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ESTABLISHMENT OF AVERAGE BODY MEASUREMENT AI'IDTHE DEVELOPMENT OF BL.OCK"PATTERNS FOR FEMALE ADOLESCENTS IN ENUGU STATE

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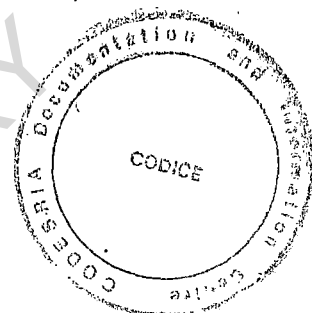ESTABLISHMENT OF AVERAGE BODY MEASUREMENT AND
THE DEVELOPMENT OF BLOCK PATTERNS FOR
FEMALE ADOLESCENTS IN ENUGU STATE

A PROJECT PRESENTED TO THE DEPARTMENT OF
VOCATIONAL TEACHER EDUCATION
UNIVERSITY OF NIGERIA, NSUKKA

IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTERS IN EDUCATION IN
VOCATIONAL EDUCATION (HOME ECONOMICS)

BY

ILOEJE, IJEOMA CATHERINE
PG/M.ED/90/9320

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APPROVAL PAGE

UNIVERSITY OF NIGERIA, NSUKKA

FACULTY OF EDUCATION

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IN HOME ECONOMICS

APPROVED:

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THESIS ADVISER

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EXTERNAL EXAMINER

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HEAD OF DEPARTMENT

CERTIFICATION

ILOEJE IJEOMA CATHERINE. a postgraduate student in the Department of Vocational Education with Reg. No. PG/M.ED/90/9320 has satisfactorily completed the requirements for the course work and research work for the degree of Masters in Education (Home Economics). The work embodied in this project is original and has not been submitted in part or full in any other degree of this or any other University.

_____
Head of Department
Vocational Teacher Education

_____
Dr(Mrs) E.U. Anyakoha
Supervisor

DEDICATION

To my loving children; Chinenye, Nnaneme, Chukwunwike,

Adaeze and my husband, Onwuameze.

ACKNOWLEDGEMENT

I wish to express my sincere appreciation to my supervisor, Dr.(Mrs.) E.U. Anyakoha for her very useful contributions and wonderful disposition throughout this study.

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ABSTRACT

The purpose of this study was to establish average body measurements of female adolescent students of 12 to 14 years of age for use in drafting block patterns for them. A null hypothesis that there would be no significant differences in the mean body measurements for bust, waist, hip as well as back waist length of female students of 12, 13 and 14 years of age ($p < 0.05$) was tested. The population comprised all the junior secondary students in the 55 girls' secondary schools in Enugu State. The sample consisted of 600 female adolescents randomly drawn from the population. Measurements of 18 parts of the body were taken with a fibre-steel tape (non-stretchable) and the data was analyzed using the mean, analysis of variance (ANOVA) and the Duncan's New multiple Range Test (DNMRT). There were no significant differences in the mean body measurements of adolescent females aged 12 to 14 years for bust, waist, hip and back waist length. Based on the result of the statistics, one set of sloper comprising front bodice master pattern, back bodice master pattern, front skirt, back skirt and sleeve pattern was drafted for the target group. These pattern pieces were transferred on calico fabric and the pieces sewn together to form a toile. The bodice and sleeve toile were tried on a standard figure and trued to obtain good fit.

Background of the Study

Clothes have been identified along with food and shelter as essential for life. It is necessary for the protection of persons from the hazards of the environment. Horn (1968) observed that an infinite number of mechanical agents (e.g. sharp instruments, nails, thorns) cause abrasions and wounds to the skin. Also biological agents like bacteria, fungi, viri and numerous parasites and insects are capable of producing skin leison. He identified properly designed protective clothing as the most effective means of reducing the danger from these environmental hazards and irritants.

Clothing is also very important in personal well-being. According to George (1973) clothing determines to a large measure how one appears on the street and in the society, the friends he makes, the job he seeks and the company he invites to his house. The physical self can be made more desirable and attractive by the use of clothing articles. In addition to adornment, clothes are worn for modesty, status and identification. Through clothing, basic human needs are satisfied which are both physical and sociopsychological (Johnson and Foster, 1990). Some of these needs include protection from rain, hot sun and cold weather. Hurlock (1978) observed that clothes give children impression of

growing up, help children to identify themselves as individuals and help camouflage their physical defects and disabilities among others.

Before the introduction of the Structural Adjustment Programme (SAP) by the Federal Government in July, 1986, Nigeria did not have much difficulty meeting the clothing needs of her populace particularly in garment construction. The efforts of the indigenous tailors, seamstresses and fashion designers were heavily augmented by the importation of ready-to-wear clothes and commercial garment patterns. Also included in the ready-to-wear clothes are used "second-hand" garments, popularly known as 'Okrika'. There were heavy dependence among the lower and middle income groups on these used clothes as they were cheap and within reach of the average Nigerian family.

With the introduction of the SAP, the main objective of which is economic self reliance, most foreign goods that can be locally produced including imported ready-to-wear clothes and commercial patterns were banned. Where these imported items are available in the country, the costs are usually very high. Another problem associated with these imported garmets and commercial patterns is that they are produced from standardized body measurements of Europeans or Americans. As observed by Kaka (1990) garments made from such patterns do not fit perfectly because of the

apparent differences in body structure and postural alignments
of Africans which differ from those of the Europeans. These
problems are magnified where children's garments are concerned
since growth rates are more rapid and varied in their age ranges
and the matching of standard measurements to ages are thereby
made more difficult.

There are now heavy demands on our local tailors and seam-
stresses to provide the clothing needs of the large Nigerian
populace (88.4 million by the 1991 census). This is an arduous
task in view of their slow and outdated construction procedures.
The tailors and seamstresses still depend on the taking of
individual body measurements of customers or clients whenever
they want to construct a garment. This problem can greatly be
reduced by the use of garment patterns.

Patterns are basic necessities to clothing manufacturers in
the construction of perfectly fitted garments. In particular,
they are quite invaluable for large scale production. Pattern
making is a skilled trade and requires the body measurements of
wide range of people. Because of the varying human shapes,
patterns are designed to fit different groups of figures with
differences in height and contour. McCalls (1968) identified seven
groups of figures for females namely, Misses, Women's, Half-sizes,
Junior Petite, Junior, Young Junior/Teen and Girls. Females

patterns are made not only for these seven different figure
types but also for different sizes within each figure type. With
the use of patterns, individuals with basic sewing knowledge
and even primary school level of education can turn out nice
fitting garments for oneself and for the family members and they
can perform quite well as employees of garment factories.

Statement of the Problem

Nigeria does not have standardized garment patterns for her
populace which are basic to large scale production. Also there
is no conclusive study on standard body measurements that can be
used in drafting patterns for different categories of persons.
The tailors and seamstresses still depend on the taking of
individual body measurements of customers or clients whenever they
want to construct a garment. It is obviously difficult to
satisfy the large demand for clothing with this small-scale method
of production. This study was therefore undertaken in order to
provide data for use in developing block patterns for Nigerian
adolescent female students. These patterns could be used by garment
manufacturers for large scale production of garments for females
in that category.

Purpose of the Study

The purposes of the study were to:

(a) establish the average body measurements of females aged
12 - 14 years which can be used as standards for pattern
construction.

(b) utilize the standardized body measurements to develop suitable

   block patterns for the female adolescent secondary school

   students.

<u>Significance of the Study</u>

   Standardized body measurements obtained from this study will
be used for pattern drafting by students of textiles and clothing
in tertiary institutions.

   The block patterns developed for the target group will greatly
facilitate large scale production of garments for the age group
within Nigeria and other countries with similar body structure.
The pattern obtained could be utilized by home economics teachers
and their students for pattern development where they can be
manipulated into a wide variety of styles. The block patterns
developed will also be used in teaching pattern alteration to
students of textile and clothing in tertiary institutions.

   This study will provide baseline data for use in commercial
pattern production. Thus, it will be relevant to large scale
clothing manufacturing.

   With the development of block patterns, better fitting garments
will be produced for Nigerians particularly by both professional
tailors and home sewers. This study will serve as basis for
future research in pattern making for the Nigerian figure. The
patterns developed will be more relevant to the Nigerian population
than those imported from Europe and America.

Assumption of the Study

The following assumptions were made in respect of this study:

1. Patterns are very important in garment construction.

2. Adolescent females are interested in good fitting clothes.

Scope of the Study

The study was limited to female junior secondary school students between the ages of 12 and 14 years. The subjects of study were all Nigerians and were drawn from the three educational zones in Enugu State of Nigeria. Only those body measurements required for drafting the dress master front and back patterns as well as sleeve were taken.

Research Questions

The following research questions were answered through this study:

1. What are the average body measurements of female students aged between 12 and 14 years in Enugu State secondary schools?

2. Which body measurements showed marked variation(s) for the study group?

Hypothesis

N^o There are no significant differences in the mean body measurements for bust, waist, hips and back waist length of female students of 12, 13 and 14 years of age ($P < 0.05$).

Definition of Terms

Block Patterns. This is also referred to as a foundation pattern, a master pattern and (in the trade) a "slopper". It is a perfectly plain pattern assembled and altered for correct garment fit.

Pattern Drafting. This is a method of obtaining pattern by working from the measurements of the figure following a set of instructions and drawing a shape on a paper, or non woven fabric or even a fabric. It involves two stages; firstly the making of a set of five "basic patterns" or three as in dress master pattern and secondly the manipulation of the basic patterns to create styles.

Body Measurement. This is the actual measurement of the body parts like chest, waist, hip, waist length etc using a non-stretcheable measuring tape. The figures obtained are recorded in inches or centimetres and used in drafting patterns and for classification into body types.

Figure Types. The classification for various figures according to height and body proportions. Within each figure type are various size ranges.

Foundation Garments. These are garments worn under the outer garment which help to hold down body bulges. They include brassiere, girdle etc.

Stay-Stitching. A type of stitching done along edges of garment pieces to hold the grain threads in position so as to prevent stretching. It is usually done through a single thickness.

<u>Standard Pattern Figure</u>. An imaginary figure for sizing a pattern. It has perfect posture and symmetry and unvarying proportions and contours, and has a bust two inches smaller than the hip measure.

<u>Foundation Pattern</u>. The basic pattern constructed within the block to be used as a template from which to draft patterns.

<u>Foundation block</u>. The rectangle based on figure measurements.

<u>Toile</u> (calico shape). A mock-up, in fabric of a foundation pattern to ensure a good fit and to correct faults.

<u>Grading</u>. A process by which a range of larger and smaller sizes are produced from the master pattern using a proportional system of measurement. It will faithfully reproduce the design without loss of balance, line or fit.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter deals with the review of related literature. The literature was reviewed and organised under the following headings.

1. Children's Clothing - Provision and Importance.

2. Children's Body Size Variations and Patterns.

3. Physical Growth and Concerns of Adolescent Girls.

4. Essential Body Measurement, Techniques and Equipment for Pattern Drafting.

5. Pattern Development, Fitting and Problems.

Children's Clothing - Provision and Importance

Clothing has always been important to people because it meets one of their primary needs. According to Graof and Storm (1976); Horn (1968); Lewis, Bowers and Kettunen (1960), clothing is worn as a result of modesty, protection, status, identification and adornment. Because it is easily seen, clothing may express one's feelings and moods. Clothing is frequently important as a means towards acceptance by the group. Tate and Glisson (1967) noted that suitable clothes contribute to the children's character development and increase their self confidence. Suitable clothes may influence a child's mental health by encouraging him or her to accept responsibility to cooperate with adult and peers. Good fit is a desirable feature in both children's and adult's

clothes. Tate and Glisson (1967) identified poor fit to be the most frequent reason given by school girls for not wearing their clothes and they feel very uncomfortable when forced to wear such poor fitting clothes. Children's clothing should also provide for growth as growth is rapid in children. However Johnson (1962) condemns the practice that children's clothing should be oversized while new so that children may grow into them. This is because the garment may be worn out long before the wearer has caught up with it in size and meanwhile the newest and prettiest time of the garment life is wasted.

Gawne and Oerke (1975) identified some features that are desirable in children's clothing and which lead to their greatest satisfaction to include comfort, safety, self-help features, growth allowance and ease of care. Adolescent girls however are more interested in style and vogue (Hurlock, 1978). Though children look very lovely in cute dresses, it is still important to consider health and comfort features in addition when choosing their clothing.

Through clothing, different human needs are satisfied both adults and children. Horner (1960) identified clothing as an important area of personal satisfaction and a means of social identification. Children need clothes to protect them from the weather, to make them more attractive and acceptable to society

as well as helping to identify them with their peers. Clothes also promote a feeling of security, ease, self confidence and express personality. Tate and Glisson (1967) on the physiological, social and psychological needs of clothing the family, observed that meeting the above needs help to develop self confidence and feeling of security at any age. They also help to build and stabilize personality. Hurlock (1978) also observed different children's needs that are satisfied through clothing. For instance, clothes give children impression of growing up and help them call attention to themselves. Clothing also helps children to identify themselves as individuals. Furthermore, children who have physical defects tend to use clothes to camouflage their physical disabilities. It is therefore necessary to provide adequate clothes for the younger people since they affect their development and happiness.

Children's Body Size Variations and Patterns

Many studies have been conducted on children's measurements but not much is available on Nigerian children for developing garment patterns. Anthropometric measurements for assessing the nutritional status of children are among the few works done on children's measurements in Nigeria and they provide the most valid assessment of physical growth and body composition (Jellife, 1966). These anthropometric indices include height measurements, weight measurements, head circumference, arm

circumference, chest circumference and triceps skinfold measure-
ments.

Growth is rapid in children and their growth patterns have been
observed to differ from one locality to another. Nnanyelugo and
Ngwu (1985) in their study to find out the differences in the
growth pattern of children in five geographical subdivisions of
old Anambra State, noted that zonal variables appear to exert
more significance on height, weight and triceps estimates of
children than those of arm or chest and head ratios.

It has been found that many children of like age have entirely
different proportions and dimensions (Tanner, 1976). The variations
are due to several factors which include hereditary, socio-economic
status which encompasses nutrition, health, living standards,
family surrounding, in fact, all the extrinsic environment of the
child and time (Davidson, Passmore and Trustwell, 1986). Also
Tanner (1966) observed that family size affects children's body
size and stated that the more mouths to feed and children to
bother about, the less well the feeding and the general care of
the children.

The variations in body sizes among people of the world have
been identified to be very significant. In a study carried out
by Ashcroft (1964), he found out that the differences between
the Chineese children and those of African and European origin

amounted to about seven centimetres. Ashcroft was firmly of
the opinion that the differences were genetic in origin. His
study also showed that children of yellow skin were markedly
shorter and lighter than white and black children. At times,
where there is abnormal genetic make up, the stature and shape
of the individual may be affected. According to Davis (1986),
genetic abnormalities may cause marked stunting, disproportionate
growth and development. Such girls, according to Lyon, Preece
and Grant (1985) grow at a slightly slower than average rate
throughout childhood and will fail to experience puberty growth
spurt. Therefore the inherited growth potential of a child
determines the pattern of body build particularly under ideal
environmental conditions.

Nutrition, according to Adenike (1983) as well as others, is
one of the major environmental factors that affect child's growth
and development. It has been reported that nutritional influence
may modify the effect exerted by genetic control (Waterlow, 1986;
and Maxlorell, 1986). Nutritionists in countries where children
have different body size, have found it difficult to establish
appropriate genetic growth reference in order to define the envi-
ronmental factors (Habitch, 1974; Roche and Michingnerg, 1974;
Mckigney and Munro, 1978). However, McWilliams (1975) added that
if environmental conditions are favourable and able to supply all
the necessary nutrients, the child will be able to express all

its genetic potentialities. Disturbances of growth and maturation have been reported among malnourished children. In their study, Graham and Advianzen (1972) and Richardson (1975) reported that growth retardation could be a permanent feature of malnutrition if the general condition of living were not improved on.

Socio-economic levels within an area have been shown by researchers to add to the differences in stature of today's children (Tanner, 1976; and Mora, 1985). According to Bhattachayya (1986), socio-economic factors include living condition, economic levels, social status, hygiene and educational level. He reported the noticeable changes in body sizes in industralized countries with respect to hygiene level, rate of infection and food consumption. In economically disadvantaged area, poverty and malnutrition were associated as factors that influence body size. In a survey by Tanner (1976), young children in a superior socio-economic environment were found to be taller than children of comparable age who live in less advantaged area. Another study was conducted by Janes (1974) to assess the growth pattern of two groups of Nigerian Yoruba children from elite and poor families. Results show that the children of the elite were larger in size than children from the poor families. It is advisable therefore that children's patterns should not be sized according to age, height or weight but on the body measurements obtained especially waist and chest measurements (Sara, 1969; McCalls, 1969; Simplicity, 1972).

Children's block patterns are however very important to achieve good fit and also to provide for large scale production. Even for some home sewn garment makers it is easiest to purchase some commercial patterns and make the blocks from the patterns. With the use of patterns garment making business will flourish. Job opportunities are likely to exist in the area of pattern making, pattern alteration and tailoring among others.

Physical Growth and Concerns of Adolescent Girls

Biologically, adolescence is the period from the onset of puberty to adulthood. Although, as observed by Lefrancois (1990), it occasionally designates the period beginning with pubescence and terminating with adulthood. The onset of adolescence is heralded by two significant changes in physical development. The first is the change in size and shape as they enter the adolescent growth spurt. They also reach puberty - a point of sexual maturity (Shaffer, 1993). Lefrancois (1990) observed that growth spurt marks the beginning of adolescence and it is a period of rapid acceleration in height and weight. Also the timing of this event varies considerably from child to child. According to Tanner, (cited in Shaffer, 1993), some may begin as early as seven and a half years or as late as 12 years but they typically enter the growth spurt by age 10½, reach a peak growth by age 12 and return to a slower rate of growth by age 13 to 13½.

At this period also the child grows taller and heavier, looses the "girlish" look and begins to resemble an adult. The most noticeable changes are the widening of hips.

Tanner's work (cited in Shaffer, 1993) showed that the adolescent growth spurt begins with an increase in body weight and follows four to six months later by a rapid increase in height. Though the muscles are growing along with the body, the period of greatest muscular development (muscle spurt) does not occur until a year after the maximum acceleration in height.

Physical Concerns of Adolescents

What do adolescents think about the physical changes they are experiencing? Greif and Ulman (1983) noted that adolescents often become quite concerned about their appearance and may spend a great deal of time worrying about what other people think of them. In general teenage girls hope to be attractive to members of the other sex and their self concept largely depend on how attractive they believe themselves to be (Berscheid, Walster and Bohrnstedt, 1973). In a survey carried out by Lefrancois (1990), he reported that almost 50% of the adolescents he studied, showed concern for physical appearance among other things. Good fitting clothes can be used to enhance one's appearance.

Essential Body Measurements, Techniques and Equipment For Pattern Drafting

Pattern by different companies are in standard sizes according to body measurements and figure type. Johnson and Foster (1990) observed that figure types vary according to height, back waist length and body build. Some of these figure types are juniors, petites, misses, teen boys and men. They also observed that figure type may change as body matures.

A good knowledge of body measurements is very vital for drafting basic garment patterns and for constructing garments that will fit perfectly (Bray, 1971; Kaka, 1990). According to Reader's Digest (1987), the first step in pattern drafting is to take a list of measurements and decide on which pattern size and type. The body parts that have been considered very essential and needed for pattern drafting and clothing construction are the bust, waist and hip (McCalls, 1969; Simplicity, 1972; Reader's Digest, 1987). Other measurements needed in addition are shoulder length, shoulder width, front waist length, back waist length etc. Tuit (1975) emphasized the need to take accurate measurements. She suggested that the tape with an equal amount of tension should be placed on the appropriate part. This is because inaccurate measurement may cause an unnecessary amount of fitting and recutting after the garment is tacked together. In addition, landmarks for measurement on the soft

fleshy body must be satisfactorily located. The essential body measurements are taken over foundation garments. Tuit (1975) also noted that measurements may be taken over a dress if it is close fitting. She also suggested the need for a general observation of the figure before taking measurements so as to note any variations from normal posture. Such variations could be sloppy shoulders, bent back etc. Furthermore, measurements should be taken sequentially to avoid missing any body part.

While taking measurements, Stringer (1993) suggested that the usual underwears and shoes should be worn. The person being measured should stand naturally and look straight ahead. She further stated that circumference measurements should be taken firmly but not tightly. For bust and hip it is advisable to measure up to the nearest even centimetre (ie 86, 88, 90, etc).

Patterns can either be made flat or draped on a model. In making flat patterns, the designer follows a set of instructions to draft a set of five basic patterns, which include - the bodice/blouse front, the bodice/blouse back, the front skirt, the back skirt and the sleeve. Dress master pattern on the other hand has three basic patterns: the front dress, the back dress and the sleeve. The basic pattern, sometimes called the foundation pattern, master pattern or block pattern and in the trade 'sloper' is a perfectly plain pattern that has been constructed

to fit the individual. Each pattern piece may have at least one basic dart to control the material required to cover a body buldge (Erwin, 1969). She also noted that seams, hems or extra fullness are not required in a basic pattern but are added when cutting the garment. Basic patterns should be fitted in every detail before styling features are developed. If this is done, subsequent adjustments will be slight though necessary to suit the type of fabric used.

The art of pattern drafting has become a skilled craft where precision in measuring and construction is needed. Equipment for measuring should include the following: a measurement chart, metric tape measure, a length of string about one metre long (Stringer, 1993). Others include two rulers, 30 cm and one metre in length, a set square (medium to large), a pair of scissors for cutting paper, pin and paste. Also weights for holding down the paper while working, e.g. flat stones. For accuracy in drafting Stringer (1993) made the following reco-mmendations:

> Tape measures and rulers must agree. Rulers must be straight. Set-squares must have a true 90° angle. Pencils should give a bold line and be suitable for drawing curves. A large flat surface for working on is required. Large sheets of plain paper or cheap white newsprint is suitable. H-pencils are preferable for pattern making and B-pencils for sketching and

practising curved lines. Coloured pencils can be
used where a contrast is needed.

Straight lines should be drawn with a ruler and right-angles

with a set-square while curved lines should be smooth.

Pattern Development, Fitting and Problems

The initial patterns obtained in flat pattern drafting are

not usually reliable for indicating a perfect fit. A calico

shape or toile is used to obtain a more accurate fit.

Tuit (1975) observed that a good fit depends as much on

careful preparation of the pattern as it does on skill in

fitting the garment to the figure, especially as many faults

cannot be corrected successfully after the fabric has been cut.

This is because adjustments can be made exactly where they are

needed on the pattern, where as, after the garment has been cut

out, it can only be made on the existing darts and seams. Often

time seam allowance are not always adequate to allow the recutting

necessary. Correcting the pattern for fit is safer and easier

and more likely to be successful than altering the garment

constructed with faulty patterns.

Toile Fitting (Bodice and Sleeve)

The front and back bodice patterns as well as the sleeve are

placed on calico fabric and all lines marked. A wide seam

allowance is allowed at the centre back opening of the bodice

so that the toile can be put on easily and pinned together down

the back. Erwin (1969) suggested half inch seam to be allowed
on curves and one inch seam on straight edges. At the centre
back which is left open for fitting purposes, two inch seam is
allowed. After transfering the markings from the pattern to
the calico, the patterns are cut out. The armhole and neckline
curves are stay-stitched to avoid stretching. The darts and
seams are stitched using a long machine stitch so that the thread
can be pulled out easily.

The toile is tried on a standard figure and necessary
adjustments made. To get a clear and accurate picture of fit,
appropriate shoes and undergarments are recommended. According
to Stringer (1993), the procedure for fitting is as follows:
The bodice is pinned up at the centre back. With a ball-point
pen or soft pencil any excess or shortfall of fabric around the
neck or armhole is marked as well as any change needed in the
shoulder line position. Any excess buldging is also pinned.
She also noted that fitting can be done by changing the size and
position of darts and seam allowances. Necklines, waistline and
wristline should be comfortably snug and curved to fit naturally.
All darts, shoulder and underarm are straightened with ruler.
Curved ruler is used as a guide to true curves.

When the toile has been adjusted to solve all fitting problems,
the corrections are transferred back to paper or to the original

foundation. By unpicking the seams, the toile is taken apart, pressed and laid flat for use. Erwin (1969) noted that this process of making the pattern fit the figure is known as "trueing the pattern". The corrected or trued patterns are transfered back to paper without seams. These now become the "master patterns" or "block patterns".

Stringer (1993) observed that for some people, the toile is not necessary, and often, it is just the bodice/blouse that needs attention. Though calico is traditional she recommends the use of any strong cotton fabric. However, materials with stretch are not suitable.

Pointers to good Fit

Readers Digest (1987) noted that appearance is one of the important factors to consider when judging garment for fit. For a good appearance, all darts and seams must fall in the proper places. The garment should have a smooth look over all without pulls, creases, sagging or baggy areas. They outlined the following pointers to good fit.

a) Shoulder seams rest smoothly on the shoulder tops, point towards and end at shoulder joints.

b) Sleeves hang straight to the elbow, then bend towards the front as the arm does when relaxed.

c) All vertical seams look straight from beginning to end, are not "wavy" along their length.

d) The hem is even and hangs parallel to the floor.

e) Darts taper towards and stop short of fullest part of the area they shape.

f) Waist seam rests at the natural waist (if this is the style) fits closely without binding.

Erwin (1969) noted that poor sewing and or poor pressing often gives impression of poor fit, hence good techniques are essential for good dressmaking as well as good fit. Some of the techniques include placing patterns true to grain of materials; cutting accurately along lines; stitching and pressing of darts; basting by hand or machine and easing of fullness. She also identified five standards of good fit to include the following ease, line, grain, set and balance.

1. Ease

This is the extra amount a designer leaves beyond the body measurement at any given point (Johnson et al, (1990)). A garment with adequate ease seems the right size, neither draws nor looks baggy and does not rise up in sitting or wearing when the ease is correct. Adequate ease is ensured at the sleeve cap, over bust and seat of garment. Insufficient ease in a garment is indicated by loose vertical folds. Johnson and Foster (1990) also observed that there are two types of ease whether in a pattern

or a ready-made garment. One is the 'wearing ease' for body
movement and comfort and the other is the designer's ease for
fashion or style. They also noted that a pattern designed
only for knitted or stretcheable fabrics will include less
wearing ease than a pattern for woven fabrics. This is because
a woven fabric has little or no stretch.

2. Line

Line refers to many aspects of fitting: the silhouette of the
garment, the proportion of the garment to the figure and of
various parts of the garment to each other; the shapes of the
curved lines and the placing of the details of the design
(Tuit, 1975). She also observed that line is affected by the
quality of the sewing more than any other factor in fitting.
Hence the need for accuracy in all dressmaking, process from
cutting out to final stitching. This goes to emphasize the impor-
tance of mastery of certain dressmaking techniques. Erwin (1969)
noted that the shoulder, underarm blouse seam and side seams
should appear in a continuous line from tip of ear to ankle.
Circumference lines - neckline, armhole, wristline, waistline
and hemline should be smoothly graded curves following the
natural curves of the body. The neckline should set up well in
the back hugging the neck yet comfortable. The armhole should
be oval- neither round nor pointed under the arm. It should follow
with natural creases made where the arm joins the body.

Erwin (1969) observed that if the armhole is too low, the arm cannot be lifted comfortably with a set-in sleeve. The waist-line seems parallel with the floor but a bit lower in the back to fit the natural hollow. The hemline should be parallel to the floor. The wristline should be long enough at the underarm seam that it will not pull away at the wrist but form a continuous curve to the tip of the hand.

3. Grain

The threads or yarns, the unit that make cloth are called "the grain". Grain refers to the lengthwise and crosswise threads from which a woven fabric is constructed. Erwin (1969) observed that in the standard basic pattern, the lengthwise grain should run perpendicular to the floor and back and at bust and hip. Also in a basic sleeve, the lengthwise thread should hang vertically from top of shoulder to elbow and crosswise threads in the upper sleeve should be parallel to the floor.

Set

A smoothness of "set" or freedom from wrinkles is always required for a good-looking fit. Folds created by gathers, unpressed pleats, or draped features are style lines which must not be confused with wrinkles.

Wrinkles appear like slanting tringles straining from some curves or buldge of the body. Wrinkles are usually on the bias because it is more elastic and gives way to strain. According to

Erwin (1969), creases are due to poor pressing and they detract from the smooth look which is desired.

Balance

For desired balance the dress should hang so that it extends the same distance from the legs from right to left and from front to back. The shoulder seam should rest evenly on the shoulder and not buldge away from the neck.

Lewis, Bowers and Kettunen (1960) observed that pattern manufacturers have done a great deal to help make sewing easy. For instance all large companies print their patterns and make them easy to understand and extremely accurate. Most patterns today are carefully labelled. The pattern number, size and the company making the patterns are all given. In addition each pattern piece is labelled so that you know whether it is a collar, a sleeve, bodice front or back or some other parts of the garment.

Patterns are however not without its problems. They will fit well in some places and less well in others. Bray (1979) observed that among the problems encountered is the frequent changes in size and shape of a growing child's figure and the need to make adjustments. This situation calls for knowledge of pattern alteration as well as grading.

Summary of Literature Review

The review of literature highlighted the importance of clothes in the lives of individuals and the urgent need to boost garment making business in the country. The review also identified apparent differences in body structure and postural alignments of Africans which differ from those of Europeans and other foreign countries hence the need to develop patterns specific to the Nigerian figure in order to make clothes that fit. The physical growth and concerns of adolescent girls were also highlighted. The essential body measurements for pattern drafting were reviewed as well as processes involved in pattern development, fitting and problems with patterns. Many studies have been conducted on children's measurement but there are no known standardized body measurements for pattern making for the Nigerian figure. This study was therefore designed to establish average body measurement of adolescent girls and develop patterns for them.

CHAPTER THREE

METHODOLOGY

This chapter deals with the methods and techniques used in this study. It includes the plan of the study, the area, population and sample of the study as well as the data analysis and presentation.

Plan of the Study

This procedure was adopted in carrying out the study:

i. Identification of body measurements needed for the block patterns through literature review.

ii. Developing the body measurement chart (the instrument of the study).

iii. Validation of the instrument.

iv. Actual collection of body measurements (data collection).

v. Analysing the data.

vi. Drafting of the block patterns.

vii. Trueing the patterns developed for good fit.

Area of Study

The area of study was Enugu State of Nigeria. There are three educational zones in Enugu State namely, Abakaliki, Enugu and Nsukka zones. The study was carried out in all the zones. The 55 girls secondary schools in Enugu State comprised the population of the study. The distribution is as follows:

Abakaliki zone has seven girls' secondary schools and a student population of 3,019. Enugu zone with 34 girls' secondary schools has a student population of 21,310. Nsukka zone with 14 girls' secondary schools has a student population of 8,157. A total number of 32,486 students formed the population of the study (see appendix F).

Sample of the Study

All the schools in the zonal headquarters, Abakaliki, Enugu and Nsukka were selected for sampling. Proportionate sampling was used to select one school out of the two in Abakaliki, five schools out of eleven in Enugu and two schools out of five in Nsukka. A total number of eight schools were selected from the 18 schools in three zonal headquarters with a student population of 10,308 and a JSS population of 5,214.

For students' sample, proportionate sampling was also used to select 75 students from Abakaliki, 150 students from Nsukka and 375 students from Enugu. In Abakaliki, 25 students each were randomly drawn from ages 12, 13 and 14 years. In Nsukka, 75 students were randomly selected from each school and 50 students were drawn from each of the three ages groups, 12, 13 and 14 years. In Enugu, 75 students were also randomly selected from each school, 125 from each age group. A total number of 600 students, 200 from each age group, formed the sample of the study.

Instrument for Data Collection

The instrument used in this study was a Body Measurement Chart (BMC) developed by the researcher through a review of literature on essential body measurements needed for drafting flat patterns and constructing garments for accurate fit. The instrument comprised two sections. Section A contained background information such as age, nationality, family size, parents educational level etc. Section B contained the body parts of circumferences, height and lengths to be measured. The instrument was given to three university lecturers of Textile and Clothing department and two other lecturers, one in Statistics and the other in Measurement and Evaluation for both face and content validity. Based on their recommendations a total of 18 body measurements were selected for use in obtaining body measurement data for the adolescent female students.

Data Collection Techniques

Data collection was carried out in two phases.

i. Training of the Research Assistants

Using the body measurement guide, the researcher taught the four assistants different measurements to be taken; sites or location of the body where these measurements were to be taken and how to take each measurement. The assistants repeatedly took the measurement of the subjects as demonstrated by the researcher

until they were able to get uniform data and have gained
mastery of the techniques involved.

ii. Administration of the Instrument

The first part of the instrument (Section A) requiring the
background information of the subjects were completed by the
subjects themselves. The second part which comprised the body
measurements were completed by the researcher and trained
assistants as soon as each body part was measured. Body measure-
ment was taken over one layer of garment, that is, their school
uniform. Cardigans, vests, belts or adornments were removed so
as not to interfere with the data. A fibre-steel tape (non-
stretchable) was used for circumference measurements as well as
the lengths.

Procedure for taking Measurements

The subjects stood naturally, hands by the sides, looking
straight ahead and only moved when requested to do so. Positions
on the body to be measured were identified. For "across"
measurements (back, chest, shoulders) marks were made at the base
of neck and armhole positions. Readings were recorded to the
nearest centimetre after three measurements. For bust/chest and
hip measurements readings were recorded to the nearest even
centimetre. The following measurements were taken (see figure I
for illustration).

Height

The subject stood with back against wall, no shoes on and posture erect but natural. A ruler was placed on top of head and mark made where the ruler touches the wall. The height of the subject is determined by measuring from the floor up to the mark on the wall.

Shoulder length: Measurement was taken from the base of the neck to the shoulder edge. To determine the base of the neck, subject was asked to shrug the shoulders.

Apex of bust: Measurement was taken from the base of the neck to the point of bust that is, the breast point.

Bust: Measurement was taken around the bustline from under the arm, across full bustline, across the widest part of the back, to starting point. Measurement across the bustline from side seam to side seam was also determined.

Waist: To determine waistline, a string was tied snugly around the waist and this rolled to the natural waistline. The waist measurement was taken around the string marker.

Hip: Measurement was taken around fullest part of hip, (18 cm - 23 cm) below waistline.

Back waist length: Measurement was taken from the prominent bone at the base of neck to the natural waist.

Shoulder width: Measurement was taken from one edge of the shoulder, across the back, to the other edge.

Front waist length: Measurement was taken from the base of the neck at the shoulder, passing over the point of one breast, to the waistline.

High bust width: Measurement was taken across the front, between the armholes, about 10 cm below the base of the neck.

Width between breast points: Measurement was taken from one breast point to the other.

Over arm length: Measurement was taken from the top of arm, over bent elbow, to the wrist bone.

Under arm length: Measurement was taken from lower edge of the armhole down to the wrist.

Wrist: Measurement was taken around the wrist.

Bicept: Measurement was taken around bicept.

Shoulder-to- elbow: Measurement was taken from edge of shoulder to the prominent bone at the elbow.

Elbow: Measurement was taken around elbow with bent arm.

Finished dress length: Measurement was taken from the base of neck at centre back, to the hem (knee level).

Procedure For Drafting the Block Patterns

Dress Master Pattern: back (Figure 2)

Using a ruler and a set square, a right-angle was drawn
A-B-C on a drafting paper as shown in figure 2. Line BC was
extended above B by 1.5 cm to b. Point D, 8 cm from B along BA
line was raised by 3 cm to d. The back waist length measurement
(36 cm) was measured from b to c and C repositioned at this
point. Half back waist length measurement (18 cm) was measured
from B to E and a quarter (9 cm) of the back waist length
measured from B to F. From C, 18 cm was measured down to G to
get the hip level and to H to get the full dress length. Lines
were drawn at right angles to b-h from F, E, C, G and H. The
bustline E-e (20 cm) equals a quarter of the bust circumference.
The hipline G-g and the hemline H-L are a quarter of the hip
circumference (21 cm). The side seamline e - g-h was joined.
Half the shoulder width (18.8 cm) was measured from E to I and
from B to A. A was repositioned accordingly. The same distance
(18.8 cm) was measured along bustline from E to I and across
back with line from F - f. A was joined to I. Half way point on
the line F-f was marked, and this point raised by 4 cm to a.
a to d and A to I are joined with broken lines (see figure 2).
From f, 1 cm was measured in and the armhole a-L-e was carefully
joined with an armhole curve.

To shape the waistline 2 cm was measured in from C to cc.
Cc was joined to e with a straight line and with a gentle curve
to meet side seamline 15 cm below the waist at M. To provide
for the waist dart, the centre line of C to cc was marked the
centre of the dart. The width of the dart was determined by
subtracting the width C - cc from a quarter of the waist measure-
ment (17 cm). Half of this width was marked at either side of
the centre of the dart. The dart line was extended from N,
2 cm below the bustline, to O, 15 cm below the waistline.

For the shoulder dart, a line was drawn, 1 cm wide and 6 cm
long half way along line d - a. Line d - a was extended by the
width of the dart to S. The dart was closed and the shoulder
line corrected by joining d to S. The upper armhole curve S to
e was redrawn. The finished pattern was cut out with dart still
closed.

Dress Master Pattern: Front (See figure 3).

A right-angle A-B-C was drawn as in the back pattern.
Measuring down from B and using the back waist length measurement
(36 cm) points C, F and E were marked and the front waistline,
back wastline and bustline levels established as in the back
pattern. From B on line B C, b was marked 1.5 cm down and line b
to a drawn parallel to B-A.

To establish the front waistline, the distance of the front waist length (38 cm) was measured from b down to c.

To fix e, a quarter of the bust measurement plus 2 cm was measured from E to e.

To fix points g and h, a quarter of the hip measurement plus 2 cm was measured from G to g and from H to h. The side seamline e-g-h was joined.

To establish the neckline, the line b-D on the front pattern equals line b-d on the back pattern plus 0.5 cm. From b, along the line b-H, the distance b to D was measured down to d. The neckline D to d was joined with a curve.

To establish the front shoulder line, the same distance as the back shoulder line minus 1 cm was measured from D to I. To establish the front shoulder slope, 2 cm was measured directly from I to i and D - i joined with a straight line.

Along the line E - e, one half of the high bust width measurement (16 cm) was measured from E to ee. A line L - m was drawn parallel to and 2 cm above E to ee. Point N was marked 1.5 cm below e and the armhole curved from i to M to N.

To locate the point of the bust dart, the apex of the bust measurement (21 cm) was measured from b to P along b - H line and below the bustline. From P and at right-angles to the line b - H, half the width between the breast points (9.5 cm) was

measured to point O. The width of the bust dart equals the distance C to c and this was measured from a point 2 cm below e.

Having established the bust dart and keeping it closed, the front dress pattern was cut out following the main outlines. The side seamline was adjusted by measuring 2 cm in from cc to R. Point S was marked 15 cm below cc and this was joined to R with a slight curve and R to e joined with a straight line.

The front pattern was laid on the back pattern aligning the underarms, waist and hips. Both patterns were cut along line e - R - S. The bust dart was reopened after the alignment. The two patterns were separated in order to draw the waist dart on the front pattern. The vertical centre line of the waist dart was aligned with O, the point of the bust dart and extended from 2 cm below O, to 15 cm below waistline. The width of the dart was calculated by dividing the waist circumference (68 cm) + 2 cm into four and deducting the result from c to R.

The Sleeve Master Pattern (Figure 4)

A line, A B was drawn at the centre of the drafting paper equal to the overarm length measurement (58 cm). The underarm measurement (45 cm) taken from A to C. A line was drawn from C to D equal to half of bicept measurement (12.5 cm), and C to E is the other half of the bicept measurement. A quarter of DC was measured in from D to plot F. From E, on the bicept line, half

of D to F was measured in to plot G. DF is the front armhole and
EG is the back armhole. To establish H, a line was drawn out
from B to H equal to DF plus half the distance from GE. To
establish I, a line was drawn from B to I equal to the distance
of BH. H was connected to F and I to G as guides for shaping
the sleeve cap. Halfway between C A, point J was marked and
point K marked 2.5 cm above J. Using K as midpoint, half of
elbow measurement was drawn from K to L and the other half from
K to M. D was connected to L and E to M. A line was drawn from
A to N equal to one-third wrist measurement (6 cm). Another line
was drawn from A to O equal to two-third wrist measurement (12 cm).
From N, 2 cm was measured to P and sleeve cap DBE and sleeve edge
PAO shaped. The outline of the sleeve was marked from
P-M-E-B-D-L-O and back to P. The pattern was traced out and
developed.

Data Analysis Technique

The data comprised the body measurements obtained and these
were analyzed using the mean, analysis of variance, (ANOVA) and
the Duncan's New Multiple-Range Test (DNMRT). The mean was
obtained using the SPSS computer programme.

(a) The Mean

The mean was used to determine the body measurements of
subjects derived from three groups (12 ± ½, 13 ± ½, and 14 ± ½ years.

The mean for each group was calculated by summing up the measurements obtained for each variable and dividing by the number of subjects measured.

Data for mean:

$$\text{Mean (Mn)} = \frac{X}{N}$$

Where

X = body measurement data

N = number of subjects (Sample size)

Σ = summation

The mean measurements obtained were used in drafting block patterns for the target group.

The standard error of the mean was used in determining areas of measurement that showed marked variation within groups.

(b) Analysis of Variance (ANOVA):

Hypothesis I which tries to find out whether the mean body measurements vary significantly from one age group to another in the areas of bust, waist, hip and back waist length was tested using the ANOVA at 0.05 level of significance, However, the ANOVA ends with the F-tests which do not tell which means are statistically different except for planned comparisons or single degree of freedom contrasts.

(c)   Duncan's New Multiple Range Test (DNMRT):

To find out which means are statistically different, the DNMRT, a multiple comparison procedure was used. The least significant Range (LSR) values are used to compare differences between treatment means for significance.

Three steps are involved in DNMRT.

Step I: Calculate the Standard Error ($S\bar{x}$) of a treatment mean.

$$S\bar{x} = \sqrt{\frac{s^2}{2}}$$

where s^2 = error mean square from the ANOVA table.

r = df

Step II: Find the significant Studentized Ranges (SSR)

The SSR values are determined by:

(a)   the α or probability level

(b)   the error df

(c)   the number of groups

SSR is the table value

Step III: Calculate the Least Significant Range (LSR)

LSR = (SSR) $S\bar{x}$

LSR is the calculated table value from ANOVA.

The Decision Rule

If the difference between any two means (under comparison) is greater than the LSR value at a given " ρ " or probability level, then the two means are statistically different at that " ρ " level.

But if the difference between two means is less than the LSR, then the two means are statistically equal at that " ρ " level.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

This chapter deals with the presentation and analysis of data collected in the study. The main purpose of the study was to establish the average body measurements of females aged between 12 to 14 years for use in developing suitable block patterns for them as well as to test the patterns developed for fit.

The chapter is developed under the following subheadings:

i) Background information of subjects.

ii) Average body measurements of adolescent female students aged 12, 13 and 14 years.

iii) Areas of measurement showing marked variation from the group mean.

iv) Comparison of mean height measurement with NCHS standards.

v) Testing the hypothesis of the study.

vi) Drafting the Block Patterns and Trueing for Fit.

Background Information of Subjects

Information was sought on the subjects' State of origin, place of dwelling for most years, family size as well as the socio-economic status of parents. Responses from the questionnaire showed that most of the subjects 68.7% are of Enugu State origin and they have lived most of their lives in urban areas with

their parents. They have average family size of between six to nine members and their parents are mostly middle income earners.

Research Question I:

What are the average body measurements of adolescent female students, of 12 to 14 years of age in Enugu State secondary schools?

The data for answering research question I are summarized in table I.

Table I shows the mean measurements of each of the age groups for the different body measurements taken. A look at Table I shows that the mean body measurement for each of the variables progresses with age.

Table I

Average Body Measurements (cm) for Ages 12 to 14 years
and Standard Error of the Mean

Variables	12 Years	13 Years	14 Years
Height	151.00+0.50	155.50+0.51	159.30+0.50
Shoulder Length	11.70+0.06	12.00+0.06	12.30+0.06
Apex of bust	19.40+0.16	20.50+0.16	22.88+0.14
Bust	76.00+0.47	80.00+0.46	84.00+0.47
Waist	65.00+0.30	69.00+0.40	71.00+0.34
Hips	80.00+0.42	84.00+0.44	88.00+0.44
Back waist length	34.70+0.16	35.60+0.15	36.70+0.13
Shoulder width	35.70+0.13	36.64+0.15	37.48+0.13
Front waist length	36.80+0.15	37.87+0.15	39.00+0.15
High bust width	30.84+0.13	31.80+0.14	32.82+0.13
Width between breast points	18.08+0.10	19.10+0.10	20.30+0.11
Over-arm length	56.00+0.24	57.65+0.25	59.56+0.24
Under-arm length	43.85+0.22	45.30+0.24	45.01+0.23
Wrist	17.00+0.06	18.00+0.07	18.00+0.07
Bicept	23.00+0.13	25.00+0.16	26.00+0.16
Shoulder-to-elbow	30.80+0.15	31.70+0.14	32.86+0.15
Around elbow	27.00+0.18	28.00+0.19	29.00+0.19
Finished dress length	87.70+0.41	89.80+0.35	92.60+0.36

Research Question 2

Which body measurement showed marked variations from the group mean? The data for answering this research question are also shown in Table I. The table shows that in terms of variability, height (SE = 0.50 - 0.51) had the widest distribution of values for the three ages. This is followed by the bust (SE = 0.46 - 0.47). Others are the hips (SE = 0.42 - 0.44) and waist (SE = 0.30 - 0.4). The least spread were the shoulder length (SE = 0.06) and the wrist (SE = 0.06 - 0.07) for the three age groups.

Table 2

Comparison of Average Body Measurement obtained for Height with the National Centre for Health Statistics (NCHS) Standards

Age in year	Local Standard (cm)			NCHS Standards (cm)	
	Min.	Max.	Mean	Range	Median
12	132.0	168.0	151.0	144.7-158.3	151.5
13	135.0	180.0	155.5	150.5-163.8	157.1
14	144.0	179.0	159.1	153 - 167	160.4

Table 2 shows that the mean body measurement obtained for height falls within accepted limits of the NCHS standards. The mean obtained for height from the study shows very close relationship with the median for the NCHS.

H^o: There are no significant differences in the mean body measurements for bust, waist, hips and back waist length of adolescent female students of 12 to 14 years of age at 0.05 level of significance.

To test the hypothesis, a one-way ANOVA and the DNMRT were used to test for significance. The ANOVA showed significant difference in the mean tested. However the DNMRT was used to test which means are statistically different. Data analysis on the H^o is summarised in Table 3.

<div align="center">Table 3</div>

<div align="center">Test of Significance Using the DNMRT</div>

Age (Years)	Bust (cm)	Waist (cm)	Hips (cm)	Back Waist-length (cm)
12	76.00	65.00	80.00	34.70
13	80.00	69.00	84.00	35.60
14	84.00	71.00	88.00	36.70
LSR (P = 0.05)	12.88	9.11	11.96	4.07
	13.58	9.61	12.61	4.29
	14.04	9.94	13.05	4.44

Table 3 shows that the difference between any two means for bust, waist, hips, and back waist length measurements were less than the LSR values.

Therefore the hypothesis of no significant differences in the mean body measurements for bust, waist, hips and back waist

length of the adolescent female students, aged 12 to 14 years
is accepted at 0.05 level of significance.

Drafting the Block Patterns and Trueing For Fit

The average body measurements established from the study
(Appendix E) was used in drafting the block patterns which
included the front dress master pattern, the back dress master
pattern and the sleeve pattern. Each of the garment block was
drafted following the procedure for drafting, the dress master
patterns for front dress, back dress and sleeve as described
in chapter three.

Usually the initial patterns obtained in flat pattern
drafting are not reliable for indicating a perfect fit. A calico
shape (toile) was therefore used to correct the imperfections or
true the patterns in order to obtain a more accurate fit.

Toile Fitting (Bodice)

The front and back bodice patterns were traced out from the
front and back dress master patterns. These pattern pieces are
cut out and seam allowances added. An opening was provided at
the centre back with 5 cm seam allowance so that the bodice or
blouse can be put on easily and pinned together down the back.
2 cm seam was allowed at the shoulder line, waistline, under-arm
seamline, neckline and armhole seams to make room for adjustments
at those points. The front and back bodice patterns were placed
on calico fabric, pinned down firmly and all pattern marks

transferred from the paper to the fabric. The pattern pieces were cut neatly along the seamlines, with bodice centre front placed on fold of fabric. The fabric pieces were separated out from the paper patterns and the neckline and armhole curve stay-stitched to avoid stretching. The front and back bodices were joined at the shoulder seamline and at the underarm seamlines using long machine stitch so that the thread can be pulled out easily. After stitching the toile was put on a standard figure for corrections.

To get a clear and accurate picture of fit, the researcher ensured that appropriate shoes that is their correct school sandals, and under-garments were worn by the standard figure.

With the toile on the figure, the bodice was pinned together at the centre back along the seams. Tailor's pencil was used to mark the excess or shortfall of fabric around the neck and armhole and certain changes needed in the shoulderline positions. Excess bulging was pinned down to smoothen out the fault. Dart positions were corrected to taper towards and stop short of the fullest part of the area they shape. The waistline dart was finished at 3 cm below the bust point. Having made the necessary corrections, the researcher once more made a final check on the figure to ensure that:

1. shoulder seams rested smoothly on the shoulder tops,
    pointing towards and ending at the shoulder joint.

2. the darts and underarm seams are straight from beginning
    to end, and not wavy along their lengths.

3. the waistline rested at the natural waist.

When the toile had been adjusted to solve all fitting problems, the seams were unpicked and the front and back bodice pieces taken apart, pressed and laid flat for use. The corrected or trued bodice patterns were transferred back to a plain paper with no seams added. These now become the "master patterns" or "block patterns" for the bodice.

The Toile Fitting (Skirt)

The skirt patterns, front and back were traced out from the master dress patterns, front and back. 5 cm seam was allowed at the centre back opening for fitting purposes. At the sides and waistline, 2 cm seam was allowed. The skirt front and back patterns were placed on calico, pinned flat and cut out after transfering the pattern marks. The waistline was stay-stitched and the front and back waist line darts stitched straight with long machine stitch for easy removal of thread, tapering towards the buttocks at the back skirt and stomach at the front skirt. The front and back skirt patterns were pinned together and stitched loosely at the side seams. Just like the bodice block, the skirt

was tried on a standard figure for trueing.

The centre back seam was first pinned close and necessary corrections effected using the tailor's pencil. The skirt toile was checked for fit by making the following observations:

1. Waistline comfortably snug and curved to fit naturally.

2. The hemline parallel to the floor.

3. Side seams aligning with the bodice side seamline and shoulder line.

Toile Fitting (Sleeve)

The master sleeve pattern was traced out on a plain sheet of paper and seam allowances added, 5 cm at the underarm seam and 2 cm at the sleeve cap and wrist. The sleeve pattern was placed on fabric pinned down and cut out after transferring pattern marks. The sleeve cap and wrist edges were stay-stitched. The under-arm seams were joined together with long machine stitch. The toile was slipped on the standard figure's left arm observing the position of the front and back armholes. The elbow was bent to check for ease around elbow. The wristline curve was adjusted to fit naturally. The sleeve cap was pinned to the bodice armhole matching the underarm seamline of sleeve and bodice and the bodice shoulderline seam with the centre of the sleeve. After the corrections, the sleeve toile was flattened again by unpicking the underarm seams and pressing. The toile was placed on a plain

sheet, pinned and transferred, noting the corrections. The
trued sleeve pattern without seam allowance now becomes the
master sleeve pattern.

Findings

    The following findings were made:

1. Mean body measurement of subjects 12, 13 and 14 years of age
were established for all the body measurements required for
drafting basic dress master patterns. (See table below).

2. Widest distribution of values were found in the bust, waist,
hips and height measurements while the least spread were
found in the shoulder length and wrist measurements for
all the subjects.

3. There was no significant differences in the mean body
measurements for bust, waist, hips and back-waist length
of the adolescent female students of 12 to 14 years of age
at 0.05 level of significance. This was shown by the DNMRT,
where the LSR were greater than the differences between
the means tested and so led to the acceptance of the null
hypothesis.

4. The mean for height measurement of the three ages fall
within the NCHS standards.

Variables	12 Years (cm)	13 Years (cm)	14 Years (cm)
Shoulder length	11.7	12.0	12.3
Apex of bust	19.4	20.5	23.0
Bust	76.0	80.0	84.0
Waist	65.0	69.0	71.0
Hips	80.0	84.0	88.0
Back waist length	34.7	35.6	36.7
Shoulder width	35.7	36.6	37.5
Front waist length	36.8	38.0	39.0
High bust width	30.8	31.8	32.8
Width between breast points	18.0	19.0	20.3
Over-arm length	56.0	57.6	59.6
Under-arm length	44.0	45.0	45.0
Wrist	17.0	18.0	18.0
Bicept	23.0	25.0	26.0
Shoulder-to-elbow	30.8	32.0	32.8
Around elbow	27.0	28.0	29.0
Finished dress length	88.0	90.0	92.6

5. Block patterns were developed for the target group (See Appendix G). They are the front bodice pattern, the back bodice pattern, the front skirt pattern, the back skirt pattern and the sleeve pattern.

Discussion of the Findings

The discussion of the findings are organized around the data presented by the research questions and the hypothesis of the study.

Research Question I

The first research question was to find out the average body measurements of adolescent female students, aged between 12 and 14 years in Enugu State secondary schools. The average body measurements of the subjects were established for all the body parts used for the study (see Table I). The mean for each of the body measurement progresses with age. The 14 year old had the highest values followed by the 13 year old, while the 12 year old had the lowest mean measurements. These means were utilized in drafting garment blocks for the target group.

Research Question 2

The second research question was to find out the body measurements that showed marked variation from the group mean. Of all the body measurements taken, the widest distribution of values were found in the means for bust, waist and hip measurements

as well as height. The least spread were found in the shoulder
lengths and wrists measurements. This agrees with the recommen-
dation that children's patterns and sizes should be based on
waist, chest and hip measurements (McCalls, 1969; Simplicity, 1972;
and Reader's Digest, 1987). However, McCalls (1969) among others
recommended that children's patterns should not be selected
according to age, height or weight. This is because measurement
of children of the same age can vary greatly in height, weight
and contour (Tanner, 1976).

Hypothesis

The null hypothesis sought to find out if there were
significant differences in the mean body measurements for bust,
waist, hips and back waist length of the adolescent female
students aged 12 to 14 years.

The summary of the statistics for the variables tested
is shown in Table 2.

Bust, Waist and Hip

The bust of all the groups varied. The bust of the 14 year
old had the highest mean values while those of the 12 year old
was the least. The bust of the 13 year old was higher than
those of the 12 year old. Those of the 14 year old were higher
than those of 12 and 13 year old. However the differences were

not significant (P ⊴ 0.05). The waist and hip followed the same pattern. The mean waist and hip of the 14 year old were higher than those of the 13 year old. The twelve year old had the least mean value for waist and hip. There differences were nonetheless significant (P ⊴ 0.05).

The similarities in the bust, waist and hips of these three groups of adolescents are revealing. The similarities could be attributed to the age of puberty, which according to Tanner, (cited in Shaffer, 1993), girls typically reach a peak growth by the age of 12 and return to a slower rate of growth by age 13 to 13½ years. It could also be related to their nutritional status as most of their parents are of average income with family sizes ranging from six to nine.

The slightly higher value for the 14 year old could be due to the higher activity of the growth hormone in that age group. It was observed that after 13 years girls showed marked increase around the circumferences of the bust and hip probably because of the effect of gonodal hormones in the body which had prepared the subjects to attain sexual maturity. Tanner, (cited in Shaffer, 1993), also observed that though the muscles are growing along with the body during growth spurt, the period of greatest muscular development usually occurs a year later after the maximum acceleration in height.

Back-Waist Length

The back-waist length of the three groups appear to follow the same trend as the bust, waist and hip. Their back waist length measurements seem to progress with age. Those of the 14 year old was higher than those of the 13 and 12 year old. The 13 year old back waist length mean measurement was also higher than the 12 year old. However these differences were not significant (P< 0.05). The similarities could also be attributed to the period of puberty and the slow rate of growth of the body part at that period. Zonal variables have also been found to affect growth pattern. In a study by Nnanyelugo et al (1985) zonal variables appear to exert more significance on height, weight and tricepts estimates. The subjects of study are mostly from the same geographical subdivision, hence the similarity in their growth pattern.

Since no significant differences have been found in the mean body measurements of the three ages, one set of sloper was used to develop garment patterns for these groups. Therefore, the criteria for developing garment paper patterns for these adolescent female students should not be based on age but on body dimensions.

The mean body measurement for height falls within the NCHS standards (see Table 2). The means for ages 12, 13 and 14 years

local standard are higher than the lower ranges of the NCHS

standard but lower than the highest ranges. However, the

subjects of study were not all 12, 13 and 14 years on the dot,

but fall within the age ranges of 11½ years to under 12½ years;

12½ years to under 13½ years; and 13½ years to under 14½ years.

Whereas the data for the NCHS standard are for females exactly

12, 13 and 14 years old. It has to be noted that smaller sample

size was used for the local standard. It is possible that a

higher sample size may affect the outcome.

The null hypothesis proved no significant differences in

the mean body measurements for bust, waist, hips and back-waist

length of adolescent female students of 12 to 14 years of age,

at 0.05 level of significance. These variables tested are among

the criteria for sizing patterns. Since no significant differences

exist, a set of basic patterns was therefore drafted for the

target group. They include, the front dress master pattern, the

back dress master pattern and the sleeve pattern. However the

initial patterns obtained in flat pattern drafting are not

usually reliable for indicating a perfect fit (Erwin, 1969);

Stringer, 1993). A calico shape (toile) was used to correct

the imperfections and obtain a more accurate fit. This process

of making the pattern fit the figure is known as "trueing the

pattern. After trueing the patterns, five block patterns were

developed: the front bodice pattern, the back bodice pattern the front skirt pattern, the back skirt pattern and the sleeve pattern. Garments developed from these basic or block patterns would certainly give better fit.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter gives a summary of the study, highlights the implications of the findings, draws some conclusions and makes suggestions for future research.

Re-Statement of Problem

Clothes have been identified along with food and shelter as essential to life. Patterns have also been found to enhance garment production. However there is no pattern for the Nigerian figure or even conclusive study on body measurements for use in drafting patterns for any category of the Nigerian population. The tailors and seamstresses still depend on the taking of individual body measurement of customers or clients whenever they want to construct a garment. It is obviously difficult to satisfy the large demand for clothing by this slow and out-dated construction procedure. This study thus aimed at developing master patterns for adolescent female students for use in their garment construction.

Procedure Used

The population for the study comprised all the JSS students in the 55 Girls' Secondary Schools in Enugu State of Nigeria. Proportionate sampling was used to select eight schools from the 55 with a total number of 5,154 JSS students. A student sample of 600 was randomly drawn from this population, 200 from each

age group. The instrument of the study - a Body Measurement Chart (BMC) was developed by the researcher through literature review and given to lecturers of Clothing and Textiles among others for validation. The instrument comprises two sections, one section on background information of subjects and the other section on essential body measurements needed for flat pattern drafting.

Principal Findings

The mean body measurements of the subjects on all the body parts needed for drafting basic garment patterns were established (See Table I).

Variations in the mean body measurements of the subjects were highest in the bust, waist, hips and height measurements but lowest in shoulder length and wrist measurements.

There was no significant differences in the mean body measurements for bust, waist, hips and back waist length of adolescent females of 12 to 14 years of age at 0.05 level of significance.

The mean for height measurement of the three ages, 12 to 14 years fall within the NCHS standards.

Block patterns were developed for the target group.

Implications of the Study

The findings of this study have implications for clothing and textile lecturers in tertiary institutions who have the task of teaching pattern development to their students. The patterns thus developed will then be utilized in teaching style adaptations where they can be manipulated into wide variety of styles.

The findings of this study also have implications for professional tailors particularly those who are knowledgeable in the use of commercial patterns which are no longer readily available. By making garments from the trued patterns especially school uniforms, they are more likely to produce better fitting garments.

The findings of this study have implications for home sewers who may need to improve the fit of garments they make. In absence of commercial patterns, the basic patterns developed becomes a better alternative for sewing for females in that category.

On a long term, the findings of the study have implications for garment making businesses and fashion houses particularly for quantity production and better fitting garments. When these patterns are eventually commercialized they will certainly go into large scale production and the garment making businesses will flourish.

The findings of this study have implications for entrepreneurs in clothing and textile business who may want to expand their businesses from tailoring to commercial pattern making, garment alteration, grading, modelling and all such related businesses.

For the Nigerian government, the finding of this study will serve as basis for funding future researches in pattern making and pattern development for the Nigerian figure.

CONCLUSION

Patterns are basic necessities in the construction of perfectly fitted garments. In particular, they are quite invaluable for large scale production. Clothing and textile lecturers need master patterns to teach their students basic and advanced pattern alteration as well as grading so that standardized basic blocks can be used in constructing garments for figures that have larger or smaller dimensions than the standard figure. Students offering courses in Clothing and Textile as well as home sewers knowledgeable in the use of commercial patterns can develop the master patterns into wide variety of styles. Also with the use of patterns, individuals with basic sewing knowledge and even primary school level of education can turn out nicely fitted garments for oneself and for the family members and they can perform quite well as employees of garment factories.

Recommendations For Action

Based on the findings of the study the following recommendations were made:

1. Mean body measurements obtained from this study be made available to students of Clothing and Textiles for use in their pattern drafting courses.

2. Master or block patterns developed for the target group should be utilized by Textile and Clothing lecturers in tertiary

institutions and their students for pattern development where these can be manipulated into wide variety of styles.

3. The block patterns should also be used in teaching pattern alteration to students of Textile and Clothing courses.

4. Data obtained from this study should serve as basis for further research in pattern making and development for the Nigerian figure. The block patterns developed is recommended for use by professional tailors involved in constructing school uniforms for post primary institutions to help them in quantity production and also to obtain better garment fit.

Suggestions For Further Research

Based on the findings of this study, the following have been suggested for further research:

1. A similar study should be undertaken to develop these block/master patterns obtained from the study into a variety of styles for the target group.

2. A comparative study should be undertaken using adolescent female students of the same age range from the northern part of Nigeria.

3. Further studies should be undertaken using larger samples, cutting across a wide section of the Nigerian population to obtain size ranges for children, women, boys, men etc. and draft basic pattern for these different groups.

4. Additional research to investigate the educational level at which pattern drafting is introduced in the school curricula and the clearness and comprehensiveness of textbooks and handouts.

5. Finally, extension and enlightenment programme should be carried out to further explain the importance of garment patterns to the not-well informed dress makers and home-sewers, so as to improve their output both in quality and quantity and as such minimize the problems of clothing acquisition in Nigeria.

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APPENDIX A

Body Measurement Chart

Section A: Personal Data

Give the following information about yourself.

i. Age (11½ – under 12½) years ☐
         (12½ – under 13½) years ☐
         (13½ – under 14½) years ☐

ii. Tribe in Nigeria _____

iii. Nationality _____

Answer the following questions by ticking (x) for the correct answer in the box provided.

1. Where have you lived most of your life?
   (a) Rural area ☐   (b) Township ☐   (c) City ☐
   (d) Rural/town ☐   (e) town/city ☐
       e.g of rural area   - Ukehe, Mgbowo, Ikwo etc
       e.g of township   - Nsukka, Abakaliki, Oji etc
       e.g of city   - Enugu, Lagos, Kano etc.

2. With whom did you live most these past years?
   (a) father ☐   (b) mother ☐   (c) father & Mother ☐
   (d) brother ☐ (e) sister ☐
   (f) Others (specify) ☐ _____

3. How many people live and feed together in your home?
   (a) 1 - 5 ☐; (c) 6 - 9 ☐; (c) 10 and above ☐

4. What level of education has your father?
   (a) No schooling ☐ (b) Primary/Modern School ☐
   (c) Secondary/commercial ☐ (d) Teacher's Grade II ☐
   (e) NCE, HND, University Degree ☐
   (f) Others (specify) ☐ _____

5. What level of education has your mother?

   (a) No schooling /___7 (b) Primary/modern school /___7

   (c) Secondary/commercial /___7 (d) Teacher's Grd II /___7

   (e) NCE, HND, University Degree /___7

   (f) Others (specify) _____

6. What is your father's occupation?_____

7. If father is employed, state title of job.

   (a) farmer /___7 (b) Lawyer /___7 (c) Teacher /___7

   (d) contractor /___7 (e) Trader /___7 (f) Clerk /___7

   (g) mechanic /___7 (h) Others (specify) _____

8. What is your mother's occupation? _____

9. If mother is employed, state title of job.

   (a) Farmer /___7 (b) Lawyer /___7 (c) Teacher /___7

   (d) Contractor /___7 (d) Trader /___7 (e) Clerk /___7

   (f) Others (specify)_____

SECTION B

Body Measurement Data

Height _____

Shoulder length _____

Apex of Bust _____

Bust _____

Waist _____

Hips _____

Back waist length _____

Shoulder width _____

Front waist length _____

High Bust width _____

Width between Breast Points _____

Over-Arm length _____

Under-Arm length _____

Wrist Circumference _____

Bicept _____

Shoulder to Elbow _____

Around Elbow _____

Finished Dress Length _____

APPENDIX B
Body Measurement of 12 year old (cm) - (N = 200)

Body Measurement	Min.	Max.	Mean	SE
Height	132.00	168.00	150.95	0.493
Shoulder length	10.00	14.00	11.67	0.056
Apex of bust	14.00	26.00	19.40	0.159
Bust	42.00	92.00	76.00	0.471
Waist	56.00	81.00	65.50	0.287
Hips	64.00	98.00	80.00	0.417
Back waist length	28.00	40.00	34.70	0.161
Shoulder width	31.00	41.00	35.70	0.133
Front waist length	31.00	43.00	36.80	0.148
High bust width	27.00	36.00	30.80	0.132
Width b/w breast points	15.00	24.00	18.10	0.102
Over-arm length	49.00	65.00	56.00	0.237
Under-arm length	36.00	53.00	44.00	0.224
Wrist	16.00	21.00	17.40	0.065
Bicept	19.00	29.00	23.50	0.134
Shoulder-to-elbow	27.00	37.00	30.80	0.148
Around elbow	20.00	34.00	27.00	0.181
Finished Dress length	77.00	106.00	88.00	0.409

APPENDIX C

Body Measurement of 13 year old (cm) - (N = 200)

Body Measurement	Min.	Max.	Mean	SE
Height	135.00	180.00	155.50	0.51
Shoulder length	10.00	15.00	12.00	0.06
Apex of bust	13.00	27.00	20.50	0.16
Bust	66.00	98.00	80.00	0.46
Waist	58.00	90.00	68.50	0.35
Hips	70.00	98.00	84.00	0.44
Back waist length	30.00	40.00	35.60	0.15
Shoulder width	31.00	42.00	36.60	0.15
Front waist length	30.00	44.00	38.00	0.15
High bust width	26.00	39.00	32.00	0.14
Width b/w breast points	15.00	23.00	19.00	0.10
Over-arm length	48.00	71.00	58.00	0.25
Under-arm length	35.00	58.00	45.30	0.24
Wrist	16.00	21.00	18.00	0.07
Bicept	21.00	39.00	25.00	0.16
Shoulder-to-elbow	26.00	38.00	32.00	0.14
Around elbow	22.00	36.00	27.60	0.19
Finished dress length	78.00	107.00	90.00	0.35

APPENDIX D

Body Measurement of 14 year old (cm) - (N = 200)

Body Measurement	Min.	Max.	Mean	SE
Height	144.00	179.00	159.00	0.48
Shoulder length	11.00	14.00	12.30	0.06
Apex of bust	14.00	29.00	23.00	0.14
Bust	68.00	98.00	84.00	0.47
Waist	60.00	88.00	71.00	0.34
Hips	74.00	98.00	88.00	0.44
Back waist length	31.00	42.00	36.70	0.13
Shoulder width	33.00	43.00	37.50	0.13
Front waist length	33.00	44.00	39.00	0.14
High bust width	28.00	38.00	33.00	0.13
Width b/w breast points	17.00	26.00	20.30	0.11
Over-arm length	51.00	69.00	60.00	0.24
Under-arm length	37.00	55.00	45.00	0.23
Wrist	16.00	22.00	18.00	0.07
Bicept	20.00	34.00	26.20	0.16
Shoulder-to-elbow	28.00	38.00	33.00	0.15
Around elbow	22.00	36.00	28.50	0.18
Finished dress length	72.00	112.00	92.60	0.36

APPENDIX E

Body Measurement of 12, 13 and 14 year old (cm)
(N = 600)

Body Measurements	Min.	Max.	Mean	SE
Height	132.00	180.00	155.00	0.32
Shoulder length	10.00	15.00	12.00	0.04
Apex of bust	13.00	29.00	21.00	0.11
Bust	42.00	98.00	80.00	0.31
Waist	56.00	90.00	68.00	0.21
Hips	64.00	98.00	84.00	0.28
Back waist length	28.00	42.00	36.00	0.10
Shoulder width	31.00	43.00	36.60	0.08
Front waist length	30.00	44.00	38.00	0.09
High bust width	26.00	39.00	32.00	0.08
Width b/w breast points	15.00	26.00	19.00	0.07
Over-arm length	48.00	71.00	58.00	0.15
Under-arm length	35.00	58.00	45.00	0.14
Wrist	16.00	22.00	18.00	0.04
Bicept	19.00	39.00	25.00	0.10
Shoulder-to-elbow	26.00	38.00	32.00	0.09
Around elbow	20.00	36.00	28.00	0.11
Finished dress length	72.00	112.00	90.00	0.23

APPENDIX F

ZONAL DISTRIBUTION OF GIRLS' SECONDARY SCHOOLS IN ENUGU STATE

ABAKALIKI ZONE

S/No	Name of Schools in each LGA	No. of Students
1.	Abakaliki LGA	
1.	Holy Child Sharon	229
2.	Girls' High School, Abakaliki	1,002
	Ezza LGA	
3.	Ezza Girls' Secondary School, Izzikworo	209
	Ikwo LGA	
4.	Girls' High School, Ikwo	149
	Ishielu LGA	
5.	Girls' High School, Ezzillo	410
6.	Model Comprehensive Girls' Secondary School, Umudara (MCGSS)	804
	Izzi LGA	
	Nil	
	Ohaukwu LGA	
7.	Izzia Girls' Secondary School, Izzia	216
	Abakaliki Zone - Total	3,019

ENUGU ZONE

Enugu North LGA

8.	Queen's School, Enugu	1,855
9.	Girls' Secondary School, Abakpa Nike	1,328
10.	Trans-Ekulu Girls' Secondary School	1,329
11.	Girls' Secondary School, Emene	1,037
12.	Urban Girls' Secondary School, Enugu	908
13.	City Girls' Secondary School, Enugu	1,314
14.	New Haven Girls' Secondary School, Enugu	563

Enugu South LGA

15.	Girls' High School, Awkunanaw	1,588
16.	Idaw River Girls' Secondary School, Enugu	1,291
17.	Republic Girls' Secondary School, Enugu	632
18.	Holy Rosary College, Enugu	1,082

Awgu LGA

19.	Rosary High School, Awgu	382
20.	Girls' High School, Nenwe	375
21.	Girls' Secondary School, Mmaku	284
22.	Girls' Secondary School, Owelli	225
23.	Girls' Secondary School, Agbogugu	244
24.	Girls' Secondary School, Mgbowo	150

Udi LGA

25.	St. Theresa's Secondary School, Abor	517
26.	Girls' Secondary School, Ngwo	1,208
27.	Girls' High School, Nachi	457
28.	Girls' High School, Amokwe	610
29.	Girls' Secondary School, Abor	309

Ezeagu LGA

30.	Sedes Sap. Model Comprehensive Girls' Secondary School, Oghe	338
31.	Girls' Secondary School, Imezi-Owa	149
32.	Girls' Secondary School, Mgbagbu-Owa	175
33.	Girls' Secondary School, Aguobu-Owa	145

Nkanu LGA

34.	Girls' Secondary School, Amuri	136
35.	Girls' Secondary School, Obe	762
36.	Girls' Secondary School, Nara	241
37.	Girls' Secondary School, Akaegbe-Ugwu	620

Oji River LGA

38.	Girls' Secondary School, Achi	450
39.	Girls' High School, Inyi	572
40.	Girls' High School, Ugwuoba	422
41.	Girls' Secondary School, Isikwe-Achi	522

Enugu Zone - Total   =   21,310

NSUKKA ZONE

Igbo Etiti LGA

42.	Girls' Secondary School, Aku	683
43.	Girls' Secondary School, Ukehe	269

Igbo Eze North LGA

44.	Girls' Secondary School, Umuagbo-Agu	78

Igbo Eze South LGA

45.	Iheaka Girls' Secondary School, Iheaka	531
46.	Girls' Secondary School, Ibagwa Aka	706

Isi-Uzo LGA

47.	Neke Girls' Secondary School, Neke	120
48.	Girls' Secondary School, Owerre Ezeorba	500
49.	Community Girls' Secondary School, Imilike-Uno	429

Nsukka LGA

50.	Queen of the Rosary Secondary School, Nsukka	1,151
51.	Community Secondary School, Isi-Enu	1,012
52.	Urban Girls' Secondary School, Nsukka	1,408
53.	Special Science Secondary School, Nsukka	476
54.	St. Cyprain's Girls' Secondary School	709

Uzo-Uwani LGA

55.	Girls' Secondary School, Umulokpa	85

Nsukka Zone - Total   =   8,157

Source: Post Primary Institutions in Enugu State –
Enrolment and Staff Distribution as at
1st June, 1992.

Statistics Division, State Education Commission, Enugu.

FIG. TAKING CHILDREN'S MEASUREMENT
## I
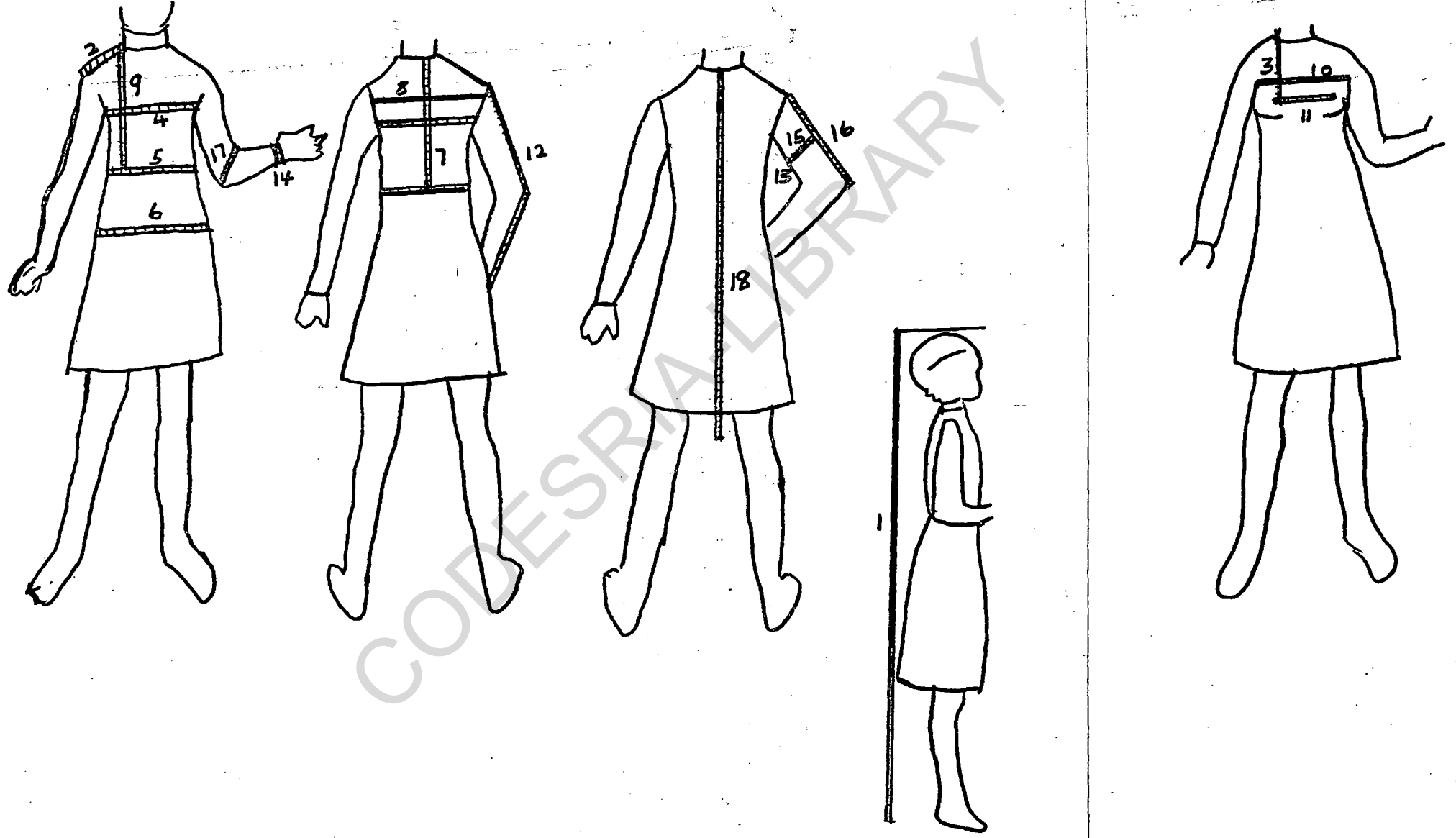
KEY

1.   Height

2.   Shoulder length

3.   Apex of bust

4.   Bust

5.   Waist

6.   Hips

7.   Back waist length

8.   Shoulder width

9.   Front waist length

10.   High bust width

11.   Width between breast points

12.   Over-arm length

13.   Under-arm length

14.   Wrist

15.   Bicept

16.   Shoulder-to-elbow

17.   Around Elbow

18.   Finished dress length

2: Dress Master Pattern Front
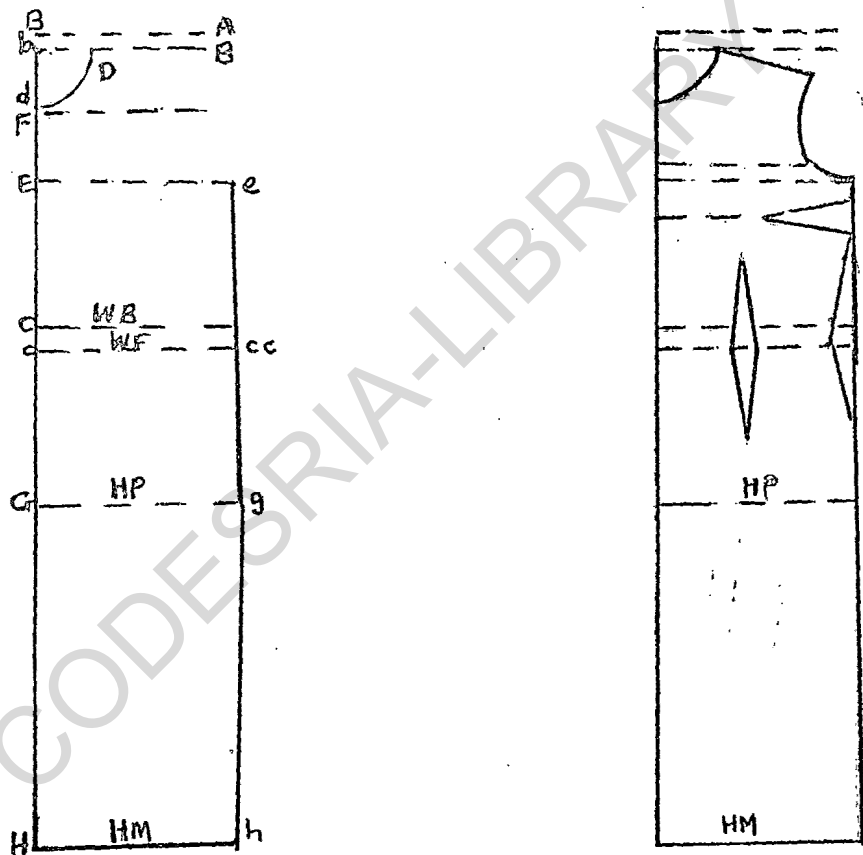
KEY

WB — Back waistline

WF — Front Waistline

HP — Hipline

IM — Hemline

FIG. 3: Dress Master Pattern Back
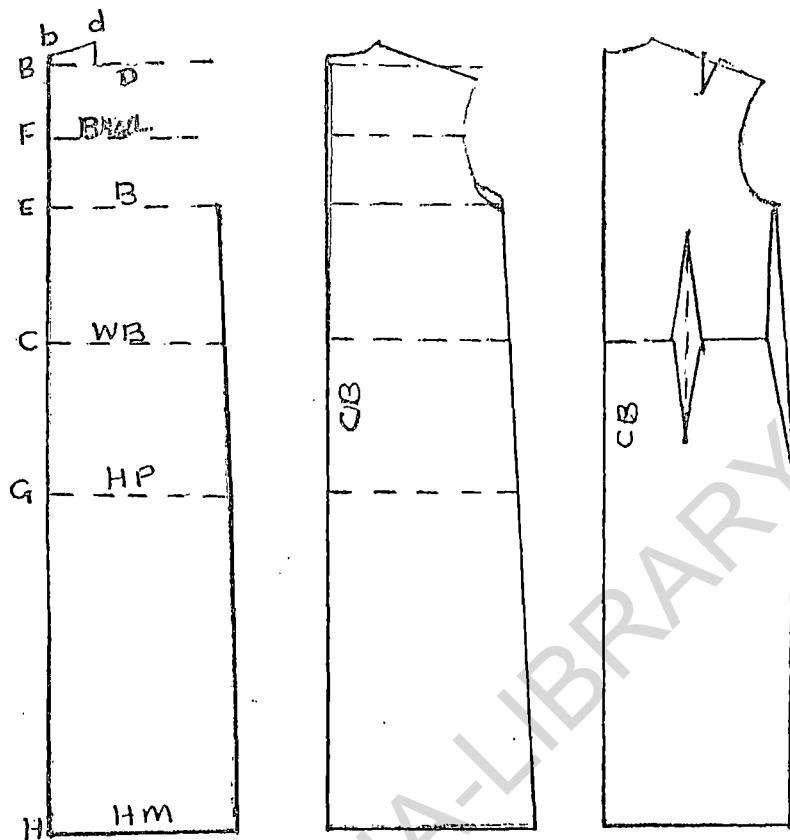
KEY

BWL - Back-width line

B   - Bustline

WB - Back Waistline

HP - Hipline

CB - Centre Back

HM - Hemline

FIG. 4: Master Pattern: Sleeve
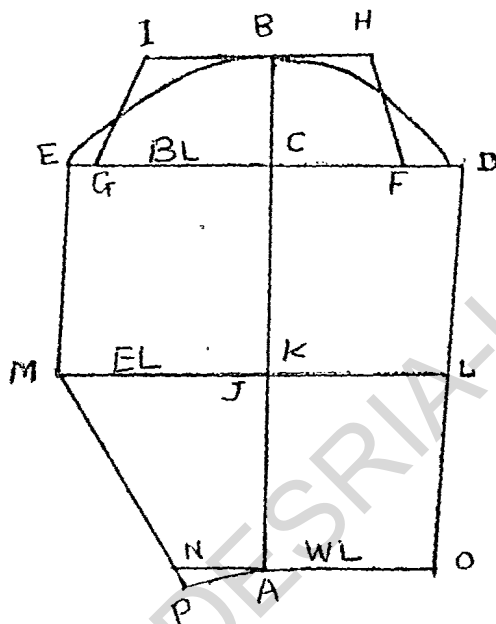
KEY

BL — Bicept line

EL — Elbow line
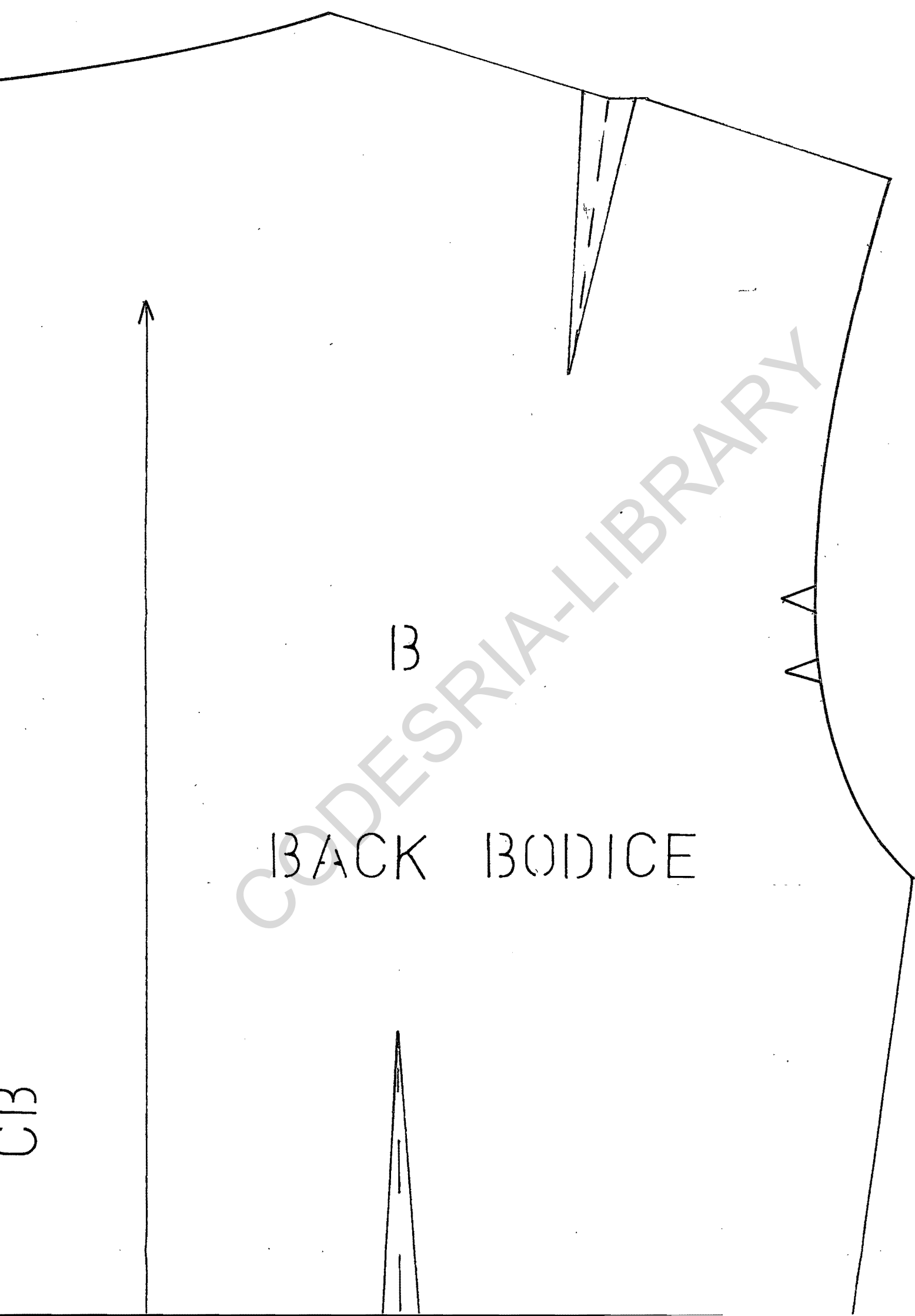
WL — Wrist line

CF

fold of fabric

A

FRONT BODICE

CB

B
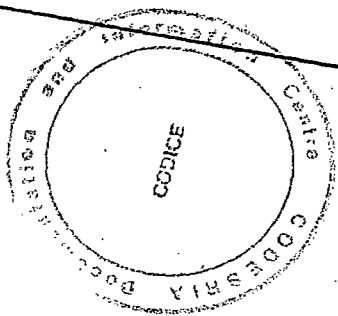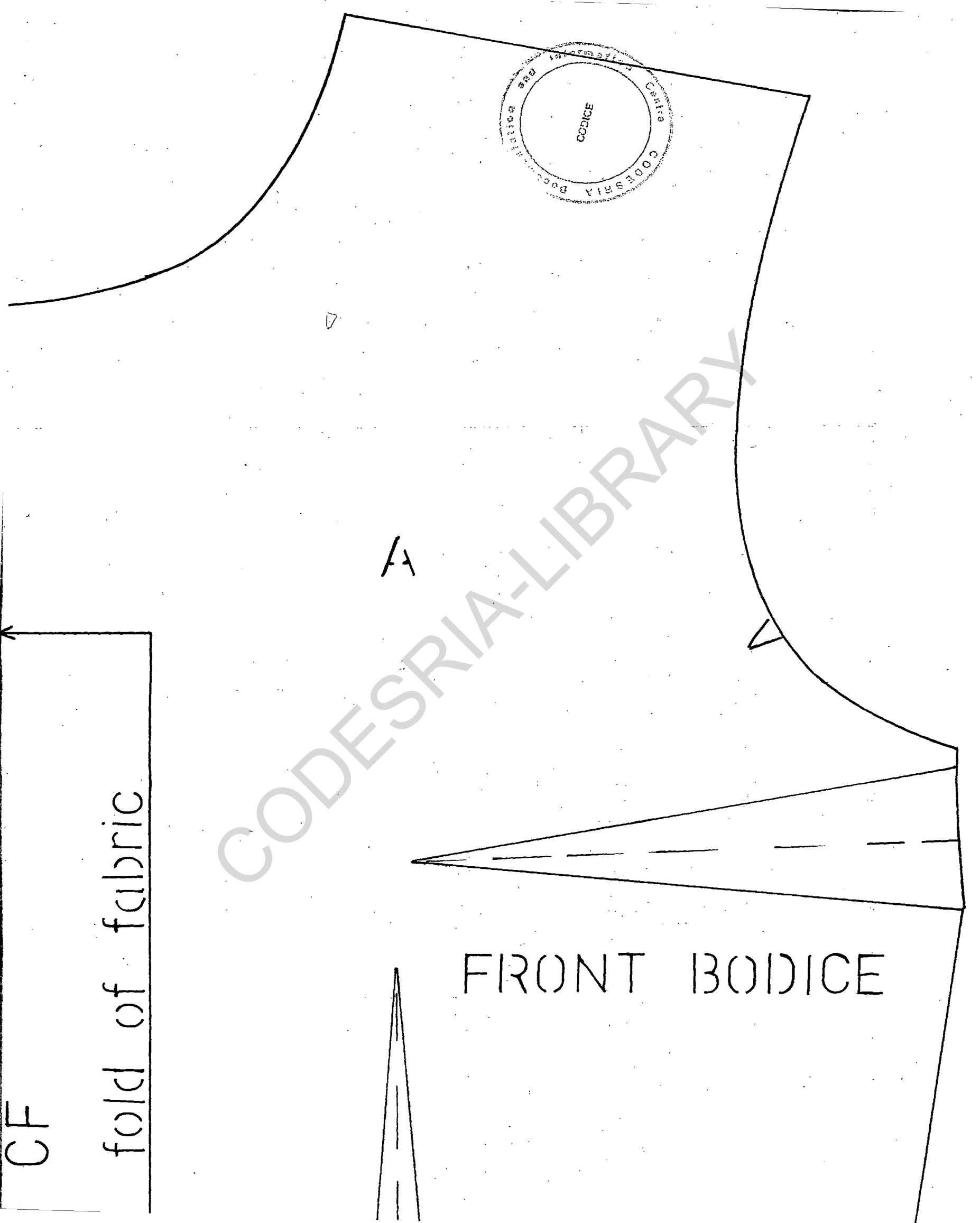
BACK BODICE

CF

fold of fabric

FRONT SKIRT

C

BACK   SKIRT