Bone mineral density (BMD) data results:

This data set contains the hip BMD, age, sex, and diabetes status of 50 people. The aim of this project is to observe the variation in hip BMD with age and find out if gender or diabetes status affects this association. The hip BMD (mean ± SD) of the participants based of gender and diabetes status is provided below.

Gender		Diabetes Status	
Female	Male	Non-diabetic	Diabetic
0.878 ± 0.165	0.911 ± 0.153	0.890 ± 0.174	0.898 ± 0.146

Exploratory data analysis shows that the hip BMD decreases with age. The decrease is observable even when the data is stratified by gender and diabetes status.
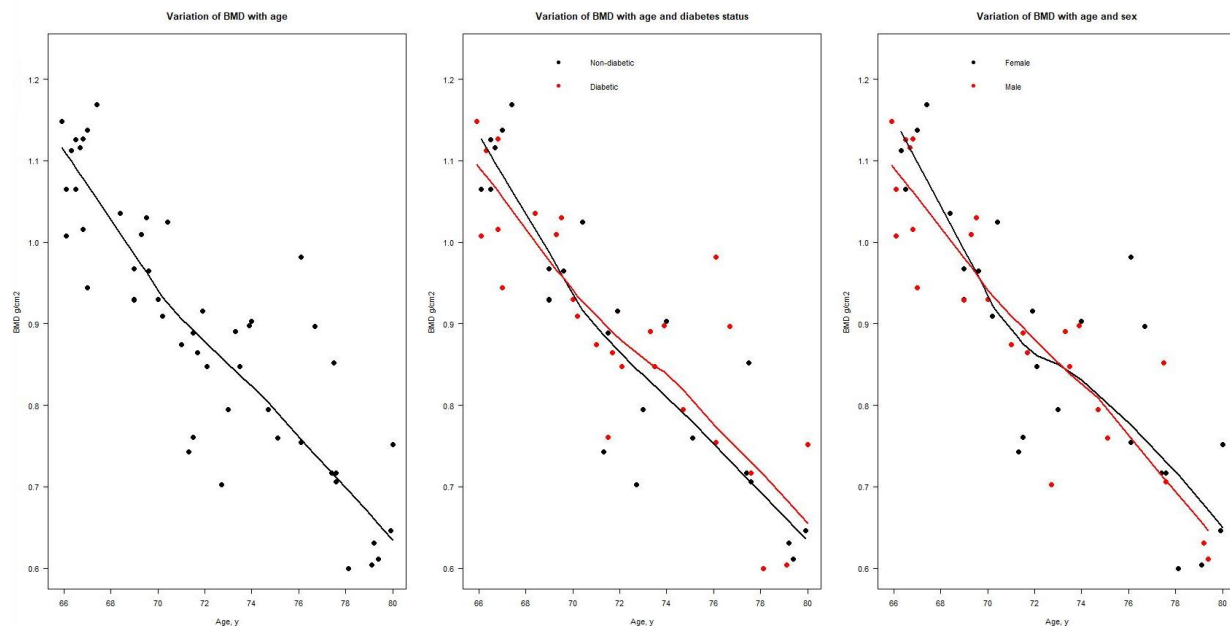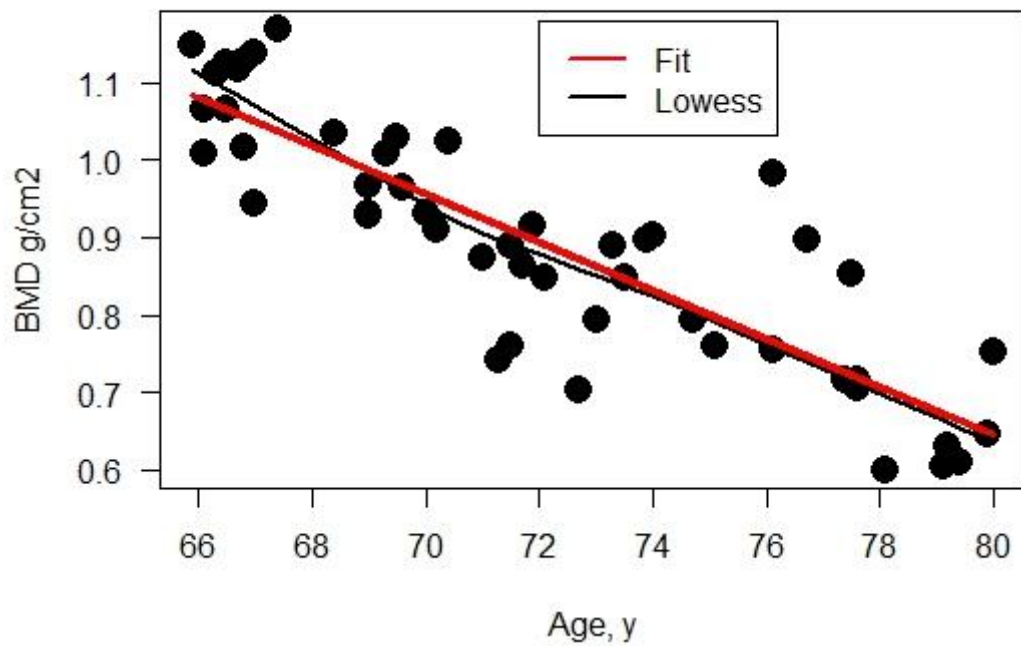

Next, I tried to model the variation of hip BMD with age. Linear regression model supports our earlier conclusion of a decrease in hip BMD with age. The hip BMD of a person 60 years old is 1.268 g/cm^2 and for every unit increase in age, the hip BMD decreases by 0.031 g/cm^2 (95% CI 0.026 - 0.036). This is Model 1.

Multiple linear regression model controlling for diabetes status (Model 2) and additional comparison with Model 1 using ANOVA shows that diabetes status does not significantly alter the decrease of hip BMD with age. Similarly, controlling for age (Model 3) and comparison with Model 1 shows that gender dose not significantly alter the decrease in hip BMD with age.

After this analysis, I conclude that in this data set, hip BMD decreases with age and gender and diabetes status does not affect this association. (The residual plot without any trend, supports this conclusion.)

Variation of BMD with age

Plot of residual