

Analysis of the age-related dynamics of measuring of Kazakhstan woman adults

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Abstract. This study analysis the body sizes of Kazakhstan woman adults in order to categorize into 4 age groups. The sample size consisted of 1500 Kazakhstan females between the ages 18 and over 60 year. Most measurements items increased significantly relative to age. A total twenty seven measurements were obtained and analyzed in this study. There results were as follow: First, there were big differences in stature, waist height, knee height, body rise. Girth and width measurements of Kazakhstan females were significantly smaller than dimensions of the old “soviet” size typology 1986 year. However, there were no differences in Front waist length (Neck shoulder point to waist) and Back width. According to the comparison analysis of Kazakhstan females by age groups, all measurements had significant differences among the age groups. With age significantly increases except head girth, all girth and width, but height measurements is decreased.

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Introduction

This work was supported by the Foundation Grant of Ministry of education and research of the Republic of Kazakhstan. Size characteristics of consumers of the Republic of Kazakhstan nowadays regarding industrial manufacturing of clothes as determined by the old “soviet” industry-specific standards [1-4].

As for the classification of frames’ types developed in the Russian Federation for men, women and children population is applicable for only Russian manufacturers, as it reflects only size characteristics of Russians [5]. The present moment there is no information about modern size typology of the population of Kazakhstan, which adequately reflects size characteristics of different age groups, including shapes of women, men and children.

Manufacturers from Kazakhstan need own size characteristics for mass production of clothes [3,4].

Because of changes in sizes, proportions and forms of the human body, many countries, have conducted campaigns of anthropometric enquiry of the population for development a design of well proportioned fit clothes [5-8].

Therefore, this study was conducted to compare the body characteristics between Kazakhstan and old “soviet” size characteristics (1986 year) by utilizing body measurements.

These anthropometric data obtained on the basis of mass measuring of Kazakhstan woman adults by measurement methods using measuring tapes and calipers. The results obtained from this research

probably are helpful for apparel manufacturers, application of which on stages of clothing manufacture design preparation works will provide good fitting of the clothes on figures of Kazakhstan woman adults.

Methods

Twenty seven anthropometric measurement data of 1500 Kazakhstan women adults were analyzed in this study, including 12 items, 4 items, 9 items and 2 items under the dimensions of girth, height, length, width.

To determine the structure of the choice population sample method was applied [1-4]. Complied with all requirements for sampling: in accordance with percentage of age groups; randomness; accounting of the population, working in various spheres of activity (mental and physical).

As of January 1, 2014 year number of the female population in the Republic of Kazakhstan represents 52% of the total number, including 38% of the adult male population. 14% - is the number of the female population with age 1-17 year.

Kazakhstan women were categorized into 4 age groups because statistical data of adults of Kazakhstan women was fixed at 4 age groups.

Demographic distribution of subjects by age groups, which corresponds to percent distribution on ages in Kazakhstan, is shown in <Table 1>.

For expansion of knowledge of population structure concerning morphological structure of separate groups, in the course of collecting materials detailed questioning was made.

The list of the most important twenty seven measurements, which are often used in garments designing, are shown in <Table 2>.

Table 1. Demographic distribution of subjects (women)

Age groups	Count	%
18-29	434	11,0
30-39	297	7,5
40-49	294	7,5
more 50	475	12,0
Total	1500	38

Table 2. List of measurements

#	Groups	Name of measurements
1	Girth	Head girth
2		Neck girth
3		Hip girth
4		Bust girth
5		Chest girth
6		Under bust girth
7		Waist girth
8		Wrist girth
9		Thigh girth
10		Knee girth
11		Calf girth
12		Upper-arm girth
13	Height	Height
14		Knee height
15		Waist height
16	Length	Body rise
17		Back waist length
18		Front waist length (Neck shoulder point to waist)
19		Total crotch length (lower trunk length)
20		Arm length (shoulder to wrist)
21		Outside leg length
22		Inside leg length
23		Trunk Circumference
24		Shoulder length
25		Skye depth
26		Width
27	Bust width	

Results and discussion

All measurements were taken according to same measuring techniques [2, 9-13]. Size characteristics of women adults of old "soviet" size typology (1986 year) was obtained on the basis of mass measuring of the population of Soviet Union, which had been held by Central scientific-research institute in Moscow. Then population of Kazakhstan was presented, as 1% from the incurrence of population of Soviet Union.

<Table 3> illustrates the comparison of size characteristics of Kazakhstan women adults nowadays and during the Soviet Union.

Table 3. Comparison of women body dimensions

#	Measurements	Kazakhstan (2013 year)			Old "soviet" size typology (1986 year)		t-value	
		Mean	S.D.	Min	Max	Mean		S.D.
1	Head girth	55,83	1,5	51	61	55,17	1,51	17,883***
2	Neck girth	34,0	3,18	26	44,5	36,95	2,03	-46,717***
3	Hip girth	100,5	8,45	81	140	101,35	8,57	-23,071***
4	Bust girth	98,7	9,79	78	130,5	102,21	9,86	-115,85***
5	Chest girth	96,0	9,34	77,5	122	97,35	9,96	-15,152***
6	Under bust girth	81,1	9,8	57	116	85,86	8,64	-37,483***
7	Waist girth	81,0	11,82	69	119	81,27	11,14	-2,830***
8	Wrist girth	16,5	1,23	12	24	17,05	1,13	-30,741***
9	Thigh girth	53,6	6,2	32	87	57,85	5,19	-48,498***
10	Knee girth	37,9	3,9	28	52	37,07	2,86	12,138***
11	Calf girth	34,22	3,69	20	56	36,03	2,93	-31,373***
12	Upper-arm girth	30,28	3,51	18,5	43	30,99	3,36	-27,4***
13	Height	162,5	5,23	145	180,4	156,42	5,63	112,56***
14	Knee height	44,6	3,0	35	55	43,35	2,29	24,989***
15	Waist height	106,0	5,5	85,5	114	97,85	4,28	24,389***
16	Body rise	29,5	4,8	13	34,5	28,23	3,65	15,810***
17	Back waist length	37,92	2,4	32	45	39,47	1,97	-44,224***
18	Front waist length (Neck shoulder point to waist)	41,8	3,0	34	51	42,0	2,95	-6,247 ^{NS}
19	Total crotch length (lower trunk length)	78,36	7,28	61	100,0	-	-	-10,983***
20	Arm length (shoulder to wrist)	54,89	3,11	48	66,4	52,89	2,94	73,706***
21	Outside leg length	101,3	5,20	84	117,5	99,32	4,53	18,194***
22	Inside leg length	71,5	4,89	57	88,5	71,05	4,06	6,415***
23	Trunk Circumference	160,44	6,23	130	198	-	-	73,569***
24	Shoulder length	12,63	0,78	10,2	15,5	12,96	0,95	-23,783***
25	Skye depth	20,83	1,46	16,5	25	16,9	1,32	21,389***
26	Back width	37,1	2,98	24	45	37,22	3,0	-0,219 ^{NS}
27	Bust width	19,45	1,88	14,5	29	22,03	2,24	-82,2***

Many measurements were different deviations between old "soviet" size typology (1986 year) and Kazakhstan females nowadays. In most of the dimensions, the averages of the old "soviet" size typology 1986 year were higher, larger and longer than now Kazakhstan females. The differences in the female measurements were recognized at $p < 0,01$ the level, except for Front waist length and Back width.

So, the results indicates that from data 1986 year Kazakhstan females have other proportions, which characterized by the ratio of inside leg length in relation to height. At a height a 156,4 cm, inside leg length makes 71,05 cm. While, from data measurements of 2013 year Kazakhstan females at a height a 162,5 cm, inside leg length makes also 71,5cm. There can be remarked increase of height, arm length and inside leg length in relation to the height.

Consequently, to the modern women of Kazakhstan characteristically more short lower limbs (inside leg length) as compared to an old "soviet" size typology. Because at a height of 156,4 cm and 162,5 cm, the length of the lower limbs, one and the same (71,5 sm).

The greater value of height, arm length, body rise, less value of girth measurements, such as neck, bust, chest, hip, under bust, wrist, thigh, calf girths and bust width is characteristic for the women of Kazakhstan. However, Kazakhstan women are characterized by a large value of waist girth, as well as men [4]. All girths (neck girth, hip girth, bust and chest girth) are decrease, except head girth. At the less values of bust girth anymore value of hip girth. But, back width and front waist length (neck shoulder point to waist) not change with time.

<Table 4> shows the differences of the each age group in Kazakhstan females.

Table 4. Comparison measurements of Kazakhstan females by age groups

#	Measurement	18-29		30-39		40-49		more 50	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1	Head girth	55.43	1.54	55.91	1.47	56.09	1.43	55.89	1.70
2	Neck girth	32.77	3.47	34.07	3.22	34.73	3.13	34.69	2.86
3	Hip girth	95.48	4.99	99.64	7.92	102.45	10.62	104.56	10.30
4	Bust girth	92.12	7.57	98.33	10.08	102.38	10.99	102.03	10.53
5	Chest girth	89.29	7.04	95.72	9.29	99.57	10.63	99.94	10.36
6	Under bust girth	71.96	7.02	81.02	10.66	83.95	9.83	87.58	11.50
7	Waist girth	72.31	9.57	80.23	12.83	83.00	12.13	86.95	13.30
8	Wrist girth	16.08	1.07	16.66	1.29	16.63	1.36	16.71	1.60
9	Thigh girth	50.10	5.21	55.85	6.67	55.79	7.32	54.76	5.50
10	Knee girth	36.32	3.53	37.86	3.82	38.58	4.20	38.95	4.00
11	Calf girth	33.39	2.99	34.08	3.76	34.64	4.49	34.75	3.51
12	Upper-arm girth	27.06	3.37	30.69	3.65	31.49	3.43	31.56	3.70
13	Height	166.89	5.2	165.44	5.04	160.27	5.26	157.58	5.90
14	Knee height	46.21	2.9	44.35	2.75	44.44	3.11	43.47	3.42
15	Waist height	102.66	5.61	101.98	5.11	98.98	5.43	96.76	5.86
16	Body rise	29.66	4.84	29.87	5.10	29.77	4.45	29.0	5.38
17	Back waist length	37.05	2.06	37.99	2.42	38.06	2.45	38.57	2.67
18	Front waist length (Neck shoulder point to waist)	40.74	2.66	41.51	2.97	42.04	3.20	42.96	3.20
19	Total crotch length	75.10	5.34	78.37	7.46	79.08	8.48	80.86	7.43
20	Arm length (shoulder to wrist)	54.91	3.17	55.34	3.39	55.00	3	54.62	2.86
21	Outside leg length	105.59	5.29	104.94	5.08	99.01	4.94	95.85	5.60
22	Inside leg length	75.95	4.86	74.34	5.07	69.00	4.29	68.77	5.30
23	Trunk circumference	153.67	4.27	160.60	5.26	162.54	5.72	164.96	5.46
24	Shoulder length	12.32	0.73	12.40	0.83	12.66	0.74	12.91	0.78
25	Skype depth	20.31	1.66	20.29	1.57	20.44	1.28	20.28	1.34
26	Back width	35.84	3.48	37.15	3.2	37.79	2.75	37.52	2.29
27	Bust width	17.93	1.63	19.55	1.82	19.91	1.95	20.42	2.10

The results show, that all measurements had significant differences among the age groups. With age significantly increases girth measurements (neck, hip, bust, under bust, chest, waist, thigh, upper-arm girth), width (back and bust width), but height measurements (waist height, knee height) and length (outside leg length, inside leg length, arm length) is decreased.

Only head girth with age practically does not change.

Conclusions

1500 women of Kazakhstan on 61 measurements was measured. Results of statistical treatment on 27 measurements were summarized in this study. First, it was determined that measurements of Kazakhstan females such as girth, width measurements were significantly smaller than dimensions of the old 'soviet' size typology 1986 year. The greater value of height, arm length, body rise, less value of girth measurements, such as neck, bust, chest, hip, under bust, wrist, thigh, calf girths and bust width is characteristic for the women of Kazakhstan. However, Kazakhstan women are characterized by a large value of waist girth. Back width, front waist length not change with time.

The results indicate that from data 1986 year Kazakhstan females have other proportions.

Second, the subjects were categorized into 4 age groups: 18-29, 30-39, 40-49, more than 50. According to the comparison analysis of Kazakhstan females by age groups, all measurements had significant differences among the age groups.

Third, with age significantly increases girth and width. But, head girth does not change.

Fourth, with age height measurements is decreased.

These results of this research will be useful for companies as background information in the planning and manufacture of clothing. The statistical information will also be a valuable database for the future research in projecting test dummies of women apparels.

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