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Modeling for Anthropometric Data of Combined Populations

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Abstract: When designing for a specific population it should not be assumed, without verification, that anthropometric data from one population can be used for design purposes on another population. This is of particular importance if the target population is the mixture of one or more subpopulations. Studies have shown that there are circumstances where individuals of a subpopulation might be at risk if industrial safety standards do not take into consideration the dissimilarity of this subpopulation with regards to the assumed overall population from which standards were drawn. In this paper we developed certain models using Monte Carlo and Bootstrap simulation, first to find the parameters of the distribution of a gender and/or ethnic group mixture of homogeneous populations, and second to find the empirical percentiles. Results showed that the common assumption of approximate normality does not hold in general. Discrepancies from normality depend on the mean and standard deviation of each population as well as in the mixing proportion. The percentiles obtained in this study could be used in the ergonomic design of workstations and equipment used by combined populations similar to the ones used in this study.

Keywords: Anthropometry, Combined Populations, Monte Carlo simulation, Bootstrap Simulation