

# **Anthropometric Comparative Study of Oman Military Aircraft Recruits**

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# Introduction

- ▶ Military aircrew-aircraft compatibility is of prime importance for task accomplishment and flight safety
- ▶ Royal Air Force of Oman (RAFO)  
Anthropometric aircrew selection standards based on
  - ▶ Selection standards of western defense forces
  - ▶ As the aircrafts were imported from those developed countries

# Introduction

- ▶ Efforts made to fit the local native aviators into the aircraft
  - ▶ not initially designed for them
- ▶ This study to obtain the anthropometric data of Oman aircrew recruits
- ▶ Compare with published western and eastern aircrew data
  - ▶ To understand and to highlight the aircrew-aircraft mismatch issues, if any

# RAFO Anthropometric Standard

Parameter	Range (cm)
Standing Height	162 – 188
Sitting Height	86.5 – 101
Arm Reach	74 – 90
Thigh Length	56 – 66
Leg Length	100 - 120

# Methodology

- ▶ The anthropometric data of Omani recruits from 2003 to 2012 collected
- ▶ Their statistical distribution of data collated
- ▶ The anthropometric comparison with the published data from the USA, UK, and Singapore done

# Results

- ▶ 3,000 Omani candidates underwent initial screening for standing height parameter alone
  - ▶ 704 failed giving an initial screening rejection rate of 23.4%.

	N	Percentage
Recruits	2296	
Anthropometric fit for aircrew	1968	86%
Anthropometric unfit for aircrew	328	14%

# Results

- ▶ 2296 Omani recruits for aircrew selection

Parameter	Mean	SD
Age	20.1 years	2.34
Body Weight	64.09 kg	9.52
BMI	21.65	3.06

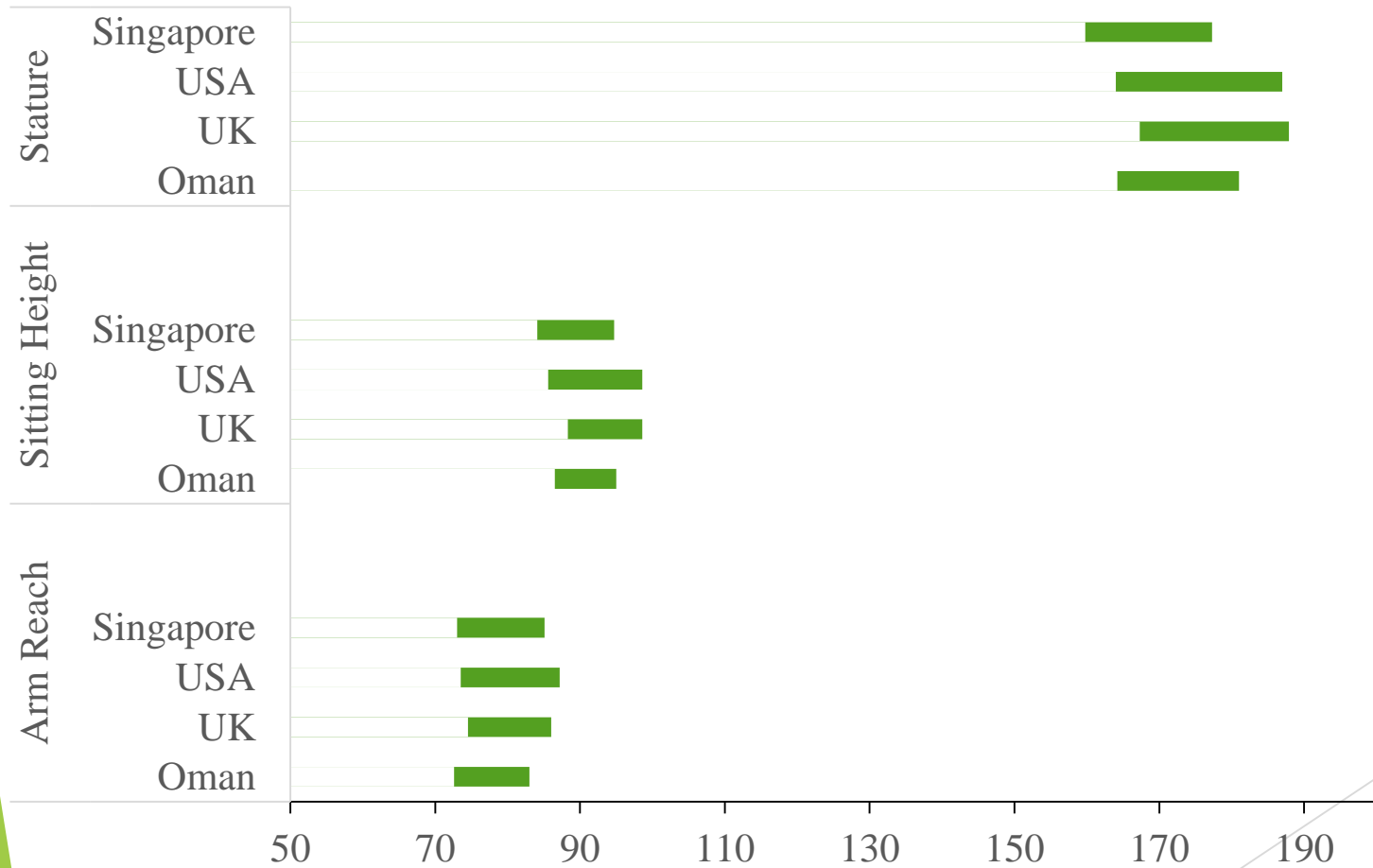
# Results

- ▶ 5 Aviation significant anthropometric measurements

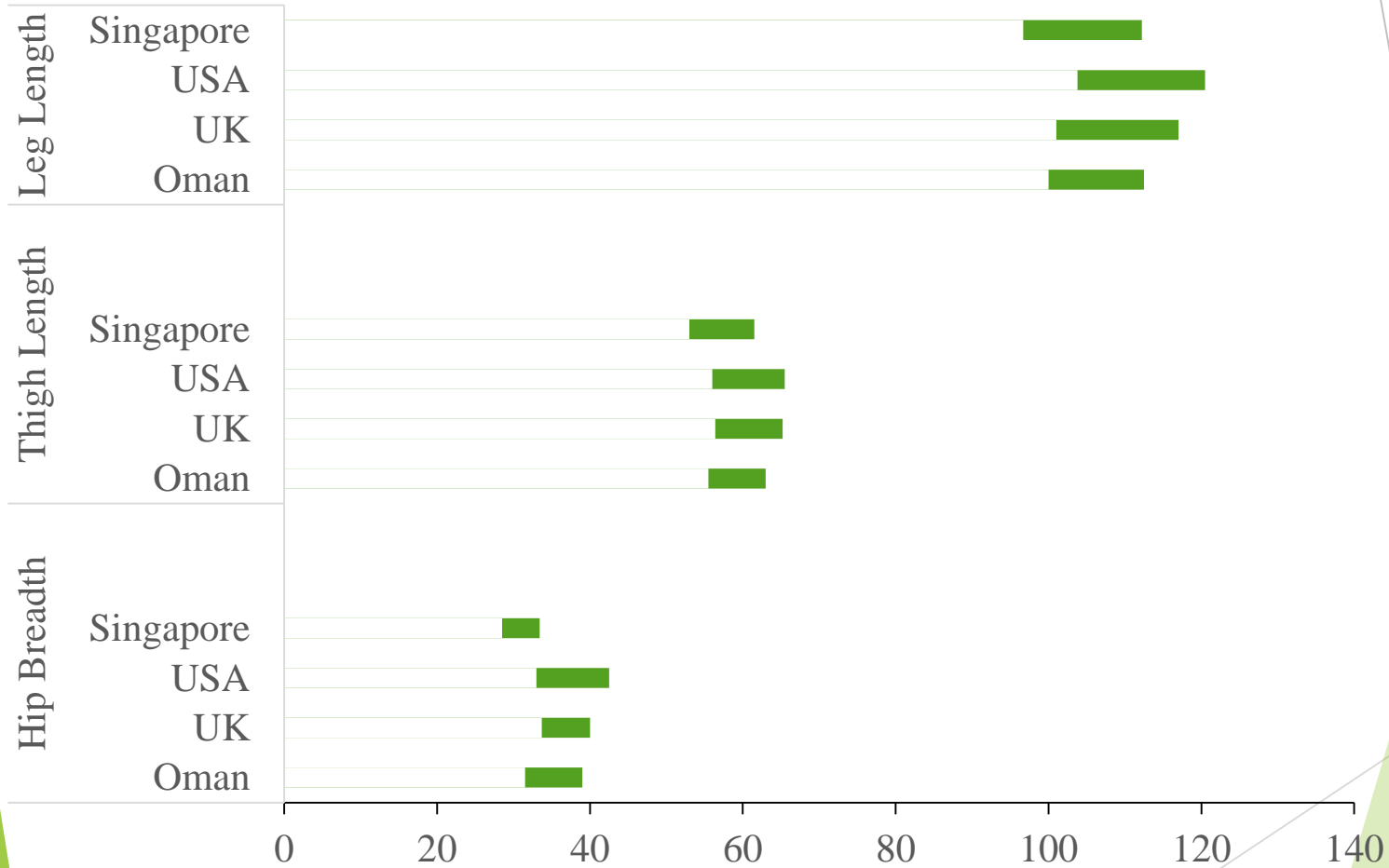
Parameter	Mean (cm)	SD
Standing Height	171.95	4.95
Sitting Height	90.31	2.74
Arm Reach	77.07	3.33
Thigh Length	58.6	2.99
Leg Length	104.93	4.05



# Anthropometric comparison 1



# Anthropometric comparison 2



# Discussion

- ▶ Anthropometric comparison studies between Western and Far Eastern country aviators available
  - ▶ Differences among Asians minimal
  - ▶ Differences substantial when compared to American and European aircrew

\*Singh, J., Peng, C. M., Lim, M. K., & Ong, C. N. (1995). An anthropometric study of Singapore candidate aviators. *Ergonomics*, 38, 651–658

\*Kennedy, K.W. 1982, International anthropometric variability and its effect on aircraft cockpit design, in A. Chaparis (ed.) *Ethnic Variables in Human Factors Engineering* (Baltimore, Johns Hopkins Press), pp. 42-66.

# Discussion

- ▶ Aircraft cockpit design
  - ▶ To nominally accommodate the 5th to 95th percentile of the population
  - ▶ Across aviation significant anthropometric parameters
- ▶ Military aircraft engineers design cockpit
  - ▶ Only 12–15% population should be too small or too large to operate the aircraft

# Discussion

- ▶ Anthropometric comparison between Middle Eastern (Omani) data with Western and Far Eastern data
  - ▶ Similar differences noted with data midway between Western and Far Eastern data
- ▶ Higher anthropometric rejection rate among native recruits
- ▶ Serious Ergonomic implications while importing aircrafts to suit native population

# Discussion

	<b>RAFO Standard (cm)</b>	<b>Recruit Data (5<sup>th</sup>-95<sup>th</sup> percentiles)</b>
Stature	162 – 188	164.19 – 181
Sitting Height	86.5 – 101	86.5 – 95
Arm Reach	74 – 90	72.6 – 83
Leg Length	56 – 66	55.5 – 63
Thigh Length	100 - 120	100 – 112.5

# Discussion

In this study,

- ▶ 34% of the anthropometric unfit recruits in different parameters had standing height below 165 cm
- ▶ Recruits passing RAFO minimum standing height standard (162 cm) but failed in other anthropometric parameters had the minimum recruitment standard measurement around 50th percentile
- ▶ Scope to revise minimum standing height standard from 162 cm to 165cm

# Conclusion

- ▶ Recognizes the dilemmas of Middle Eastern aircrew selection for western cockpits
  - ▶ Using the western anthropometric selection standards
- ▶ Scope for native aircrew recruitment standards and periodical updation to aid the ideal man-machine interface
  - ▶ National policy
  - ▶ Anthropometric trends of general population
  - ▶ Procured aircraft profile of the country



Thank you