JHER Vol. 27 No. 2, December 2020, pp. 1-10

Establishment of Mean Body Measurements for Development of Block Patterns for Functional Apparel for Pregnant Women in Lagos State

Oluwaleyimu, O.O
Department of Science and Technology Education,
University of Lagos,
Akoka, Lagos State

And

Igbo, C.A
Department of Home Economics and Hospitality Management Education,
University of Nigeria, Enugu State, Nsukka.

Abstract

This study established mean body measurements for development of block patterns for functional apparel for pregnant women in Lagos State. Specifically, the study determined the average body measurements (AVBM) of pregnant women in small, medium and large sizes. Research design was exploratory and survey design. The population consisted of registered pregnant women who attended government and private hospitals in Lagos Metropolis. Research instrument was a standard body measurement chart (SBMC) developed by Petra and Blazena (2010). Data were analyzed using mean and standard deviation. Mean body measurement for development of block patterns for pregnant women was established. The study identified 33 measurements of body parts of pregnant women. Measurements were categorized into small, medium, and large size. Anthropometric measurement of pregnant women for development of functional apparels was validated. It was also found that large size was the predominant size of pregnant women in Lagos State. Mean body measurements established in the study were recommended for use by apparel industries and manufactures in Lagos State, for mass production of functional maternity commercial patterns for local use and exportation.

Keywords: Mean, Body, Measurement, Pregnant, Women, Functional, Apparel.

Introduction

A pregnant woman is one who is carrying a developing embryo or foetus in her womb. In most cases, pregnancy lasts for about nine months, counted from the date of the woman's last menstrual period (LMP). Pregnancy is conventionally divided into three

trimesters, each roughly three months long. The course of pregnancy involves psychological, emotional and physical changes in women. The metabolic, chemical and endocrine balance of the body is altered during pregnancy. During this period, the woman could be identified through many characteristics, such as her physical shape, look and gait, and her sitting, standing and walking position, (Petral and Blazena, 2010). Other physical characteristics common with pregnant women are fuller and firmer breasts. Often folds in the body especially at the axial (armpit) and neck, even the mid-cliff and the surface of the belly may appear and eventually protruding belly accompanies pregnancy.

During this period, pregnant women need functional apparels that will accommodate the daily protruding stomach (Mohammed, 2011). The apparel should also be able to cover the expanded belly and still make the pregnant woman comfortable. There is therefore need for functional apparels that will accommodate the increase in body size occasioned by pregnancy, and will also meet the social and psychological needs of the users. Functional apparels are those apparels designed to offer practical function and be useful for some purpose rather than be just attractive. Functional apparel process begins with a thorough analysis of the anticipated user who are in different sizes of small, medium or large, and the identification of the physical, emotional and situational needs of that user, climate and other hazards in the environment. Development of the patterns termed block patterns prior to apparel construction precedes designing.

A pattern is the map of the apparel. There are two main types of patterns: the block pattern and the trade pattern (Anikweze, 2013). The block pattern is to the dress designer what the blue print is to the architect (Igbo and Iloeje 2012). Aldrich, (2006) justifies the use of block patterns in the clothing industry because the blocks are constructed to standard (average) measurements for specific groups of people but could also be drafted to fit an individual figure using personal measurements. All humans have peculiar shapes and sizes. Sizing and shaping are crucial factors in pattern development. Ohaka and Igbo (2012) asserted that size system in garment production is based on the body and not the garments. Apparels that are sized properly and according to fashion, style and fabric used, and which conform to body measurements, will fit the wearer well. A garment that is well - sized will fit and align with body contours without any strain. No matter the function of any apparel to the user, the size must be proportionate to the wearer to achieve the purpose for which it is constructed.

To address this need, most pregnant women in Lagos state obtain their maternity apparels as custom-made by indigenous tailors whose technology often depend on trial and error. The tailors waste a lot of customers' time by coming and going for trials (Anikweze, 2013). Women with body proportions that deviate from normal have figure flaws. Dresses sewn on standard measurements based on average body measurements for their sizes do not

normally fit them. The dresses require making necessary alterations to take care of the deviations (Ezieke & Bob-Eze, 2019).This calls for the need for production of standard size charts/sizing system using the anthropometric measurements of pregnant women.

Anthropometric requirements of pregnant women are very different because there are substantive weight gains which are not uniform around the body. There is prominent growth on the waist, bust, biceps, hips and thighs. This calls for the need to establish specific patterns that can be used to produce functional apparels that will take care of the body silhouettes of the pregnant women in Nigeria. This can be achieved by using the pregnant women's own anthropometric measurements to establish specific standard measurement chart and this is the trust of the present research. Some pregnant women in Lagos state still find it difficult to select apparels from the market due to their peculiar figures such as heavy buttocks, large arms and thighs among others. There is apparent difference in Nigerian women's shape, body structure and postural alignment. Therefore, size charts for Nigerian women is characterized by extra allowances for freeness. Hence the study is a measure towards meeting the sizing system in Nigeria and establishment of specific standard measurement chart for apparels for pregnant Nigeria women in Lagos State, using their own anthropometric measurements.

Purpose of study

The general purpose of study was to establish the mean body measurements for development of block patterns for functional apparels for pregnant women. Specifically, the study determined the average body measurements (AVBM) three categories of pregnant woman size of:

1. Small sized.
2. Medium sized.
3. Large sized.

Methodology

***Design of the study*:** The study was exploratory and survey research. An exploratory research is an attempt to lay foundation that would lead to future studies. (kowalczy, 2015).T his is a foundation for future studies as the established mean measurements can be adopted for further studies.

***Area of the study*:** The study was carried out in Lagos State, Nigeria. The state is bounded by Republic of Benin on the West and Ogun state both on the North and East respectively. On the South, the state stretches for 180 kilometres along the coast of the Atlantic Ocean and consists of Lagoon and Creeks. The state has 20 Local Government Areas (LGAs). The study took place in Lagos metropolis. Lagos metropolises have a good mix of people from different parts of Nigeria. (Lagos Island Local Government Area), Lagos Mainland LGAs which is from the middle ring of the metropolis and Ikeja division LGAs were used for the study. There are tertiary health care delivery centres, government and private

maternity centres and clinics in Lagos metropolis.

***Population for the study*:** The population for the study was 1,069,125 pregnant women registered in government and private hospitals in Lagos metropolis. Lagos state Bureau of Statistic on Pregnant Woman (2018). These women could be grouped into three categories of sizes; small, medium and large. They were at varying stages of pregnancy.

Sample for the study: To obtain this, six LGA were randomly selected from 20 LGA in the area. Two hospitals were purposively selected from each of the LGA, to give a total of 12 hospitals. Thirty two (32) pregnant women who were willing to participate in the study were purposively selected from each hospital to give a total 384 pregnant women who formed the sample for the study.

***Instrument for data collection*:** The standard body measurement chart (SBMC) by Petra and blazer (2010) was used to take the body measurements of the pregnant women in small, medium and large sizes. Basic measurements of parts of the body required for drafting blouse bodies: burst girth, waist girth, hip girth, neck girth, nape to waist, shoulder length, front length to waist, front length to breast and sleeve.

Skirt: Frontal various, round waist, hip girth and length of skirt.

Trouser: Waist girth, hip girth, ankle, length of crotch, thigh girth, outside leg length, front leg length and back leg length. This is the compilation of the different body parts needed to be measured for effective pattern drafting and apparel construction for pregnant women. For blouse, skirts, gown, and trouser blocks (See Tables 1,2 and 3). The instrument was validated by four clothing experts, two from the University of Nigeria, Nsukka, two from Yaba College of Technology, Lagos and two nurses from government hospitals in Lagos metropolis. The trial test of the research instrument was carried out in a study area that did not form part of the study. The reliability of the instruments was established using Crombach Alpha method which yielded 0.84 which indicated high consistency reliability of the instrument.

***Method of data collection*:** Research assistants were recruited to assist the researcher in recording measurements taken and helped the pregnant women where necessary. The researcher used consent form to seek consent of participants prior the study. The entire sample of the pregnant women totalling 384 was measured. The exercise involves taking measurement of each pregnant woman. The data was analysed and the average body sizes were categorised into three sizes (small, medium, and large) some of the pregnant women who were very heavy found it difficult to stand up for a long time to take the static body measurement, but some were very active and cooperated with the researcher in taking both the static and dynamic body measurements. The researcher paid several visit to the hospitals on their ante natal clinic days before the task could be completed. Each measurement was taken personally by the researcher to avoid discrepancies in computation of the correct measurement. Measurements

were taking in the morning hours to avoid interference of emotional and physical balance.

***Data analysis*:** Data obtained on the measurements of the pregnant women were analyzed using means, and standard deviation to establish the mean body measurements. The research questions were analysed using mean and standard deviation. The high SD of large, medium and small sizes was indications of wide differences in the shapes and figures of the pregnant women within the sizes (Tables 1, 2, and 3).

Finding of the Study

Table 1: Mean and Standard Deviation of Average Mean Measurements of Pregnant Women of Large size in Centimetres

S/N	Variables	Large Size (cm)					
		MIN	MAX	Total	AVBM	$\overline{X}$	SD
1	Bust girth	106	156	28378	128	128.407	11..841
2	Underbust girth	12	199	24090	109	109.005	23.450
3	Frontal waist width	76	188	23958	108	108.407	15.491
4	Profile waist width	77	175	23911	108	108.195	15.304
5	Frontal hip width	109	165	31037	128	140.602	15.169
6	Profile hip width	17	161	29542	134	133.674	20.146
7	Neck girth	31	56	8921	47	40.367	6.041
8	Across chest	27	67	8309	38	37.597	6.730
9	Across back	28	53	8237	37	37.271	3.982
10	Nape to waist	32	58	8662	40	39.195	5.161
11	Height/full length	100	186	28951/31382	140	206.79/224.16	6.893
12	Frontal length to bust	23	46	6934	31	31.376	5.259
13	Frontal length to ventricose	21	84	10268	67	46.462	15.950
14	Frontal length to waist	21	77	9189	66	41.575	10.438
15	Girth of biggest ventricose	103	419	29713	134	134.448	35.175
16	Frontal ventricose profile	81	139	22741	105	102.901	11.684
17	Profile ventricose	89	140	24210	111	44.692	10.146
18	Armhole circumference	30	66	9877	23	40.149	10.107
19	Upper-arm girth/bicept	20	66	8873	42	52.511	9.952
20	Long sleeve length	33	78	11605	57	29.887	9.082
21	Small sleeve length	20	48	6605	30	29.909	6.937
22	Elbow length sleeve	20	89	6610	31	14.081	6.878
23	Shoulder length	10	18	3112	201	30.362	2.012
24	Crotch depth standing	20	50	6710	31	6.540	6.540
25	Skirt length front	40	74	11435	62	8.353	8.353
26	Skirt length back	40	76	10760	59	6..966	6.966
27	Thigh girth	41	79	13145	71	10.223	10.223
28	Crotch depth	20	49	5525	32	4.432	4.432
29	Calf	14	49	8568	39	6.843	6.843
30	Knee girth	35	68	11221	52	7.533	7.533
31	Outside leg length	76	141	22166	91	13.228	13.228

32	Back leg length	80	133	22207	90	10.986	10.986
33	Ankle	21	46	7433	36	4.547	4.547

Note: $\overline{X}$ **=** Mean, SD = Standard Deviation, N=number of pregnant women = 384, AVBM = Average body measurement, N_L = Large size =221, N_m = Medium size = 102, and N_S = Small size, Min = Minimum, Max = Maximum =61.

The result in Table 1 shows the mean, standard deviation and average mean body measurements (in cm) of the large size of the pregnant women. Out of 384 samples of pregnant women, 221 were categorized as large which is 58%. The highest variation in measurement of body parts for large size are in the under bust girth, waist width, hip width and girth of biggest ventricose (SD = 23.4, 15.4, 20.1 and 35.1) respectively. The high SD of large size is an indication of wide difference in the shape and figures of the pregnant women within this size. The lowest variation of measurement of large size is found in shoulder length with SD of 2.0.

Table 2: Mean and Standard Deviation of Average Mean Measurements of Pregnant Women of Medium Size in Centimetres

S/N	Variables	Medium Size (cm)					
		MIN	MAX	Total	AVBM	$\overline{X}$	SD
1	Bust girth	90	125	10218	102	102.18	7.732
2	Under bust girth	67	114	9167	92	91.67	8.259
3	Frontal waist width	75	120	10020	10	100.2	10.412
4	Profile waist width	75	153	10027	100	100.27	11.936
5	Frontal hip width	82	160	11275	113	112.75	18.513
6	Profile hip width	36	160	11376	114	113.76	23.435
7	Neck girth	30	55	4141	41	41.41	6.145
8	Across chest	26	48	3686	37	36.86	4.230
9	Across back	30	43	3572	36	35.72	2.885
10	Nape to waist	31	51	3905	39	39.05	3.436
11	Height/full length	125	194	125/194	138	6970.38	8.354
12	Frontal length to bust	21	39	2898	29	28.98	4.183
13	Frontal length to ventricose	20	110	5338	64	53.38	20.893
14	Frontal length to waist	27	110	6048	62	60.48	25.997
15	Girth of biggest ventricose	74	151	11489	115	114.89	16.025
16	Frontal ventricose profile	80	149	10493	103	104.93	13.246
17	Profile ventricose	80	138	11059	110	110.59	12.245
18	Armhole circumference	29	82	5102	22	51.02	10.607
19	Upper-arm girth/bicept	20	66	3665	39	36.65	9.754
20	Long sleeve length	30	96	5739	54	57.39	10.77
21	Small sleeve length	20	54	2910	29	29.1	6.039
22	Elbow length sleeve	21	40	3087	30	30.87	5.193
23	Shoulder length	10	19	1295	19	12.95	2..324
24	Crotch depth standing	20	88	3197	30	31.97	7.713

25	Skirt length front	36	83	5766	59	57.7	10.2
26	Skirt length back	40	85	5977	58	60.57	10.451
27	Thigh girth	48	74	6057	67	29.6	6.745
28	Crotch depth	20	42	2959	30	34.86	6.745
29	Calf	21	52	3486	35	50.4	5
30	Knee girth	38	69	5040	51	99.51	6.025
31	Outside leg length	82	171	9951	81	99.05	6.76
32	Back leg length	73	124	9905	80	97.11	12.817
33	Ankle	20	40	3342	34	32.76	7.862

Note: $\overline{X}$ **=** Mean, SD = Standard Deviation, N=number of pregnant women = 384, AVBM = Average body measurement, N_L = Large size =221, N_m = Medium size = 102, and N_S = Small size, Min = Minimum, Max = Maximum =61.

The highest variation in measurement of body parts for medium size (SD = 23.4, 20.8, 25.9) are in hip width, frontal length to venticose, frontal length to waist respectively. The high SD of hip width of blouses skirt/trouser, frotal length to ventricose and waist was different in the shape and figure of the pregnant women within this size. The lowest variation in measurement of medium size is also on the shoulder length with SD of 2.0.

Table3: Mean and Standard deviation of Average Mean Measurements of Pregnant Women of Small Size in Centimetres

S/N	Variables	Small Size (cm) MIN	MAX	Total	AVBM	$\overline{X}$	SD
1	Bust girth	96	80	4890	86	85.789	4.208
2	Underbust girth	98	70	4697	82	82.404	6.079
3	Frontal waist width	110	76	5481	92	96.158	11.056
4	Profile waist width	111	76	5504	96	96.561	10.406
5	Frontal hip width	109	60	5374	94	94.280	13.493
6	Profile hip width	109	61	5587	98	98.017	9.218
7	Neck girth	90	32	2660	40	46.667	14.731
8	Across chest	59	30	2184	35	38.316	4.983
9	Across back	48	30	2026	35	35.544	4.520
10	Nape to waist	45	33	2211	38	38.789	2.846
11	Height/full length	100	156	7695/6203	135	135/108.82	7.324
12	Frontal length to bust	37	20	1582	28	27.754	3.480
13	Frontal length to ventricose	52	35	2455	61	43.070	4.762
14	Frontal length to waist	112	31	4416	58	77.473	20.048
15	Girth of biggest ventricose	118	79	5762	102	101..089	9.991
16	Frontal ventricose profile	118	81	5729	101	100.509	10.352
17	Profile ventricose	123	82	6257	109	109.772	9.252
18	Armhole circumference	80	31	2897	21	50.825	11.224
19	Upper-arm girth/bicept	64	23	2128	36	37.333	8.320
20	Long sleeve length	69	27	3075	52	53.947	11.593
21	Small sleeve length	40	20	1570	26	27.540	5.355

22	Elbow length sleeve	57	20	1749	29	30.684	6.205
23	Shoulder length	20	10	6892	18	12.088	2.254
24	Crotch depth standing	40	20	1777	29	31.175	4.536
25	Skirt length front	89	38	3313	57	58.123	9.247
26	Skirt length back	95	50	3424	52	60.070	9.619
27	Thigh girth	72	45	3381	59	59.316	6.798
28	Crotch depth	50	20	1754	27	30.772	6.141
29	Calf	43	20	1870	33	32.807	5.743
30	Knee girth	86	31	2845	50	49.912	9.574
31	Outside leg length	102	64	5377	80	94.333	94.333
32	Back leg length	114	73	5572	79	97.754	8.444
33	Ankle	42	26	1946	33	34.140	4.299

Note: $\overline{X}$ **=** Mean, SD = Standard Deviation, N=number of pregnant women = 384, AVBM = Average body measurement, N_L = Large size =221, N_m = Medium size = 102, and N_S = Small size, Min = Minimum, Max = Maximum =61.

Table 3 shows that the highest variance in measurement body part for small size are SD = 11.0 (waist width) SD = 13.4 (Hip Width), SD = 20.0 (Frontal Length to waist) and SD = 10.3 (Frontal Ventricose). The lowest variation is on the shoulder length with SD of 2.2. The high SD in measurement on the small category indicates wide difference in the shape and figure of the pregnant women within the size

Discussion of Findings

The mean body measurements for construction of functional block pattern for pregnant women were established. The body measurements taken for drafting the pattern were categorized into small, medium and large sizes. This study identified 33 measurements of the body parts of pregnant women and was categorized into different sizes of large, medium and small. These parts of the body that were identified and measured included: bust girth, under bust girth, frontal waist width, profile waist width, frontal hip width, profile hip width, neck girth, across chest, across back, nape to waist height/full length, frontal length to bust, frontal length to ventricose, frontal length to waist, girth of biggest ventricose, frontal ventricose profile, profile ventricose, armhole circumference, upper-arm girth/biceps, long sleeve length, small sleeve length, elbow length sleeve, shoulder length, skirt length front, skirt length back and thigh girth. This is in line with Igbo and Iloeje (2012) who noted that for a garment to be beautiful, attractive and provide good fit the dress maker must know body measurements. Dressmaking (2014) also reported that the first step in drafting is measuring the different parts of the body required in drafting the block patterns. In establishing size categorization for the pregnant women, the study revealed that 58% of the pregnant women fall within the large size category, 26% were medium sized 15 % were small sized. Sizing was based on sized categorization which was based on bust girth, waist width and hip width measurements. A lot of irregularities attended to the shape and figure of

pregnant women. Thompson (2011) again identified creative designs mean body measurements for three size categories (small, medium and large). However, Nkarubule and Klerk (2010) identified clothes sized from size 16 to 28 or size 40 to 52 + in their study. Also MacDonald (2010) reported that the goal of any sizing system is to choose the size groups in such a way that a limited, number of sizes will provide apparel/garments that fit most individuals in the specific population.

Conclusion

The mean body measurements of pregnant women in Lagos state have been established in this study. The need for taking anthropometric measurement of individuals while developing new apparel products was confirmed in the research especially due to the disparity between the sizes of users in this study. It was revealed that sizing of maternity apparels should be determined by waist, bust and hip measurements. Based on the findings of this study, it could be assumed that large size predominate size of pregnant women in Lagos State, hence in producing functional apparels for this group of people, large sizes should be more in number than medium and small sizes.

Recommendation

Based on the findings, the following recommendations were made:

1. The mean body measurements of pregnant women established in this study should be used by students of clothing textiles, and garments markers for pattern drafting
2. The apparel industries and manufacturers in Nigeria should use the mean body measurements of pregnant women established in this study to form the data base for commercial pattern.

References

Aldrich, W. (2006). Metric Pattern Cutting for Men's Wear: Including Unisex Clothes and computer *Aided Design (4th Ed*). USA: Blackwell.

Anikweze, G.U. (2013). *Development of Patterns for the Mass Production of Suits for Men With Figure Flaws in Nasarawa State, Nigeria*. Unpublished Ph.D Thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka.

Broorady, L. M., Haise, C., Rucker, M. and Ashdown, P. (2009). Protective clothing for pesticide applicators. Amultimethods needs assessment. *Journal of textile and apparel technology and management*, 6(2).

Chun-Yoon, J and Jasper, C.R. (2005). Consumer preference for size description system of men's and women's apparel. *The Journal of Consumer Affairs*, 29 (2), 89 – 95.

Dress making (2014). Tips when making body measurements before dressmaking. Online*: http:www.internet-user.com)* retrieved on 23rd August, 2016.

Ezike, P.N., Bob-Eze/ N.N, (2019*). Development of Dress Patterns For Women with Figure Flaws in A.S.International Journal of Vocational and T*echnical *Education. Research*

Faust, M.-E,(2014). *Pregnant women: Understaning Pregnant Women's Shape, Sizing and Apparel Styles Prefrences*. Woodhead. Publishing Services in Textiles 2014, pages 235-255.Vol. 5, No3, PP. 1-7. Published by European Centre for Research Training & Development U.K (www.e.ajournals.org)

Igbo, C.A. & Iloeje, C.I. (2012). *The Basic of Press Pattern Drafting Enugu*. Inselberg (Nigeria) Ltd.

Lagos State Bureau of Statics on Pregnant Women (2018).

Mac Donald, N.M. (2010). *Principles of Flat pattern design*. New York, England: Fairchild: Berg Distributor.

Mohammed, A. S. (2011). Acceptability of designed and constructed maternity wears for pregnant women teachers in Niger state. Unpublished masters degree dissertation, Department of Vocational and Technical Education, Faculty of Education, Ahmadu Bello University.

Nkambule, M. T. and Klerk, P. M. (2010). Apparel sizing and fit preferences and problems of plus size swazi working women. Unpublished Masters Degree Dissertation, Department of Consumer Science, Faculty of Natural and Agricultural Sciences, University of Pretoria.

Ohaka, A.R. & Igbo, C.A. (2012) Determinate of functionality in the Clothing of Pregnant Women in Imo State. Journal of occupation and Training (JOT), 5,3,60 -66).

Petra, K. & Blazena, M. (2010). Pattern Construction of Maternity Wear. www.patrakomarkora@tul.cz.blazena.musilova@tul.cz. Retrieved 6 October, 2017.

Thompson, D and Anyakoha, E. U. (2011). Development of functional apparel for cosmetologists in Lagos. Unpublished doctoral dissertation, Faculty of Education Vocational Teacher Education Department. University of Nigeria, Nsukka.