A Comparison of the Metabolic Syndrome among Immigrant Asian Indians and Indians in India

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Metabolic Syndrome, Diabetes and CVD

- Metabolic Syndrome (MetS) is associated with an increased risk of developing CVD and diabetes.
- High rates of diabetes and heart disease among Asian Indians/South Asians; hypertriglyceridemia, low levels of HDL-C, and high levels of LDL.
- Studies suggest that prevalence rates of diabetes and CVD escalate as Asian Indians migrate from rural to urban India and to developed countries.
- Such cross-cultural studies that examines MetS in rural Indians, urban Indians, and Indian Americans are lacking.
- MetS was diagnosed according to the modified NCEP, ATP III definition, and the IDF definition and comparison made between the three groups.

Purpose

- **To examine the prevalence of Metabolic Syndrome among rural Indians, urban Indians, and immigrant Asian Indians in the US using similar standard measurements.**
- **Community-based study design.**
- **Nine Study sites**
- **DIA Study - Seven sites in the US**
  - **Houston TX, Phoenix AZ, Washington DC, Edison NJ, Parsippany NJ, Boston MA, and San Diego, CA.**
- **Cross-cultural component**
  - **Urban Site in India – New Delhi (Collaborating Institution - AIIMS)**
  - **Rural Site in India – Gandhigram, Tamilnadu (Collaborating Institution - GRI)**

Sampling and Data Collection

- US - Respondents were randomly selected from sampling frames (compilation of temple, ethnic association, telephone, area directories) in each of the 7 US sites.
- Urban India - multi-stage cluster sampling. Railway employees in New Delhi were randomly selected.
- Rural India – Eight hamlets (villages) in Dindigul District near Madurai and the respondents were randomly selected.
- Data collection methods:
  - Telephone interviews (US sites) followed by fasting blood work at hospital/clinic/community center.
  - Face-to-face interviews (urban and rural sites in India) followed by fasting blood work at GRI and AIIMS.

Sample Size

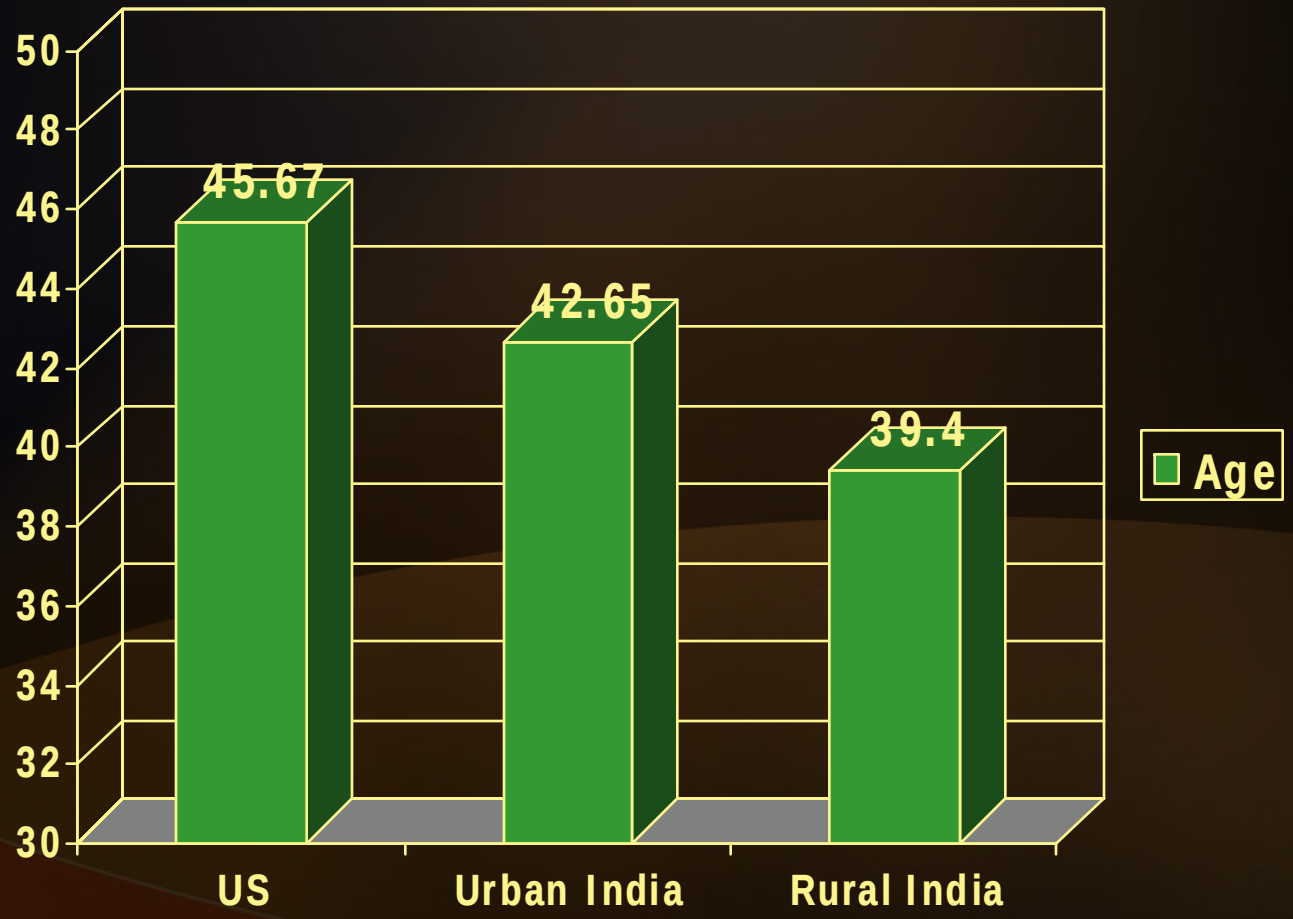
- 599 rural Indians in Tamilnadu – 93% response rate.
- 508 urban Indians in New Delhi – 88% response rate.
- 1038 migrant Asian Indians in the US – 36% response rate.

Information Collected

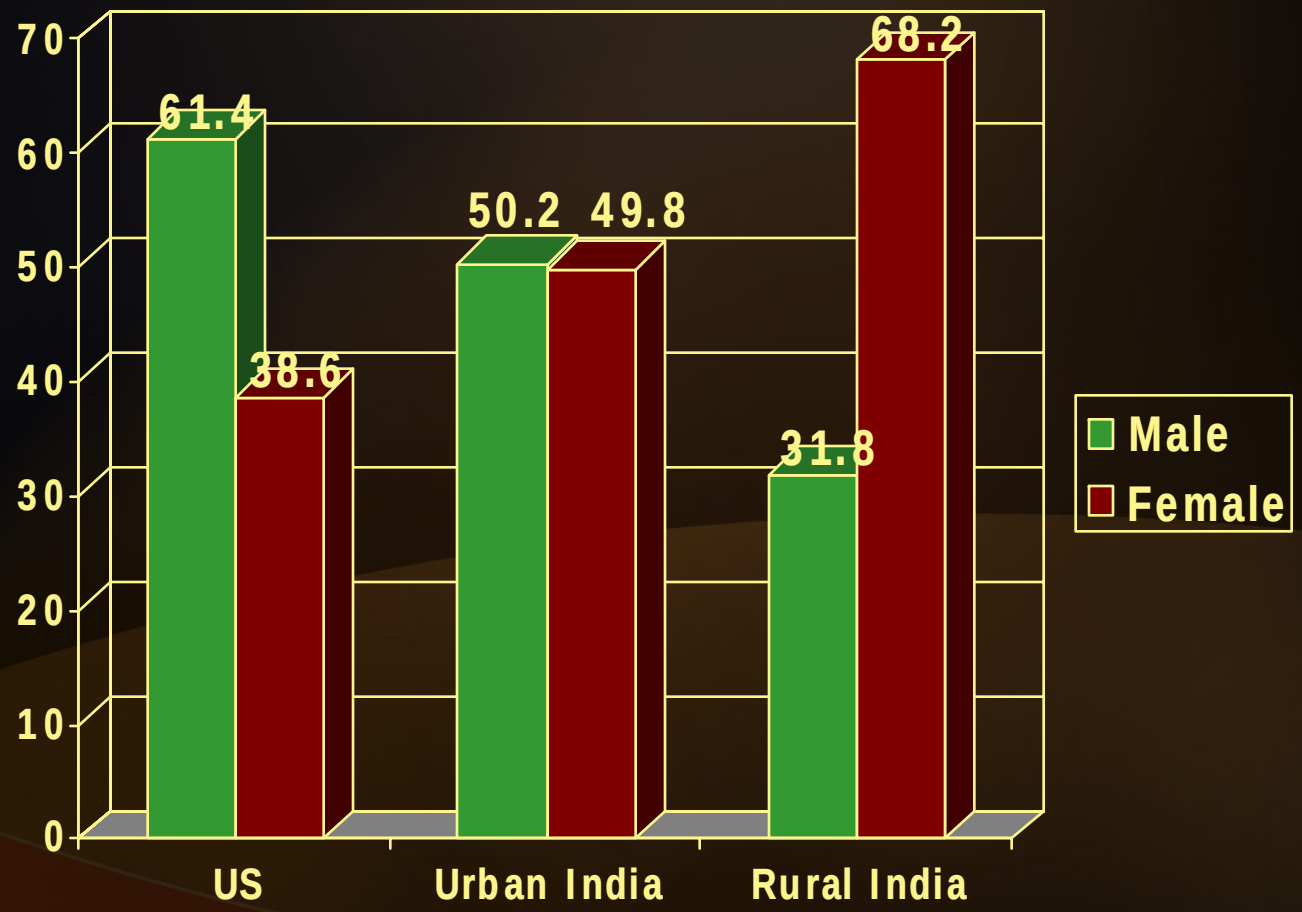
- Demographic variables
- Health behaviors, Knowledge, Beliefs, Family/Personal Medical History, Risk Behaviors.
- Anthropometric measurements
- Clinical risk factors - Fasting blood glucose and lipid profile (cholesterol, serum triglycerides, HDL and LDL).

Age of the Respondents

Mean age = 43.7 (SD=13.10).



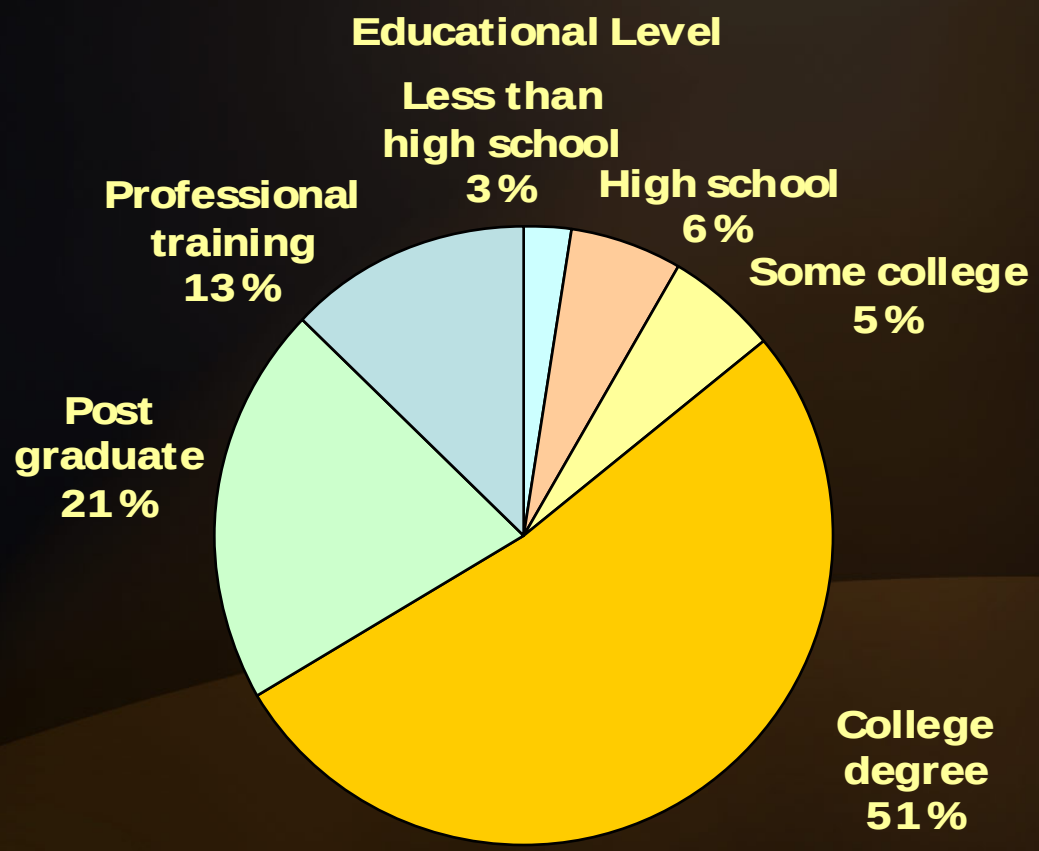
Gender Distribution



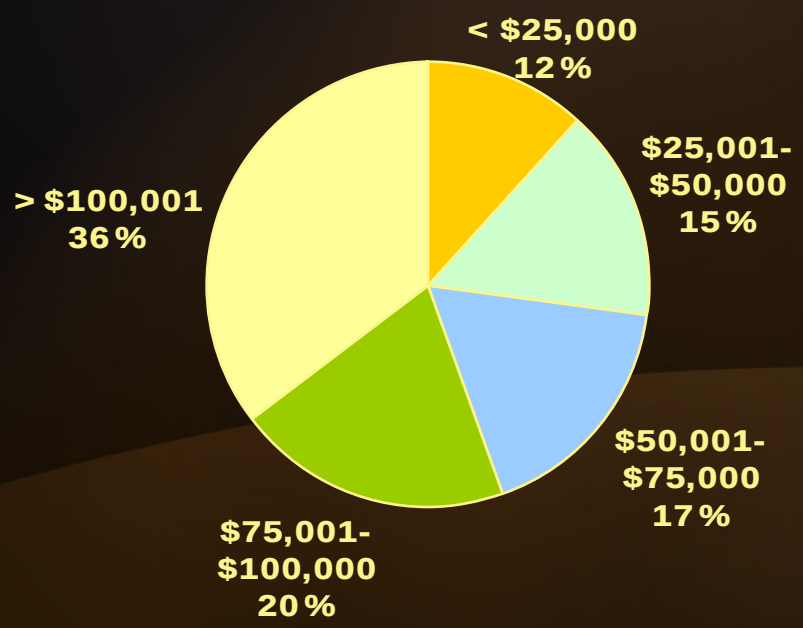
Demographic Characteristics

- Level of education
  - 84.7% of rural Indians, 53.5% of urban Indians, and 10.5% of US AIs reporting a high school diploma or below; 72% of US Asian Indians had a college degree.
- Income
  - The modal income among US Asian Indians was $50,000 to $100,000/year, urban Indians was ≥ $200/ month, and rural Indians was < $25/month.

Educational Level (US)

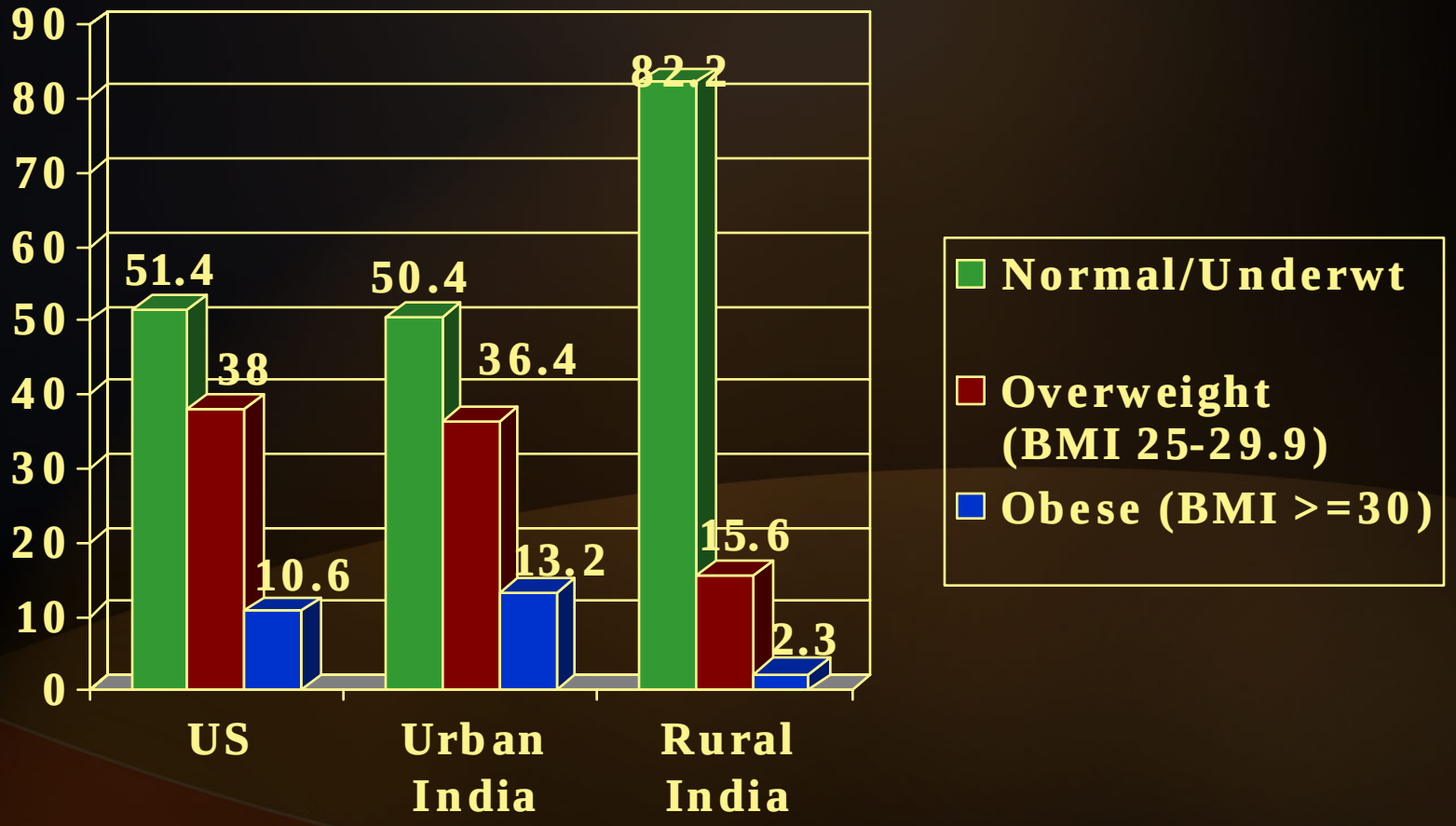


Income Level (US)



Anthropometric Measurements

Overweight & Obesity



Obesity

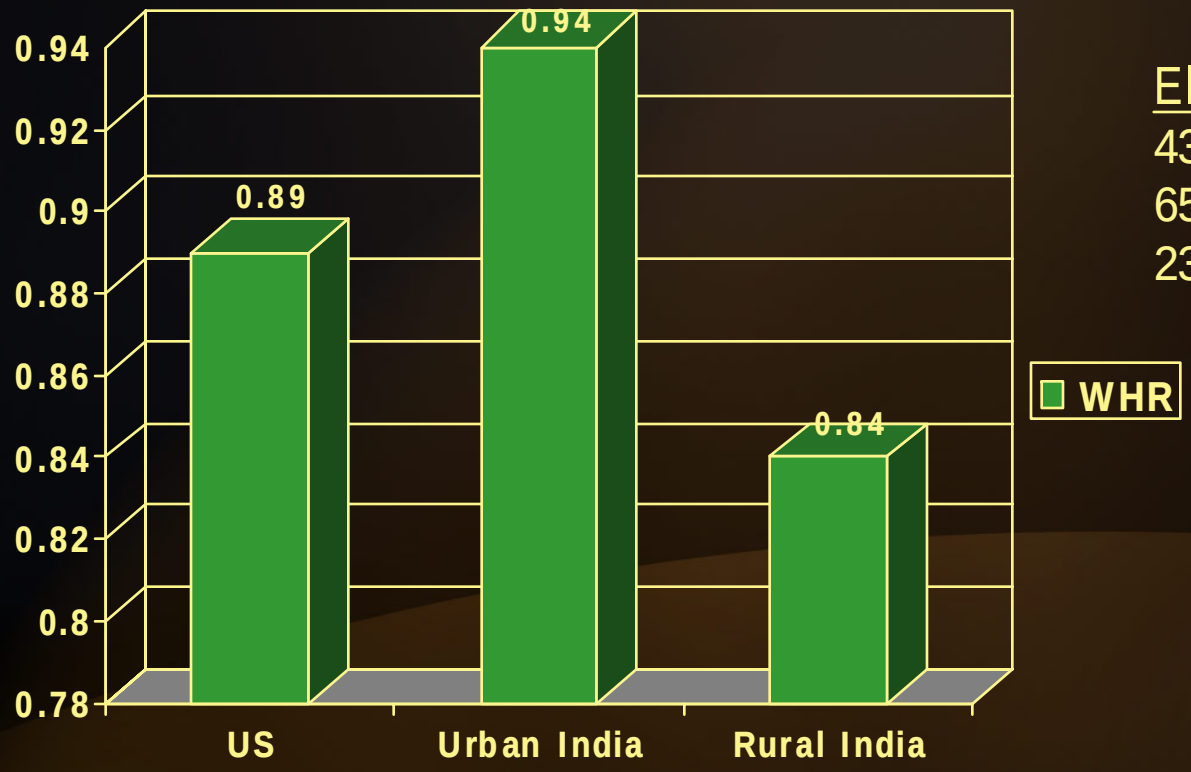
Average BMI for participants was

- **Immigrant Asian Indians: 25.17 ± 4.16**
- **Urban Indians: 24.78 ± 4.81**
- **Rural Indians: 21.29 ± 4.02**

Based on the WHO standard for overweight and obesity for Asians:

- **31.8% of participants in Rural India were overweight or obese;**
- **65.4% of participants in Urban India were overweight or obese;**
- **73.3% of migrant Asian Indians in the US are overweight or obese.**

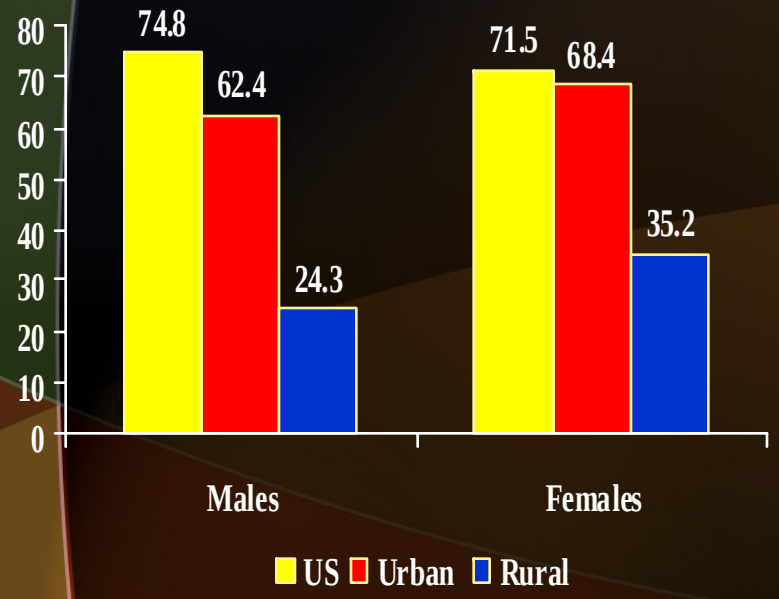
Waist-to-Hip Ratio



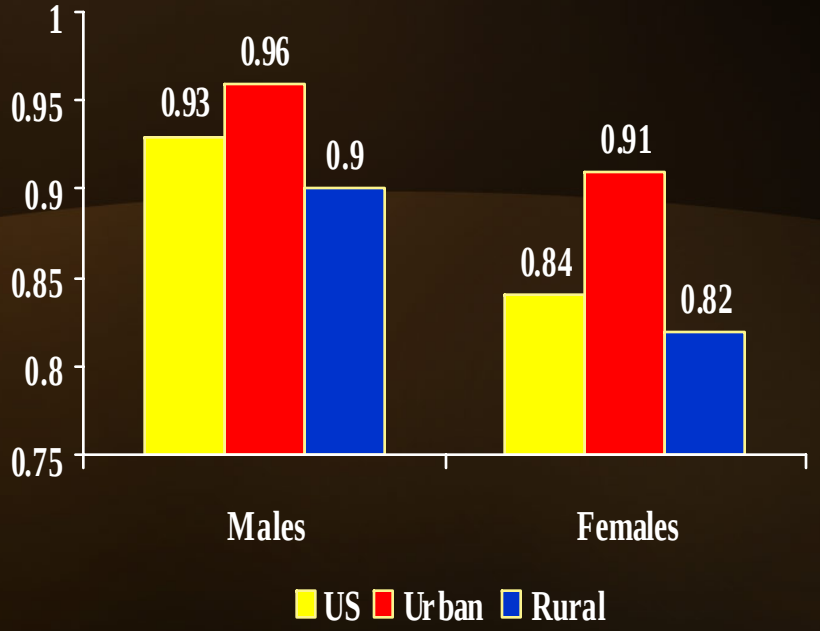
Elevated Levels
43.8% in AIs
65.7% urban Indians
23% of rural Indians.

Prevalence of Obesity by Gender

Overweight/ obesity



Waist-hip ratio



Prevalence of Metabolic Syndrome

- ATP III definition
- Modified NCEP
- IDF definition

Metabolic Indicators and cut points included in three definitions

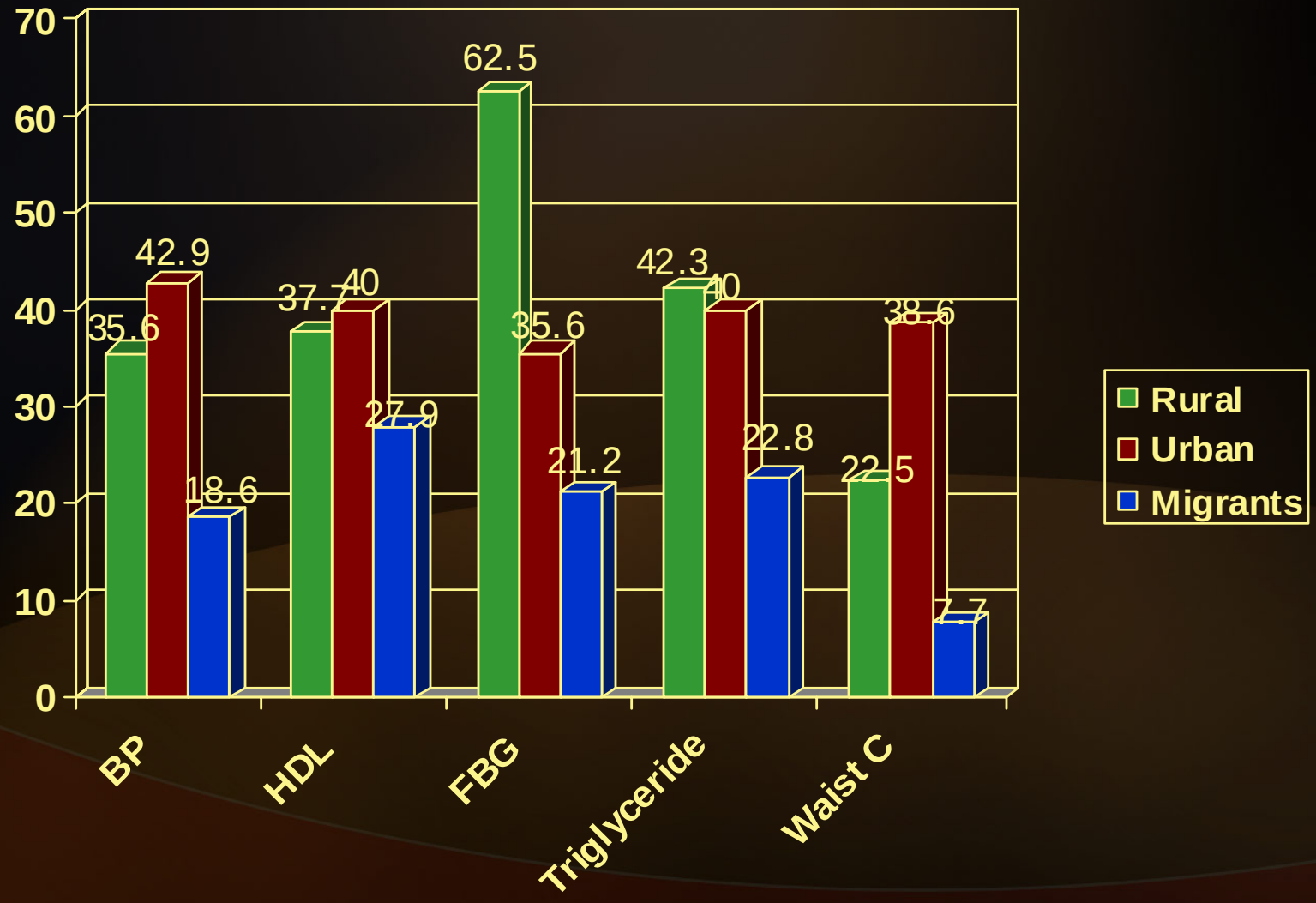
	Indicator Criteria					
	Definition of metabolic syndrome	Glucose (mg/dl)	Triglycerides (mg/dl)	HDL-C (mg/dl)	Blood Pressure (mmHg)	Waist Circumf (cm)
1	**ATP III/NCEP (ref)[a]**	≥ 110	≥ 150M	M ≤ 40 F ≤ 50	≥ 135/80	M ≥ 102 F ≥ 88
2	**(NCEP) modified (ref)[b]**	≥ 100	≥ 150M	M ≤ 40 F ≤ 50	≥ 135/80	M ≥ 102 F ≥ 88
3	**International Diabetes Federation (ref)[c]**	≥ 100	≥ 150M	M ≤ 40 F ≤ 50	≥ 135/80	M ≥ 90 F ≥ 80

a MetS present if any three indicators meet the criterion. b MetS present if any three indicators meet the criterion. c MetS present if central obesity and any two indicators meet the criterion.

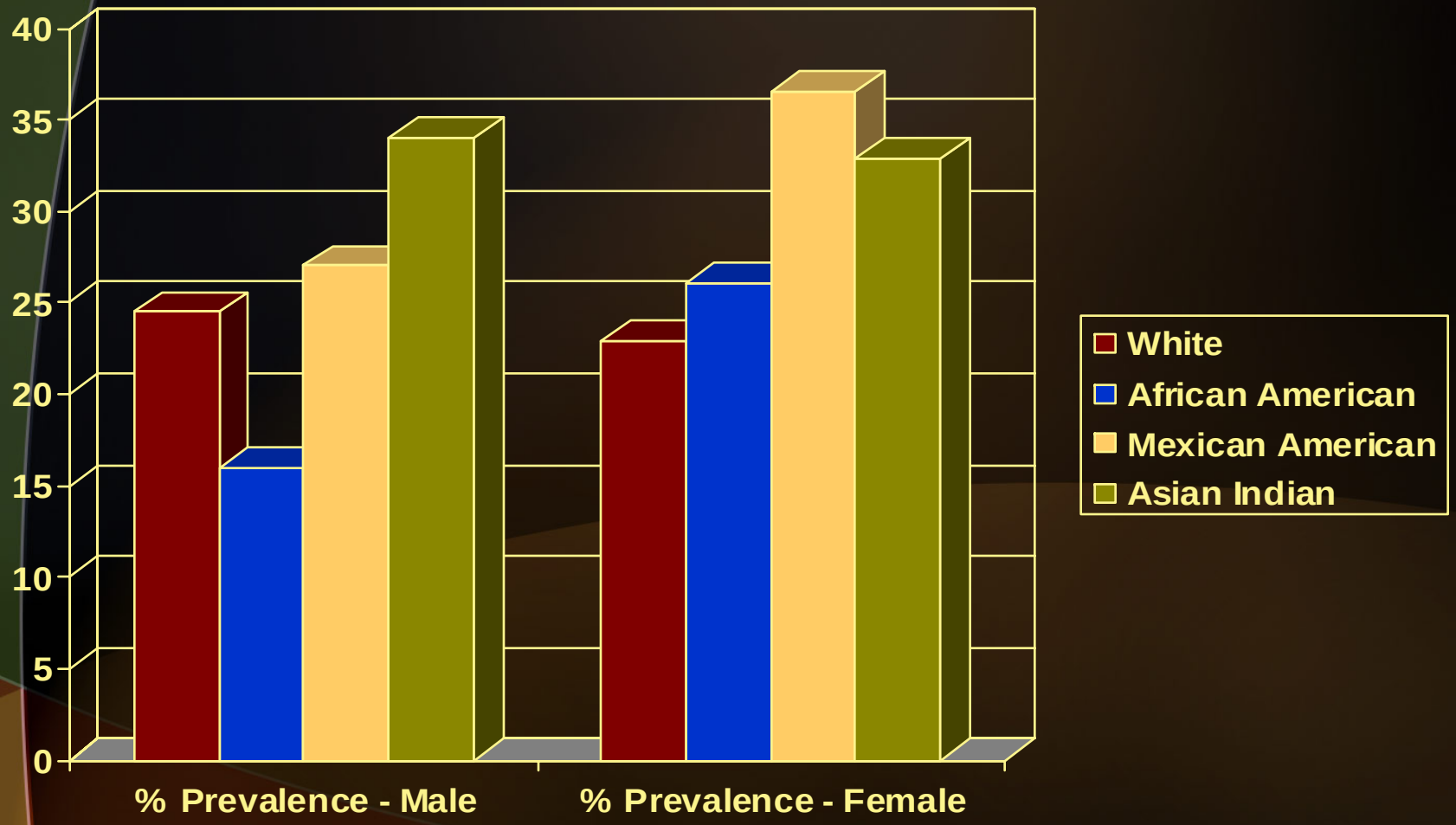
Prevalence of Metabolic Syndrome

	Definition of metabolic syndrome	**ATP III**	**Modified NCEP**	**IDF**	Gender Difference
1	**Immigrant Asian Indians**	**26.9%**	**32.7%**	**38.2%**	**Ns**
2	**Urban Indians**	**28.0%**	**30.8%**	**39.2%**	**<.001**
3	**Rural Indians**	**6.1%**	**8.6%**	**10.5%**	**<.001**

Metabolic Indicators - Rural Indians, Urban Indians and Migrant Indians



Age-adjusted Prevalence of Metabolic Syndrome – Ethnic Variation



Ford et al., JAMA 2002

Conclusion

- Highlight clear differences in metabolic profile between the three group.
- Prevalence of abdominal obesity was low in rural Indians, it was more prevalent in urban Asian Indians as compared to migrants.
- High rate of obesity in urban/migrant Asian Indians. Highest WHR among urban Indians.
- Abdominal obesity was greater in females as compared to males.
- Striking differences in prevalence of low HDL-C levels between men and women in urban (4.7% vs. 68%, respectively) and rural Asian Indians (0% vs. 40%, respectively), underlining greater cardiovascular risk.
- Low HDL and high triglycerides were found among Urban Indians and Migrant Asian Indians.
- low HDL-C levels in women in India might be linked to poor physical activity profile.
- Results provide better understanding of multi-factorial lifestyle-related diseases and how to manage and prevent them.