BODY SIZE AND SHAPE CATEGORIZATION OF SOME ETHNIC GROUPS IN BENUE STATE USING WAIST, BUST AND HIP MEASUREMENTS

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Abstract. The study was carried out in Benue State to determine body size and shape of adult females of Tiv, Etulo and Igede ethnic groups. The sample size was 90 adult females. The research design was quasi experimental design. Data were analyzed using percentages. The study revealed that many variations existed in the sizes within members of same ethnic group and between the different ethnic groups. Predominant shape of adult females of Tiv, are (Pear 36.6%, Apple 36.6%), Etulo (Banana36.6%) and Igede(Pear 30.0%).

The study revealed that no adult female has the ideal body size characteristics of (90x65x90)cm. Recommendations include: Home economic extension workers should educate females of child delivery age to achieve desirable shapes in adulthood (pear and Hourglass). Garments designers and constructors should utilize size chart for different ethnic groups to ensure perfect garment fit.

Keyword: Adoption, Fabrics, Garment, Size System, Shape.

1. INTRODUCTION

Measurement is very important in garment production because it dictates accurate fit of a garment on the wearer. The shape and size of a person can be determined only through measurement. Body proportions can vary enormously. This is obvious from the variety of body shapes that can be seen in different people. It is essential that measurements are taken accurately; in the correct position and with an equal amount of tension on the tape. Ganhada (2006) stated that body measurement is an important role in clothing design ergonomics. Data collected from measurements are used by garment produc-ers to establish shape and size of persons in garment production (Ashdown and Delong 1995). Nutrition and ethnic composition of populations lead to changes in the distribution of dimension, and require regular updating of anthropometric data collections. According to Ganhada (2006) measurements are taken for the following reasons in garment designing: To ascertain the size of the figure, to determine the proportions of the various parts of the figure, to ensure that garment fits perfectively on the wearer and to show if the garment meets the specifications claimed by its manufacturer.

The bust, waist and hips are called inflection points and the ratios of their circumferences define basic shape. Usually the bust area will depend on the person's weight and height. It is said that female body usually inflects inward towards the waist around the middle of the abdomen between the costal margins and the pelvic crests. The waist is smaller than the bust and hips, unless there is a high proportion of body fat distributed around it (Lane 1992). Every single individual has different shape from another (John 2005).

A size is an item having specified measurements along certain dimension or magnitude. The purpose of an ideal sizing system is to divide a varied population into homogeneous subgroups. Members of a subgroup are similar to each other in body size and shape, so that a single garment can adequately fit each of them (Woodson and Henry, 1990).Female's bodies come in all shapes and sizes and it is not possible to divide them on the basis of simple averages which lead to unrealistic sizes corresponding to the so called "standard"

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or "ideal" body measurements (Delong and Karin, 1993). What is needed is a completely random system, which can yield an optimum number of body sizes reflecting the true body measurements and proportions existing in the target population (Delong and Karin, 1993). Fit of a garment depends on the correlation between garment measurements and the body measurement for which it is intended. In general, very little correlation exists among the human body measurement, (Ashdown and Delong, 1995).

1.1. Figure Types

Markee and Elain, (1991) indicated that each woman is born with her own special figure type and body shape, which is why you would be hard pressed to find two females with the exact measurement. Some females look beautiful even with a smaller or bulkier shape. Other women look stunning even if they are petite or average in height. However, many believe that women who are skinny are all beautiful. Different people have different ideas of which shape is the most ideal female form. Tamburrino, (1992) said that experts in the world of beauty and fashion, as well as experts in the health and fitness industries have claimed that the perfect measurements that look best in nearly every type of clothing and situation are of 36 inches (90cm) bust, a 26inches (65cm) waist and 36 inches (90cm) hips. So far many, the 36 x 26 x 36inches(90x65x90)cm measurement is considered to be the most ideal measurement. A bend (1993) said that, ironically less than 5% of all the females in the world have achieved these so called perfect body measurement. It is ridiculous to try to force your body to achieve such a shape, unfortunately most females work their entire lines on a newer ending guest to try and get the perfect body size and shape, but just because a 32 x 34 x 36 inches(80 x 85 x 90) cm body shape is not perfectly symmetrical does not mean that it is not beautiful.

The most beautiful female in the world probably does not have perfect body measurement. True beauty is how an individual feels about herself. It is not wrong to try and figure out what the ideal female body measurement is and to try to achieve it. Churchill and Robert (2005) stated that female figures are the cumulative product of a woman's skeletal structure, quantity and distribution of muscle and fat on the body. There has been wide difference on what should be considered an ideal or preferred body shape both for attractiveness and for health reasons. These have varied among cultures simultaneously with most physical traits. There is a wide range of normality of female body shapes. Shannon and Reich (1999) noted that human beings and their cultures have perennially focused attention on the female body as a source of aesthetic pleasure, sexual attraction, fertility and reproduction. The female figure is typically narrower at the waist than at the bust and hips and usually has one of the four basic shapes: banana, pear, apple and hourglass.

1.1.1. Banana Shape: This shape is characterized by wider hip and bust relative to waist. There is usually a difference of less than an inch (2.5cm). Fat is generally distributed more in the face, abdomen and buttocks of this type of body shape. Females who have this type of body shape usually have less estrogen than androgen (Patterson and Jessie, 1990).

1.1.2. Pear Shape: This body type shows wider hip than the bust width (Markee and Elain, 1991). Fat is distributed more in the hip, thigh and buttocks area of the body. Body fat begins to develop in the upper body regions including abdomen as age increases.

1.1.3. Apple Shape: Shoulder and bust measurement are larger than the width of the hips. Women who have this shape have the highest androgen level compared to any other types of body shape (Markee and Elain, 1991).

1.1.4. Hourglass Shape: The bust and hip are almost exactly the same in width. Waist is very much narrower. This shape is said to be most symmetrical and most perfect female body shape in a majority of cultures.

Fig. 1: The four figures show the four major body shapes of females. **Source: Salusso, (1992)**

Banana Apple Pear Hourglass
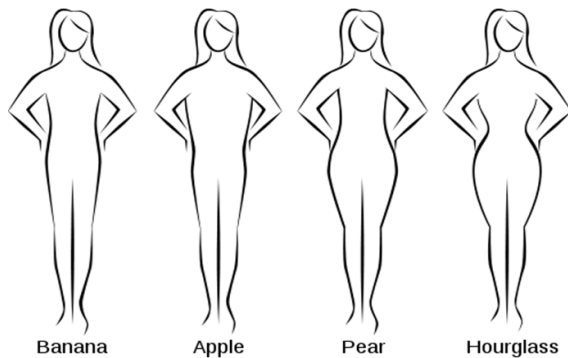
1.2. Sizing in Garment Construction

Garment size refers to the label sizes used for ready-to-wear garments sold out. Woodson and Henry (1990) stated that sizing is the measurement of an individual body for a perfect fit of garment on the figure. He also stated that the sorter sorts the patterns according to size and design and makes bundles of them; it requires much precision because making bundles of mismatched patterns can create severe problems. On each bundle there are specifications of the style size. Workman (1991), remarked that sizing in garment construction determine the fit of the garment on the wearer. The size and fit of a garment are factors which can affect both the protective aspects of a garment as well as its comfort. Proper garment fit depends on the relationship of the size of the garment. Size inflation is used to refer to the phenomenon of ready-to-wear clothing of the same nominal size becoming larger over time. Vanity sizing tends to occur in several places where clothing sizes are not standardized. Although within the United States it occurs far more frequently in women's apparel than in men's apparel partly due to the widespread and far earlier adoption of standardize measurement for men's apparel for military uniforms (wherefore example, a pair of trousers with a 32 inches waist and a 32 inches inseam must be labeled as such regard-

less of who made it).

Clauser and Pearl (2005) stated that the last decade has seen a remarkable surge in the number of studies reported on the subject of body measurements or sizes from all over the world. Various statistical methods ranging from simple percentiles to complex combination of multivariate and regression analysis have been employed for distribution of population into subgroups; more recently powerful mathematical techniques have been employed with good results. Vanity sizing merely reflects the increasing prevalence of obesity. Garment ease should allow for comfort and mobility, too much or too little ease can result in a garment that is uncomfortable and restrictive to movement. Ashdown and Delong (1995) states that, fit of a garment depends on the correlation between garment measurements and the body measurements for which it is intended. The concept of garment fit is captured by the distance measure, which is calculated from the discrepancies between the body measurements of an individual in the sample and the prototype design values of a size.

1.3. Garment Designing

Rodwell, (2000) stated that garment designing is the art of the application of design and aesthetics or natural beauty to clothing and accessories. In garment construction, Designing is the first step in garments construction (Rodwell, 2000). For this purpose the designer first draw several rough sketches in the sketch book. The designer draws inspiration from different sources such as natural objects, existing pictures in magazines and albums. Fashion designers attempt to design garment which are functional as well as aesthetically pleasing. They must consider who is likely to wear a garment and the situations in which it will be worn. The designers have a wide range and combinations of materials to work with and a wide range of colors, patterns and styles to choose from. Today most garments are designed for the mass market especially casual and everyday wear. Agbo (2013) however documented that garment designers must take cognizance of people with figure flaws and those with peculiar body shapes to accommodate their garment needs in the market. The fit of the finished garment depends on the accuracy of the designer (Bonney and

Porter, 1999).The designer needs to meet with a pattern maker and sample maker to figure out if the sketch on paper can be brought to life according to its vision, conception and production.

2. STATEMENT OF PROBLEM

Unguarded weight and size lead to difficulty in choice of what to wear. Lack of knowledge about individual's size and shape leads to poor garment selection and dressing resulting in poor fit and discomfort for garment users. Women tend to relax and become careless about their size and shape after marriage and child delivery. Ready-to-wear garment producers and importers face challenges of producing or ordering the right sizes for female users where the sizes and shapes or figures of the users in a particular locality are unknown. There are no records of shapes and sizes of adult females in Benue State. Indigenous standard garment sizes for various localities including Benue State are unavailable. It therefore becomes pertinent to establish sizes of adult females in Benue State to provide information for individuals to enhance proper check on their health, indigenous garment constructors, garment importers and garment entrepreneurs especially in Benue State.

2.1. Purpose of the Study

The purpose of this study is to determine body size and shape using waist, bust and hip measurements for effective garment designing for adult females in Benue State.

Specifically, objectives of the study included:
1. Taking measurements of female adults of three major ethnic groups in Benue State.
2. Categorizing measurements of adult females to three average sizes (small, medium and large).
3. Identifying predominant shapes of the adult females using the measurements.

Research Question
1. What are the measurements of female adults of Tiv, Etulo and Igede?
2. What are the average sizes (small, medium, large) of Tiv, Etulo and Igedefemale adults?
3. What are the predominant shapes of Tiv, Etulo and Igede female adults?

3. METHODOLOGY

3.1. Research Design

The research design was quasi experimental design. This involved selecting groups upon which a variable was tested, without any random pre-selection processes.

3.2. Population of the Study

The population for this study is146,239 comprising all female adults of Tiv, Etulo andIgede.

3.3. Sample and Sampling Techniques

Three out of the four major ethnic groups in the State were purposely selected for the study. The sample size was 90 adult females. In each ethnic group, 30 adult females were randomly selected from among those residing in the major local government headquarters namely: Gboko for Tiv, KatsinaAla for Etulo and Oju for Igede. Each of the participants anthropometric measurements were taken and documented.

3.4. Instruments

The instruments for data collection were measuring tape, note book, pencils, biros, retractable metal tape and oral interview.

4. METHODS OF DATA COLLECTION AND ANALYSIS

Anthropometric measurements of each of the respondents were taken. Measurements were obtained for bust, waist and hip using fabric measuring tape by the researcher, assisted by two research assistants. The measurement (Bust, Waist and Hip) for each selected respondent was taken in early hours of the day for uniformity. The corresponding height of individuals was taken using the retractable metal tape. Each respondent was asked to stand against a clean wall on barefoot and have her height measured. The age of each respondent were taken by oral interview. Data were analyzed using percentage and mean

4.1. Result

The results for the study is discussed based on the research questions.

Research Question 1: What are the measurements of female adults of Tiv, Etulo and Igede?

Table 1. Size measurement chart for Tiv, Etulo and Igede Adult female

S/No	Measurements for Tiv adult females					Measurements for Etulo adult females					Measurements for Igede adult females				
	HT	B	W	H	FT	HT	B	W	H	FT	HT	B	W	H	FT
1	1.29	86	86	91	Ba	1.26	99	88	88	Ba	1.26	99	104	111	Pr
2	1.29	88	93	106	Pr	1.26	101	114	101	Pr	1.26	83	71	93	Hs
3	1.29	88	86	63	Ap	1.26	101	88	101	Hs	1.29	86	93	114	Pr
4	1.32	91	76	76	Ap	1.32	114	116	116	Ba	1.29	91	83	99	Hs
5	1.32	96	96	88	Ap	1.32	124	127	124	Pr	1.32	86	101	88	Ba
6	1.32	101	114	114	Pr	1.32	88	101	93	A	1.32	96	86	91	Hs
7	1.32	99	104	109	Pr	1.32	86	99	101	Ba	1.32	101	81	91	Hs
8	1.32	104	114	119	Pr	1.35	93	101	101	Pr	1.32	99	76	91	Hs
9	1.35	106	88	101	Hs	1.35	99	96	99	Hs	1.35	101	83	96	Hs
10	1.35	114	96	76	Ap	1.35	88	88	101	Pr	1.35	91	101	114	Pr
11	1.38	109	101	106	Hs	1.38	86	93	86	Ba	1.35	114	101	101	Ba
12	1.38	127	114	119	Ap	1.38	99	101	96	Ba	1.35	116	76	93	Ap
13	1.38	119	76	76	Ap	1.41	127	114	109	Ap	1.38	127	127	101	Ap
14	1.41	88	88	83	Ba	1.41	114	101	99	Ap	1.38	88	86	86	Ba
15	1.41	83	93	101	Ap	1.41	121	119	119	Ba	1.41	101	106	114	Pr
16	1.44	101	99	101	Ba	1.41	124	88	101	Hs	1.44	96	101	101	Ba
17	1.47	127	119	121	Hs	1.44	106	114	106	Ba	1.44	93	101	114	Pr
18	1.50	132	124	114	Ap	1.44	109	114	111	Pr	1.50	119	101	88	Ap
19	1.50	119	127	127	Pr	1.44	111	101	104	Ap	1.50	119	127	122	Pr
20	1.50	88	93	101	Pr	1.50	83	88	93	Ba	1.50	96	101	101	Ba
21	1.56	91	99	101	Ba	1.50	99	96	101	Ba	1.53	106	76	101	Hs
22	1.56	93	93	114	Pr	1.50	101	99	88	Ap	1.53	88	76	106	Pr
23	1.59	99	114	99	Pr	1.59	73	76	88	Pr	1.56	91	81	91	Ba
24	1.59	88	86	86	Ba	1.59	76	88	86	Pr	1.56	93	88	99	Hs
25	1.62	83	88	76	Ap	1.62	83	93	99	Pr	1.56	93	76	86	Ap
26	1.65	96	96	101	Pr	1.62	86	88	86	Ba	1.59	93	83	83	Ba
27	1.65	96	73	76	Ap	1.62	91	101	93	Ba	1.65	96	88	88	Ba
28	1.68	104	101	101	Pr	1.68	101	101	114	Pr	1.65	99	99	101	Pr
29	1.68	104	104	101	Ap	1.68	93	99	101	Pr	1.68	78	88	93	Pr
30	1.68	124	114	109	Ap	1.68	109	101	121	Hs	1.68	114	101	101	Ap

Source: Field data 2012

Key: Ap = Apple,   HT = Height,   Hs = Hourglass,   W =Waist, Hs = Hourglass
Pr = Pear,   H = Hip ,   Ba= Banana,   B=Bust, FT = Figure Type

Table 1 shows that the shortest height of Tiv adult female is 1.29 meters and tallest is 1.5 meters. The shortest Etulo adult female is 1.26 meters and tallest is 1.44 meters, while the shortest Igede adult female is 1.26 meters and tallest is 1.50 meters. The least bust size for Tivand Etulo adult females is83cm respectivelywhile the least bust size for Igede adult female is 78cm. Both Tiv and Etulo adult females have 76cm as lowest bust sizes. The lowest bust size of Igede adult female is lower than those of Tiv and Etulo adult females (71cm). Tiv, Etulo and Igede adult females have similar highest values for waist measurement (127cm each). The least size of hip for Etulo adult females (88cm) is larger than those for Tiv (63cm) and Igede (83cm). The largest size of hip for Tiv adult females (127cm) is larger than those of Etulo (121cm) and Igede (114cm).

Research Question 2: What are the average sizes of Tiv, Etulo and Igede adult females?

Table 2. Average sizes of Tiv,Etuloand Igede adult females

Body Parts	Size Range (cm) Tiv adult females			Etulo adult females			Igede adult females		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Bust	83-98	99-122	123-138	73-96	97-112	113-128	78-102	103-118	119-135
No per range	14	12	4	9	15	6	23	4	3
%	46.67	40.00	13.30	30.00	50.00	20.00	76.67	13.30	10.00
Waist	73-88	89-112	113-128	76-99	100-115	116-131	71-94	95-110	111-127
No per range	9	13	8	15	12	3	17	11	2
%	30.00	43.30	26.67	50.00	40.00	10.00	56.67	36.67	6.67
Hip	63-78	79-102	103-111	86-109	110-125	126-141	83-106	107-122	123-139
No per range	6	13	11	22	5	0	14	6	0
%	20.00	43.30	36.67	73.30	16.67	0	46.67	20.00	0

Table 2 shows size categorization based on data obtained from field. The table shows that higher proportions of Tiv, Etulo and Igede adult females belong to small bust size range :46.67%Tiv, 50.00 % Etulo and 76.67% Igede respectively. Most 50.00 % Etuloand 56.67% Igede adult females small size waist range while more of Tiv adult females (43.30%) possess medium size waist. Majority 73.30%Etulo adult females have small hips.

Research Question 3: What are the predominant shapes of Tiv, Etulo and Igede adult females?

Table 3. Predominant shapes of Tiv, Etulo and Igede adult females.

S/No	Predominant shapes of Tiv adult females			Predominant shapes of Etulo adult females			Predominant shapes of Igede adult females		
	Shape	No of respondents	%	Shape	No of responder	%	Shape	No of respondent	%
1	Banana	5	16.6	Banana	11	36.6	Banana	8	26.6
2	Pear	11	36.6	Pear	10	33.3	Pear	9	30.0
3	Apple	11	36.6	Apple	5	16.6	Apple	5	16.6
4	Hourglass	13	10.0	Hourglass	4	13.3	Hourglass	8	26.6
Total		30	99.8		30	99.8		30	99.8

Table 3 revealed that the two predominant shapes of adult females among the Tiv adult females are Pear (36.6%) and Apple (36.6%). The most predominant shape of Etulo adult females is the Banana shape (36.6%) followed by the Pear shape (33.3%).The most predominant shape of Igede adult females is the Pear shape (30%).

5. DISCUSSION

Although Abend (1993), stated that the ideal body size of females are of 91cm bust, 66cm waist, and 91cm hips, this research revealed that none of the respondents belong to the ideal size documented by Abend (1993). The finding buttress the claims by Abend (1993) that less than 5% of all the females in the world have achieved these so called perfect body measurement. This study revealed that there is no correlation between sizes of different sizes of body parts of adult females; the size of bust of an adult female may not be deducible from the height or size of the waist or hip and vis versa.

The most predominant shape identified in this study among the respondents was Pear represented asTiv (36.6 %), Etulo (33.3%) and Igede (30.0%).This body type shows wider hip than the bust width as noted by Markee

and Elain(1991). Fat is distributed more in the hip, thigh and buttocks area of the body. Body fat begins to develop in the upper body regions including abdomen as age increases. The findings buttress the claims by Mallum and Kembe (2011) that most females exhibit increase in size especially along the waist line and abdomen tremendously during pregnancy. If deliberate effort is not made at controlling the enlargement of abdomen after delivery, the increase lingers on in life. Fat deposition on abdomen, hip and buttocks increase with increase in age among females. The implication of the predominance of this shape to the garment designer and garment merchant is that garment for adult females in Benue State should large enough to accommodate the extra fat deposits.

Apple and banana shaped adult females have higher health risk of heart disease due to the fat stored in the chest region. Pear and Hour glass shaped adult females due to the body fat building around the waist and hip and not on the chest have lowest risk of heart disease. A garment that is meant to be fitted at the waist cannot fit a female that is apple shaped or the banana shaped adult.

There is variation in shape within the three ethnic groups studied. Table 3 revealed that the predominant shape among Tiv adult females are apple 36.6% and banana 36.6%. The predominant shape among Etulo adult females are banana 36.6% and pear 33.3% while the predominant shape among Igede adult females is pear 30.0%. This finding agrees with the assertionsby Iloeje (1995), Anikweze (2003) and Agbo (2013) that size and shape variations exist among adult females in different localities and within the same locality. These shape and size variations will also pose challenges for the garment designer especially in production of garments for consumers. For instance, a garment designed for the Tiv adult females may not serve for the Etulo or Igede adult females appropriately.

6. CONCLUSION

This study has shown that variations in shape and size exist among females from the three ethnic groups as well as within adult females in each ethnic group in Benue State. Based on the findings of this study, body size and shape have no direct or inverse relationship with height of an adult female. There are differences in the body measurement chart between the three ethnic groups. No adult female possesses the ideal size of 90x65x90*cm*. Garment designers and constructors who produce ready-to-wear garments should take particular note of size and shape of individuals especially female adults in specific environment to enhance good fit of the garments on the wearers. Due to variations in size and shape of female adults, custom-made- garments may achieve better fit than ready- to -wear garments which may essentially require adjustments on purchase.

7. RECOMMENDATION

1. Based on the findings, it is recommended that adult female's make adult females should make concerted efforts at reducing accumulation of fat on the bust and waist region since the apple shape has bad health implication.
2. It is also recommended that Home Economics extension worker be involved in educating females of child delivery age on how to achieve desirable shapes in adulthood (banana, pear and Hourglass).
3. It is also recommended that garments constructors should establish a standardized garments size chart for the ethnic groups to eliminate the problems of garment fit.

Conflict of interests
Author declare no conflict of interest.

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