

**Socioeconomic differences in anthropometric measurements among school children living in Karachi**

Ms Ghazal Muzaffar Hashmi  
 Department of Clothing and Textiles  
 RLAK Govt. College of Home Economics Karachi Pakistan  
 email: ghazal97@hotmail.com

**Abstract**

Children form different socioeconomic status (SES) is likely to have different measurements. Paucity of local data hinders development of standard size of garments and presence of differences due to income level may further aggravate the problem. This study was conducted among a representative sample of 1498 7-14 year old schoolchildren of Karachi to explore socioeconomic differences in measurements needed for apparel construction.

Key words: Anthropometry, Sizing, Income level

**Introduction**

Socioeconomic status (SES) is found to be associated with body size in several countries (Groenewold & Tilahun, 1990; Wyatt & Triana Tejas, 2000). And various populations have studied body sizes and proportions in children (Becker-Christensen, 2002; Bogin et al., 2002; Dangour et al., 2002; Tanaka et al., 2004). In spite of differences in body measurements similar standard sizes could be used by children of different income levels if body proportions are not influenced by income level. In Pakistan also socioeconomic status is found to be associated with body size (Hakeem et al., 2001; Hakeem, 2001; Shah et al., 2003) but no assessment has been done of differences in body measurements needed for apparel construction. Thus this study was planned to explore socioeconomic differences in measurements needed for apparel construction and to identify association between various measurements so as to determine whether there are any differences in body proportions according to income level.

**Methodology**

This study was conducted in Karachi, the biggest cosmopolitan city of Pakistan. For data collection, four towns were randomly selected out of the total eighteen towns of Karachi. Three areas were selected from each selected town on the basis of low, middle and high category. Similarly, one school was selected from each area. Data collectors were graduates from R.L.A.K Govt. College of Home Economics (Clothing & Textile Dept); they were trained in data collection. A total of 1498 children of 6-14 years were examined, among whom 727 were from low income group (392 boys and 335 girls) and 771 from high income group (428 boys and 343 girls)..All

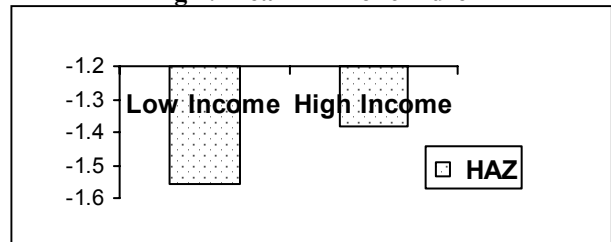
the pupils were examined in the Schools. Total fifteen measurements were examined in cm. Height and weights were compared with American standards and association of other body measurements with height and weight was studied... SPSS 11.5 version was used for data analysis.

For each child we measured height to the nearest 0.1cm, and weight to the last 100 g. For measuring height, we fixed a calibrated ruler to the wall. As the child stood barefoot with his/her heel, back and head touching the wall with the head in the Frankfurt plane, a thin wooden plate was placed above the head perpendicular to the ruler and parallel to the ground to measure the height accurately. Weight was measured using a portable weighing machine<sup>3</sup> that was standardized regularly, the child being barefoot and wearing light clothes.

**Results:**

Children from low socioeconomic status (SES) had significantly showed lower HAZ as compared to children from higher income group (Fig. 1). Modal age for various heights was higher among low income group in most cases. Average height related body measurements are expected to be lower among children from low income group as compared to their fellows of high income. However the differences would

**Fig 1: Mean HAZ of children\***



\*Difference statistically significant at  $p < 0.001$  level

**Table 1: Modal ages in months for various heights**

Height	Low Income	High Income
115.00	96.00	96.00
120.00	96.00	96.00
125.00	120.00	108.00
130.00	120.00	120.00
135.00	132.00	132.00
140.00	156.00	132.00
145.00	156.00	144.00
150.00	180.00	168.00
155.00	180.00	168.00
160.00	180.00	168.00
165.00	180.00	180.00

mainly be due to difference in height because height has significant positive correlation with other measurements as shown in table 1. All the associations were statistically significant at  $P < 0.001$  level. Though body measurements

are positively associated with age also the association is often stronger for between height and other measurements.

### Discussion

The purpose of the study was to explore socioeconomic differences in height and association of height and age with measurements needed for apparel construction. Though children from lower income levels are shorter the association between height and body measurement was strong in most cases and consistent among different income levels thus need for different dress patterns for different income level is not indicated. However the dress sizes suitable for any one age at high income level may not fit the children of similar age at lower income level due to shorter height. The dress sizes should preferably be chosen on the basis of height instead of age and in this way similar size would fit children of similar height from both income levels.

**Table 2. Association of height and age with measurements**

Measurement	Boys n= 1284		Girls n=1137	
	Age Pearson n's r	Height Pearson n's r	Age Pearson n's r	Height Pearson s r
Height	0.822		0.850	
Waist	0.590	0.601	0.573	0.626
Hip	0.691	0.750	0.731	0.766
Waist - Ankle	0.730	0.786	0.766	0.833
Body Rise	0.553	0.573	0.575	0.627
Crotch	0.694	0.681	0.589	0.606
Waist To Hip	0.496	0.570	0.449	0.498
Waist - Knee	0.741	0.764	0.693	0.767
Neck	0.612	0.681	0.715	0.757
Shoulder	0.636	0.679	0.716	0.741
CBL	0.633	0.740	0.692	0.746
Chest	0.591	0.631	0.634	0.682
Shoulder- Knee	0.786	0.748	0.715	0.789
Sleeve	0.699	0.702	0.730	0.792
Upper Arm	0.540	0.561	0.533	0.568
Wrist	0.543	0.541	0.576	0.625

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## Gender Differences In Measurements Of Pakistani Children And Implications For Designing Unisex Garments.

Mahlaqa Afreen

Department of Clothing & Textiles

Rana Liaquat Ali Khan Government College of Home Economics, Karachi

### Abstract

Sizing system is generally designed to fit a subset of the population. Factors such as gender, birth weight and height influence growth. Many anthropometric studies have been undertaken on all age groups in other parts of the world but not in Pakistan hence required. The present study analyzes the differences occurring at various height levels among boys and girls (6-14 yrs.) as per the requirement for unisex garments. The sample for this study was one selected school from each of the 03 randomly selected areas from 04 of the 18 administrative towns of Karachi. Total sample size of children was 5400. SPSS was used for analysis. Mean and mean differences were taken for each measure on the basis of factor height. Height range used for analysis was 115 cm to 165 cm. The major body differences

analyzed among boys and girls reveal that the girls have larger measurements except for shoulder and waist. The average measurements can be used to design unisex garments for the construction of loose style shirts and low crotch trousers.

Key words Anthropometry, Unisex sizes, WST, SHL, L-C-T waist.

### Introduction

Sizing system is generally designed to fit a subset of the population, i.e., the target market, defined by demographic data such as age, economic status and gender (Yeosun, Hei, and Woel. December 2001). Many Anthropometric studies have been conducted on all age group in other part of the world. NIST (National institute of Standard of Technology), ASTM (American Society for Testing Material), ISO (International Standard Organization) all have set their standard sizes for consumers. Most sizing systems are derived from ASTM standard (ASTM D5585-95, 1995; ASTM D6192-98, 1998; ASTM D6240-98, 1998; ASTM D4910, 1999; ASTM D6458, 1999 ( E-Standard Store Sep7,2005) . There are regional differences found in many studies. Studies taken in one geographic location, such as white Philadelphia school children, white Alabama school girls, or Iowa children may not be representative of the current U.S. population. Regional variations as well as socioeconomic and ethnic or racial variations have also been recorded. Factors such as gender, birth weight and birth order of children influence growth. It is hard to know how much of the differences in weight and growth of children remain if they live in a similar environment and same optimal nutrition and care (Synder. May 1975). According to a previous study on children garment sizes many manufacturers use their own different designation and body measurement for the same size products. Each brand or line has its own fit model with a body shape appropriate for its target market (Akin.1998). Survey results by Kurt Salmon 1999 show that 50% of people say their clothing doesn't fit. The reason behind it is the ignorance of important factors that effect body changes before setting the body sizing standards.

In children's wear there is a wide range of body sizes based on several lengths related to height and several girths indicating body shape. Therefore, length and some girths indicating body shape are more important than weight in sizing of children's wear (Meunier Yin October 2000). Boys' bodies (apart from hipbone and thigh bone) grow larger than girls' bodies. Thus body sizes show differences according to age and gender (Simons. January 2001).

The standards of American Society for Testing and Materials (ASTM), National Institute of Standards and Technology (NIST) USA, or International Organization for Standardization (ISO) are not likely to be applicable to Pakistani children. In Pakistan, anthropometric studies to assess measurements for apparel sizing are rare. The major purpose of this study is to provide the measurement

differences that will further help to develop sizes for unisex and other apparel for 6-14 year old children.

### Methods

This study was conducted in Karachi, Pakistan's largest cosmopolitan city. Administratively, Karachi is divided into 18 for this study, 4 towns were selected randomly; 3 areas were selected from each selected town on the basis of the apparent income level of the residents i.e., low, middle and high income. One school was selected from each area. Students of 6 -14 years of age from high, middle and low income level areas were the population in this study. The survey team consisting of faculty members and post graduate students of Rana Liaquat Ali Khan Government College of Home Economics visited the selected schools for data collection. Children's measurements were obtained after seeking due permission from the school administration in each case. Height was measured from top of head down while standing barefoot on a hard flat surface in normal posture. Waist (WST), Hip , Crotch, Waist to Hip, Shoulder (SHL) , Chest, Sleeve and Wrist measurements were taken according to methods described by "Winifred-A; 1985 Metric pattern cutting for children's wear". SHL to Hip: and Low Crotch Trouser Waist measurements (LCTW) were calculated by using standard formulas referred from "The Apparel Design and production Hand Book":

S-H:  $0.1875 * ht - (Height/2)$  & LCTW:  $(Waist - Hip) + Waist$

The data were edited on SPSS (Statistical Programme for Social Sciences) from which the mean and mean differences were analyzed on the basis of factor height.

### Results

Data was collected from a total of 5,400 children but as the data was analyzed on the basis of height data from those children was discarded where less than 100 children were available for a particular 5cm interval height range. Modal age for each height range was calculated. Number of boys and girls in each height range and their modal age is given in Table 1.

Table 1: Median age of boys and girls for each height group.

Ht. Cms.	Sex			
	Boys		Girls	
	n	Median	n	Median
115	33	7	39	7
120	72	7	103	7
125	119	8	116	8
130	145	9	129	9
135	171	10	128	10
140	176	11	108	10
145	140	12	119	11
150	122	13	143	12
155	102	13	122	13
160	79	13	83	13
165	57	14	24	13
Total	1216	11	1114	10

Mean differences in various measurements of boys and

girls at various height ranges are given in Table 2... Major differences noted were that at similar heights the boys had larger waist and shoulder measurements but smaller hips and crotch measurements as compared to girls. The differences in hip measurements were more pronounced at height range 150 to 165 cm.

For most of the other body measurements differences among boys and girls were low thus unisex garments can be made for children if loose styles are chosen such as T shirts, baggy style shirts etc. and Low Crotch Trousers.

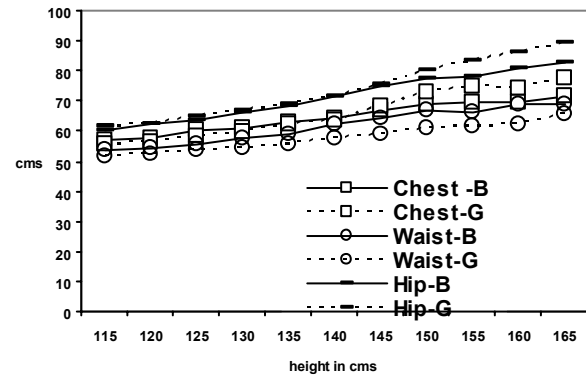
Trends in differences in measurements of boys and girls are given in Figure 1. These trends are also set on the basis of height that is from 115 to 165 cm having an average 5 cm interval. For measurement chest the trend of differences shows that from 115 to 140 cm of height boys and girls grow with same ratio whereas from 145 to 165 cm difference in growth gradually increases. Hip and waist shows marked difference in growth. In waist, differences started happening at height 130 to 165 cm and as the height increases the differences increase. In case of hip measurement from the height of 145 cm the differences are found till 165 cm and the difference in hip

have a higher ratio than any other measurement

### Discussion

The major purpose of this study was to provide measurements for children's unisex garments.

**Fig 1 Gender differences in measurements**



**Table 2: Mean difference in measurements (in Cms) of boys as compared to girls at each height group**

Measurements	Height Ranges										
	115	120	125	130	135	140	145	150	155	160	165
Waist	1.72	1.90	2.05	3.12	3.33	4.30	5.17	6.27	4.56	6.23	2.90
Hip	-1.46	-0.31	-1.42	-0.51	-0.66	0.33	-0.66	-2.22	-5.04	-5.06	-6.68
Waist to Ankle	-3.77	-3.32	-2.74	-2.75	-1.24	-3.16	-1.93	-4.92	-3.37	-4.97	-5.38
Crotch	-4.82	-4.68	-4.59	-4.39	-4.32	-7.78	-2.59	-4.18	-4.75	-3.45	-9.46
Waist To Hip	-1.97	-1.80	-1.90	-1.58	-0.74	-2.03	-1.34	-1.32	-1.37	-1.14	-1.97
Shoulder	0.67	0.95	1.02	1.42	1.09	0.93	1.14	0.90	0.87	1.32	1.63
Chest	1.01	0.72	1.87	1.25	0.48	0.59	-1.93	-3.92	-5.29	-4.48	-5.83
Sleeve	-0.47	0.52	0.73	0.40	1.07	1.15	0.31	-0.09	-0.02	1.64	0.44
Wrist	0.20	0.52	0.44	0.37	0.26	0.61	0.73	0.79	0.73	0.75	-0.14

The study shows marked differences among boys and girls in some measurements (especially hip and waist); however, unisex body measurements for loose style shirts and low crotch trousers can be analyzed. These body measurement differences vary with height.

In conclusion, these results can contribute to future studies on the development of new sizing system especially for unisex sizes. If the garment sizes are analyzed by considering these differences in body sizes it will reflect the actual growth of children in Pakistan.

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# Perception of Set Designers Regarding Role of Color in Designing Sets for Television Program

Ms. Hina Zubair

Department of Arts & Interior Design

R.L.A.K Govt. College of Home Economics Karachi, Pakistan  
email: hina\_zubair4@hotmail.com

## Abstract.

Set designer primarily, works with colors to create an environment and then to communicate the details of TV programs. The degree of color interplay is a critical element and is still the quickest and most direct means to produce visual representations of ideas of a program. Designers solve complex problems regarding color in set design by their knowledge and skill. This paper describes perception of set designers regarding color impact in TV program for creation of surroundings for consumers. The data was collected from 6 Karachi based channels. The questionnaires were distributed among the 96 designers who were associated to these channels and who worked on the sets of 4 different programs. This research study indicated that designers mostly prefer warm colors as warm colors are dark and their values dominate the environment of a set of a program. Interaction and manipulation of color create the optical illusion of space and area and attract our attention to the environment of a set. In conclusion this research describes that set designer work on a set with the collaboration of color, to create an environment and to communicate the details of TV program.

Key words: Color, Set designer, TV program, Space and size, Environment

## Introduction

"Set Design" means the creation and the organization of a "scenic" space in function of a specific media event. This involves designing on the basis of the technical and artistic needs that present many variables connected with the environment in which one is working and on the kind of use of the spectator. Designers use color to express ideas. Designers approach to color in relation to the spatial arrangement of components (Stones 2005). Set designer look at a bare stage they begin to realize all the elements and can easily manipulate to all aspects of the set (Rosenfeld, 1977). Research on design thinking also argues that designers serve to direct, order, clarify and record ideas" (Robbins 1994), or to inquire about shapes and ideas or buildings and spaces (Rowe 1984). Issues like isolation and enclosure in a limited space are the main complexities for a designer. (Patricia1998). Color is described with the directly observable features of the set as well as the spatial dimensions of size, space, and proportion. (Jacobson, 1996). Colors are perceived differently when seen against different colored backgrounds. This is where aesthetics plays its part in the

principles of vision: in the area of illusion space and size of sets (Vines, Margaret1, 996). As a designer works, choices of color and composition are made and adjusted in a continuous process until a satisfactory solution is reached.

With the proliferation of private channels there has been considerable increase in positions for set designers. Though at present set designing is being done by a variety of person ranging from people having no education for this task to those having specialized training for this purpose, it is expected that demand for trained set designers would increase. Graduates of Home Economics who specialize in interior designing can utilize their knowledge and skills in this field. Because of greater understanding of culture and details of various areas of daily life, Home Economists could be uniquely successful in designing a variety of sets according to consumers' satisfaction. However, it is also important to have a successful understanding of the views of persons who are practically working in the relevant area because it would expand their comprehension of the process of designing as applied in the specific professional area.

The purpose of this study is to find out the perception of set designers regarding color impact in TV program for creation of surroundings for consumers.

## Methodology

This study was conducted to assess the perception of the set designer regarding the color impact in TV program for creation of surroundings for consumers. For this purpose a descriptive design was used.

Pakistan is a sovereign country located in South Asia and the Greater Middle East. Pakistan is the sixth most populous country in the world. This study was conducted in Karachi .Karachi is the capital of the province of Sindh, and the most populated city in Pakistan. Located on the coast of the Arabian Sea, the mega city is the financial and commercial centre as well as the largest port of the country. Pakistan has its own cable or satellite TV Channels which can be seen in all parts of the world. Majority of these TV channels have their headquarters in Karachi. These channels have been producing a sizeable amount of decent TV programs.

The data was collected by the set designers working for Karachi based television channels. Out of the total of 26 channels, 6 channels were selected randomly. From each channel 24 set designers, working on the sets of four different programs, were recruited on the basis of their availability and willingness to participate in the study. Thus, a total size of the sample was 96. Questionnaire and interview method was used. Pre testing of the questionnaire was also done.

Data was first, entered in Epi data and then was transferred to SPSS (statistical package for social science) version 11.5.

## Results

Table 1, shows that most of the set designers use color as a tool of interaction to support the set design of a program. The majority of the designers responded that



each color has its own temperature. The basic advantage that is obtained by color is to make the set brighter. Dull effects can also be generated from color, which is usually not desirable. As far as the depth of a color is concerned, it also plays a vital role. Color may play a role in the creation of optical illusion, thus set may appear to swell or shrink depending on the color. Color degree shows significantly changes on sets of a program. A color may be seen just right in a creation of location and to grasp ant feature or possessions in relation to its surrounding of program.

**Table1. Set Designers' views about possible influences of colors in the creation of set design**

sn	Views about possible influences	n	%
1	Dull look	10	10.4
2	Bright look	65	67.7
4	Increase in depth	60	62.5
5	Increase in congestion	10	10.4
6	Increases in spaciousness	12	12.5
7	Change in apparent size	16	16.6
8	Set becomes attractive	33	34.3
9	Division of Space becomes easy	21	21.8
10	Makes the set interesting	22	22.9

**Table2. Set Designers' views about possible influences of warm and cool colors in the creation of set design**

sn	Perceptions about Color	n	%
Warm colors			
1	Brightens up the set	47	48.9
2	Makes the area looks small	18	18.7
3	Makes the area reflect more	14	14.5
4	None	6	6.2
5	All	11	11.4
Cool colors			
1	Creates Soothing effect	32	33.3
2	Make the set dull	32	33.3
3	Adds depth to the set	26	27.8
4	Others	6	6.2

Table2 indicates that Warm colors brighten up the set. In most of the programs warm colors create a strong and authoritative use of environment which makes a set to look warmer. Warm colors are considered advancing and having dynamic boundaries, which is the first thing to attract the eye. Warm colors are attention getting that can lend an accent to the sets. But according to some set designers, in many instances warm colors are tense and irritating. On the set cool color are considered to be receding if it does not command attention but provides a quiet and dull presence. Cool color can be used to cool down a warm area of the set (like news and talk shows, generally for social problems about youth, or political issues). So the liberal use of cool color can result in a cold,

sterile, or depressing atmosphere.

## Discussion

This study demonstrates set designers' holistic approach; they work on set in association with colors. Color's appearance, context, and expression used as the basis of interactive grammars. These grammars used to perform high level tasks such as legibility, categorization through logical justification and expression, which are foundation for the communication with surrounding of programs. Color sustains effort from the set to solve emerging problems and overcome various disturbances. The perceptions of set designers were not always the same as the knowledge students get from text books. The use of language and terminology by the designer was also indistinct and no-specific. This situation is understandable because the set designers were form varied backgrounds and had differing level of education and training. A large proportion had learnt only by experience and informal guidance of seniors. Thus graduates of home economics wishing to join this filed must learn to define their place within this profession. While they would need to understand the working style of current set designer and develop constructive professional relationships with them they should also be aware of their status and responsibilities as educated and trained designer. Enhancing and standardizing the field of set designing in accordance with local conditions and culture would definitely be one of their professional responsibilities as set designer. Further studies exploring current patterns of set designing would definitely help them in developing critical and constructive thinking (like color specialization, drafting, graphic design, layout plan, model building and space planning) fulfillment of their role as Home Economist set designers.

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