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Development of Size Chart for School Age Boys (6-12 years) for Large Scale Garment Construction in Imo State, Nigeria

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Abstract:
The study focused on development of size chart for school age boys in Imo State, Nigeria. Specifically, the study determined mean body measurements of school age boys required for large scale garment construction and height distribution of school age boys in Imo State. A population of 551 960 school age boys was used for the study. Sample size of 400 school age boys was selected for the study using multi-stage and purposive sampling techniques. Data were gathered through measurement survey, using tailors measuring tape and weighing machine for height and weight respectively. Descriptive statistics was used for data analysis. The study's result showed that height of school age boys progressed with age. The result also indicated that majority of school age boys had height range of 124cm to 148cm. The study recommended that body measurement of school age boys established from this study should be made available to the dressmaker by the researcher.

Keywords: Development, size chart, school age boys, garment construction

1. Introduction

Size chart is mean measurement table containing different body measurements that can be used for manufacturing clothing articles e.g. shoes, under wear, hat, and garment among others. Huyssteen (2006) described size chart as a mean body measurement table recorded as a particular range of sizes for a target population. He stated that size chart is the foundation for selecting body proportion for fit to fit dressmakers dummy or individuals. It is important that size chart should contain essential body measurements required for the manufactured clothing article. Size chart can be produced or selected based on height only or girth and circumference measurement only or it can be developed based on the combination of height and girth measurements (Kang, Choi,& Do 2001; Lee, 2004).

Huyssteen (2006) reported that size chart is used as size control and for quality purposes. It is vital for large scale garment construction. This is because it contains mean body measurements that will be used for garment construction derived from measurement survey of a large number of people.

Garment construction can be defined as the use of fabrics for making dresses by dressmakers (Iloeje, 2007). Dressmakers in Imo State take body measurements each time they are making garments, (Iloeje, 2007). This approach wastes time and is difficult especially when garments are mass-produced. Furthermore, when individual body measurement is used for mass construction of garment, it is difficult for such garment to fit the target group. This is why it is necessary to use size chart produced from measuring a large number of people. Hence, Knight (2008) recommended that body measurement for large scale garment construction should be based on mean body measurements obtained from a cross section of the population of the target group. However, when dressmakers are making garments in large scale for commercial purposes, they need mean body measurements obtained from measurement survey which they can use for garment construction. Most often the mean body measurement is not available to the dressmakers. Few dress makers that have measurements for large scale garment making keep it as trade secret. Devarajan and Istook (2004) reported that dressmakers lack size chart for garment construction and that it is one of the reasons why it is difficult to get suitable sizes. The problem is not different with dressmakers of school age boys' uniforms in Imo State, Nigeria. They lack size chart from which the required body measurements of school age boys can be obtained. As a result, the school uniform is challenged by numerous fit problems. Marshal, Jackson, Stanley, Kefgen and Touchie-Specht (2000) reported that improperly fitting garment is unattractive, lack quality and attract pitiable characters among others.

School age boys are male children within the age range of 6-12 years (Daniels, 2008). In Imo State they wear all kinds of school uniforms ranging from over size, under size, tight fitting among others. This is because their uniforms are mass-produced with inappropriate body measurements that are not representative of the sizes and shapes of school age boys in the State. The uniforms do not make the children comfortable for learning. When a child is not comfortable in the class, it is difficult for effective learning to take place. More so, the uniform restricts them from free movement and exercise. Norsaadah (2012) reported that school uniform should be constructed to keep focus on learning, enhance individuality, level social status and comfortable to the wearers. It is observed that school uniform worn by school age boys in Imo State cannot effectively serve these purposes. The above conditions motivated the

researcher to provide accurate mean body measurements that will be used by dressmakers in garment making for school age boys in the study area.

1.1. Purpose of the Study
The main purpose of the study is to develop size chart for large scale construction of garment for school age boys in Imo State. Specifically, the study aims to determine:
1. Mean body measurements of school age boys required for large scale garment construction.
2. Height distribution of school age boys in Imo State.

1.2. Research Question
1. What is mean body measurements of school age boys required for large scale garment construction?
2. What is height distribution of school age boys in Imo State?

2. Methodology
The study was carried out in public primary schools in Imo State, Nigeria. There are 1620 public primary schools in the study area.
The study adopted survey research design. Survey research design employs a study of a large group of people by collecting and analyzing data from only a few people considered as a sample of the entire group (Akuezuilo, 2002).
The study population was 551960 school age boys (Imo State Ministry of Education 2013). The sample size was 400 school age boys. Multi-stage and purposive sampling techniques were used to determine the sample size. Data were collected using tailors measuring tape (60inch or 150cm long, ModelA-1) and weighing scale for height and weight (floortype, Model RGZ-160). The body measurements consisted of the following measurements and the description of how the body measurements were taken was adopted from Aldrich (2008) and they are described below. Connennl, Ulrich, Brannon, Alexander and Presely (2006) noted that it is important that brief description of how and where the body measurements were taken is very necessary because of the variations that exist in land marks where the measurements were taken. Only net measurements were taken and ease allowance (EA) added later. Connennl et.al (2006); and Ashdown (2000) stated that it helps to minimize error in measurement.

i. Height: height was taken with the child standing erect with the two feet together on the weighing machine (Floor type, Pyrochy brand model RGZ-160).
ii. Chest: measurement was taken at widest part of the chest plus 12cm EA.
iii. Shirtwaist: measurement was taken horizontally around the waistline plus 10cm EA.
iv. Across back: measurement was taken across the back from armscye to armscye.
v. Neck size: measurement was taken around the base of the neck touching the cervical at the back of the neck and the top of the front collar bone plus 3cm EA.
vi. Shoulder length I: measurement was taken from the base of the side neck to the shoulder edge (shoulder point).
vii. Shoulder length II: measurement was taken from one shoulder bone to the other.
viii. Shirt length: measurement was taken from the shoulder point to the hip line.
ix. Sleeve length short: measurement was taken from the shoulder bone to the required sleeve length.
x. Elbow length: It was taken from the shoulder bone to the elbow bone with the hand slightly bent
xi. Sleeve length long: measurement was taken from the shoulder bone to the wrist (long sleeve length) with the hand faintly bent.
xii. Upper arm: measurement was taken from the fullest part of the arm circumference mid-way between the shoulder and the elbowplus13cm EA.
xiii. Wrist: the measurement was taken round the base of the arm over the wrist bone plus 5cm EA.
xiv. Scye depth: girth measurement was taken from the cervical to the line which touches the base of the arm scye (armhole line).
xv. Back neck-to-waist: the measurement was taken perpendicularly from the cervical bone to the waist line; a cord was tied at the waist line for easy location.
xvi. Head circumference: the measurement was taken around the horizontal girth of the head on the horizontal mark between the brows.
xvii. Pant waist: measurement was taken 3cm below the natural waist line (around the waist).
xviii. Hip/seat: measurement was taken around the largest part of the hip with a cord tied at the position for easy location and 8cm EA was added.
xix. Waist-to- hip: the measurement was measured perpendicularly from the waistline to the seat. Pant length short: measurement was taken 3cm below the natural waist line vertically to the required pant length (a little before the knee).
xx. Pant length long: measurement was taken 3cm below the natural waist line vertically to the sole of the feet or to the required pant length.
xxi. Waist to knee: the measurement was taken vertically 3cm below the waistline to the knee bone.
xxii. Body rise: the measurement was taken from the waist over the hip prominence to the surface of a chair, with the person sitting on a firm chair.
xxiii. Inside leg: the measurement was taken from the crotch in between the two legs at the back to the soles of the feet.
xxiv. Ankle girth: measurement was taken round the ankle plus 10cm EA.
xxv. Knee girth/pant bottom width: measurement was taken round the knee plus 13cm EA.

xxvi.   Thigh girth: measurement was taken round the largest part of the thigh plus 13cm EA.

The instrument was validated by five lecturers, two from Department of Home Economics Ebonyi State University Abakaliki and one from Department of Educational Psychology and two from Home Economics Department both from Alvan Ikoku Federal College of Education Owerri, Imo State. Descriptive statistics was used to analyze the data collected

3. Results

- Research Question One: What is the size chart required to mass produce garments for school age boys in Imo State?

S/N	Body Parts Measured	$\overline{X}_6$	$\overline{X}_7$	$\overline{X}_8$	$\overline{X}_9$	$\overline{X}_{10}$	$\overline{X}_{11}$	$\overline{X}_{12}$
1	A Height	123.5	125.6	130.0	135.8	140.2	144.8	148.3
2	Approximate Age	6	7	8	9	10	11	12
3	B Chest	74.0	74.6	74.3	76.0	80.0	82.3	82.8
4	C Shirt Waist	69.4	70.5	70.8	73.7	74.7	75.4	76.0
5	D Hip/Seat	71.0	72.3	73.4	78.0	80.0	81.4	81.0
6	E Across Back	27.5	28.6	29.2	30.0	30.3	32.0	33.0
7	F Neck size	29.5	29.0	29.5	30.8	31.0	33.0	33.0
8	G-H Shoulder Length I	14.3	14.4	15.2	15.7	16.0	16.8	16.8
9	X-Y Shoulder Length II	34.3	35.7	35.6	37.6	38.4	39.0	39.8
10	I Upper Arm	32.6	33.3	33.3	34.0	34.2	34.6	35.3
11	J Wrist	19.0	19.0	19.3	19.5	20.4	20.7	21.2
12	K-L Scye Depth	16.2	16.4	17.0	17.5	18.5	18.9	19.3
13	K-M Back Neck-Waist	28.5	30.5	30.0	31.7	32.6	33.4	33.6
14	M-N Waist-Hip	15.0	15.5	15.8	16.3	16.3	17.0	17.2
15	Q-R Body Rise	18.2	18.4	18.6	19.0	18.7	20.0	21.0
16	S-O Inside Leg	60.4	61.7	63.5	69.4	73.0	76.0	78.0
17	H-T Sleeve Length Long	43.3	43.2	45.0	47.8	50.0	52.0	53.7
19	H-H_2 Elbow	23.0	23.4	24.4	25.2	27.2	28.0	29.0
20	U Head circumference	52.0	51.8	53.5	52.8	52.7	53.5	53.6
21	M_1-O_1 Pant Length Short	30.0	36.5	37.6	40.0	42.0	42.7	43.0
22	C_1-O Pant Length Long	74.8	75.8	77.8	82.0	84.5	89.5	90.5
23	W Ankle Girth	30.4	30.6	30.7	32.7	33.7	33.0	34.0
24	C_1Pant Waist	61.8	62.3	62.6	66.2	66.0	68.0	68.4
25	G_1-G_2 Shirt Length	46.3	48.2	48.2	52.3	54.6	55.3	55.0
26	M_1 –P Waist –Knee	39.4	40.8	41.5	42.5	44.0	48.3	49.3
27	W_1 Knee Girth	40.2	41.0	41.0	43.4	45.5	44.0	44.8
28	W_2 Thigh Girth	50.0	51.4	51.8	53.2	56.2	56.6	57.3

Table 1: Size Chart for large scale Production of Garment for School Age Boys (6-12years, N=400).

Key:

$\overline{X}_6$= mean for six years, $\overline{X}_7$= mean for seven years, $\overline{X}_8$= mean for eight years, $\overline{X}_9$= mean for nine years, $\overline{X}_{10}$= mean for ten years, $\overline{X}_{11}$mean for eleven years, $\overline{X}_{12}$ mean for twelve years.

Table 1 showed the various body measurements obtained for each of the body parts measured for different age groups (6-12 years). It presented the mean body measurements obtained from 6-12 years old for each of the 28 body parts measured. The mean of chest measurements ranged from 74cm to 82.8cm. Mean measurements for hip/seat ranged between 71cm and 81cm, while mean measurements for pant length (short) ranged from 30.5cm to 43.0cm.

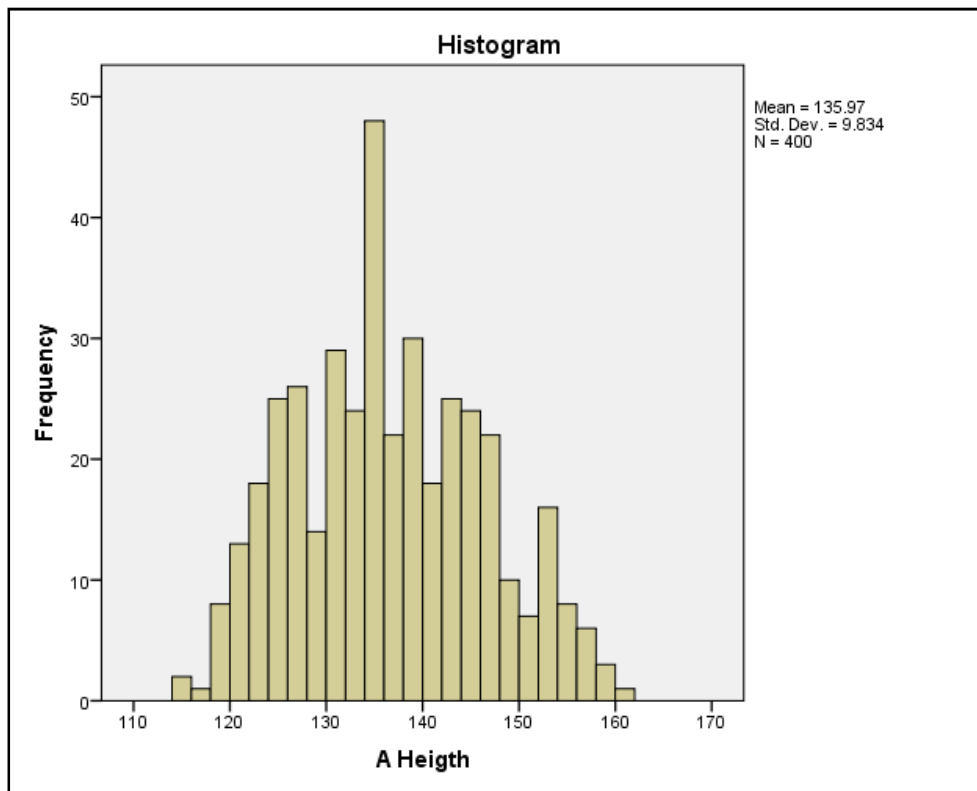- Research Question Two: What is height distribution of school age boys in Imo State?

Table 2: Height distribution of school age boys in Imo State

Table 2 showed the height distribution of school age boys as follows- lowest 115cm, highest 160cm and mean of 135.97cm with standard deviation of 9.834.

4. Findings
The followings findings were made:
1. The average heights for 6-12years old school age boys were between 123.5cm to 148.3cm.
2. The mean body measurements for pant waist and pant length (long) were 61.8cm–68.4cm and 74.8 cm-90.5cm respectively.
3. Mean body measurement for seat/hip was 71.0cm for 6 years and 81.0 for 12 years.
4. Variability in height measurements of school age boys were very high (9.8).

5. Discussion
Body measurements were taken from sample of school age boys in Imo State to determine mean body measurements(size chart) that would be used in large scale production of garment. Mean body measurements (size chart) for large scale garment construction for school age boys was established and shown in Table 1. The study's findings showed that mean body height of school age boys ranged from 123.5cm to 148.3cm. The height progresses with the age of the boys and the increase in the height was not stable between the ages. The finding of the research was in line with the results of Huyssteen (2006) and Daniels (2008) who reported that children of similar age groups had far and wide varying height and girth measurements. The findings of the study support Otieno and Fairhurst (2000) who emphasized that the differences in real body parts measurements between sizes was not measureable in comparable linear distant, meaning that the disparity in principal girth and height of mean body measurements were not stable. The study's finding was in accord with the findings of Nwonye and Thompson (2012) and Santrock (2001) who stated that there is a strong discrepancy in children's measurements as age progresses.
On the other hand, the study's findings were not in compliance with the present sizing system in use today which is based on the belief that the disparity between sizes is measureable in the same linear distances (Huyssteen, 2006). Looking at Table 1 the mean length (vertical) measurements e.g. height, shirt length, sleeve length, pant length (short and long) body rise, and inside leg progresses with age. However, the horizontal (girth, breath, depth) measurements do not progress with age. This meant that boys of different age groups can possess the same girth measurements e.g. mean of upper arm measurements of 7years and 8years old boys in Table I was 83.3cm for both years. From the results of the study in Table 1 there was no key dimension which can be used to accurately predict both vertical and horizontal measurements. The mean of height measurements in the size chart Table I showed positive relationship with the vertical measurements e.g. shirt length, inside leg, pant length (long and short) among others. Hence, the result of the study indicated that height was a vertical key dimension because it had positive relationship with most other vertical dimensions. This finding supported the findings of Huyssten (2006), and Norsaadah, (2012) who concluded that height is usually used as the perpendicular key dimension because it was absolutely linked with most other vertical measurement and most people knew their

height measurements. The perpendicular measurements were not positively related to the age of school age boys. Looking at the head circumference measurements and the neck size, they had no relationship with the age of the child. As such it would be very difficult to predict such measurements with the child's age.

Mean height measurements for school age boys ranged from 115-160cm with mean of 135.94cm and standard deviation of 9.8. The standard deviation indicated that there is wide variation in the height of school age boys as a result of growth factor. The study's findings are in agreement with the findings of Daniels (2008); Stinson (2000) and Anyanwu (2004) who reported that children have widely varying heights as a result of their continual growth.

6. Conclusion

From the findings of the study, it was concluded that height was the most dependable measure in which size chart would be based. This is because height measurements correlated positively with almost other measurements in the size chart. It showed that age was only a crude and unreliable measure on which size chart can be based; instead a combination of height and age would provide a better estimate of a child's garment size.

7. Recommendations

The study underscores relevance of use of accurate size charts and fit of school uniform for school age boys in Imo State. Based on the result of the study the following recommendations were made:

1. The researcher should make available the size chart to the lecturers and students of Home Economics, clothing and textiles who should utilize them in pattern drafting and garment construction.
2. The researcher should make available the size chart to the garment makers who should make use of them for massive construction of school uniforms and other garments.
3. Garment makers should use appropriate size chart provided by this research which was derived from measurement survey of the target population. This would ensure construction of fitting school uniforms and other garments for school age boys in the state.

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