

Introduction/Background

- BMI is the most frequently used metric for diagnosing obesity and screening for chronic disease risks like type 2 diabetes (T2D).
- Asian populations, who develop obesity-related disease at lower BMI than non-Asians populations, have high rates of undiagnosed T2D despite adjusted BMI ranges.
- This study evaluated efficacy of waist-to-height ratio (WHtR) as a screening tool for T2D in both Asian and non-Asian populations, relative to BMI, to determine if this BMI alternative may result in increased capture of undiagnosed T2D patients.

Methods

- **Database:** National Health and Nutrition Examination Survey (NHANES), 2011-2018
- **Survey-specific statistical procedures:** Conducted using SAS Software v.9.4 (SAS Institute, Cary, NC).
- **Race/Ethnicity:** Determined by self-identification in NHANES
 - Non-Asian designation includes Mexican American, non-Hispanic White, Black, and ‘other’ including multi-racial identities.
- **Statistical methods:** Receiver operator curves and area under curves (AUC) compare sensitivity and specificity of BMI and WHtR in each demographic
 - Predictiveness of BMI and WHtR established by AUC > 0.7.
 - Significance level set at P < 0.05
- **Diabetes Definition:** A1c ≥ 6.5%, or if patient reported taking oral medication or insulin to control blood sugar.

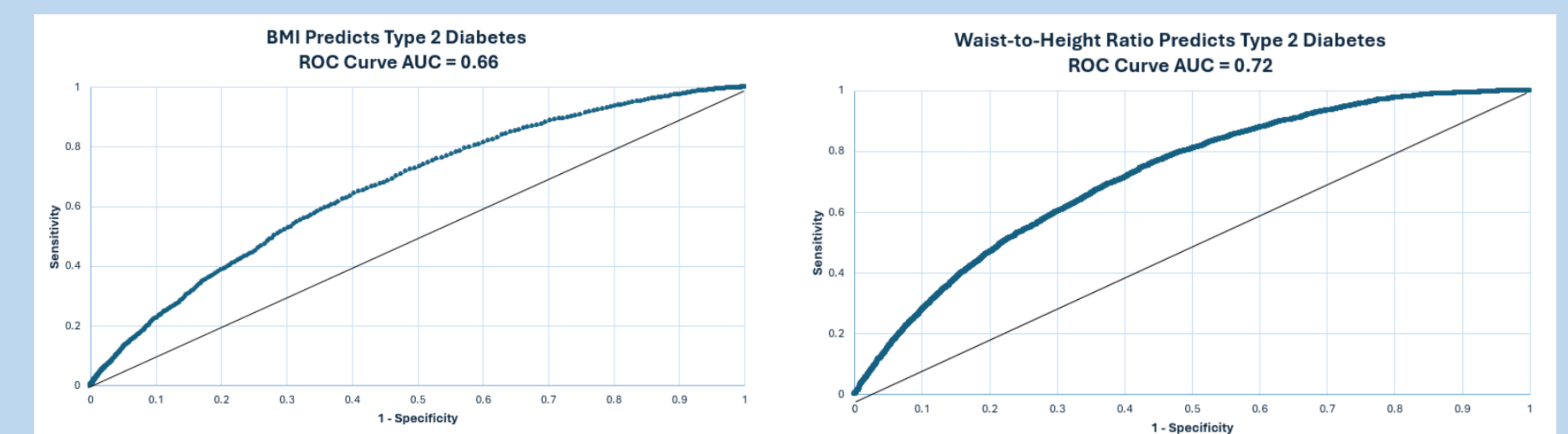
Results

- **Difference between Waist-to-Height Ratio AUCs of Asians and Non-Asians was not significant** (Chi-Square = 0.31, df = 1 P = 0.58) and can be used equally for either population.

Receiver Operating Characteristic Curves (ROC)
 Body Measurement Predictors of Diabetes in non-Asians and Asians

Body Measurement Predictor	Area Under the Curve(AUC)		
	Total adult population	Non-Asian Population	Asian Population
Body Mass Index	0.663	0.672	0.643
Waist Circumference	0.707	0.716	0.712
Waist-to-Height Ratio	0.718	0.723	0.731

- AUC of BMI < AUC of WHtR
- **Difference of BMI AUC to WHtR AUC for all adults is statistically significant** (Chi-Square = 632, df = 1, P < 0.001).



- **Specificity** was high with all anthropometric methods in Total Adult / non-Asian adult populations.
- **Sensitivity** was lowest using obese and overweight BMIs (Asian cutoffs) for predicting T2D in Asian Adults.
- Data suggests BMI classifications of obese and overweight **not** be used as a screening tool for T2D.

Table 2. Sensitivity & Specificity of Body Measures for Predicting Diabetes in Adults

Body Measures	Total adult population		Non-Asian adult population		Asian adult population	
	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
BMI ≥ 30 (non-Asian obese)	0.05	0.98	0.06	0.98	0.61	0.6
BMI > 27.5 (Asian obese)	0.03	0.99	0.04	0.99	0.35	0.78
BMI 25<30 (non-Asian overweight)	0.02	0.99	0.02	0.99	0.2	0.89
BMI 23.5<27.5 (Asian overweight)	0.02	0.99	0.02	0.99	0.15	0.93
WC > 102 cm in males	0.26	0.9	0.27	0.89	0.95	0.26
WC > 88 cm in females	0.09	0.97	0.1	0.97	0.54	0.73
WHtR > 0.5	0.33	0.87	0.31	0.89	0.51	0.78

Conclusions

- When using WHtR as a screening tool, there is no significant difference between Asian and non-Asian populations.
- Elevated WHtR is more sensitive, and more predictive, of T2D than BMI.
- **Waist to Height ratio was a numerically superior screening tool for T2D in both Asian and non-Asian populations.**

Public Health Implications

- BMI alone is not the best screening tool for T2D
- Indicators that account for distribution of weight, including waist-to-height ratio or waist circumference, can offer more meaningful information than BMI alone.

Complete Abstract and Data Files

