

Poster Title: Chemical Composition of Clay Soil Analysis and Potential Health Risks: Experimental Study in Tshwane District, Gauteng Province.



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Abstract

- The practise of geophagy is common amongst women of childbearing age from different geographic locations including SA.
- An experimental study was conducted at the laboratory to examine the chemical composition of clay soil ingested by geophagic women of childbearing age..
- The concentrations of vanadium, manganese, chromium, and barium were detected in quantities exceeding 100 mg/kg in almost all samples. Cadmium, mercury and silver were detected in low concentrations below 1 mg/kg in all samples.
- Potential health risks such as iron deficiency anaemia, constipation, shortness of breath, maternal and childhood mortalities and morbidities, neurological and central nervous system disorder appendicitis, cancers, teratogenic risks, ulcers and death were associated with geophagy.

Introduction

- Geophagy (soil addiction) refers to the continuous craving and consumption of earth materials such as rocks, chalk, kaolin, clay, dirt, clay soil, sediments, sand and soft stones, particularly by women of childbearing age.
- The characteristics of the clay soils that are often consumed by women of childbearing age are known to differ according to texture, colour, smell, taste, particle size, electrical conductivity, water content, mineralogy and chemical composition, and pH.
- This study aimed to examine the chemical composition of clay soil analysis and potential health risks in Tshwane District, Gauteng Province, South Africa.
- Women childbearing age practise geophagy regardless of their social and economic status such as their level of education, race, marital status, income or occupation.

References

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- Nakiyemba, O., et al., Covariates of Pica among Pregnant Women Attending Antenatal Care at Kawempe Hospital, Kampala, Uganda: A Cross-Sectional Study. The American Journal of Tropical Medicine and Hygiene, 2021. 105(4): p. 909-914.
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Methods

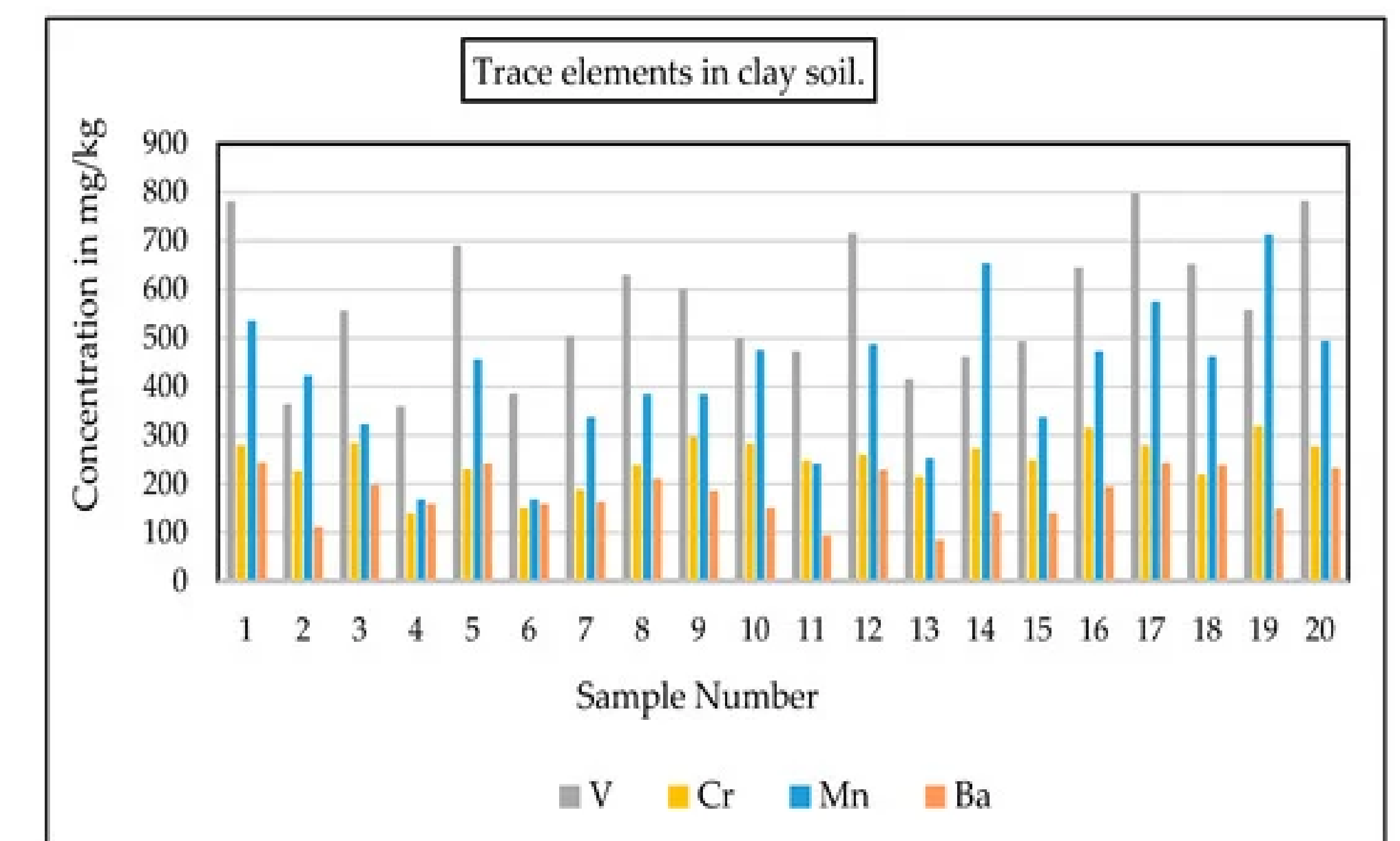
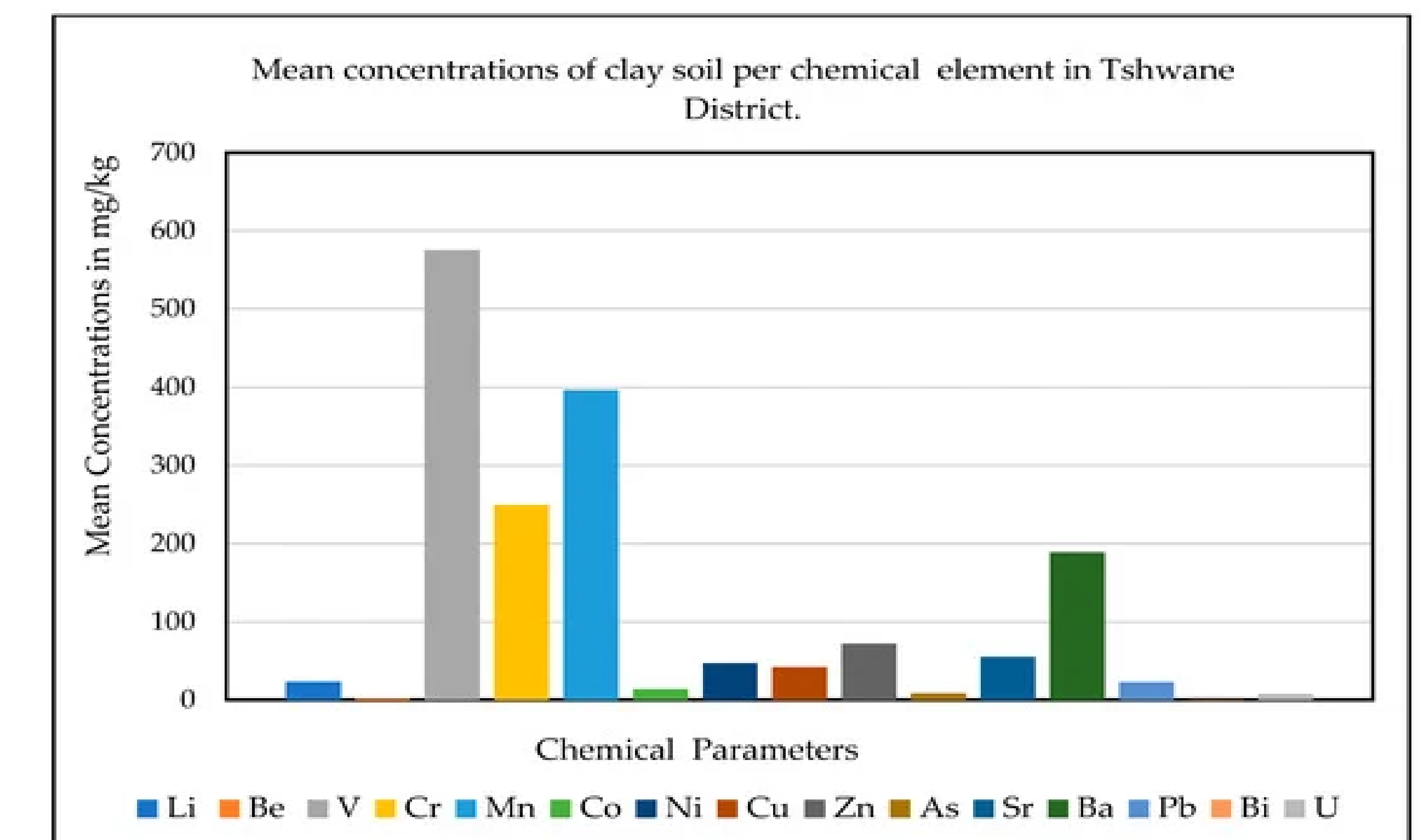
- An experimental study was conducted at the laboratory to examine the chemical composition of clay soil ingested by geophagic women of childbearing age.
- The 39 clay soil samples were collected from participants attending antenatal care services and family planning in the four settings in Tshwane District in Gauteng Province and were subjected to geochemical analysis at University of Johannesburg Biochemistry Laboratory.
- Simple random sampling was followed to include all soil samples collected from participants in the study.
- The ICP Mass Spectrometer instrument was used to measure the quantity and detect the chemical content of the clay soil samples collected from the participants in the study.
- The chemical composition tests were performed at the University of Johannesburg, Gauteng Province, whereby the step-by-step procedures stipulated by the ICP Mass Spectrometer manufacturer were followed to ensure the accuracy of the results.
- The analysed data for the clay soil samples gave good recoveries, which confirmed the accuracy of the results. The digestion process took place in 2023, followed by the analysis, and the extraction of data.



Results

- Thirty-nine clay soil samples were collected from study participants attending antenatal care services and family planning at public healthcare facilities of Tshwane District, Gauteng Province, and subjected to geochemical analysis.
- The concentrations of vanadium, manganese, chromium, and barium were detected in quantities exceeding 100 mg/kg in almost all samples. Cadmium, mercury and silver were detected in low concentrations below 1 mg/kg in all samples.
- The practice of geophagy amongst women of childbearing age has been reported to be associated with detrimental health outcomes and risks such as iron deficiency anaemia, constipation, shortness of breath, maternal and childhood mortalities and morbidities, neurological and central nervous system disorder, death, appendicitis, cancers, teratogenic risks, and ulcers.

Results



Conclusions

- The chemical composition of the clay soil eaten by women of childbearing age contains harmful substances.
- Amongst the chemical elements examined in clay soil, vanadium, manganese, chromium, and barium were recorded in high quantities.
- The lowest chemical concentrations were detected for silver, cadmium, and mercury in clay soil eaten by geophagic women of childbearing age in Tshwane District, Gauteng Province.
- The trace elements detected in clay soil had high concentrations, exceeding the recommended allowable levels, and this poses serious health risks.
- The practice of geophagy contributes to the incidence of maternal, neonatal, and child mortalities and morbidities due to the chemical composition and structure of the substances eaten.