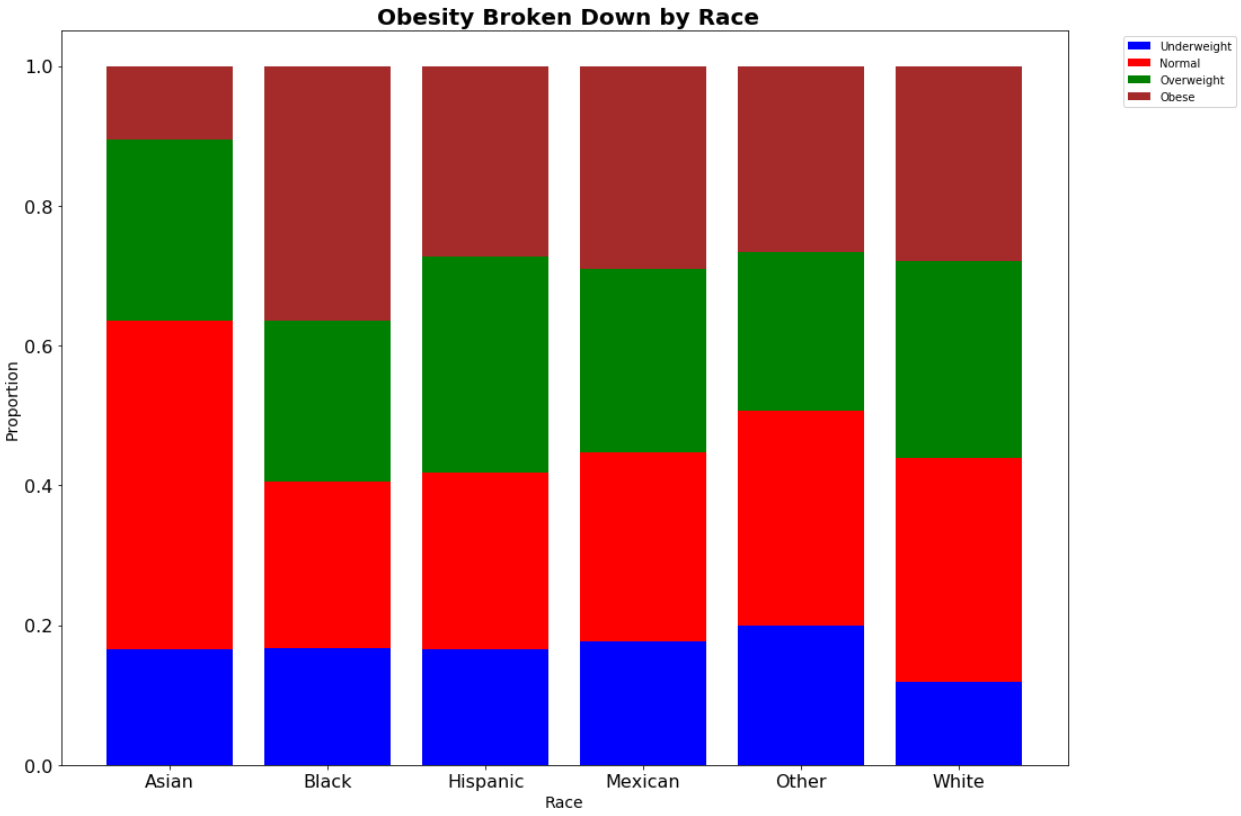
Test 1

H_O: Obesity is not Associated with race
H_A: Obesity is associated with race



Race3	Asian	Black	Hispanic	Mexican	Other	White
BMI Levels						
Underweight	46	95	56	80	30	364
Normal	130	135	86	122	46	974
Overweight	72	131	105	119	34	858
Obese	29	207	93	131	40	851

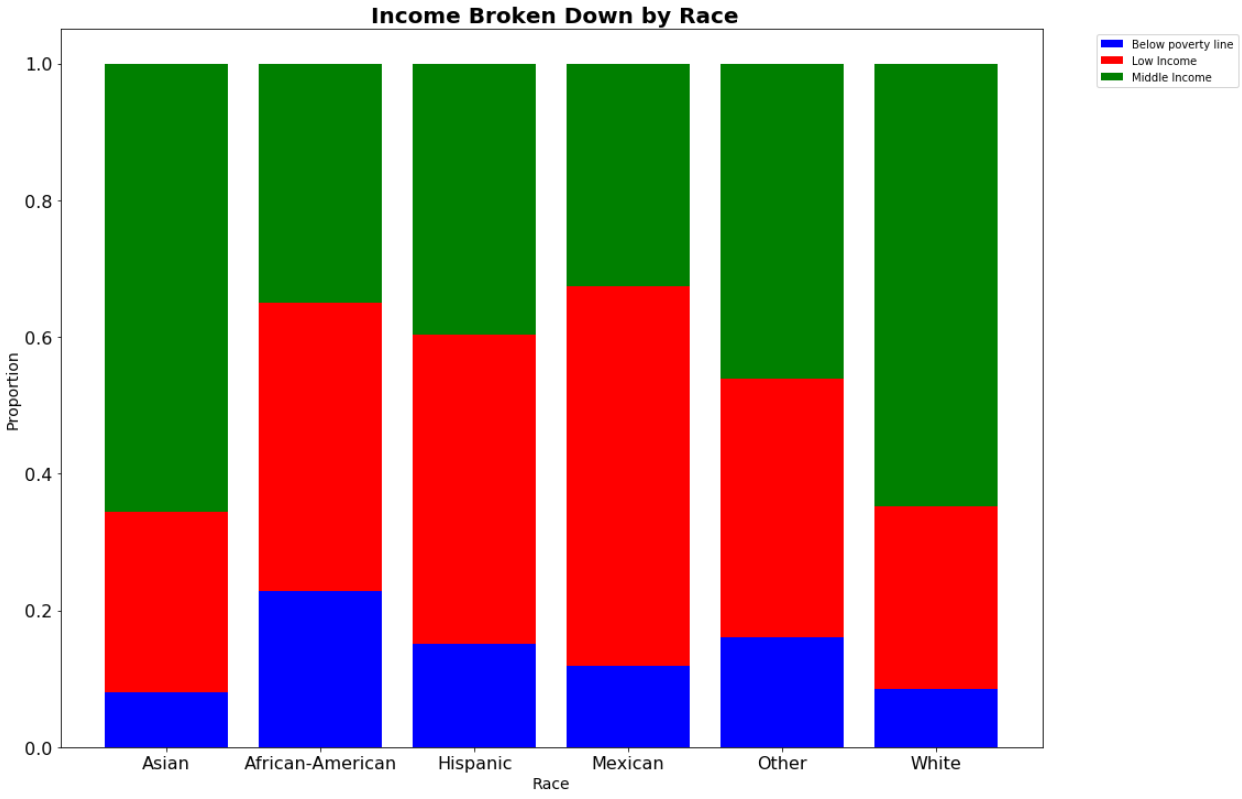
A chi-square test of independence was performed to examine the relation between race and obesity. The relation between these variables was significant, X^2 (15, N = 9634) = 115.6, p = 1.4E-17. Of all races, African-Americans were more likely to be obese, The biggest difference in porpotion of obese individuals was between African Americans and Asians with a value of 0.26 (95% CI = [0.21, 0.31]). Contrastingly, the smallest diffrence in the proportion of obese individuals was between African-Americans and Mexicans since the difference in proportion was 0.07 (95% CI = [0.02, 0.13]).

Test 2

Race and income

H_O: Race is not associated with income

H_A: Races is associated with income



Race3	Asian	Black	Hispanic	Mexican	Other	White
Income Levels						
Below poverty line	19	113	47	47	23	247
Low income	63	209	140	221	54	772
Middle Income	156	174	123	130	66	1868

A chi-square test of independence was performed to examine the relation between race and income. The relation between these variables was significant, X^2 (10, N = 8852) = 352.06, p = 1.5E-69. Of all races, African-Americans were more likely to be on the lower tier for income, meaning that the null hypothesis is rejected in favor of the alternative hypothesis. The largest difference in the proportion of low income individuals was between African-Americans and white Americans with a value of 0.21 (95% CI = [0.168, 0.258]). By contrast, the smallest difference in the proportion of low income individuals was between African-Americans and Hispanics with a value of 0.0125 (95% CI = [-0.057, 0.082]).

Test 3: BMI and Income

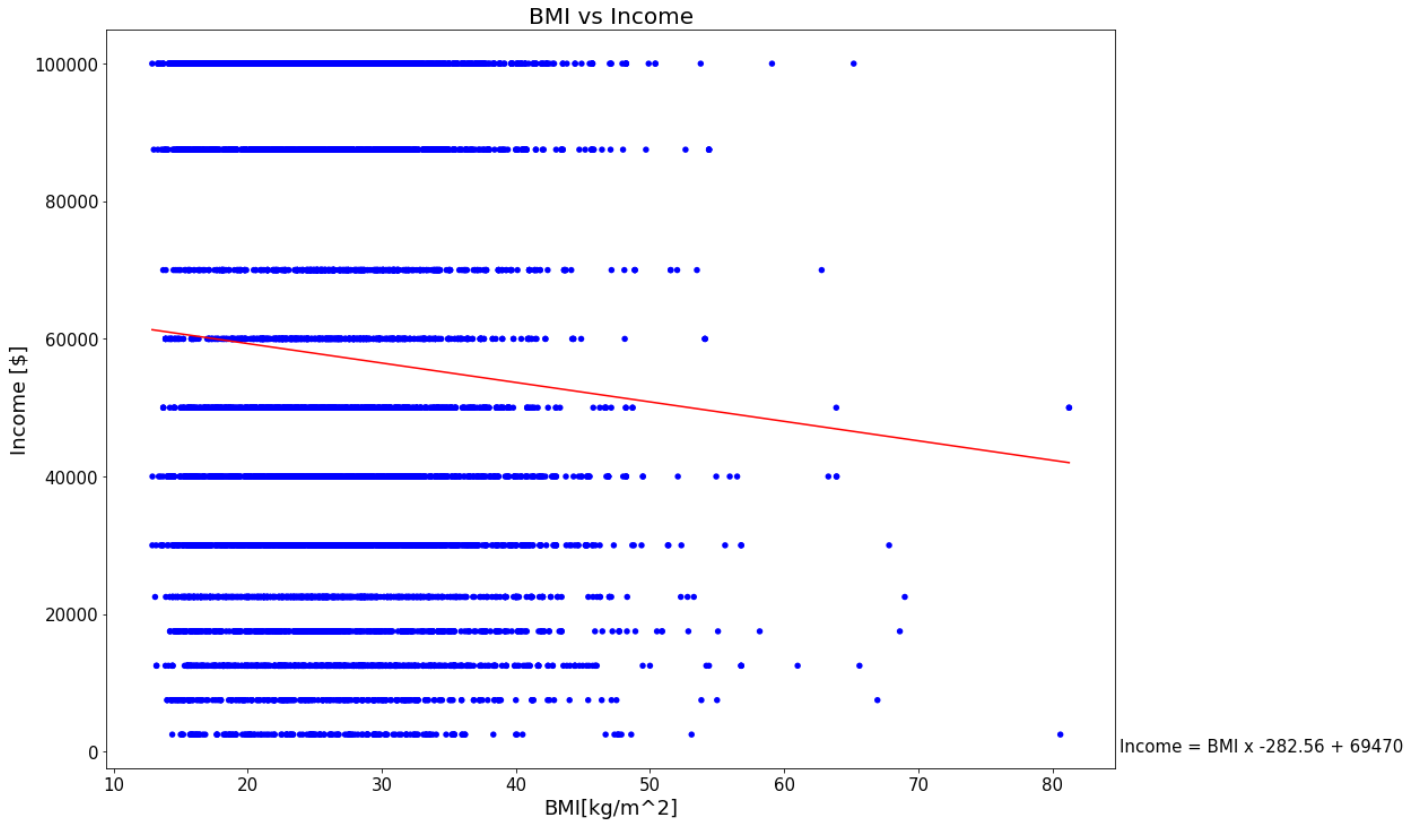
H_O: A higher BMI does not reduce income.
H_A: A higher BMI does reduce income.

Linear regression

Dep. Variable:	HHIncomeMid	**R-squared:**	0.004
Model:	OLS	**Adj. R-squared:**	0.004
Method:	Least Squares	**F-statistic:**	35.89
Date:	Wed, 23 Dec 2020	**Prob (F-statistic):**	2.17e-09
Time:	05:41:20	**Log-Likelihood:**	-1.0464e+05
No. Observations:	8852	**AIC:**	2.093e+05
Df Residuals:	8850	**BIC:**	2.093e+05
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
const	6.497e+04	1306.712	49.719	0.000	6.24e+04	6.75e+04
x1	-282.5644	47.169	-5.990	0.000	-375.026	-190.102

Omnibus:	59984.257	**Durbin-Watson:**	1.335
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	794.376
Skew:	0.019	**Prob(JB):**	3.19e-173
Kurtosis:	1.533	**Cond. No.**	104.

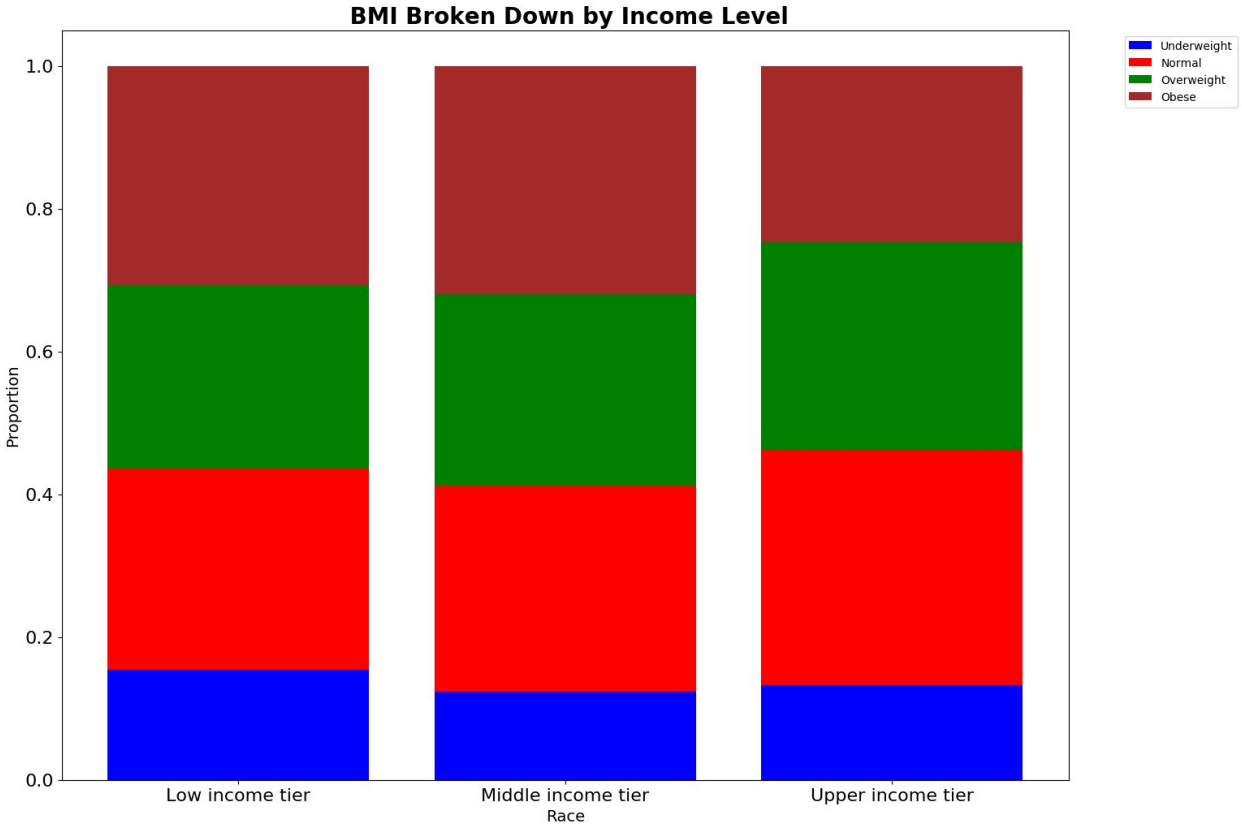


A simple linear regression was calculated to predict income based on BMI. A significant regression was found (f(1,8850)= 35.89, p <.0001), with R^2 of 0.004. Subjects' predicted income is equal to 69470 - 282.56 [BMI] dollars when BMI is measured in kg/m^2. Income is decreased by -282.56 (95% CI = -375.026, -190.102]) dollars for each kg/m^2 of BMI. The model is significant but cannot account for much of the variability as the p-value is lower than 0.05 but R-squared is lower than 50%.

Test 4

H_O: BMI is not associated with income

H_A: BMI is associated with income.



Income Levels BMI Levels	Low income tier	Middle income tier	Upper income tier
Underweight	314	447	424
Normal	572	1046	1055
Overweight	521	970	931
Obese	623	1160	789

A chi-square test of independence was performed to examine the relation between BMI and income. The relation between these variables was significant, X^2 (6, N = 8852) = 62.81, p = 1.2E-11. Of all income tiers, middle income had the highest proportion of obese individuals. The largest diffrence in the proportion of obese individuals was between the middle income tier and the high income tier with a value of 0.109 (95% CI = [0.087, 0.131]). By contrast, the smallest

difference in the proportion of obese individuals was between the low income tier and the middle income tier with a value of 0.049 (95% CI = [0.023, 0.075]).

Test 5
BMI and insurance payments

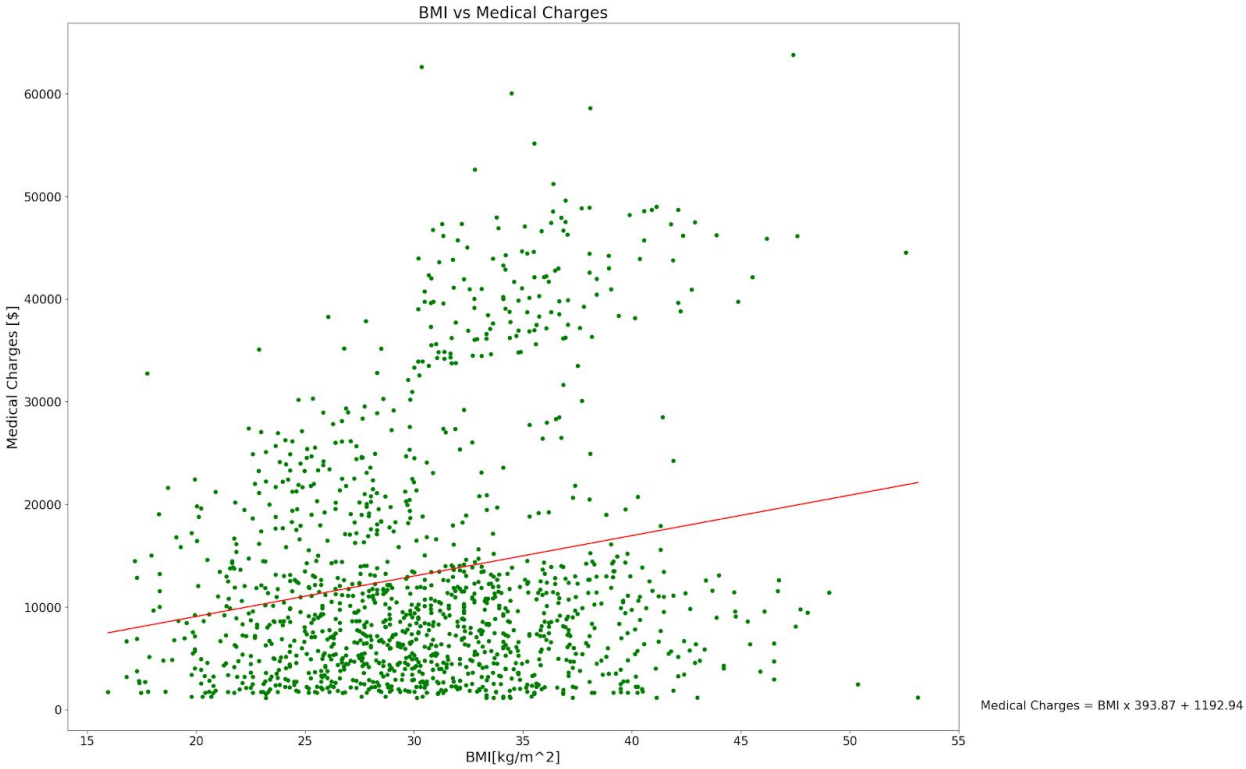
H_O: A higher BMI does not lead to more insurance payments
H_A: A higher BMI does lead to higher insurance payments.

A moderate significant relation was found between BMI and medical charges, r(1336) = .2, p = 2.5E-13.

Dep. Variable:	charges	**R-squared:**	0.039
Model:	OLS	**Adj. R-squared:**	0.039
Method:	Least Squares	**F-statistic:**	54.71
Date:	Wed, 23 Dec 2020	**Prob (F-statistic):**	2.46e-13
Time:	11:00:12	**Log-Likelihood:**	-14451.
No. Observations:	1338	**AIC:**	2.891e+04
Df Residuals:	1336	**BIC:**	2.892e+04
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	1192.9372	1664.802	0.717	0.474	-2072.974	4458.849
bmi	393.8730	53.251	7.397	0.000	289.409	498.337

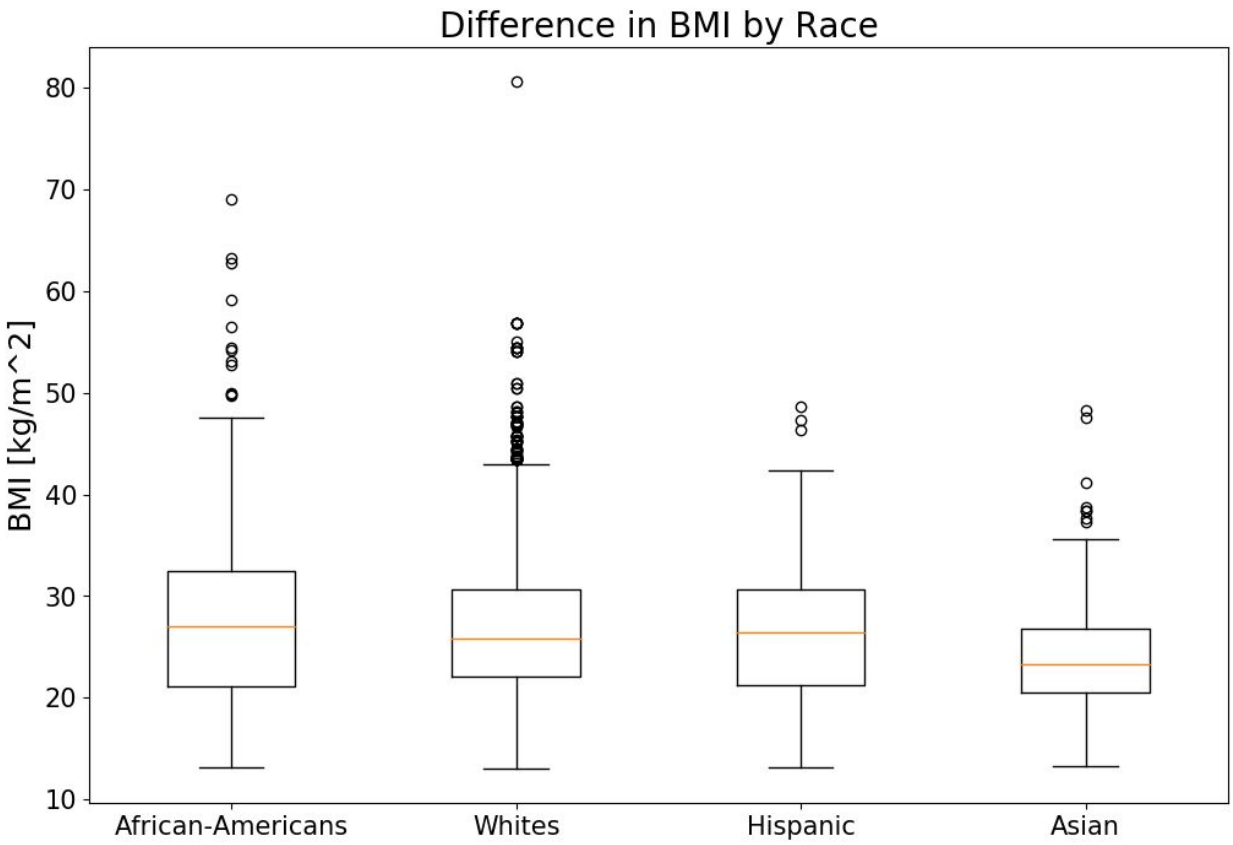
Omnibus:	261.030	**Durbin-Watson:**	1.983
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	431.091
Skew:	1.297	**Prob(JB):**	2.45e-94
Kurtosis:	4.004	**Cond. No.**	160.



Linear Regression

A moderate significant relation was found between BMI and medical charges, r(1336) = .2, p = 2.5E-13. Furthermore, A simple linear regression was calculated to predict income based on BMI. A significant regression was found (F(1,1336)= 54.71, p <.0001), with R^2 of .039. Subjects' predicted medical charges are equal to 393.87 [BMI] + 1192.94 dollars when BMI is measured in kg/m^2. The medical charges are increased by 393.87 (95% CI = 289.41, 498.34]) dollars for each kg/m^2 of BMI. The model is significant but cannot account for much of the variability as the p-value is lower than .001 but R-squared is lower than 50%.

Test 6
BMI



H_O: $M_{Black} - M_{White} = 0$
H_A: $M_{Black} - M_{White} \neq 0$

H_O: $M_{Black} - M_{Hispanic} = 0$
H_A: $M_{Black} - M_{Hispanic} \neq 0$

H_O: $M_{Black} - M_{Asian} = 0$
H_A: $M_{Black} - M_{Asian} \neq 0$

Paired t-test

The BMI of African-Americas,Asians,Hispanics, and Whites was compared. African-Americans (M = 27.75, SD = 8.87) had a higher BMI than whites (M = 26.63, SD = 7.07), as there was a statistically significant difference of 1.2 (95% CI = [0.3, 1.94]); t(3380) = 2.98, p = .008. African-Americans (M = 27.75, SD = 8.87) also had a higher BMI than Hispanics (M = 26.1, SD

= 6.79), as there was a statistically significant difference of 1.65 (95% CI = [0.55, 12.74]); t(804) = 2.98, p = .003. Lastly, African-Americans (M = 27.75, SD = 8.87) had a higher BMI than Asians (M = 23.67, SD = 5.76), as there was a statistically significant difference of 4.07 (95% CI = [3.01, 5.14]); t(732) = 7.46 , p = 2.8E-13.

Test 8
Income and Race

H_O: Race is not associated with income
H_A: Races is associated with income

The Income of African-Americas, Asians,Hispanics, and Whites was compared.

African-Americans (M = 41920.36, SD = 31175.28) had lower incomes than whites (M = 63332.18, SD = 33027.76), as there was a statistically significant difference of $21411.82 (95% CI = [18417.93, 24405.70]); t(3380) = 14.01, p = .1.8E-39. Likewise, African-Americans (M = 41920.36, SD = 31175.28) had a lower income than Asians (M = 65094.54, SD = 32913.49), as there was a statistically significant difference of 23174.17(95% CI = [18181.72, 28166.63]); t(732) = 9.08, p = .3.5E-18. Lastly, African-Americans (M = 41920.36, SD = 31175.28) did not have a significant income difference when compared with Hispanics (M = 44629.03 , SD = 30504.51). Although the difference was of 2708.67(95% CI = [-1650.97, 7068.31]), the p-value was over the significance level of 0.05; t(804) = 1.22, p =0.22.

Test 9

BMI and Blood Pressure

H_O: BMI is not associated with a higher blood pressure
H_A: BMI is associated with a higher blood pressure.

BMI Levels	Normal	Obese	Overweight	Underweight
Blood Pressure Classification				
Healthy	1064	941	991	74
Elevated	264	426	358	7
Stage 1 Hypertension	285	586	417	10
Stage 2 Hypertension	209	365	318	4
Hypertensive crisis	16	14	5	2

A chi-square test of independence was performed to examine the relation between BMI and blood pressure. The relation between these variables was significant, X^2 (6, N = 8852) = 62.81, p = 2.1E-32. Of all BMI levels, obese had the highest proportion of individuals with stage 2 hypertensions. The largest difference in the proportion of stage 2 hypertension was between obese income tier and underweight with a value of 0.12 (95% CI = [0.07, 0.16]). By contrast, the smallest difference in the proportion of individuals with stage 2 hypertension was between obese and overweight with a value of 0.004 (95% CI = [-0.017, 0.026]).