 47.4 and 49.9 cm.

As shown in Fig. 5, red bars show recommendations for minimum height for seat and table; green bars show recommendations for maximum height for seat and table (according to study recommendation, standard of MESTI, field measurements, and standard BS EN 1729-1). Based on Fig. 5, the dimensions of the chairs and tables in the preschool institutions, where the measurements were made, do not have appropriate dimensions that are suitable for children who follow the educational process in these facilities.

CONCLUSIONS

Based on the findings presented in this paper, it is recommended that the responsible institutions should take necessary precautions to improve the conditions of children in the schools where they are enrolled. Measurements should also be made in other regions in order to draw a more accurate conclusion about the data of children in the territory of Kosovo. It is imperative to conduct a comprehensive review of the guidelines for norms and standards of the spaces of preschool facilities established by MESTI (2018) and subsequently align them with the empirical observations and research findings in the field. According to the study, the different heights of chairs and tables are encountered in all respective institutions. Even so, the lowest seat height measured in the field is 28.5 cm. According to the data, this chair height will not accommodate any child aged 3 and 4 years; but it will accommodate about 50% of children aged 5 and 6 years. Consequently, these chairs do not meet the anthropometric criteria regarding heights.

Regarding the depth of the seat, as a very important factor in the ergonomic determination, it has been found that the maximum depth of the chair is 33 cm. Based on the measurement data, it turns out that this depth exceeds all the body dimensions of the children. The minimum depth of the chairs measured was 28 cm. This depth accommodates around 5% of children 3 and 4-year-old children, while it accommodates about 50% of 5 and 6-year-old children.

Another important variable in determining ergonomics while sitting is the height of the table. In this respect, the minimum height found by field measurements turns out to be 51.2 cm. Based on the data, it appears that this height does not accommodate children of any age. This is attributed to the measured dimensions, which suggest a lower height of the table. Even for children aged 5 and 6 years (95th percentile), the maximum required height is between 46.2 and 50.1 cm.

Regarding the height of the back rest, the results show that the height of the back rest does not correspond to the measured dimensions.

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