
Establishment of Average Body Measurements and Development of Block Patterns for Adolescent Boys in Nigeria.

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Abstract

The purpose of this study was to establish average body measurements and develop block patterns for shirts and trousers for adolescent Boys in Nigeria. The survey research design and quasi-experimental design were used for the study. A sample of 399 adolescent boys were measured and arranged in three categories of small, medium and large. The measurements were standardized to obtain average body measurement for the boys. Data obtained were used to draft block patterns for the three categories of adolescents. The patterns were, front shirt, back shirt, sleeve, trouser front and back. Three shirts and three pair of trousers were constructed on calico from the pattern pieces drafted. The shirts and trousers were fitted on three adolescent boys, small, medium and large who also acted as models. Judges and the models assessed the shirts and trousers for fit and comfort using a five point scale. Mean was used for data analysis. A mean score of less than or more than 3.00 showed that the garment was either bigger or smaller than the size considered comfortable, and needs to be altered, while a mean of 3 indicated that the patterns fitted and were comfortable. Minor alterations were made on certain areas of the patterns and final patterns traced out. Recommendations were made based on the established average body measurements and the block patterns produced.

Key words: Block Patterns, Apparel Designing, Sizing, Adolescent

Introduction

Adolescence is a transitional period in the human life span, linking childhood and adulthood (Santrock, 2005). This period according to Santrock (2005) involves biological, cognitive and socio emotional changes. An adolescent is a young male or female between the ages 12-18 years. The period of adolescence vary with cultural and historical circumstances. In Nigeria, as in many cultures, adolescence starts from age 10 to 12 and may end between ages of about 18 and 22. The adolescent period is divided into early adolescence and late adolescence. This period of adolescence begins with the onset of puberty and ends with the entrance into the world of adults. During this period, adolescents undergo several mental, biological, social, psychological and physical changes. According to Myrick (2002), physical changes occur in height, weight and body shape.

These changes are as a result of generations of genes, the individual's mother's pre-natal diet, adolescent nutrition, exercise habits and current life style (Keith, 1981). During the period of adolescence, clothing becomes very important to adolescents because adolescents use clothes to identify and belong to peer group. They also use clothing to make statements about the fact that they have come of age (Igbo and Anikweze, 2005). Adolescents also use clothing to protect, adorn and modify the body (Iloeje, 1995).

Clothing is anything placed on the body in order to protect, adorn and modify it. Clothing includes dresses, dressing accessories, make-ups, hairdos etc (Anyakoha and Eluwa, 1999). Adolescents feel that their acceptance, group membership and popularity are determined by the appropriateness and attractiveness of the clothes they

wear. Clothing also reflects a feeling of self worth of adolescents or a means of coping with the environment (Cox and Dietz, 1998). Hurlock in Iloeje (1995) also stated that clothes give adolescents an impression of growing up, becoming independent, self identification and identification with other people. Clothing gives cues to others about age, sex, race, social status, roles, intelligence, popularity, potential success and competence to individuals and these include adolescents (Marshall, Jackson, Stanley, Kefgen and Touchie-Speght, 2000). Also, clothing helps camouflage physical defects and disabilities.

Adolescents according to United Nations Department of Public Information (UNDPI) (1997) constitute the largest number of individuals in any nation or state. Hence they are the largest consumer of clothing items. In Nigeria, they constitute the largest customers to dress and apparel makers. The major method of providing clothing by dress and apparel makers in Nigeria is by the use of free hand cutting which does not involve the use of patterns. The dressmakers, tailors or apparel makers take body measurements and do free hand cutting out of fabric. Most tailors in Nigeria do not possess knowledge of pattern making and cutting out (Anikweze, 2003). This however has obvious disadvantages during construction as free hand cutting does not lend itself to mass production. Free hand cutting constitutes delays and may bring about poor fit.

Fit according to Marshall et al (2000) is the correspondence in the form of a piece of clothing to one's body. Properly fitting garments give feeling of physical comfort and self confidence.

Clothing items which do not fit well can never appear attractive or give the look of quality. Fit has been described as the most difficult area of sewing (Nastuk, 1975). She noted that the body fluctuates many pounds in a matter of one or two days, thus directly affecting fit. Apart from lack of skills in the use of patterns; commercial patterns which could be used in mass production are not available in Nigeria owing to its inclusion in the list of items the Nigerian government banned in order to save scarce foreign resources. The few available are so expensive that they are beyond reach of many dress makers and tailors.

Presently in Nigeria, there is no standardized average body sizing or standard block patterns developed from the body measurement of Nigerian youths. What is available right now is sizing and patterns from Europe and America. Kaka (1990) observed that this is a problem because the patterns are produced from body measurement of individuals from Europe and America. Body alignment and figure type of these Europeans and Americans are however different from what is obtainable in Nigeria.

The Nigerian adolescent especially the late adolescent is thicker at the hip-line than her European counterpart (Iloje, 1995). Hence occasionally, their patterns do not fit. These commercial patterns even when they could be adjusted are not readily available. It takes a lot of money, time and other resources to make a survey of body measurement, hence measurement surveys are not frequently done. According to Aldrich (2002). The last comprehensive British survey of body measurement publicly was in 2005. Many clothing construction companies still use them without modification. With this unavailability of commercial patterns, it has become necessary that basic patterns (blocks) which could be adapted to different designs and styles be produced. This thus calls for skill in pattern development.

As a first step towards the mass-produce ready-to-wear clothes for adolescents, there is need to establish average body parts measurement for producing patterns for mass production of clothes for adolescents in Nigeria. Body measurements needed for the drafting of patterns for adolescent boys include measurement of the chest, waist, hip, sleeve length, sleeve circumference, trouser length, crotch etc. Producing well fitted clothes for these adolescent boys is a function of accurate body measurement. This in turn depends upon the availability of accurate measuring instruments and appropriate skills in measurement (Igbo and Iloje, 2003). For measurements to be accurate, a number of guidelines which include measuring over non-bulky overdresses must be observed. Bray (1994) stated that there are two methods of taking body measurements namely; the direct measurement and the measurement obtained by the calculation of the proportion of one or two basic measurements. The direct method has been considered as difficult and patterns produced from such are unreliable. Its unreliability stems from the fact that it is not possible for instance to establish exact points or levels on the

figure being measured. Moreover, the figure of an individual fluctuates from day to day; the physical state and mood of a person may affect some measurements. For example a tired person usually stoops more and so will have a wider back. Haggard (2006) also advocated that during measurement a careful look at the personal characteristics of the individual figure, shape and stance whether ideal or not, upright posture, sloping or rounded shoulders, hollow back should be carried out as this will help in producing appropriate and good patterns. Taking a body measurement for a few people is not enough to produce patterns to be used for large scale production of clothes hence there is a need to obtain a set of standardized body measurements from a large number of adolescent boys which can be used to produce patterns for manufacturers of clothing to meet the needs of the teeming number of adolescents in Nigeria.

This study will be very useful to many groups of individuals. These include clothing and textile students as it will help them to learn how to develop block patterns which can be adapted to various styles. It will also help the teachers as it will provide information on how to draft and prepare patterns for boys. As more boys are gradually enrolling in clothing and textile classes, the study will be useful to them. Large scale clothing construction companies will find the block patterns useful as the block patterns produced could be used to mass produce shirts and trousers for boys. This is more so because as stated by Weber (1990) sewing for men is not as challenging as men's dresses do not experience change in styles very often. So patterns produced by this study will stay a long time in the market. Patterns produced can be of help to novices in clothing construction and home sewers in the area of producing garments for adolescents. This study was limited to adolescent boys in secondary school out of school adolescents were not part of the study.

Objectives

The major objective of this study was to establish average body measurements and develop block patterns for adolescent boys in Nigeria. Specifically the study involved:

Taking body measurements of adolescent boys

Standardizing the measurements obtained

Using the measurements to draft shirt and trouser pattern pieces

Standardizing the patterns obtained

The following research questions guided the study:

- 1) What are the average body measurements of the adolescent boys of small, medium and large size in Nigeria?
- 2) How can the block patterns for adolescent boys in Nigeria be drafted?
- 3) How can the drafted block patterns be tried on the adolescent boys?
- 4) How can the block patterns drafted be validated for the adolescent boys in Nigeria?

Method

This describes the design of the study, area of the study, plan for the study, population, sample, instrument for data collection, procedure and data analysis technique

Design of the Study: This study was carried out using both survey and quasi-experimental designs. The procedures involved were:

- 1) Developing body measurement chart that was used to collect the data.
- 2) Taking actual body measurements of the adolescent boys in their different sizes i.e. small, medium and large.
- 3) Establishing average body measurement for the different sizes of boys i.e. small, medium and large.
- 4) Drafting three shirts and three pairs of trousers from the block patterns using flat pattern method.
- 5) Constructing three shirts and three pairs of trousers.
- 6) Judging for fit and comfort of the block patterns drafted.
- 7) Correcting and transferring corrected patterns unto fresh papers.

Area of Study: The study was carried out in North central Nigeria that is Benue State. Benue state is strategically located as it has the characteristics of individuals from north and southern Nigeria. It is bound in the East by Taraba state which is a state in Northern Nigeria, Kogi and Nasarawa state. Kogi state also has people of Yoruba origin there too. By the South, Benue is bounded by Cross River and Akwa Ibom which are Niger Delta states. The vintage position of this state therefore made it possible for it to be chosen since almost all the regions and tribes in Nigeria have geographical influence on her. The state has twenty three local government areas and three educational zones with 254 secondary schools.

Population for the Study: The population for the study constituted all adolescent boys from all the government approved secondary schools in Benue state. The total population of adolescent boys as at 2004/2005 session was 108695 (Teaching Service Board Makurdi, 2004).

Sample: Two sampling techniques were used in this study:

1) To select secondary schools from the sample of schools the convenience sampling technique was utilized. Convenience sampling is the type of sample selected according to the researcher's convenience without necessarily referring to the representatives of the sample to the population (Uzoagulu, 1995). Thus the researchers selected five schools. The boys in these schools had the same features with all other adolescents in the state, besides the schools' population comprised all the ethnic groups in Nigeria.

2) To obtain the sample size of the adolescent boys, the Yaro Yammer formula in Uzoagulu (1998) for a finite population was used. The formula is $n = \frac{N}{1 + N(e)^2}$ where

n = the sample size

N = the finite population

e = level of significance

1 = unity (constant)

After the computation, a total number of 399 adolescent boys were randomly sampled. The criteria for sampling the adolescent boys were their class at school which in effect represents their age. Nigerian secondary schools operate a six year programme. The researchers grouped the secondary school adolescent boys into three, that is Junior, Secondary one, and Secondary two with ages ranging from 12-13 years, Junior secondary 3 and Senior secondary 1 age ranging from 14-15 years and Secondary 2 and 3 age ranging from 16-17 years. They were called, small, medium and large sized and each group had 133 subjects.

Four types of instruments were developed for Data Collection: Body measurements chart (BMC), Toiles/shells for Testing (three shirts and three pairs of trousers), and Assessment charts for judges and for models

The body measurement chart (BMC) was divided into two sections. Section A dealt with personal information like age, state of origin, while section B was concerned with the body measurement. The measurements used were for the shirt: - neck size, chest, nape to waist, half back, shirt length, syce depth, arm circumference and wrist. For the pair of trousers measurement carried out were for waist, hip/seat, trouser length, crotch, knee length and ankle measurements were carried out from instructions in Aldrich (2006).

The Toiles/shells of three shirts and three pairs of trousers were assembled based on instructions from Igbo and Iloeje (2003) and Cock (2003). The toiles were for small, medium and large size adolescent boys.

Assessment criteria charts: two assessment charts were developed. The assessment charts were modeled from Anikweze (2003). The charts comprised eighteen items. These charts were rating scales based on a 5 point scale of 5,4,3,2 and 1 with variables like too wide, slightly too wide, satisfactory, slightly too narrow and too narrow respectively. A mean of 3.00 was considered appropriate and comfortable while any mean less than or above 3 was considered not fitted or comfortable.

Validation of Instruments

The four instruments used were face validated by two experts of clothing and textiles. One from the University of Nigeria, Nsukka and the other from the Dept. of Home Economics, University of agriculture, Makurdi. The experts scored the instruments on a three point scale of 1, 2 and 3 representing not relevant, relevant and very relevant respectively. Any instrument with a mean of 2.5 and above was regarded as relevant while any with a mean less than 2.5 is seen as not relevant.

The BMC had a mean of 2.9 while the assessment criteria charts for shirt and trouser fit and comfort has a mean of 2.8. This showed the instruments were very relevant for data collection. The instruments were therefore used to collect data for the study.

Reliability of the Instrument

To ascertain the reliability of the assessment criteria charts, a trial test was carried out. The researchers made three shirts and three pairs of trousers for the three

different sizes of the adolescent boys. These were modeled by three boys who were not part of the sample. The fit for the shirts and trousers were assessed using the five point scale. These score were organized and subjected to Cronbach Alpha reliability test. The coefficient of reliability was 0.86 which showed that the instrument were reliable.

Data Collection Technique

Data were collected using the survey and quasi-experiment methods. Data was collected following these phases:

- 1) Training of research assistants on how to measure the adolescents
- 2) Taking of body measurement
- 3) Establishing average body measurements
- 4) Drafting of the patterns of three shirts and three pairs of trousers using flat pattern method as outlined by Aldrich (2006)
- 5) Constructing/Assembling of the shirt and trouser pieces.
- 6) Fitting and judging for comfort of the shirts and trousers and comfort. The judgment was carried out by 20 judges for fit. The judges were chosen from one hundred and twenty male registered garment makers in Makurdi. The tailors list was obtained from their association's headquarters in Makurdi. The judges were randomly selected using the simple balloting method on the day of their general meeting. The judges and the models were then brought together and given the two sets of criteria for assessment of fit and comfort respectively. (See tables 2 and 3)
- 7) Producing the final pattern pieces.

Means was used to answer all the research questions. For research question which sought to take and find the average body measurement of the adolescent boys for small, medium and large size in Nigeria, the mean was used (see tables 1-6). For the research question that sought to find out how the patterns can be drafted, this was done following Aldrich (2006). For the research question on fit and comfort of the patterns, the mean of the judges' scores were used. The assessment charts had five options with the following ratings: Too large = 5, Slightly large = 4, Satisfactory =3, Slightly small = 2 and Too small = 1

Options 1 and 5 and options 4 and 2 showed degrees of dissatisfaction with fitness for the shirts and trousers while option 3 showed that shirts and trousers were satisfactory.

Results

The following findings were made from the study:

- A) Average measurement of the various parts of the body for drafting of patterns for adolescent boys in the categories of small, medium and large were established (see tables 1-3)
- B) Three shirt patterns and three pairs of trouser patterns were drafted for the three categories of adolescents using flat pattern method (see figs 1-4).

C) The three shirts and three pairs of trousers were judged to have proper fit (see tables 4-5).

D) The models (adolescent boys) judged the shirts comfortable (small, medium and large) (see tables 6-7)

E) The three shirts and three pairs of trousers were ripped apart and their patterns traced out. (see figs 5-19).

Table 1 above shows that apart from the front neck depth and sleeve length which were slightly too wide and too long respectively, all the rest of the criteria had mean scores of 3.

Table 1: Average Measurement of Adolescents Boys

Measurement	Small N=133		Medium N=133		Large N=133	
	Mean	SD	Mean	SD	Av	SD
Neck	31.65	1.85	35.25	2.80	37.05	2.46
Chest	79.80	5.75	86.90	6.00	91.11	6.62
Scye Depth	19.59	1.25	22.05	1.51	24.43	1.97
Nape to waist	39.98	2.72	44.11	3.70	46.86	3.31
Half Back	15.81	0.98	18.19	1.49	20.52	0.88
Shirt length	64.59	3.58	69.50	4.74	79.92	4.92
Sleeve length	53.56	3.58	56.84	4.38	61.76	9.12
Arm Circumference	33.82	1.08	36.09	1.20	38.82	6.40
Wrist	18.99	1.36	21.15	1.60	22.78	1.95
Under arm	41.98	3.53	45.06	4.07	48.08	3.83
Hip/Seat	81.81	4.74	87.89	6.71	93.00	7.44
Waist	67.46	3.93	75.17	6.91	79.05	3.88
Body rise	18.77	1.32	21.51	2.18	24.04	1.29
Inside leg	69.66	5.46	72.31	4.88	74.32	4.85
Ankle	35.40	1.76	39.16	1.59	43.51	1.84
Knee length	46.26	3.66	50.56	4.16	53.35	6.34
Trough length	88.79	5.74	92.91	4.92	99.02	4.80
Thigh	48.74	4.76	61.93	4.60	64.04	7.51

Table 2. Assessment of Shirts by Models and Judges

Measurement	Models			Judges		
	S	M	L	S	M	L
Neck size ease	4.7	4.3	4.4	3	3	3
Chest ease	3	3	3	3	4	4
Scye depth ease	3	3	3	3	3	3
Nape to waist	3	3	3	3	3	3
Shirt length	3	3	3	3	3	3
Half back length	3	3	3	3	3	3
Sleeve length	3	3	3	3	3	3
Arm circumference	3	3	3	3	3	3
Wrist ease	3	3	3	3	3	3
Under Arm ease	3	3	3	4	4	4
Overall comfort	3	3	3	3	3	3

This showed that the fit for the shirts on all the three categories of boys was satisfactory. For the front neck depth, the mean showed that it was slightly loose. These neck lines and sleeves lengths were thus adjusted following pattern adjustment methods. These were again modeled by the boys and then assessed to be satisfactory. The inside legs of trousers (table 2) was slightly too short with a score of 1.67. The trouser toile met the other

criteria with a satisfactory mean of 3.00. The inside leg which rated as being short was then adjusted using methods of pattern adjustment. These were worn again by the models for fit and comfort. They were then regarded as fitted and comfortable. The above table showed that the models found the shirt comfortable in all areas except for the neck size ease which were loose. The necks were thus adjusted using methods of pattern

Table 3 showed that the models found the trousers comfortable except for the inside leg which they did not find comfortable because it was slightly too high. This inside leg was then adjusted and the models were asked to wear the trousers and they returned the verdict of satisfactory.

adjusted and the models were made to remodel the shirt and found necklines comfortable.

Discussion

Many of the measurements obtained from the present study did not seem to tally with measurements from Aldrich (2006), Bray (1994) and Hagggar (2006). This might be as a result of the fact that the figures of the subjects in this study were different from those of Europe and America. The adolescents from Europe and America may be slimmer and taller. The difference may also be as a result of the type of food eaten in Nigeria. Nigeria's staple food is more of carbohydrate and energy giving foods. The adolescents in this study might be stockier than their counterparts in Europe when considering the measurements in Aldrich (2006).

Table 3. Assessment of Trousers by Models and Judges

Measurement	Models			Judges		
	S	M	L	S	M	L
Hip / Seat	3	3	3	3	3	3
Waist	3	3	3	3	3	3
Body rise/Crotch	3	3	3	3	3	3
Inside leg	4	4	4	3	3	3
Trouser bottom/ Ankle width	3	3	3	3	3	3
Knee length	3	3	3	3	3	3
Trouser length	3	3	3	2	1	2
Thigh	3	3	3	3	3	3

Their counterparts from Europe and America seem to be taller. Poverty might be the contributing factor to this effect since protein foods like meat and poultry are not easily within reach of many of the inhabitants especially in the rural areas.

The findings of this study have implications for tailors/dress makers for they can adopt and adapt the block patterns produced by this study into various styles and use them in mass production of adolescent boys' clothes.

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The study also has implication for clothing teachers for they can use the block patterns drafted to teach the students how to adapt the blocks into various styles. The study has implication for home sewers. These home sewers can adopt and adapt the block patterns into various styles of shirts and trousers for adolescent boys at home.

It also has implication for the adolescent boys who are studying clothing and textiles as the pattern can help them in making their own clothing items.

The study has implication for entrepreneurs who could mass produce the patterns and thus fill the gap of the dearth of commercial patterns in Nigeria. This study also has implication for Nutrition Society of Nigeria and researchers in Nutrition as the body measurements could serve as anthropometric data which could be used for nutritional assessment.

It has implication for the Nigeria government as the findings could help in job creation in Nigeria as some entrepreneurs could get into the business of pattern making thereby providing employment for youths. Some researchers could be encouraged by the government to get into mass production of patterns which in turn will be of great use to clothing manufacturers and uniformed organizations like the army, the police, the navy, the air force and other uniformed groups.

Conclusion

Based on the findings of the study, the following conclusions have been reached;

Since no body sizing system or patterns have been developed from the body measurement of Nigerians, particularly adolescent boys, measuring and establishing average body measurement is essential in constructing well fitted garments for the male adolescents.

Tailors/Seamstresses take a long time doing free hand cutting; this at times end up in waste of fabric or distortion of the design. Drafted patterns are therefore important to save time and fabric and provide good fit and comfort.

Many dressmakers who were used to commercial patterns do not sew again because of lack of commercial patterns. The development of blocks will make patterns readily available to them.

Block patterns can be adapted to various styles. As pattern drafting encourage creativity, these blocks could lead to further creativity on the part of pattern developers.

Based on the findings, the following recommendations have been made:

- 1) Data obtained from the average body measurements can be used by pattern makers for the mass production of patterns for adolescent boys. This will also provide employment for the many unemployed youths in Nigeria.
- 2) The data could be used for the adaptation of styles for adolescent boys.
- 3) The fashion and clothing industry, the military, the uniformed services like the police and air force and fire services could use the patterns for mass production of garments and uniforms.
- 4) The Nutrition industry could use the anthropometric data obtained for nutritional assessment.

References

- Aldrich, W. (2002). *Metric Pattern Cutting*. 3rd Ed. U.K. Black Well Science Limited.
- Aldrich, W. (2006). *Metric Pattern Cutting for Men's*

- wear. 4th Ed. Oxford U.K.: Blackwell Publishing.
- Anikweze, G.U. (2003). Development of Dress Patterns for Women with Figure Problems in Enugu State. *Unpublished M.Ed. Thesis University of Nigeria, Nsukka.*
- Anyakoha, E.U. (1999). *Home Management for Schools and Colleges.* Onitsha Nigeria: Africana-Feb Publishers Ltd.
- Bray, N. (1994). *Dress Pattern Designing.* The Basic Principles of Cut and Fit with Fashion Supplement and Illustrations by Ann Hagger (5th Ed.) London: Blackwell Science.
- Cock, V.I. (2003). *Dress making Simplified;* Oxford U.K.: Blackwell Science.
- Cox, C.E. and Dietz, E.B. (1998). Adapting to Teen Culture. *Journal of Extension.* Vol. 31, No. 1.
- Hagger Ann (2006). *Pattern Cutting for Lingeries, Beachwear and Leisurewear.* Oxford U.K.: Blackwell Publishing.
- Igbo, C.A. and Anikweze, G.U. (2005). Establishment of Average Body Measurement for Women with Figure Problems. *Ebonyi Technology and Vocational Education Journal (ETVEJ)* Vol 1, No 1.
- Igbo, C.A. (2004). Establishing of Average Body Measurements and the Development of Block Patterns for Female Pre-schoolers. *African Journal of Educational Studies in Mathematics and Sciences.* Vol. 3.
- Igbo, C.A. and Iloeje, C.I. (2003). *The Basics of Dress Pattern Drafting.* Enugu Nigeria: Inselberg Ltd.
- Iloeje, C.I. (1995). Establishment of Average Body Measurement and the Development of Block Patterns for Female Adolescents in Enugu. *Unpublished M.Ed. Thesis. University of Nigeria, Nsukka.*
- Kaka, A.H. (1992). Comparative Study of Body Dimension of 13 to 16years old Beron Girls Towards the Development of Basic Paper Pattern. *Journal of Technical Education.* Vol. 7, No. 1.
- Marshall S.H., Jackson, H.O., Stanley, M.S., Kefgen, M. and Touchie Specht. (2000). *Individuality in Clothing Selection and Personal Appearance* (5th Ed.): New Jersey: Prentice Hall.
- Myrick, R.D. (2002). *What Early Adolescents are like?* Retrieved from the internet, on the 20th November 2004.
- Santrock, J.W. (2005). *Adolescence.* 10th Ed. Boston: McGraw Hill.
- UNDPI (1997). *The World Programme of Action for Youths to the year 2000 and Beyond.*
- Uzoagulu, A.E. (1998). *A Practical Guide to Writing Research Project Reports in Tertiary Institution.* Enugu: John Jacob's Classic Publishers Ltd.
- Weber, J. (1990). *Clothing* (2nd Ed.). New York: Glencoe McGraw-Hill.