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DISTRIBUTION, BIOACCESSIBILITY, AND HUMAN HEALTH IMPLICATIONS OF POTENTIALLY TOXIC ELEMENTS IN TOP SOILS THROUGH GOLD MINING IN THE OBUASI MUNICIPALITY OF GHANA

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INTRODUCTION

Gold mining accounts for about 20% of gross domestic product (GDP) in countries where gold is predominant. In Ghana, for example, 90% of mineral exports are attributed to gold mining, making gold the focal point of the mining and mineral industry, sustaining the livelihoods of more than 200,000 gold workers, and supporting around one million family members who depend on them.

Potential toxic elements emanating from extracted ores during gold processing present occupational and unintentional health hazards in communities, the general populace, and the environment.

These potentially toxic elements can enter humans through inhalation, skin contact, and/or ingestion and become available for adsorption into the bloodstream.

Gold extraction in Obuasi and surrounding areas dates back to the nineteenth century, with underground mining being the most common method used.

Detrimental effects associated with potentially toxic element pollution in soils and other environmental media around the Obuasi mine have been previously studied.

However, data on these metals' distribution and in-vitro bioaccessibility in the Obuasi Municipality is unavailable.

RESEARCH OBJECTIVES

1. Determine the concentrations of potentially toxic elements in the top soils of the Obuasi municipality.

2. Analyze the spatial distribution of potentially toxic metals within the study area.

3. Assess the potential human health risks from ingesting soil-borne contaminants

STUDY AREA

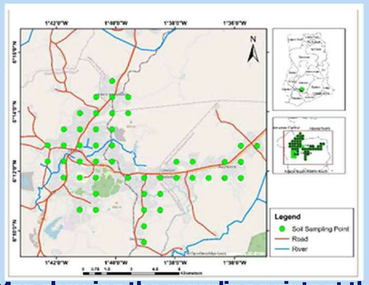

Fig 1: Map showing the sampling points at the study area

METHODOLOGY

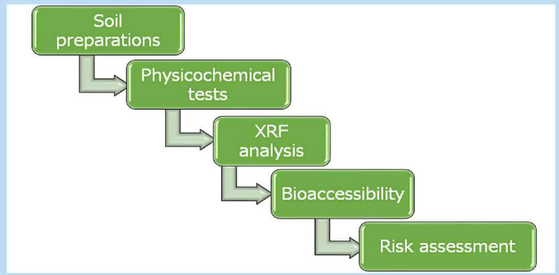

Fig. 2: Flow chat showing the methodology for this study

RESULTS

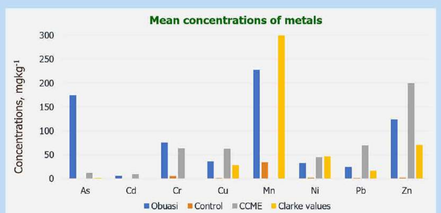

Fig. 3: Comparison of mean concentrations at Obuasi with control site, and international standards

RESULTS

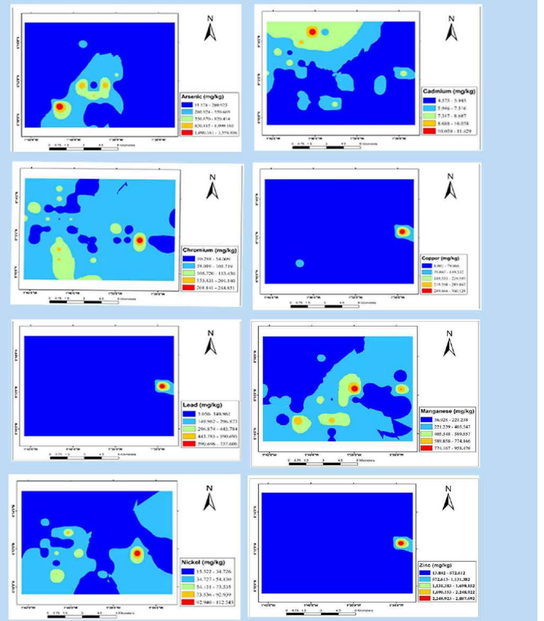

Fig. 4: Distribution pattern for the potentially toxic metals in Obuasi

RESULTS

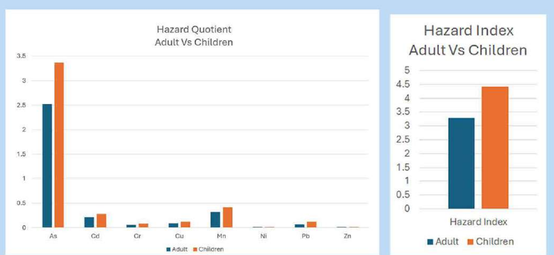

Fig. 5: Hazard indices for the pontetially toxic elements

CONCLUSION

1. Mean levels of all the potentially toxic elements far exceeded those recorded at the control site, indicating contamination of the topsoil in the study location

2. Higher concentrations of the elements were observed in the eastern corridor of the municipality where some illegal miners were spotted on site.

3. Risk indices and human health risk assessment results also suggest a high overall risk among children and adults within the municipality.

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