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# Assessment of Microplastics Found in Two Fish Species of *Clarias gariepinus* and *Oreochromis niloticus* From River Niger, Lokoja, Kogi State, Nigeria

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**ABSTRACT:** Recent studies show that microplastics are prevalent in various products, leading to environmental deposition, especially in riverine areas. The River Niger, crucial for fishing, farming, and transportation, serves as a vital resource in Nigeria. Hence, the objective of this paper was to assess microplastics found in two fish species of *Clarias gariepinus* and *Oreochromis niloticus* from River Niger Lokoja, Kogi State, Nigeria. Fish organs were analyzed after digestion with 10% KOH, followed by density flotation using NaCl and filtration. Microplastics were identified using Fourier Transformed Infrared (FTIR) spectroscopy and quantified with Openspecy. Statistical analysis was performed using SPSS, with significance evaluated by One-way ANOVA. Findings revealed 10 microplastic polymers: Polyethylene (PE), Polystyrene (PS), Polypropylene (PP), Low-Density Polyethylene (LDPE), Polyvinyl Chloride (PVC), Cellulose Acetate (C), Polyethylene Terephthalate (PET), Polyamides (PA), Polydienes (PD), and Other Plastics (OP). PS microplastics were most prevalent in gills 4.67 to 7.00 (MP/3 g) in *Oreochromis niloticus* and 5.67 to 7.00 (MP/3 g) in *Clarias gariepinus*), while cellulose acetate (C) dominated in intestines 5.33 to 6.00 (MP/3 g) in *Oreochromis niloticus* and 5.67 to 6.67 (MP/3 g) in *Clarias gariepinus*) and livers 6.00 to 6.67 (MP/3 g) in both species. These findings show significant long-term risks to the River Niger ecosystem, threatening aquatic life and communities reliant on these resources.

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**Key words:** Microplastics; *Oreochromis niloticus*; *Clarias gariepinus*; Water; Pollution

Plastics are synthetic or natural high molecular weight compounds known as polymers, extensively utilized across various industries since the 1950s due to their economic efficiency, adaptability, lightweight nature, strength, and durability. Over 6.3 billion tons of plastics have been produced globally, with

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approximately 9% recycled and about 12% incinerated for disposal (Lilis *et al*., 2024). Plastic waste decomposes slowly, with a 1 mm thick plate taking decades to a century to break down, depending on its chemical makeup and environment (Chamas *et al*., 2020). During decomposition, plastics fragment into smaller pieces, known as microplastics (MP) when they measure less than 5 mm. Particles less than 100 nm are referred to as "nanoplastics" (NP) (De Sá *et al*., 2018).

Microplastics arise as primary microplastics, intentionally manufactured for applications like cosmetics and cleaning agents, or as secondary microplastics, formed from the breakdown of larger plastic items (Hirt *et al*., 2020; Yee *et al*., 2021). Due to their small size, microplastics disperse rapidly through air and water, leading to their prevalence in various environments, including polar ice, deep-sea regions, and within organisms (Fackelmann and Sommer, 2019). Microplastics are emerging contaminants that have gained considerable attention due to their adverse impacts on ecosystems and living organisms (Mammo *et al*., 2020). They enter aquatic environments through various means, such as storm-water runoff and illegal dumping, and can be transported across different environmental compartments (Sutton *et al*., 2016; Wagner and Lambert, 2018). The surge in synthetic plastic production has resulted in an alarming increase in plastic waste in aquatic environments (Woodall *et al*., 2014). Freshwater ecosystems act as critical pathways for transferring microplastics from land to oceans (Mani *et al*., 2015; Luo *et al*., 2019). The concern regarding microplastics has intensified due to their widespread presence across environmental compartments (Bellasi *et al*., 2020). Their persistent nature allows for bioaccumulation and biomagnification in food webs, with smaller microplastics showing increased bioaccumulation potential (Frias *et al*., 2019; Tongo *et al*., 2022). Various organisms, from bivalves to mammals, may ingest microplastics as part of their diet (von Moos *et al*., 2012; Watts *et al*., 2014; Vikas *et al*., 2019). The Niger and Nile rivers, carry yearly loads of about 35,196 and 84,792 tons, respectively, they are two of the ten rivers in the world that are thought to be accountable for 90% of the plastic garbage that ends up in the oceans (Alabi *et al*., 2019). Fishing has been implicated as one of the major economic activities taking place in River Niger, Lokoja (Usman *et al*., 2019). Fish that live in aquatic environments have the potential to consume microplastics (Fred-Ahmadu, 2020). With the increasing industrial activities and population density in the Lokoja metropolis, and the fact that River Benue discharges its content into the river Niger at Lokoja, there is a tendency for higher microplastic pollution. Hence, the objective of this paper is to assess microplastics found in two fish species *Clarias gsssgariepinus* and *Oreochromis niloticus* from river Niger Lokoja, Kogi State, Nigeria.

## MATERIALS AND METHODS

*Sample Site***:** This study was conducted in River Niger, Lokoja the capital city of Kogi State. Lokoja is situated in the central region of Nigeria as indicated on the map represented in Figure 1. It lies on Longitude 6°44' East of the Greenwich meridian and Latitude 7°49' North of the Equator, and an altitude of 45-125 m, on the western bank of the Niger River. It is some 160 km south of the new federal capital Abuja and straddles the strategic roads to at least five geopolitical zones out of the six zones in the country. The terrain of the region comprises dissected undulation plains on the one hand, and lofty hill masses and mesas on the other hand. Lokoja, which lies on a plain element bordering the Niger River, is sandwiched between the Niger River and one of the main high plateau ridges, the mount Patti. The ridge, which is star-shaped, reaches an altitude of 400 m, and together with the Niger River, had streamlined the Lokoja town to a linear pattern. The annual rainfall is about 1150 mm. Rains begin, on average, in March and peak in June to September, while the dry season begins at about November. Every month has an average temperature close to 30$^{o}$C. The weather is perpetually damp due to the high sensible temperature promoted by high humidity. The Niger and its main tributaries are characterized by flash floods superimposed on perennial flow. The Niger floods at Lokoja begin in July, peaks in October, and finishes by December. The smaller streams on the other hand are characterized by flash flow superimposed on rainy season flow, or simply flash flow only during and for a short time after run-off-producing storms. The groundwater resources so far located in the area occur in a perched form, and that explains the high failure rate of wells and boreholes located intuitively. The population of Lokoja is estimated to be over 886,000. Lokoja is known for its many agricultural activities, particularly fishing because of the presence of river Niger in the area and other industrial activities such as mining, plastic productions and several other manufacturing companies. For the purpose of the study, samples were collected in three location which include; Ganaja, Adankolo, and Kabawa and are situated in Lokoja, Kogi Local Government Area, of Kogi Nigeria.

*Sample Collection:* According to F.A.O (2018) and Olaosebikan and Raji (2011), the most economically viable fish in the River Niger, Lokoja kogi state are *Oreochromis niloticus* and *Clarias gariepinus* and were collected for investigation. The fish were collected from the fish caught from the River Niger by local fishermen using sets of gill nets and hand nets (Connell *et al*., 2020). Fish sampling was done for four consecutive months, the onset of rainfall, March to June 2024. In each of the months, three fish were collected for each species. The fish were immediately fixed in 95 % alcohol and transported to the laboratory facilities at the Animal and Environmental Biology Department, Prince Abubakar Audu University (PAAU), Anyigba Kogi State. The organs; gill, liver and the intestines, dissected out and fixed in 95 % alcohol in a glass bottle (Lattin *et al*., 2004) until further asnalysis.

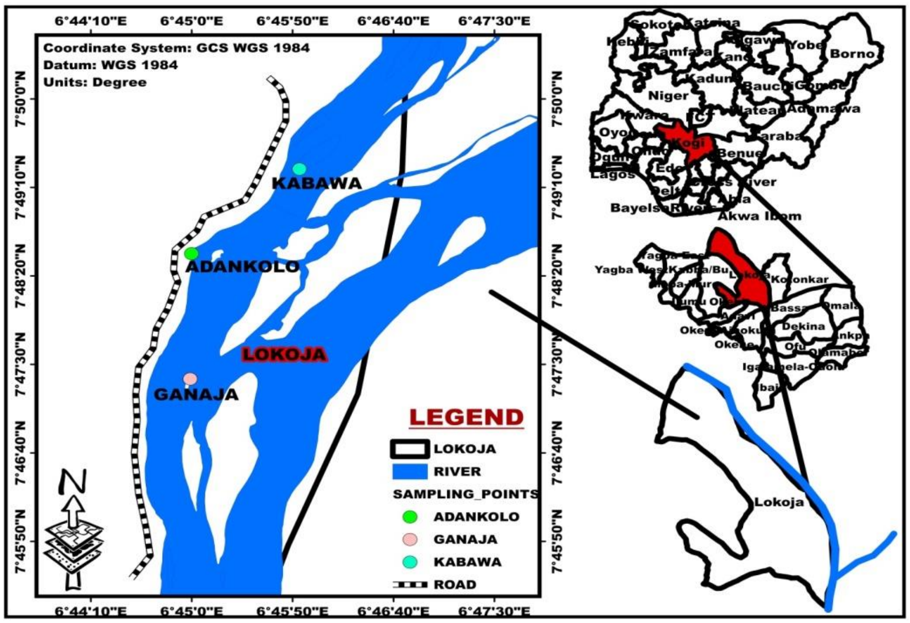


**Fig. 1:** Map of Lokoja, Kogi State, Nigeria**.**

*Digestion of Fish Samples and Extraction of Microplastics:* Fish organs were digested according to Foekema *et al*. (2013). Briefly, the organs; gill, liver and the intestines, were removed and placed in 100 mL beaker containing an appropriate volume of 10% KOH solution until the organs were completely submerged and placed in the incubator for 24hours at 60°C. After digestion, the sample was filtered with a 0.45 μm filter paper) using vacuum pump. Each membrane filter paper were labeled and placed in a petri dish, oven dried for 12hours before FTIR analysis.

*Microplastic Analysis Using Fourier Transform infrared Spectroscopy (FTIR):* A Fourier Transform Infrared Spectroscopy (FTIR) was used for chemical analysis of the microplastic. The incident laser was set to 532nm and the FTIR spectra were from 50 to 3500 $cm^{-1}$. The FTIR images of the sample were analyzed to identify and quantify the microplastic present, using their chemical properties, this analysis required the removal of materials other than the subject to be investigated. The method was optimized for microplastics identification and abundance in the fish samples; fish samples were determined and the concentration was expressed as a number of particles per gram tissues using FTIR analysis.

*Identification and Quantification of Microplastic Using Openspecy:* The identification and quantification of the microplastic were done using openspecy application. The image from the FTIR was uploaded to into the openspecy application and the microplastic with $R^2 \geq 0.05$ was considered as microplastic.

## RESULTS AND DISCUSSION

The comparison in microplastics concentration between the organs of *C. gariepinus* in River Niger, Lokoja is shown in Figure 1. Cellulose was significantly ($p < 0.05$) high in the liver while PP and PS were significantly high in the gills. There was also significant difference ($p < 0.05$) in microplastic composition with C and PS microplastics recorded the highest significant value, followed by PP and LDPE, PVC and PE and significantly lowest in PA, PD, OP and PET. The comparison in microplastics concentration between the organs of *O. niloticus* in River Niger, Lokoja is shown in Figure 2. Cellulose was significantly ($p < 0.05$) high in the liver while PP was significantly high in the gills and intestine of the catfish. There was also significant difference in microplastic composition with C and PS microplastics recorded the highest significant ($p < 0.05$) value, followed by PP and LDPE, PVC and PE and significantly lowest in PA, PD, OP and PET.

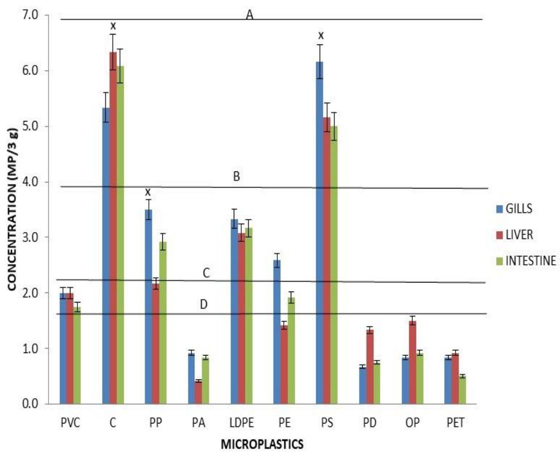


**Fig. 2**: Microplastics variation in the organs of *Clarias gariepinus* (MP/3.0g)

*Key: Polyethylene (PE), Polystyrene (PS), Polypropylene (PP), Low-Density Polyethylene (LDPE), Polyvinyl Chloride (PVC), Cellulose Acetate (C), Polyethylene Terephthalate (PET), Polyamides (PA), Polydienes (PD) and Other Plastics (OP)*

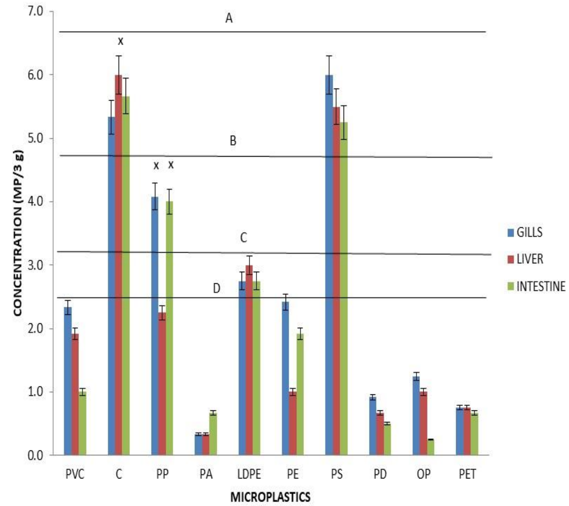


**Fig. 3:** Microplastics variation in the organs of *Oreochromis niloticus* (MP/3.0g)

*Key: Polyethylene (PE), Polystyrene (PS), Polypropylene (PP), Low-Density Polyethylene (LDPE), Polyvinyl Chloride (PVC), Cellulose Acetate (C), Polyethylene Terephthalate (PET), Polyamides (PA), Polydienes (PD) and Other Plastics (OP)*

**Table 1:** Monthly variation of Microplastics in Gills of *Oreochromis niloticus and Clarias gariepinus from* River Niger, Lokoja. Nigeria.

| MP | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|
| PVC **(MP/3 g)** | $2.67\pm1.53^{a}$ | $2.33\pm0.58^{a}$ | $1.67\pm1.53^{a}$ | $2.67\pm0.58^{a}$ |
| | $2.00\pm1.73^{a}$ | $2.33\pm0.58^{a}$ | $1.33\pm1.53^{a}$ | $2.33\pm0.58^{a}$ |
| C **(MP/3 g)** | $5.67\pm1.15^{a}$ | $5.00\pm0.00^{a}$ | $5.00\pm0.00^{a}$ | $5.67\pm0.58^{a}$ |
| | $5.33\pm0.58^{a}$ | $5.33\pm0.58^{a}$ | $5.33\pm0.58^{a}$ | $5.33\pm0.58^{a}$ |
| PP **(MP/3 g)** | $2.00\pm1.00^{a}$ | $4.33\pm2.52^{a}$ | $5.67\pm1.53^{a}$ | $4.33\pm2.08^{a}$ |
| | $3.00\pm1.00^{a}$ | $4.00\pm0.00^{a}$ | $4.00\pm2.00^{a}$ | $3.00\pm1.73^{a}$ |
| PA **(MP/3 g)** | $0.67\pm1.15^{a}$ | ND | ND | $0.67\pm0.58^{a}$ |
| | $0.33\pm0.58^{a}$ | $0.33\pm0.58^{a}$ | $2.67\pm0.58^{b}$ | $0.33\pm0.58^{a}$ |
| LDPE **(MP/3 g)** | $2.00\pm1.00^{a}$ | $3.00\pm2.00^{a}$ | $3.00\pm0.00^{a}$ | $3.00\pm0.00^{a}$ |
| | $3.00\pm0.00^{a}$ | $3.33\pm0.58^{a}$ | $3.67\pm1.15^{a}$ | $3.33\pm0.58^{a}$ |
| PE **(MP/3 g)** | $3.67\pm3.21^{a}$ | $3.67\pm2.52^{a}$ | $1.67\pm2.08^{a}$ | $0.67\pm0.58^{a}$ |
| | $2.33\pm1.53^{a}$ | $2.67\pm1.15^{a}$ | $2.00\pm1.00^{a}$ | $3.33\pm2.52^{a}$ |
| PS **(MP/3 g)** | $4.67\pm2.52^{a}$ | $6.33\pm1.15^{a}$ | $7.00\pm0.00^{a}$ | $6.00\pm1.73^{a}$ |
| | $7.00\pm2.00^{a}$ | $5.67\pm1.15^{a}$ | $6.00\pm1.00^{a}$ | $6.00\pm1.00^{a}$ |
| PD **(MP/3 g)** | $1.33\pm1.53^{a}$ | $1.67\pm1.53^{a}$ | ND | $0.67\pm1.15^{a}$ |
| | ND | $0.67\pm1.15^{a}$ | $0.67\pm1.15^{a}$ | $1.33\pm1.53^{a}$ |
| OP **(MP/3 g)** | $2.00\pm2.00^{a}$ | $2.33\pm2.08^{a}$ | ND | $0.67\pm1.15^{a}$ |
| | $0.67\pm1.15^{a}$ | $1.33\pm1.15^{a}$ | ND | $1.33\pm1.53^{a}$ |
| PET **(MP/3 g)** | $1.00\pm1.00^{a}$ | $1.33\pm1.15^{a}$ | $0.67\pm1.15^{a}$ | ND |
| | $0.33\pm0.58^{a}$ | $1.33\pm1.53^{a}$ | $0.67\pm1.15^{a}$ | $1.00\pm1.73^{a}$ |

*Value as mean ±SD. Different superscript in the same column indicate significant difference at $p< 0.05$*

***Key:*** *Polyethylene **(PE)**, Polystyrene **(PS)**, Polypropylene **(PP)**, Low-Density Polyethylene **(LDPE)**, Polyvinyl Chloride **(PVC)**, Cellulose Acetate **(C)**, Polyethylene Terephthalate **(PET)**, Polyamides **(PA)**, Polydienes **(PD)** and Other Plastics **(OP)**; **ND** = Not detected*

The monthly variation of microplastics in the Gills of *O. niloticus* and *C. gariepinus* in River Niger, Lokoja is shown in table 1. There was no significant difference ($p > 0.05$) in the microplastic concentration across the four months studied, except PA which was significantly high in May. The mean monthly variation of microplastics in the intestines of *O. niloticus* and *C. gariepinus* from River Niger, Lokoja, Kogi State is shown in Table 2. The result shows no significant difference ($p > 0.05$) in the microplastic concentration, except LDPE which was significantly high in March (3.67 MP/3 g). The level of PS shows consistent presence across the four months examined in *C.gariepinus*. The Mean monthly variation in microplastics concentration in the liver of *O.niloticus* and *C. gariepinus* from River Niger, Lokoja, Kogi State is shown in Table 3. The result shows no significant difference except cellulose which was significantly high in May and June in *Oreochromis niloticus*.

**Table 2:** Mean monthly variation in microplastics concentration in the intestine of *Oreochromis niloticus* and *Clarias gariepinus* (MP/3g) from River Niger Lokoja Kogi State.

| **MPs** | **MARCH** | **APRIL** | **MAY** | **JUNE** |
|---|---|---|---|---|
| PVC **(MP/3 g)** | 0.33±0.58$^{a}$ | 1.33±0.58$^{a}$ | 1.00±1.73$^{a}$ | 1.33±1.53$^{a}$ |
| | 2.67±0.58$^{a}$ | 1.67±1.15$^{a}$ | 1.00±1.00$^{a}$ | 1.67±1.15$^{a}$ |
| C **(MP/3 g)** | 5.33±0.58$^{a}$ | 6.00±1.00$^{a}$ | 5.67±1.15$^{a}$ | 5.67±0.58$^{a}$ |
| | 5.67±0.58$^{a}$ | 6.33±0.58$^{a}$ | 5.67±0.58$^{a}$ | 6.67±0.58$^{a}$ |
| PP **(MP/3 g)** | 2.67±1.53$^{a}$ | 4.33±1.15$^{a}$ | 4.67±1.53$^{a}$ | 4.33±2.31$^{a}$ |
| | 3.00±0.00$^{a}$ | 2.33±1.15$^{a}$ | 3.67±2.08$^{a}$ | 2.67±0.58$^{a}$ |
| PA **(MP/3 g)** | 0.67±1.15$^{a}$ | 0.67±0.58$^{a}$ | 0.67±1.15$^{a}$ | 0.67±0.58$^{a}$ |
| | 1.33±1.53$^{a}$ | 0.33±0.58$^{a}$ | 1.00±1.00$^{a}$ | 0.67±0.58$^{a}$ |
| LDPE **(MP/3 g)** | 2.00±1.73$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ |
| | 3.67±0.58$^{b}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ |
| PE **(MP/3 g)** | 2.00±1.00$^{a}$ | 1.67±0.58$^{a}$ | 2.33±1.53$^{a}$ | 1.67±0.58$^{a}$ |
| | 2.50±2.12$^{a}$ | 1.67±0.58$^{a}$ | 1.67±0.58$^{a}$ | 2.33±2.52$^{a}$ |
| PS **(MP/3 g)** | 4.33±3.06$^{a}$ | 5.33±0.58$^{a}$ | 5.67±1.15$^{a}$ | 5.67±1.15$^{a}$ |
| | 5.00±0.00$^{a}$ | 5.00±0.00$^{a}$ | 5.00±0.00$^{a}$ | 5.00±0.00$^{a}$ |
| PD **(MP/3 g)** | 0.00±0.00$^{a}$ | 0.33±0.58$^{a}$ | 0.67±1.15$^{a}$ | 1.00±1.00$^{a}$ |
| | 1.00±1.00$^{a}$ | 1.00±1.00$^{a}$ | 0.33±0.58$^{a}$ | 0.67±0.58$^{a}$ |
| OP **(MP/3 g)** | 0.33±0.58$^{a}$ | 0.33±0.58$^{a}$ | ND | 0.33±0.58$^{a}$ |
| | 1.67±1.53$^{a}$ | 0.33±0.58$^{a}$ | 0.67±1.15$^{a}$ | 1.00±1.00$^{a}$ |
| PET **(MP/3 g)** | 0.33±0.58$^{a}$ | 0.33±0.58a$^{a}$ | 1.00±1.00$^{a}$ | 1.00±1.00$^{a}$ |
| | 1.00±1.73$^{a}$ | ND | 0.33±0.58$^{a}$ | 0.67±1.15$^{a}$ |

*Value as mean ±SD. Different superscript in the same row indicate significant difference at p<0.05*
***Key:*** *Polyethylene **(PE)**, Polystyrene **(PS)**, Polypropylene **(PP)**, Low-Density Polyethylene **(LDPE)**, Polyvinyl Chloride **(PVC)**, Cellulose Acetate **(C)**, Polyethylene Terephthalate **(PET)**, Polyamides **(PA)**, Polydienes **(PD)** and Other Plastics **(OP) ; ND** = Not detected*

**Table 3**: monthly variation of microplastics in the liver of *oreochromis niloticus* and *clarias gariepinus* (mp/3g) from river niger lokoja kogi state, nigeria.

| MPs | **MARCH** | **APRIL** | **MAY** | **JUNE** |
|---|---|---|---|---|
| PVC **(MP/3 g)** | 2.00±2.00$^{a}$ | 2.33±1.15$^{a}$ | 2.33±1.15$^{a}$ | 1.00±1.00$^{a}$ |
| | 2.33±1.15$^{a}$ | 1.33±0.58$^{a}$ | 2.00±1.00$^{a}$ | 2.33±1.15$^{a}$ |
| C **(MP/3 g)** | 6.00±1.00$^{ab}$ | 5.00±0.00$^{a}$ | 6.33±0.58$^{b}$ | 6.67±0.58$^{b}$ |
| | 6.00±1.00$^{a}$ | 6.33±0.58$^{a}$ | 6.33±0.58$^{a}$ | 6.67±0.58$^{a}$ |
| PP **(MP/3 g)** | 2.00±1.73$^{a}$ | 4.00±3.46$^{a}$ | 1.33±0.58$^{a}$ | 1.67±1.15$^{a}$ |
| | 3.00±0.00$^{a}$ | 2.33±0.58$^{a}$ | 1.33±0.58$^{a}$ | 2.00±1.00$^{a}$ |
| PA **(MP/3 g)** | 0.67±1.15$^{a}$ | 0.33±0.58$^{a}$ | 0.33±0.58a | ND |
| | 0.00±0.00$^{a}$ | 1.00±1.00$^{a}$ | 0.33±0.58$^{a}$ | 0.33±0.58$^{a}$ |
| LDPE **(MP/3 g)** | 3.00±2.00$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ |
| | 3.33±0.58$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ | 3.00±0.00$^{a}$ |
| PE **(MP/3 g)** | ND | 1.33±1.53$^{a}$ | 2.00±1.00$^{a}$ | 0.67±1.15$^{a}$ |
| | 1.50±2.12$^{a}$ | 1.33±1.53$^{a}$ | 1.33±1.53$^{a}$ | 2.00±1.00$^{a}$ |
| PS **(MP/3 g)** | 5.00±0.00$^{a}$ | 6.33±1.15$^{a}$ | 5.67±1.15$^{a}$ | 5.00±0.00$^{a}$ |
| | 5.67±1.15$^{a}$ | 5.00±0.00$^{a}$ | 5.00±0.00$^{a}$ | 5.00±0.00$^{a}$ |
| PD **(MP/3 g)** | 1.00±1.00$^{a}$ | 1.00±1.00$^{a}$ | 0.33±0.58$^{a}$ | 0.33±0.58$^{a}$ |
| | 1.00±1.00$^{a}$ | 1.00±1.00$^{a}$ | 2.33±0.58$^{a}$ | 1.00±1.00$^{a}$ |
| OP **(MP/3 g)** | 0.33±0.58$^{a}$ | 0.33±0.58$^{a}$ | 0.67±0.58$^{a}$ | 2.67±2.52$^{a}$ |
| | 0.67±1.15$^{a}$ | 2.00±1.73$^{a}$ | 2.67±2.31$^{a}$ | 0.67±0.58$^{a}$ |
| PET **(MP/3 g)** | 1.00±1.00$^{a}$ | 0.33±0.58$^{a}$ | 1.00±1.73$^{a}$ | 0.67±1.15$^{a}$ |
| | 0.67±1.15$^{a}$ | 1.00±1.73$^{a}$ | 1.00±1.73$^{a}$ | 1.00±1.00$^{a}$ |

*Value as mean ±SD. Different superscript in the same row indicate significant difference at p<0.05*
*Key: Polyethylene (PE), Polystyrene (PS), Polypropylene (PP), Low-Density Polyethylene (LDPE), Polyvinyl Chloride (PVC), Cellulose Acetate (C), Polyethylene Terephthalate (PET), Polyamides (PA), Polydienes (PD) and Other Plastics (OP); ND= Not detected*

Microplastic pollution has become an ecological threat as these pollutants are increasingly found in water bodies that act as both conduits and reservoirs for these persistent contaminants. Studies have highlighted the potential for trophic transfer of microplastics to raise awareness about the dangers posed by this emerging pollutant. The current study focused on assessment of microplastic composition in

*O. niloticus* and *C. gariepinus* in River Niger, Lokoja. A total of ten (10) types of microplastics were found in the two fish species (*O. niloticus* and *C. gariepinus*) examined in this study. Eight (8) different types of microiplastics were identified in the studies conducted in River Ikopba, Edo State (Ogbomida *et al*., 2023). As recorded in this study, microplastics were also recorded in all observed species of fish studied in the pelagic skipjack tuna (Neto *et al*. 2020). Also, the study carried on microplastics in edible fish sold in Lagos State, Nigeria, it was found that microplastics were present in all fish samples (Ndibe *et al*., 2023). Some studies showed that not all the fish studied had microplastic. For instance, Gunawan *et al*. (2021) reported that out of 100 pindang fish samples tested, 75 were contaminated with microplastics, while only 11 out of 25 fresh fish samples showed contamination with other materials. Furthermore, some studies reported microplastics in various species of fish. On the Colombian Caribbean coast, microplastics were found in the digestive tracts of 9 species of commercial fish (Garcés Ordóñez *et al*., 2022). A study along the Finnish coast detected microplastics in the digestive tracts of 38 fish (Sainio *et al*., 2021), while a study in Japanese waters found microplastics in 39.1% of pelagic fish and 10.3% of demersal fish (Yagi *et al*., 2022). Wild fish in the Atlantic Ocean were also found to have high levels of microplastic contamination (Guilhermino *et al*. 2021). Similarly, a study in Guangdong, China, showed that freshwater fish commonly consumed by the public were contaminated with microplastics, with different abundances found in 52 tilapia and 24 mud carp samples from 25 locations (Sun *et al*., 2021). Another research also showed that as much as 26 percent of microplastics were found in the gills of fish and 15 percent in the intestines (Lilis *et al*., 2024).

The dominant types of microplastics in this research were recorded as follows; C, PS, PVC, PP, LDPE, and PE. This finding is consistent with studies conducted by Ogbomida *et al*. (2023), Bordos *et al*. (2019); Liu *et al*. (2021); Garcés-Ordóñez *et al*. (2022) and (Lilis *et al*., 2024). These plastics materials are commonly utilized for packaging products like films, shopping bags, bottles, toys, household items, juice containers, milk containers, crates, plastic packaging materials as well as fibers and textiles (Lilis *et al*., 2024).

In *O. niloticus* and *C. gariepinus* Cellulose (C), polystyrene (PS), Low-Density Polyethylene (LDPE) and Polypropylene (PP) microplastics were the highest in the three organs examined. The high concentration level of microplastics in the liver and gill. As for the liver, it might be because the liver serves as a primary organ for detoxifying harmful substances and metabolizing various compounds, as microplastics are ingested, they can accumulate in the liver where the body processes and attempts to detoxify these foreign particles, leading to higher concentrations in the liver compared to other organs. On the second thought, smaller particles are more likely to pass through the intestinal barrier and enter systemic circulation, accumulating in the liver. As for the gills, water exchange that occurs in the gills during the process of respiration and the fact that smaller particles are more likely to be trapped in the gills, the findings in this study was in line with the study carried out by Ogbomida *et al*. (2023) and Adeogun *et al*., 2020 and also in line with the study conducted on water, fish and sediment and microplastics presence in some selected fresh water fish within eight different species of freshwater fish. Microplastics such as PE, PP, PS, PET have been implicated to have numerous adverse effects on aquatic organisms (De Sá *et al*. 2018). The occurrence and identification of microplastics within an environment are heavily influenced by the sources of plastic waste present. The higher level of microplastics in *C. gariepinus* as compare to *O. niloticus* may be due to their proximity to sediment. Catfish are regarded as benthic fish and they majorly feed on the organic matters and feeds that are found in or around the sediment. Sediment has been implicated to have higher microplastics presence as a result of microplastics stocking in the sediment (Ogbomida *et al*., 2023). The various microplastic types were present in the gills, intestines, and livers of *O. niloticus* and *C. gariepinus* fish across all four months, this is in line with other studies that found microplastics in *O. niloticus* and *C. gariepinus* (Ndibe *et al*., 2023 and Doherty *et al*., 2024). Notably, there was no significant difference in microplastics presence across the months, suggesting that microplastics consumption in these fish species may not be season-dependent. This contradicts the study done by Ndibe *et al*. (2023) that detected higher microplastics abundance and significant difference during the rainy season. This discrepancy may be due to differences in location, rainfall patterns, or other environmental factors.

*Conclusion:* The assessment of microplastic in commercially viable fish in River Niger, Lokoja revealed that both species investigated have microplastic in their gills, liver and tissue. Microplastic pollution in River Niger Lokoja Kogi State represents a significant environmental challenge with considerable implications for ecological health and food security. Lack of variation in the abundance and distribution of microplastics across different months, with notable contamination in fish gills, intestines, and livers, indicating bioaccumulation risks. These findings suggest that the River Niger's ecosystem faces long-term risks due to persistent plastic pollution, posing threats to aquatic life and human populations reliant on these resources for sustenance and economic activities.

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Data Availability Statement: Data are available upon request from the corresponding authors.

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