**Analysis and Conclusion:**

Heat map 22: A positive correlation between selenium and triglycerides could suggest a possible relationship between selenium intake and lipid metabolism. Similarly, the correlation between cadmium and triglycerides could indicate a potential link between cadmium exposure and lipid metabolism.

The correlations between lead and LDL-cholesterol, selenium and LDL-cholesterol, and Mercury and LDL-cholesterol suggest a potential association between these variables, but further research would be needed to investigate the nature of this relationship.

However, the numbers as well as the plot scatter indicate that overall, the correlation are insignificant. So, no predictive power is expected from the existing variables. The most correlated variable is Cadmium, with a correlation of 0.5 to triglycerides.

To measure the regression lines’ performance, a test dataset could be used to calculate the errors and select the best variable based on the regression model.

Table 26: Exposure to, lead and cadmium is associated with an increased risk of cardiovascular disease and coronary heart disease, as we can see they can increase amount of LDL and triglycerides directly. selenium is not associated with cardiovascular risk.

These findings reinforce the importance of environmental toxic metals in cardiovascular risk, beyond the roles of conventional behavioural risk factors (BMJ 2018;362:k3310).

Cadmium Box plot (28):

The data set for cadmium concentration in blood showed that the first quartile was 0.15 ug/L, representing the 25th percentile, while the third quartile was 0.53 ug/L, representing the 75th percentile. The interquartile range (IQR) was calculated as 0.38 ug/L, which is the difference between the third and first quartiles. Based on the lower and upper boundaries for outliers, which were -0.42 and 1.1 ug/L, respectively, there were no lower outliers, but 126 upper outliers were identified, which fell above the upper boundary for outliers.

After analyzing the chosen biomarkers in the dataset, no meaningful correlations were found with the blood metal concentrations. As a result, we are including new heart biomarkers in the dataset, which are reported in the literature to be related to the consumption of heavy metals. By doing so, we hope to gain a better understanding of the possible effects of heavy metal exposure on heart health.

To come up with more predictive variables we added a number of additional factors, including blood pressure and glycohemoglobin Looking at the correlation heat map and the plots it can be observed that there is a slightly higher correlation between lead and blood pressure. This suggests that blood pressure may be a more predictive variable for lead levels than glycohemoglobin.

In conclusion, toxic heavy metals like mercury, lead, and cadmium are detrimental to our health and increase the risk of heart disease by raising levels of LDL cholesterol. Conversely, essential minerals like selenium and manganese have been shown to be beneficial for heart health by promoting higher levels of HDL cholesterol. Additionally, incorporating predictive variables such as C-reactive protein (CRP) into our analysis can provide valuable insights into an individual's risk of developing heart disease by indicating the presence of inflammation. By understanding these factors and incorporating them into our health assessment, we can take proactive steps to minimize our risk of heart disease and lead a healthier life.