

Distribution and Health Risk Assessment of Heavy Metals in Blue Crabs (*Callinectes sapidus*) from the Escravos Estuary in Southern Nigeria

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1. RESEARCH BACKGROUND

The blue crab (*C. sapidus*) – invasive decapods and exhibit apparent sexual dimorphism (Zakzok *et al.*, 2022). They are commonly found in coastal waters in the Gulf of Guinea (Jerome *et al.*, 2017). However, they are declining due to overfishing, habitat destruction and pollution (Smith *et al.*, 2018).

Heavy metals are primary contributors to pollution in aquatic systems especially in industrial areas (Chen *et al.*, 2021). They can accumulate in the tissues of aquatic organisms (Elekima *et al.*, 2020).

Seafood and benthic organisms like blue crabs could provide insights on heavy metals distribution in coastal ecosystems.

Aim and Objectives

To evaluate the distribution of heavy metals in blue crabs from the Escravos estuary. The objectives of the study are to: 1) investigate the concentration of lead, mercury, arsenic, nickel, chromium and cadmium in blue crabs, 2) determine the distribution of the selected metals in the Escravos estuary and 3) evaluate the associated risk to human health

2. METHODOLOGY

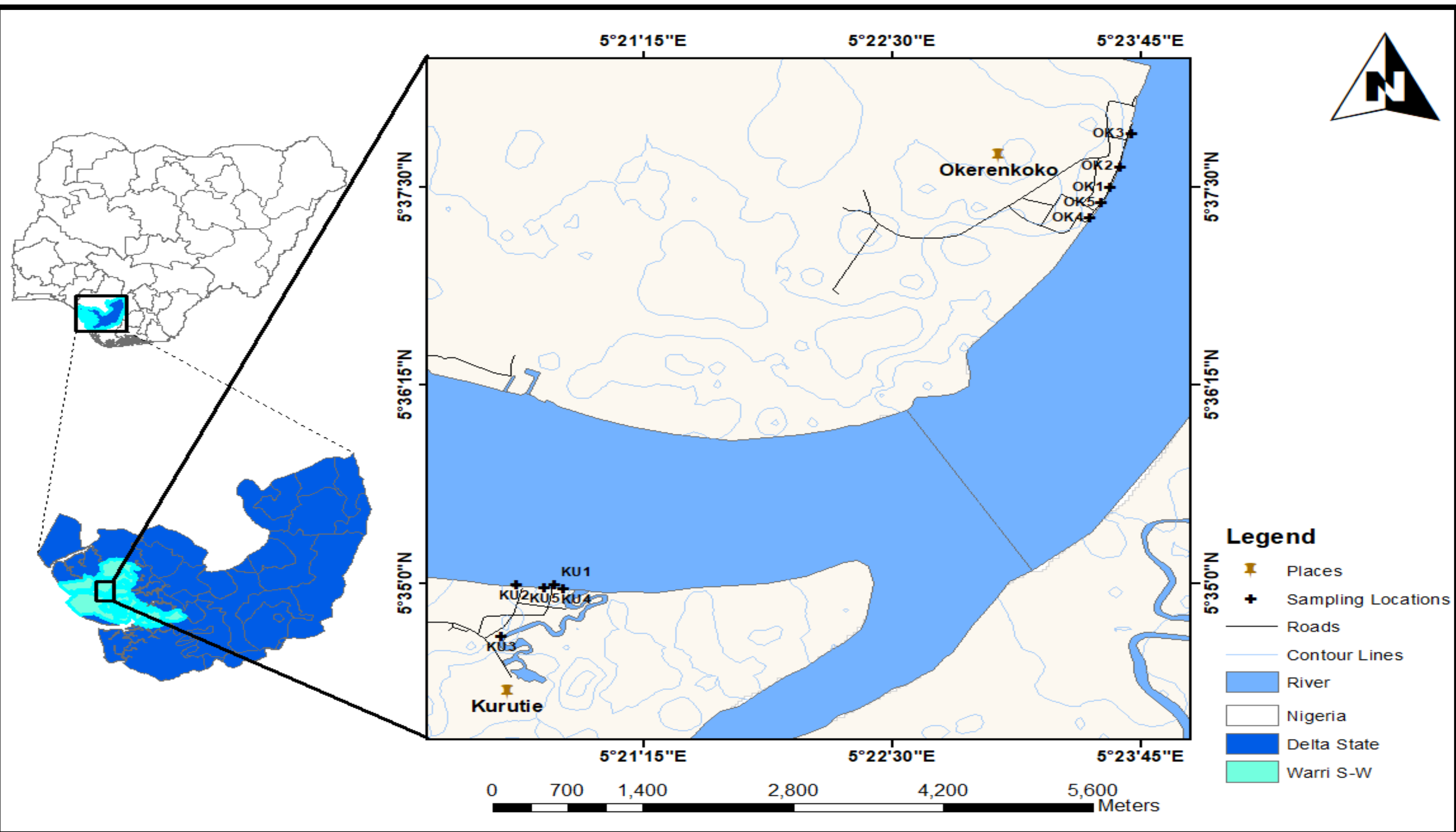
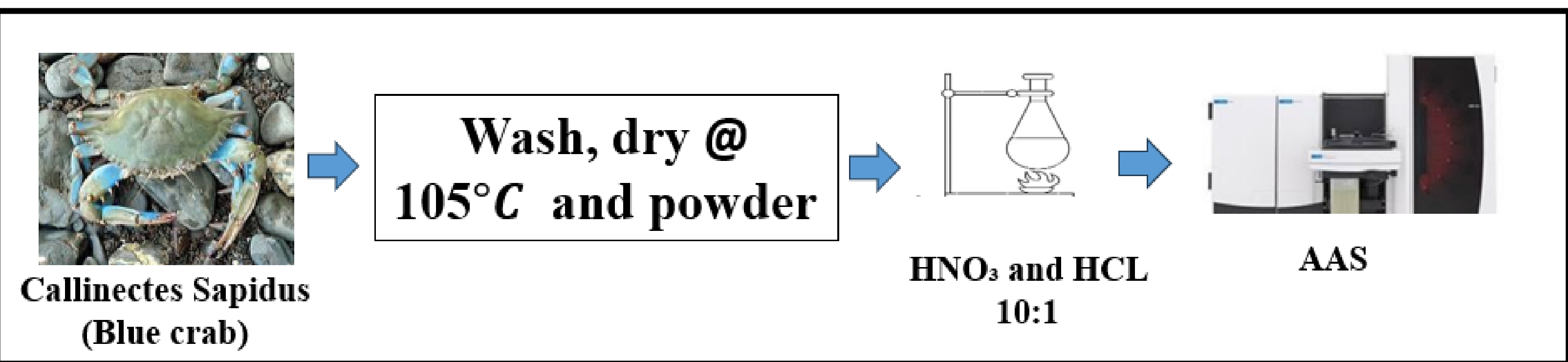


Fig. 1: Map of study area showing sampling sites along the Escravos Estuary.

Sample Extraction and Statistical Analysis



Data Analysis (SPSS v.23)

Summarise – mean and SD

ANOVA – differences in the mean

Human Health Risk Assessment

$$EDI = C \times FIR/BW \quad (1)$$

$$HR = EDI/RfD \quad (2)$$

3. RESULTS

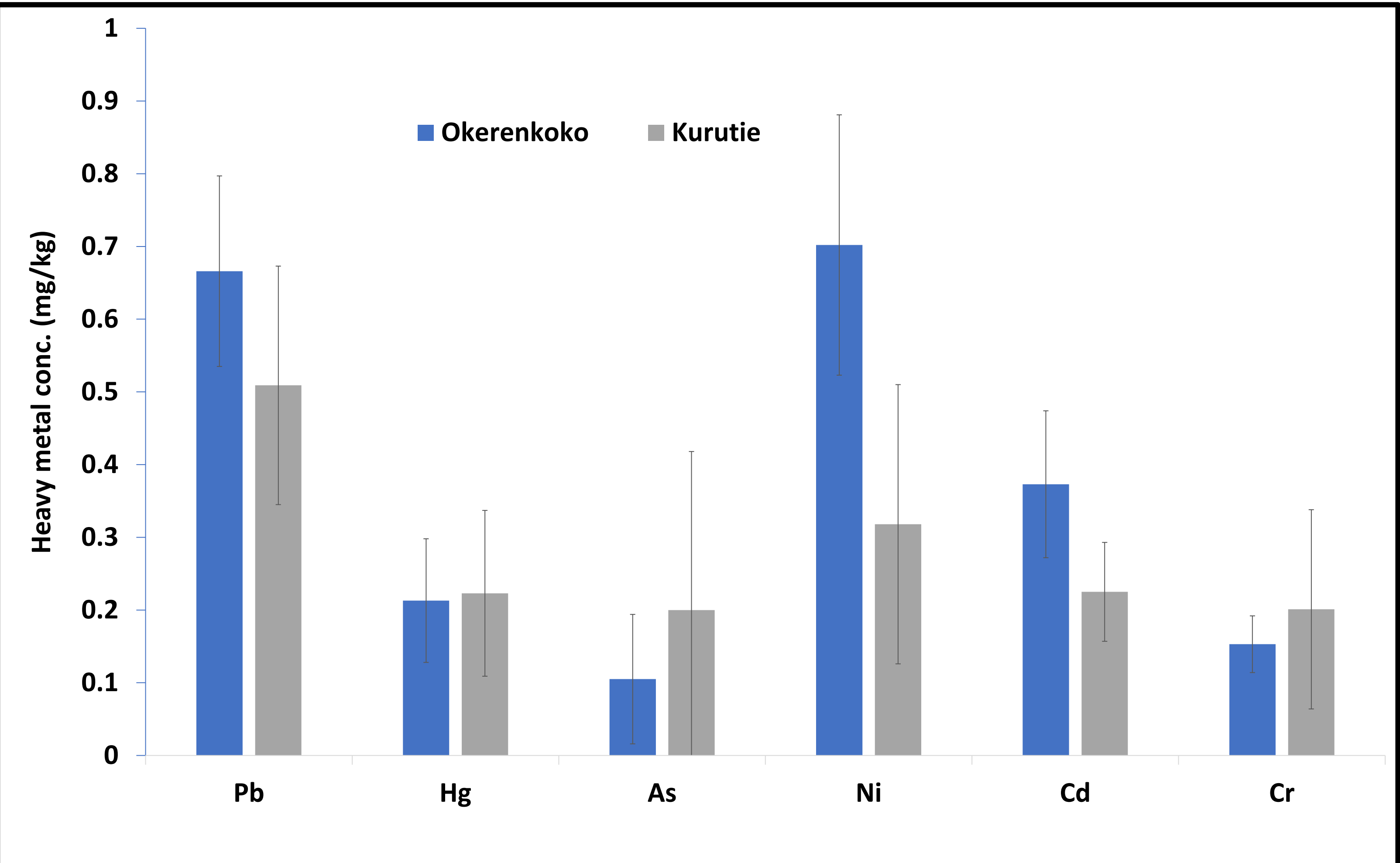


Fig. 2: Heavy metals concentration (mean ± SD in mg kg⁻¹) in blue crabs

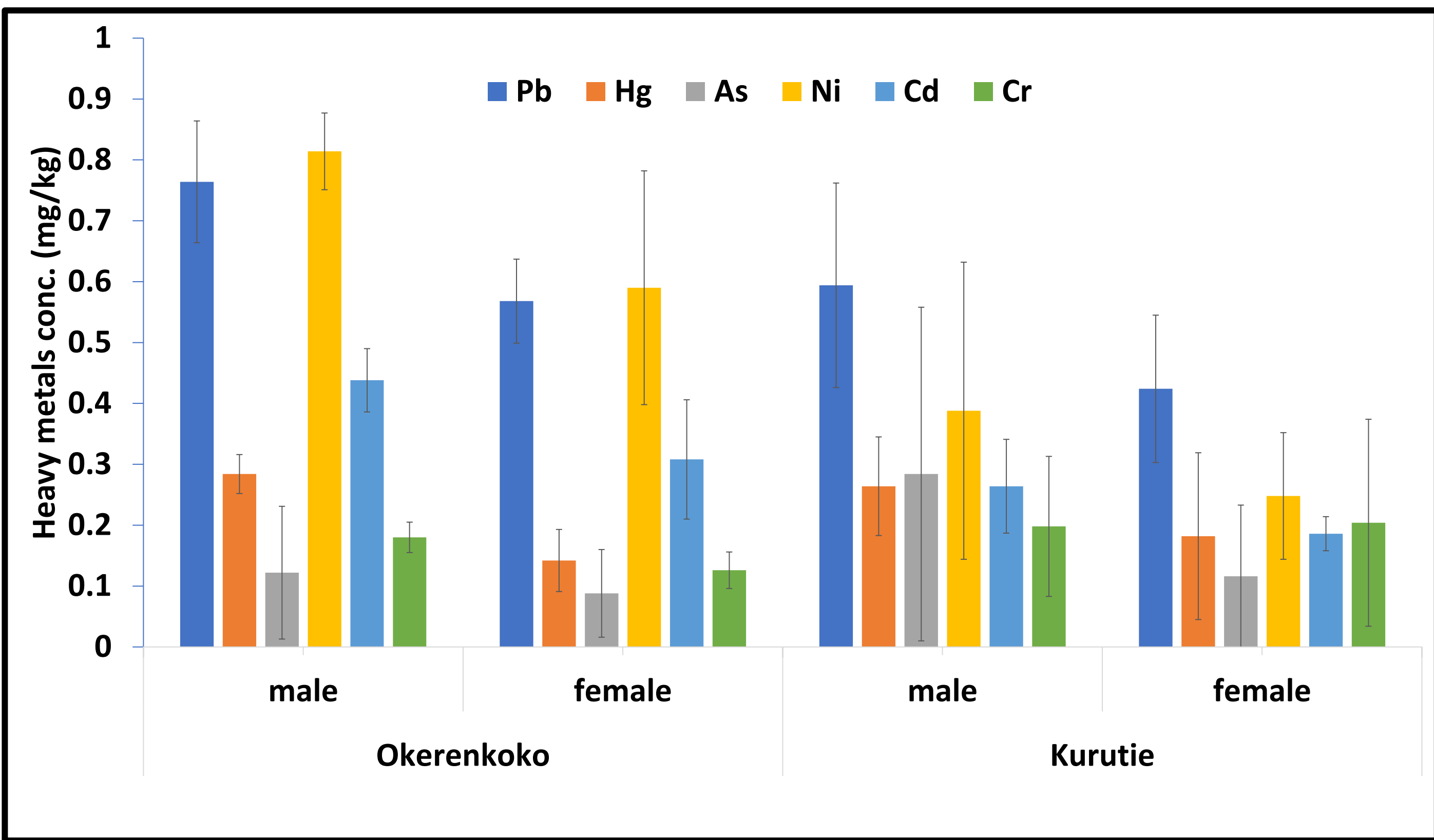


Fig. 3: Heavy metals concentration (mean ± SD) in relation to sex from the two sampling sites

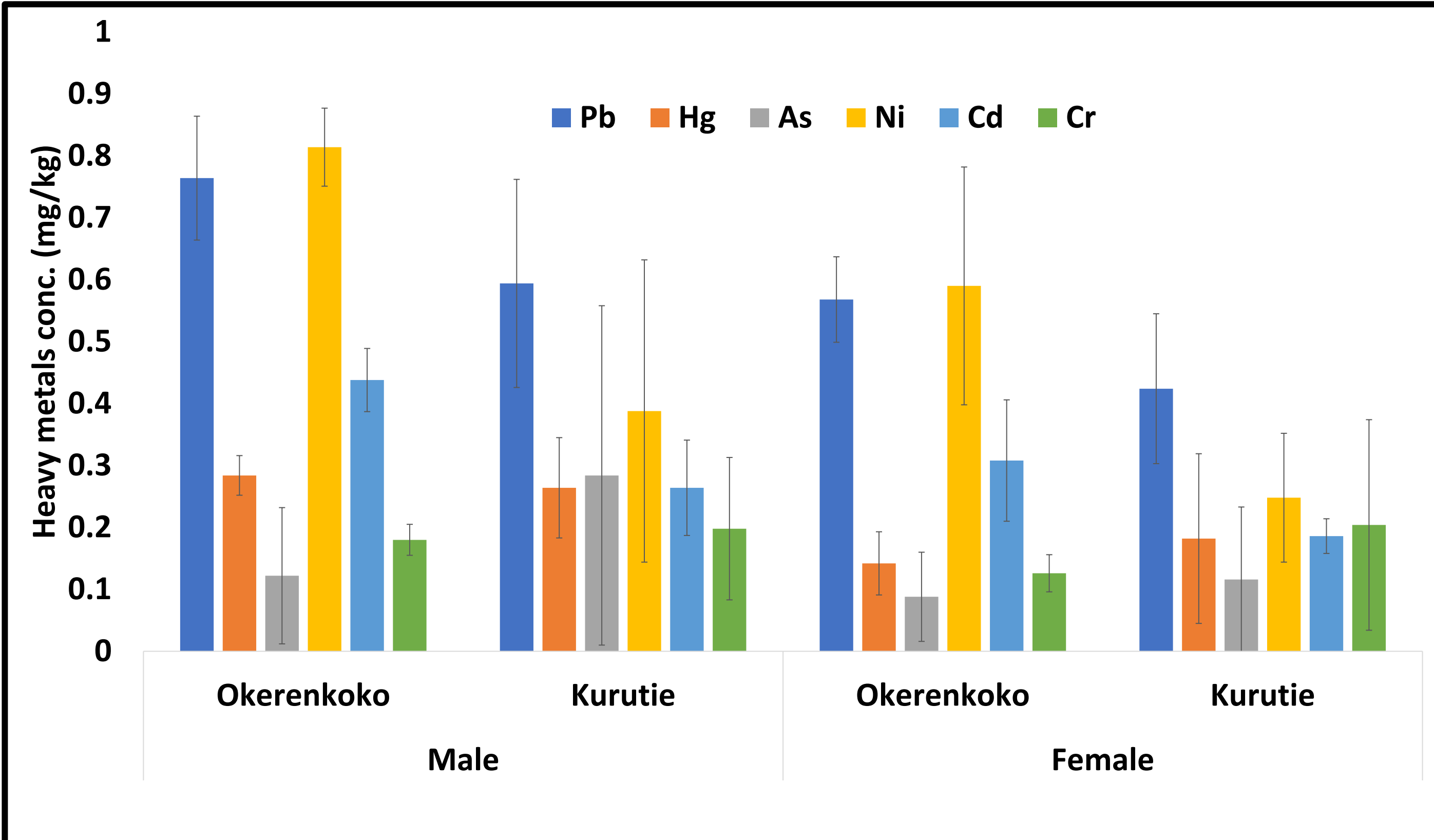


Fig. 4: Heavy metals concentration (mean ± SD) in male and female in relation to sites

Table 1: Summary result for human health risk assessment

Risk Indicator	Categories	Ni	Cd	Cr	Pb	Hg	As
EDI	Okerenkoko						
	Adults	7E-05	4E-05	2E-05	8E-05	2E-05	1E-05
	Children	2E-04	9E-05	4E-05	2E-04	5E-05	2E-05
	Kurutie						
	Adults	4E-05	5E-05	3E-05	6E-05	3E-05	2E-05
HR	Children	7E-05	5E-05	5E-05	1E-04	5E-05	5E-05
	Okerenkoko						
	Adults	0.007	0.042	0.006	0.214	0.080	0.040
	Children	0.015	0.085	0.012	0.043	0.160	0.080
	Kurutie						
RfD	Adults	0.004	0.052	0.008	0.016	0.083	0.073
	Children	0.007	0.051	0.020	0.034	0.170	0.150
RfD	USEPA, 2019	0.01	0.001	0.003	0.0035	0.0003	0.0003

4. CONCLUSION

Blue crabs are excellent bioindicators for marine contamination. The mean concentration revealed that nickel and cadmium were the most prevalent metals in blue crabs. Male crabs had higher metal levels compared to females. The hazard ratio (HR) of metals shows a high exposure of heavy metals in the estuary. The findings indicate significant contamination from human activities, with serious implications for both the local ecosystem and public health.

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