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Anthropometry of Workers for Some Specific Regions in Bangladesh

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Abstract

The anthropometric measurements are mainly used to design human fitted tools, clothing, workstation, personal equipment, comfortable devices that increases human comfort, safety, quality of working and efficiency. The intension of this paper is to forecast the anthropometric characteristics of Bangladeshi population by geographical region (Khulna Division- Khulna, Bagerhat, Chuadanga, Jessore, Kushtia, Magura, Meherpur, Narail and Satkhira), age and gender which are used for various purposes of design. We have considered here both male and female. This is based on the study done with several industries from districts in Khulna Division of Bangladesh. There are almost 300 measurements in anthropometry but used only 36 of them because these measurements are commonly used in industry. The measurements are almost same and does not vary too much except the tribal region. Here we calculated 5P, 50P and 95P which will help to design an adjustable system which will consider flexible to all.

Index terms— anthropometry, body dimension, industrial worker.

1 I. Introduction

he word ”anthropometry” means measurement of the human body. It is derived from the Greek words anthropos means man and metron means measure. Anthropometric data are used in ergonomics to specify the physical dimensions of workspaces, equipment, furniture and clothing so as to fit the task to the man **??**Grandjean, 1980) and to ensure that physical mismatches between the dimensions of equipment and products and the corresponding user dimensions are avoided. Anthropometry is important for both developed and developing countries. Many developed countries like U.S.A., European countries, Japan etc. have their own anthropometric measurement of people and workers. Developing country like Bangladesh has their own anthropometric measurements of people and workers. Bangladesh Bureau of statistics survey different regions of Bangladesh and collect their own data of people and workers. The purpose of anthropometry is to secure data on human body measurements which describes the use the data in such a way that can be used for deduction and anthropological comparison. Anthropometric data can 1. We have taken 150 male workers and 50 female workers from every industries from different districts for our anthropometric data. For mean, standard deviation, Max and Min calculation we have considered two hundred workers (approximately 150 male and 50 female workers) of each industries. But in some places the female workers number was higher than fifty. We considered the male and female both genders separately and calculated the mean. The male workers participating in the survey were within the age group of 15-34 years, 35-54 years, 55-64 years and above 65 years. The percentages were 52.82% for 15-34years, 32.82% for 35-54years, 8.2% for 55-64 years and 6.13% for above 65 years. The female workers participating in the survey were within the same age groups as same as male. The percentages were 81.29% for 15-34years, 15.29% for 34-54years, 2.43% for 55-64 years and 1% for above 65 years. The data were obtained from the survey work were analyzed for mean, standard deviation and percentile values of population. The 5th, 50th and 95th percentile values were obtained for various anthropometric dimensions. Those dimensions are important for designing workstations, tools, clothing, furniture etc. The methodology, which was used in this, enables to collect

valid and reliable information/data and to analyze those data to conclude with a correct decision. For this study we have used different statistics method. The data were analyzed by probability statics method, ratio scaling method, regression method. "Ratio scaling" (used by Pheasant in 1986 and 1996 to establish the British) is one technique to estimate data from known body dimensions (Pheasant, C.M 2003). It relies on the assumption that, though people vary greatly in size, they are likely to be relatively similar in proportions. Another way of estimating the relations among dimensions is through regression equation if we were able to do so, we would describe the parameters of that total population by the mean (average) and standard deviation (SD).

2 Result and Discussion

We have used 200 (approximately 150 male and 50 female workers) workers anthropometry measurements for each area. We have used nine districts and two hundred workers for each industry to calculate the mean and standard deviation. We have used Microsoft Excel for calculating mean and standard deviation. After calculating the mean and standard deviation we have calculated the 5 th , 50 th and 95 th percentiles. The 95 th percentile value of stature of workers were 70.89 inch. So any entry and exit to any workstation should not be less than 70.89inch. 95% of total population can easily enter and exit from workstation by using 70.89inch entrance. The 5th percentile value can be used for lower limit of designing workstation, tools, selecting operator etc. The 50 th percentile value is the average value. We can use this value for designing workstation, tools, selecting operator etc. work which is perfect for 5 th and 95 th percentile. Most commonly the 5 percentile of female and 95 th percentile of male dimensions are used to design. The 5 th percentile of female dimensions are the smallest measurement for the design of population. 5 th and 95 th range accommodates approximately 90% of the population. Table **??** shows the Mean, Standard deviation and percentile calculation of male workers of Khulna, Bagerhat, Chuadanga, Jessore, Kushtia, Magura, Meherpur, Narail and Satkhira and Table **??** shows Mean, Standard deviation and percentile calculation of female Fig. **??** : District-wise distribution of mean weight of workers both male and female of Bangladesh

From figure **??** we can see that the lowest average weight of male workers is from Chuadanga and the highest average weight is from Satkhira. The lowest average weight is 57.2kg and the highest average weight is 63.5kg. From the same figure we can see that the lowest average weight of female workers is from Meherpur and the highest average weight is from Khulna. The lowest average weight is 39.9kg and the highest average weight is 42.3kg. From figure **??** we can see that the lowest mean stature of male workers is from chuadanga and the highest mean stature is from Satkira. The lowest mean stature value is 64.9inch and the highest mean stature value is 68.4inch.

From the same figure we can see that the lowest mean stature of female workers is from Jhenidah

3 Conclusion

Anthropometry plays an important role in designing sector to improve efficiency, comfort and safety to human being. We have taken 200 people anthropometric measurements among them 150 are male and 50 are female in most cases. These data are taken from many industries of Khulna division of Bangladesh. We have taken 36 anthropometric measurements of workers. Then we have calculated mean, standard standard deviation, 5P, 50P and 95P. All these percentile values are important for designing devices, equipment, clothing, workspaces and so on. We have also shown the normal distribution curve of sitting height, elbow height, knee height and stature for both male and female workers and shown the 5P, 50P Tables **??**able 2 : Mean, Standard deviation and percentile calculation of male workers of Khulna, Bagerhat, Chuadanga, Jessore, Kushtia, Magura, Meherpur, Narail and Satkhira [1] [2]

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Figure 1: Fig. 1 :Fig. 2 :

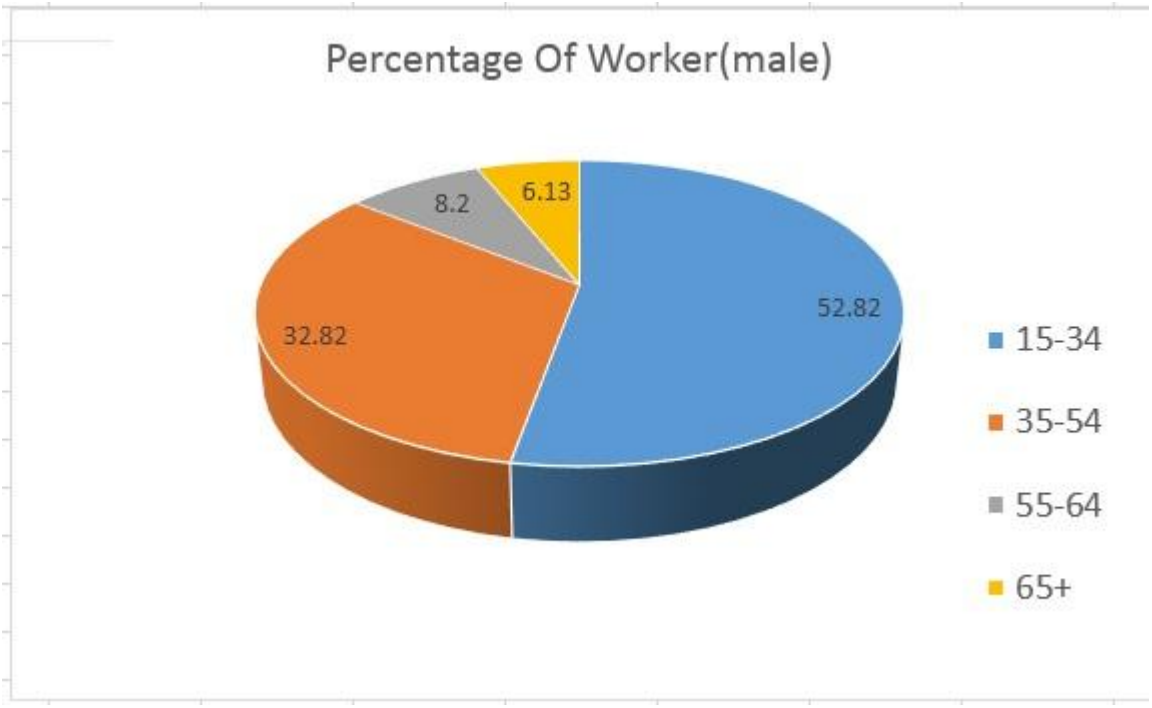

Figure 2:

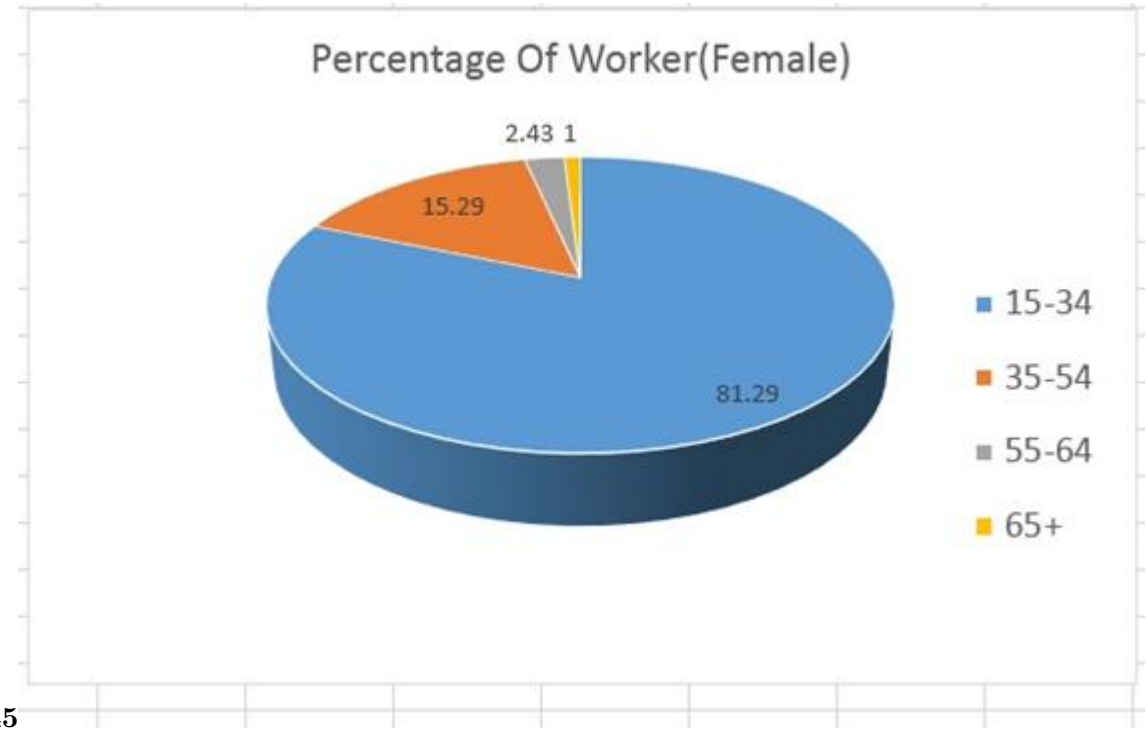

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Figure 3: Fig. 4 :Fig. 5 :

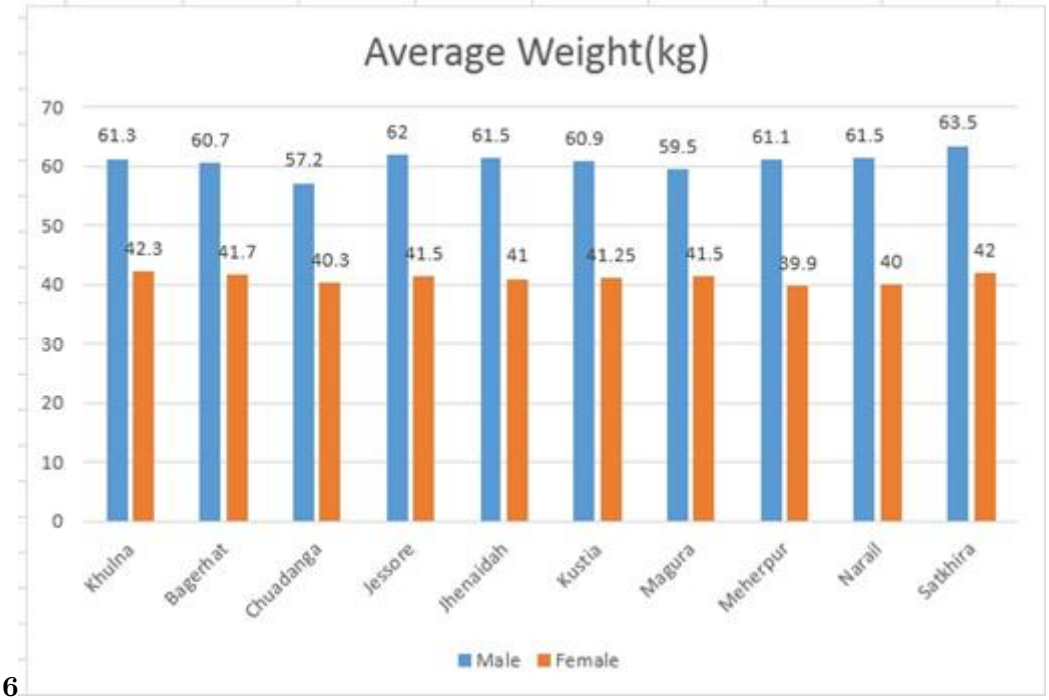

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Figure 4: Fig. 6 :

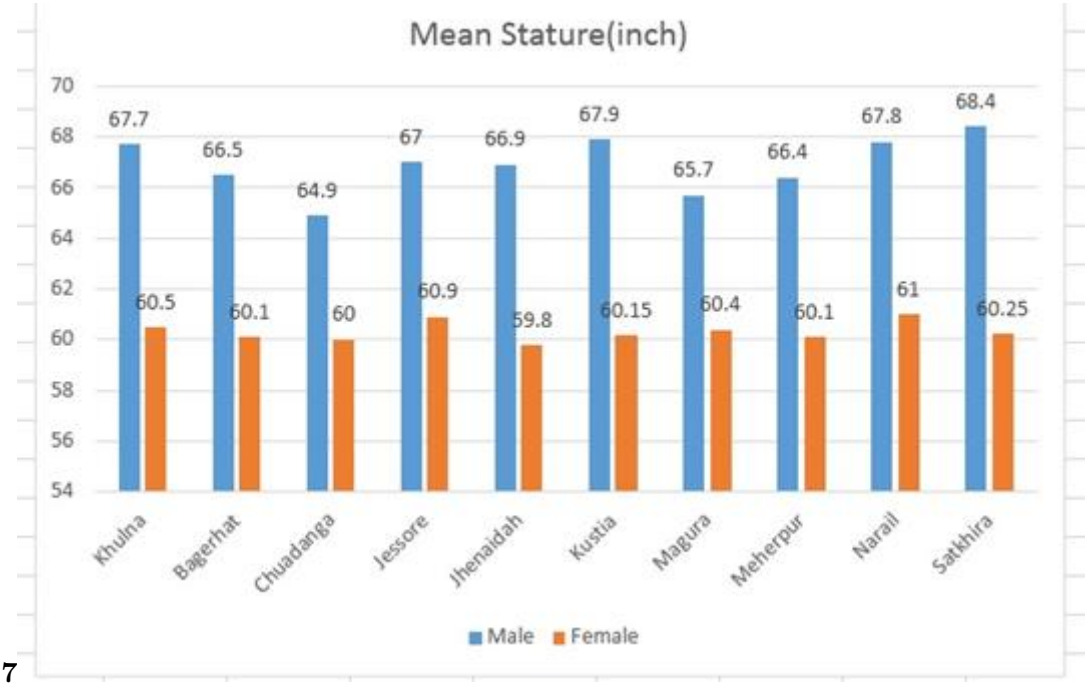

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Figure 5: Fig. 7 :

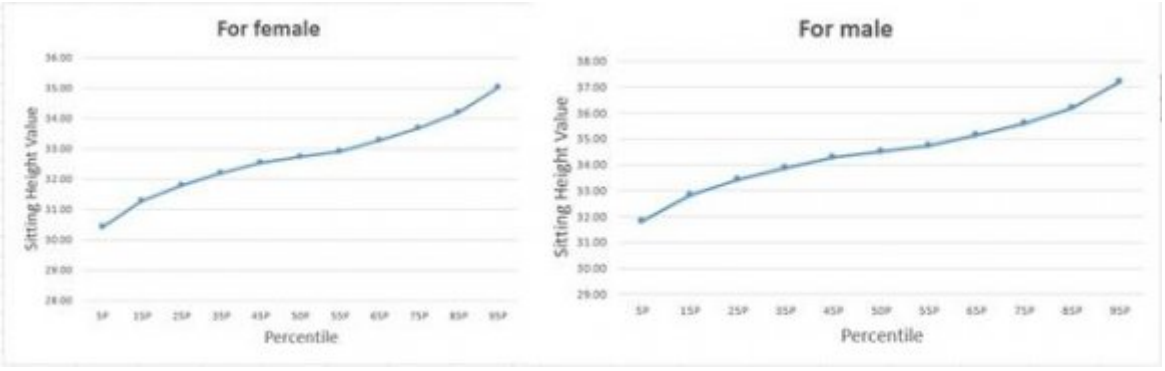

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Figure 6: Fig. 8 :

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		Percentile	Knee height(Female)	Knee height(Male)
		5 th	16.4854	18.84073596
		50 th	18.1254	20.69791667
		95 th	19.7654	22.55509737
Percentile	Sitting height (Female)	Sitting height(Male)		
5 th	30.4281	31.82836		
50 th	32.7241	34.50938		
95 th	35.0201	37.19039		
Percentile	Elbow height(Female)	Elbow height(Male)		
5 th	37.8698	39.0548		
50 th	39.3458	42.98958		
95 th	40.8218	46.92437159		

[Note: and 95P values of male and female workers individually in a chart to show the difference.Year 2016 6. Marras S. William, KarwowskiWaldemar (2006) Fundamentals and Assessment Tools for Occupational Ergonomics Taylor & Francis. 7. Richard Tinning (2010) Pedagogy and Human Movement Taylor & Francis. 13. Jurgens, H.W., Aune, I.A., Pieper, U (1990) s -]

Figure 7: Table 1 :

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