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A Standard Sizing System for Clothes Based on Anthropometric Statistics of Ghanaian Boys Aged Seven to Twelve Years

[1]Biney-Aidoo, Vivian; [1]Senayah, William K; [2]Osei, Antwi; [3]Antiaye, Eunice
[1]Department of Fashion Design and Textiles Studies; [2]Department of Mathematics & Statistics; [3]Department of Management and Public Administration; Accra Technical University, Accra, Ghana.
Corresponding Author: vbiney-aidoo@atu.edu.gh

Abstract

The study developed a sizing system for pre-teen boys (7 to 12 years), using anthropometric measurements. Specifically, it determined key dimensions; cluster; groupings; and size intervals of Ghanaian pre-teen boys' measurements; and created a size chart. The study was conducted in Greater Accra region of Ghana using an experimental research design. Population consisted 324,288 Ghanaian pre-teen boys. It adopted the International Organization for Standardization (ISO) 8559 (2017; 2018) anthropometric measurement protocols. Relationship between body dimensions were assessed using Pearson's correlation coefficient, based on the British Standard Institution (BSI) standard 7231 (BSI, 1990) related to clothing. Key dimensions were selected based on correlation among the 27 dimensions. Results include four key dimensions; height, chest, waist, and hips, for creation of the size chart. Sizing structure was based on centilong system, which applies a 6 cm yearly increment in height of children, resulting in nine clusters for six age group studied. Height was main parameter for size designation, in addition to age and key dimensions. Also, three size variations; small medium and large were created for each size category.

Keywords: Anthropometry, Fit, Chart, Clothes, Pre-teens, Boys, Standard, Sizing, System.

Introduction

Anthropometric statistics and sizing are important components of clothing fit, and are considered the primary focus of the business of garment manufacture. Clothing size and fit are influenced by available and well-defined data on human size and shape, usually obtained from anthropometric surveys (Wang et al., 2021). Anthropometric data is useful for developing a method of sizing (Zakaria, 2016; Dāboliņa & Lapkovska, 2020) and for solving the numerous fit problems related to ready-to-wear clothing. Therefore, the fit of clothing is a function of the anthropometric data of prospective consumers. Several anthropometric studies have revealed variations in body size and shape of people based on nationality, ethnicity, gender and age (ISO 8559, 2017; Etier, 2021). Therefore, many more surveys are being directed at obtaining anthropometric data for different populations worldwide (Xia & Istook, 2017; Zakaria & Ruznan, 2020). Additionally, the global nature of the apparel trade in recent times comes along with difficulties in dealing with body size variations between different populations (Wang et al, 2021). Therefore, it is also

important to define the anthropometric dimensions of different population for the purposes of customer satisfaction and to facilitate comparison. Sizing involves the classification of body dimensions for a given population. Sizing systems are created by identifying key dimensions that are useful for clustering the population into body size categories (Zakaria & Ruznan, 2020; Kolose et al., 2021; Bizuneh et al., 2025). A size chart facilitates the manufacture of good fitting clothes for prospective consumers (Xia & Istook, 2017; Biney-Aidoo et al., 2023). The fundamental elements of a size chart include key dimensions, size intervals (width between sizes) and size designation (method of size labeling).

Fewer anthropometric studies relating to children have been conducted compared to adults (Etier, 2021). In the early years of garment manufacture, children's clothing needs were not given much attention as a result of the application of adult sizing for children (Zakaria 2016; Etier, 2021). The story is however different in recent times and the children's wear market is receiving more attention, as children become more fashion-conscious and can no longer be ignored (Sowah, 2020; Prabhakar & Rajagopal, 2023). Children's self-image during the various growth stages are influenced largely by clothing (Zakaria, 2016; Prabhakar & Rajagopal, 2023). Physical activity during childhood boosts energy balance, leading to a healthy and positive lifelong behaviour (Aldrich, 2012; Armstrong, 2014). Such physical activity is greatly enhanced by well-fitting clothes (Dāboliņa & Lapkovska, 2020; Kolose et al., 2021). Additionally, there are continual and rapid changes in the body shape and size during the development process (Aldrich, 2012; Sowah, 2020), leading to issues with size and fit of clothing. Thus, size of clothing is important in providing children the right fit for growth.

The body characteristics of children vary, even at similar ages and between sexes (Aldrich, 2012; Hrzˇenjak et al., 2013). Thus, separate size charts are recommended for different age groups of children (ISO 8559, 2018; Prabhakar & Rajagopal, 2023), to ensure morphologic homogeneity of the population (ISO 8559, 2018). For instance, in terms of clothing sizes, children are categorized into infants, boys and girls (Hrz`enjak et al., 2013; ISO 8559, 2018). The 7 to 12-year group (pre-teens) are considered the most vulnerable because of their rapid growth rate, coupled with the onset of puberty and hence, require psychological and physical attention (Sowah, 2020; Prabhakar & Rajagopal, 2023). At the pre-teen stage, boys are slightly taller and slenderer than girls, and they also develop wider shoulders (Aldrich, 2012). On the other hand, girls' waists become smaller compared to their increasing hips size (Aldrich, 2012; Sowah, 2020). Moreover, boys are quite rigid and succumb to peer pressure, while girls are fashion conscious, yet their bodies may not have fully developed (Aldrich, 2012; Sowah, 2020). Therefore, the pre-teen fashion market has become one of the most challenging and important retail segment (Sowah, 2020; Prabhakar & Rajagopal, 2023).

Children's clothing is sized primarily by height since it relates well with children's growth patterns and also facilitates the uniformity of pattern

grading (Zakaria & Ruznan, 2020). Aldrich (2012) therefore proposed the Centilong system which uses 6 cm height intervals between size groups. The 6 cm height intervals are found to correspond with children's yearly growth intervals (Aldrich, 2012). Additionally, age is usually included as a method of size designation due to its popularity and simplicity of use in size selection (Aldrich, 2012). Accordingly, other studies have proved that the sizing systems of children's wear are best designated by age together with height and other key dimensions (Hrž enjak et al., 2013; Dāboliņa & Lapkovska, 2020). Furthermore, for a more functional sizing system that serves a larger target population, there should be more size variations in each size category (Prabhakar & Rajagopal, 2023). For instance, three height groups that start with the middle size (medium) and then applies a grading system that maintains three proportional height groups within each size range is usually recommended. Aldrich (2012) used the 75th percentile as the middle size (M), and the M plus or minus 6 cm for the large (L) and small (S) sizes respectively. Another method of obtaining three size groups in any size group is the use of standard deviation (SD) together with the mean values of each dimension (Beazley, 1998). The mean value becomes the medium size (M) and then is used plus or minus the SD to obtain the large (L) and small (S) respectively. The centilong system offers easy size grading and designation, covering at least a third of the population of children, and has been applied in various studies (Aldrich 2012; Widyanti et al., 2017; Destaw, 2020).

Several anthropometric studies for the purposes of sizing have been conducted for various populations. There are however very limited studies in the African Sub region, especially for children (Zakaria & Ruznan, 2020; Bizuneh et al., 2025). Current data on global demographics show that Africa has the youngest population. As at 2022, 40% of the continent's population was aged 15 years and younger (Mulikita, 2022). The emerging population boom suggests that researchers should focus on addressing issues relating to children. Children's issue includes clothing needs, as clothing shape children's image and sense of identity. This study provides novel data on anthropometric statistics that can be contextualized for Ghanaian and African children.

Objectives of the Study

The general purpose of the study was to evolve a standard sizing system using anthropometric data of Ghanaian pre-teen boys. Specifically, the study determined:

The specific objectives were to determine:

1. key body dimensions of Ghanaian pre-teen boys;
2. cluster groupings for Ghanaian pre-teen boys' measurements;
3. size intervals of Ghanaian pre-teen boys' measurements; and
4. create a size chart for Ghanaian pre-teen boys.

Methodology

***Design of the Study*:** The study adopted the experimental research design. Anthropometric measurements were collected, key dimensions were established based on correlation, thereafter the measurements were

processed into garment sizes and size categories.

***Area of Study*:** The study was conducted in the Greater Accra Region of Ghana, the capital city which has a very wide coverage of all ethnic groups in Ghana, making it suitable for the survey. According to the Ghana Statistical Service (GSS), the region is the converging point for all ethnic groups in Ghana, as people from all ethnic backgrounds migrate to the region in search of jobs and improved living standards (GSS, 2021). Specifically, two (2) districts, Accra Metropolis and Ga East Municipal districts were the areas for the study. The selection was done to represent urban and sub-urban districts, in order to include different socio-economic backgrounds which influence the anthropometric characteristics of people (Khurana et al., 2024).

***Population for the Study*:** The population of the study was made up of all 7 to 12-year-old Ghanaian pre-teen boys in the study area. Although pre-teen children typically experience rapid bodily development, the growth spurt ensue at different stages and parts of the body for boys compared to girls. At this stage, boys are taller, slenderer, and develop broader shoulders, with little increase in hip circumference compared to girls (Aldrich, 2012; Twum, 2023). Additionally, boys usually begin and end puberty later than girls (Sowah, 2020; Twum, 2023), making it imperative for a separate size chart.

***Sample for the Study*:** The total population of pre-teen boys in the study area, according to the GSS (2021), was 324, 288, with a breakdown of averagely, about fifty 50,000 thousand boys in each age category. A sample of 601 was selected, based on the consideration that a sample of between 500 and 1000 is adequate to represent any given population (Bizuneh et al., 2025). A total of approximately 100 basic school boys from the six (6) different age strata (7, 8, 9, 10, 11 and 12 years) were therefore targeted from public and private schools in both urban and sub-urban districts. A multi-stage sampling approach was adopted as follows:

Two (2) sub-metropolitan (sub-metro) districts, Korley Klottey and Abokobi were selected form 11 and 10 sub-metros in Accra Metroplitan and Ga East Municipal districts respectively, using simple random sampling. A total of 11 basic schools; 4 public and 3 private in Korley Klottey, as well as 2 public and 2 private in Abokobi, were selected using proportionate stratified random sampling. The schools were selected from a total of 39; 14 public and 10 private in Korley Klottey, as well as 9 public and 6 private in Abokobi. Approximately 10 boys from each of the 6 age groups were sampled conveniently from each of the 11 schools, based on willingness to participate. The sampling of the number of girls needed from each age stratum was therefore, not random.

***Instrument for Data Collection*:** The data collection instrument included: a stadiometer for taking height measurements; and a measuring tape for taking body measurements. Materials used were: elastic tapes and small white sticky papers for land marking the body before measuring; as well as measuring kits (close fitting under shorts of the same type and brand).

Data Collection Procedures: Twenty-seven (27) anthropometric dimensions commonly used the manufacture of boys'

garments were studied. The manual measuring procedure was adopted, considering cost and availability. The ISO standard 8559 (2017, 2018) definitions of anthropometric instruments, materials, dimensions, landmark points, and processes were adopted as guideline for the survey. Ten (10) research assistants were trained to assist in taking the measurements. Before the conduct of the study, ethical clearance was obtained from the Directorate of Research, Innovation and Technology Transfer (DRIPPT) of Accra Technical University with Ethics ID: Re#14-2022-DRIPPT. The ethical clearance was shared with head teachers who in turn shared with parents via school email list to seek permission for the conduct of the study. Thus, consent was ultimately sought from school head teachers, parents and the children.

Each subject was assisted to change into measuring kits. To ensure consistency and accuracy, elastic tapes were tied around the chest, waist, and hips. The beginning and end of the other measuring positions were also marked with small white sticky papers. The measurements were taken at the right side of each boy (subject), who stood upright in most cases. Each instrument was assessed intermittently, during the measurement taking exercise, to ensure consistency in executing their respective functions. The measurements were taken in centimeters (cm), and recorded on specially designed sheets that also captured demographic data such as date of birth, class, school, area and district of the subject.

***Data Analysis Techniques*:** The Kolmogorov Smirnov test was used to check the normality of the data, whereas box plots and histograms with normal curves were used to check the symmetry of the data. Key dimensions were selected by assessing the strength of correlation among the body dimensions using the Pearson correlation coefficient, and based on the BSI (1990) clothes standard. The standard indicates that a correlation coefficient value of 0.76 or more show a strong relationship; a value between 0.5 - 0.75 shows a mild relationship; while a value of less than 0.5 indicates a weak relationship. The mean values were used as preliminary values for determining the sizes, as applied in related works. To establish the sizing system for the boys, the centilong system was adopted. This paper focused on the creation of a size chart using key dimensions.

Results

Table 1: Key Dimensions of Ghanaian Pre-teen Boys based on Correlation

		Age in Years ($\bar{X}_M$)							
S/N	**Dimensions**	**7**	**8**	**9**	**10**	**11**	**12**	**C**	**NCD**
1.	Height	124.8	128.4	134.4	140.3	143. 4	148.7	0.77*	7
2	Back neck point to ground	103.6	107.4	112.4	116.4	120.3	124.9	0.83*	7
3.	Neck base circumference	27.5	28.2	29.5	29.7	30.1	30.8	0.60	1
4.	Chest circumference	58.5	60.7	63.5	65.7	67.8	69.6	0.85*	8
5.	Waist circumference	55.1	56.1	59.0	61.2	62.3	64.0	0.86*	7
6.	Hip circumference	61.8	64.9	68.3	71.0	73.5	75.8	0.85*	6
7.	Thigh circumference	36.1	40.2	40.0	41.1	43.20	44.3	0.50	1
8.	Knee circumference	27.2	28.4	29.9	31.1	31.8	32.8	0.84*	7

Table 1 continued

9.	Ankle circumference	20.4	20.6	21.8	22.0	22.7	23.1	0.60	1
10	Across chest width	24.3	24.9	26.3	27.5	27.9	28.4	0.60	4
11	Across back width	26.3	1.6	28.6	29.5	30.5	31.3	0.76*	7
12	Across back shoulder width	29.2	30.4	32.0	32.9	34.0	35.0	0.63	7
13	Shoulder length	9.1	9.4	10.1	10.5	10.7	11.1	0.54	2
14	Back neck point to wrist	57.6	59.3	62.7	65.1	67.1	69.9	0.60	5
15	Arm length	43.2	45.8	47.9	49.9	51.3	53.9	0.60	6
16	Under arm length	35.7	37.2	39.3	40.7	41.9	43.9	0.60	6
17	Upper arm circumference	18.1	18.4	19.6	20.4	21.1	21.4	0.60	5
18	Wrist circumference	13.3	13.3	13.6	14.2	14.4	14.8	0.50	1
19	Shoulder point to waist: Front	32.6	33.1	35.8	36.4	37.2	37.7	0.52	1
20	Scye depth	15.2	15.6	16.5	16.5	16.8	17.3	0.54	1
21	Back neck point to waist	27.0	28.1	29.2	31.4	31.2	32.7	0.55	1
22	Side waist to hip	14.5	14.6	15.2	15.4	15.9	16.4	0.51	1
23	Waist to knee	41.8	42.8	44.9	46.5	48.1	50.2	0.53	2
24	Outside leg length	76.3	79.8	83.8	86.7	89.8	94.1	0.80*	6
25	Inside leg length	56.6	58.9	62.2	64.3	67.4	70.5	0.50	2
26	Total crotch length	47.5	49.2	52.5	53.8	57.0	58.7	0.50	1
27	Straight body rise	18.6	18.7	19.3	19.8	20.6	20.7	0.50	1
	Total	**85**	**109**	**102**	**100**	**100**	**105**		

*All measurements are in cm; n = 601; Correlation: *Strong = 0.76 < r < 1; Mild = 0.5 < r < 0.76; Weak = r < 0.5; $\bar{X}_M$ = Mean Measurement; C = Correlation; NCD = Number of Correlation Dimensions.*

Table 1 show correlation results of 27 dimensions of the respective ages for the determination of key dimensions, based on the mean measurements. The correlation coefficient values generally show strong to mild correlation among all 27 dimensions. Eight dimensions namely height, back neck point to ground, chest circumference, waist circumference, hip circumference, knee circumference, across back width and outside leg length, correlated strongly (Strong = 0.76 < r < 1) with a minimum of six other dimensions in this study. In order or ranking, the mean correlation coefficients were: waist circumference (0.86), chest circumference (0.85), hip circumference (0.85), knee circumference (0.84), back neck point to ground (0.83), outside leg length (0.80), height (0.77), and across back width (0.76). The rest of the dimensions exhibited mild correlation. Four out of the eight dimensions; waist, chest, hips and height, were selected, based on important recommendations for the selection of key dimensions.

Table 2a: Cluster Grouping of Ghanaian Pre-teen Boys' Measurements

Dimensions	Measurements (Min – Max)	Range	Range/6
Height	115.4 - 169.3	53.6	8.9
Chest	51.0 - 98.0	47.0	7.8
Waist	43.0 - 95.0	52.0	8.7
Hips	49.0 - 108.0	59.0	9.8
Average		52.9	8.8 (9)

All values are in cm; min. = minimum; max. = maximum

Table 2a shows determination of cluster groupings for the boys' measurements using the Centilong system. The Table shows the minimum and maximum measurements of the key dimensions, the measurement ranges, as well as the average ranges. To establish the number of clusters using the centilong system, a 6 cm height interval was applied between sizes. Using the minimum and maximum measurements of the key dimensions, the average range (52.9cm) divided by 6 cm resulted in an average of approximately nine clusters. The population was therefore distributed into nine equal clusters based on height, ranging between 115.4 cm to 169.3 cm, irrespective of the ages.

Table 2b: Clusters of Ghanaian Pre-teen Boys

Clusters	1	2	3	4	5	6	7	8	9
HR	115.4 - 121.3	121.4 - 127.3	127.4 - 133.3	133.4 - 139.3	139.4 - 145.3	145.4 - 151.3	151.4 - 157.3	157.4 - 163.3	163.4 - 169.3
Dimensions	**Mean Measurements**								
Height	119.1	124.5	130.2	136.0	142.1	148.4	154.5	159.5	165.6
Chest	56.9	59.0	61.3	63.9	66.9	70.1	72.1	77.3	80.7
Waist	53.6	54.5	57.1	59.1	62.0	64.9	66.5	69.4	71.6
Hip	60.8	62.4	65.5	69.0	73.4	76.3	78.9	82.4	86.7

All values are in cm; HR = Height Ranges

Table 2b shows the cluster groups of Ghanaian pre-teen boys. The nine clusters obtained, based on height ranges were; 115.4 -121.3, 121.4 -127.3, 127.4 -133.3, 133.4 -139.3, 139.4 -145.3, 145.4 -151.3, 151.4 -157.3, 157.4 -163.3, and 163.4 -169.3. The Table also presents the respective mean height, chest, waist and hip measurements of each cluster.

Table 3a: Intervals between Clusters of Ghanaian Pre-teen Boys

Dimensions	**Intervals**								**ASI**	**FSI (Appro**
Height	5.4	5.7	5.8	6.1	6.3	6.1	5.1	6.1	5.8	6.0
Chest	2.1	2.3	2.6	3.0	3.2	2.0	5.2	3.4	2.7	3.0
Waist	0.9	2.6	2.0	3.1	2.9	1.6	2.9	2.2	2.3	2.5
Hip	1.6	3.1	3.5	4.4	2.9	2.6	3.5	4.3	3.3	3.5

All values are in cm; ASI = Average Size Interval; FSI = Final Size Interval

Table 3a shows the initial intervals between cluster measurements of key dimensions of the boys, the average size interval (ASI), as well as the final size interval (FSI) (approximated average).

Table 3b: Normalized Measurements of Key Dimensions Ghanaian Pre-teen Boys

Clusters	1	2	3	4	5	6	7	8	9
Dimensions		**Measurements**							
Height	119.0	125.0	131.0	137.0	143.0	149.0	155.0	161.0	167.0
Chest	57.0	60.0	63.0	66.0	69.0	72.0	75.0	78.0	81.0
Waist	54.0	56.5	59.0	61.5	64.0	66.5	69.0	71.5	74.0
Hip	61.0	64.5	68.0	71.5	75.0	78.5	82.0	85.5	89.0

All values are in cm

Table 3b shows results of the application of the final size intervals to normalize the measurements, leading to changes in a few of the initial measurements as is characteristic of normalization. For instance, the chest measurements of cluster 2 before normalization was 59.0 (Table 2b), whereas the chest measurement of cluster 2 after normalization was 60.0 (Table 3b).

Table 4: Size Chart of Ghanaian Pre-teen Boys

AR		**7 - 8**			**9 - 10**			**11 - 12**	
	115.4	121.40	127.40	133.40	139.40	145.40	151.40	157.40	163.40
HR	-	-	-	-	-	-	-	-	-
	121.3	127.39	133.39	139.39	145.39	151.39	157.39	163.39	169.39
SV	**S**	**M**	**L**	**S**	**M**	**L**	**S**	**M**	**L**
Dimensions	**Measurements**								
Height	119.0		1	131.0	137.	143.0	149.0	155.	161.0	167.0
Chest	57.0		6	63.0	66.0	69.0	72.0	75.0	78.0	81.0
Waist	54.0		5	59.0	61.5	64.0	66.5	69.0	71.5	74.0
Hip	61.0		6	68.0	71.5	75.0	78.5	82.0	85.5	89.0

*All values are in cm; AR=Age range; HR = Height Range; SV = Size Variation; S =Small; M = Medium; L =*Large

Table 4 shows the size chart of Ghanaian pre-teen boys. One part of the chart shows a size code, presented in age range (AR), height range (HR), and size variation (SV), while the other shows the respective measurements of the key dimensions within each size group. The nine clusters, divided among the 6 age groups, resulted in two age groups per three clusters. Therefore, the 7 to 8 year group for example, was assigned to clusters 1, 2 and 3 which were also equated to the S (small), M (medium) and L (large) size variations respectively. The rest followed accordingly: clusters 4, 5 and 6 for the 9 to 10 years group; and clusters 7, 8 and 9 for the 11 to 12 years group.

Discussion

This study compiled anthropometric measurements of 27 dimensions of 601 pre-teen Ghanaian boys, and created a clothing size chart. The dimensions studied generally correlated well with each other, mostly with strong to mild correlations. Four (4) key dimensions (chest, waist, hip and height) were selected based on important recommendations for the selection of key dimensions and the classification of body measurements. The recommendations include; the strength of correlation with the other dimensions measured, usefulness in determining children's sizes, as well as the ease with which the

measurements are taken (Zakaria & Gupta, 2014; Zakaria & Ruznan, 2020). A combination of vertical and horizontal dimensions is also important (Dāboliņa & Lapkovska, 2020; Bizuneh et al., 2025). Therefore, aside chest, waist, and hips, height was selected ahead of 4 other dimensions (knee circumference, back neck point to ground, outside leg length, and across back width), first as a vertical dimension and also due to the ease of measuring. Moreover, the strong correlations observed for height in this study were all with vertical dimensions. This confirms the assertion that height is a good representation of vertical dimensions based on strong correlation (Zakaria & Ruznan, 2020). Height is also used in most cases, as a key dimension for assessing lineal growth in children (Hrzˇenjak et al., 2013; Zakaria & Gupta, 2014). The selection of chest, waist, hip and height as key dimensions, is corroborated by other studies (Hrzˇenjak et al., 2013; Zakaria & Gupta, 2014; Widyanti et al., 2017). The ISO 8559 (2017) standard also recommends chest, waist, hip and height, as key dimensions for determining sizes of children. Height and chest are often used for classifying the upper body, while waist and hips are often used for classifying the lower body (Zakaria & Gupta, 2014; ISO 8559, 2017). The back neck point to ground, knee circumference, across back width, and outside leg length measurements, were classified as reference dimensions in addition to the key dimensions for clothing manufacture. Key and reference dimensions are critical components for developing body sizes categories (Widyanti et al., 2017; Xia & Istook, 2017).

To develop a size chart for the boys, 9 clusters of sizes, ranging from height 115.4 to 163.4 were created based on the centilong system. Clustering facilitates the division of a population into homogenous subgroups such that members share identical body features (Zakaria & Runzen, 2020; Twum, 2023). The use of height in clustering the measurements into groups is the most appropriate (Aldrich. 2012; Zakaria & Ruznan, 2020). Thus, height has been applied by various authors including Zakaria & Runzen (2020), Xia & Istook, (2017), Twum (2023) and Bizuneh (2023), for the formation of clusters.

The intervals between the measurements of the clusters were similar but not consistent and were therefore normalized. The average intervals of each dimension, approximated to the nearest 0.5 cm were therefore computed for use as the intervals for the size chart. The normalized values reflect consistent intervals between the clusters (ISO 8559, 2018; Bizuneh et al., 2025). Although intervals can vary or be consistent between sizes, several practical reasons have been given in favor of the latter (Beazley, 1998). Consistent size intervals lead to standard inter-size differences, facilitates memorization and usage of size charts, leading to work efficiency. Moreover, with consistent intervals manufacturers can provide for limitless number of sizes within a target population.

The size chart created for the boys presents important data for determining the sizes of Ghanaian preteen boys. The spread of size ranges for two age groups, for example, 7 and 8 years coupled with a size variation of small (S) medium (M)

and large (L), is useful for fitting a wide variety of boys' measurements within the various size groups, as found in this study. This finding is in line with a study by Prabhakar & Rajagopal (2023) who recommended for the purposes of effective sizing, the formation of sub-sizes within age groups as a result of wide measurement variations. Moreover, the combination of age and height ranges, as well as the 3 size variations, are important codes for size designation, while the measurements of each dimensions within each size group provide supplementary information, useful for garment manufacture and selection. This is very important as most people, especially parents, are used to selecting sizes only based on age (Prabhakar & Rajagopal, 2023). Indeed, the entire set of size chart information for each size group can be presented on size labels of garments for more informative and effective size selection.

Conclusion

This study revealed significant correlations between the 27 dimensions studied. Height, chest, waist and hips were the key dimensions for the creation of a size chart based on the strength of correlation. The method of sizing using the 6 cm yearly height increment for children, yielded 9 different sizes for the 6 age groups. The study found a wide variation of measurements for each dimension, confirming the rapid growth of children within the age categories studied. The method of size designation identified in this study was based primarily on the key dimensions in addition to the size groupings (age/height) and size variations (S, M, L). The results of this study will be beneficial to designers, manufacturers and consumers in Ghana, Africa and worldwide, for the purposes of providing children with well-fitting clothes.

Recommendations

The following recommendations are made based on the finding:

1. promoting the use of the new size chart among major stakeholders like the Ghana Standards Authority (GSA), related academic institutions, associations of garment manufacturers, retailers as well as consumers of children's clothing.
2. Size designation for pre-teen children should be based primarily on height in addition to age and other key dimensions, in contrast to the common practice of using age alone.
3. Sizing systems for pre-teen children should include a greater number of size categories and size variations to effectively accommodate a wide variety of measurements resulting from rapid growth rates.

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