



## Lead Toxicity Prediction in Maternal Blood Sample using ML Techniques

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9. <b>Abstract text</b> <u>300 words maximum; up to 3 keywords at the end.</u>	

Please structure using these headers: **Background; Objectives; Methods; Results; Conclusions.**

**Background:** Lead, an environmental toxicant, accounts for 0.6% of the global burden of disease, with the highest burden in developing countries. Lead poisoning is very much preventable with adequate and timely action. Therefore, it is important to identify factors that contribute to maternal BLL and minimise them to reduce the transfer to the foetus. Literacy and awareness related to its impact are low and the clinical establishment for biological monitoring of Blood Lead Level (BLL) is low, costly, and time-consuming. A significant contribution to an infant's BLL load is caused by maternal lead transfer during pregnancy. This acts as the first pathway to the infant's lead exposure. The social and demographic information that includes lifestyle and environmental factors are key to maternal lead exposure.

**Results:** We propose a novel approach to build a computational model framework that can predict lead toxicity levels in maternal blood using a set of sociodemographic features. To illustrate our proposed approach, maternal data comprising socio-demographic features and blood samples from the pregnant woman is collected, analysed, and modelled. The computational model is built that learns from the maternal data and then predicts lead level in a pregnant woman using a set of questionnaires that relate to the maternal's social and demographic information as the first point of testing. The range of features identified in the built models can estimate the underlying function and provide an understanding of the toxicity level. Following feature selection methods, the 11-feature set obtained from the Boruta algorithm gave better prediction results ( $kNN = 76.84\%$ ,  $DT = 74.70\%$ , and  $NN = 73.99\%$ ).

**Conclusion:** The built prediction model can be beneficial in improving the point of care and hence reducing the cost and the risk involved. It is envisaged that in future, the proposed app will become a part of a screening process to assist healthcare experts at the point of evaluating the lead toxicity level in pregnant women. Women screened positive could be given a range of facilities including preliminary counselling to being referred to the health centre for further diagnosis. Steps could be taken to reduce maternal lead exposure; hence, it could also be possible to mitigate the infant's lead exposure by reducing transfer from the pregnant woman.

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