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Comparative Study on Physicochemical and Microbial Quality of Water Stored in Different Container Materials

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ABSTRACT
Post-collection water storage in suboptimal materials compromises drinking water safety, particularly in resource-limited settings. This study evaluated the impact of common storage materials—plastic, stainless steel, copper, and earthen pots—on physicochemical and microbiological water quality.

Keywords: Water storage, Copper antimicrobial, Microbial contamination, earthen pot, plastic leaching, Water quality parameters.

1. Introduction
Access to clean and safe drinking water is a fundamental human right and a cornerstone of public health. Despite global advancements in water purification technologies, over 780 million people remain without access to treated water, primarily in low-resource settings where post-collection storage compromises water safety (World Health Organization [WHO], 2017). Contamination during storage—driven by material interactions, microbial proliferation, and environmental factors—accounts for a significant burden of waterborne diseases, including cholera, typhoid, and dysentery (Prescott et al., 1999). Water quality degradation during storage is a critical issue in both urban and rural settings where potable water, once treated, is often stored in containers that can introduce contaminants or foster bacterial growth, thereby reversing the effects of initial purification processes (Balasooriya et al., 2023; Zhang et al., 2023).

Commonly used materials for water storage include plastic, stainless steel, clay, and glass (D et al., 2024). Plastics, metals, and earthenware all interact differently with water, potentially altering its pH, adding chemical compounds through leaching, or serving as a breeding ground for microorganisms

(Aralappanavar et al., 2024; Barone et al., 2024; Issac & Kandasubramanian, 2021). The presence of microplastics in water stored in plastic containers is also a concern and studies have shown that even bottled water, often perceived as safer, can contain microplastic particles, which may pose health risks when ingested (Aralappanavar et al., 2024).

Traditional storage materials like copper and earthen pots are deeply rooted in cultural practices (e.g., Ayurveda) for their purported health benefits, including antimicrobial properties and mineral enrichment (Packiyam et al., 2016). Conversely, modern materials like plastic and stainless steel dominate household use due to affordability and convenience, yet their long-term impact on water quality remains understudied. Plastic, for instance, may leach endocrine-disrupting chemicals (e.g., bisphenol A), while stainless steel, though inert, offers no inherent antimicrobial defense (Maske et al., 2024).

This study bridges critical knowledge gaps by systematically evaluating four common storage materials—plastic, stainless steel, copper, and earthen pots—on physicochemical (pH, TDS, turbidity, alkalinity, chloride, calcium, hardness) and microbiological (E. coli, yeast/mold, coliforms) parameters over 10 days. The findings aim to inform evidence-based storage recommendations, particularly for regions lacking centralized water treatment.

2. Materials and Methods

2.1 Experimental Design and Storage Materials

- **Water Source**: Water was collected from Bagad Rajput village (Alwar District, Rajasthan, India) using sterile containers. The source water was tested for baseline parameters to ensure initial potability.
- **Storage Vessels**:
  - **Plastic**: Food-grade polyethylene terephthalate (PET) bottles (1 L capacity).
  - **Stainless Steel**: AISI 304-grade containers (1 L capacity).
  - **Copper**: Traditional hand-beaten copper vessels (1 L capacity).
  - **Earthen Pot**: Unglazed terracotta pots (1 L capacity), locally sourced.

Containers were sterilized with distilled water. Samples (1L each) were stored at **27± 1°C** for **10 days** and covered to prevent airborne contamination. Experiment conducted in triplicate to ensure reproducibility.

2.2 Sampling and Analysis Schedule

- **Sampling Intervals**: Days 0 (initial), 1, 3, 5, 7, and 10.
- **Parameters analyzed**:
  - **Physicochemical**: pH, total dissolved solids (TDS), turbidity, alkalinity, chloride, calcium, total hardness.

- **Microbiological**: Yeast/mold, *Escherichia coli*, coliform bacteria.

2.3. Physicochemical Analysis Methods

All physicochemical analyses strictly adhered to protocols prescribed by the Bureau of Indian Standards (IS: 3025). The following standardized methods were employed:

2.3.1 pH: Electrometric measurement using a calibrated digital pH meter (Hanna Instruments HI98107). Electrode Calibrated with standard buffers (pH 4.0, 7.0, 9.2) prior to analysis. Sample (50 mL) analyzed post-stabilization were equilibrated to 25°C, and triplicate readings recorded (BIS, 1984).

2.3.2 Total Dissolved Solids (TDS): Conductometric measurement via digital TDS meter (Model: Hanna HI98311; accuracy ±2%). Meter calibrated with 1000 ppm NaCl standard. Samples filtered (0.45 µm) to exclude suspended solids. Probe immersed in 50 mL sample; reading recorded post-stabilization (units: mg/L). (BIS, 2003).

2.3.3 Turbidity: Nephelometry (IS: 3025 Part 10) using turbidity meter (Hach 2100Q). Light scattering intensity compared to formazin standard. Hydrazine sulfate (1 g/100 mL) and hexamethylenetetramine (10 g/100 mL) for 40 NTU standard suspension. Measured in NTU after zero-calibration with distilled water.

Standard suspension (400 NTU): Mix 5 mL hydrazine sulphate + 5 mL hexamethylenetetramine; age 24 h. (BIS, 1984).

Turbidity (NTU) = $(I_{\text{standard}} / I_{\text{sample}}) \times C_{\text{standard}}$

Where I = scattered light intensity, C = standard concentration.

2.3.4 Alkalinity (Potentiometric titration, IS:3025 Part-23):

Reagents used are 0.02 N H_2SO_4 (5.6 mL conc. H_2SO_4 → 100 mL H_2O). Mixed indicator (0.02 g methyl red + 0.1 g bromocresol green in 100 mL ethanol). Titrate 20 mL sample to pH 3.7 endpoint.

Alkalinity (mg/L as $CaCO_3$) = $(A \times N \times 50{,}000) / V$

Where A = acid volume (mL), N = acid normality, V = sample volume (mL).

2.3.5 Chloride: Argentometric titration (IS: 3025 Part 32) with 0.0141 N $AgNO_3$. Potassium chromate (K_2CrO_4 indicator) (5% w/v); Titrate 20 mL sample to brick-red endpoint. (BIS, 1988).

Chloride (mg/L) = $(V_1 \times 0.0141 \times 35{,}450) / V$

Where V_1 = $AgNO_3$ volume (mL), V = sample volume (mL).

2.3.6 Calcium: EDTA titration (IS: 3025 Part 40) with 0.01 M EDTA. NaOH (1 N; 40 g/L). Patton-Reeder's indicator (0.2 g indicator + 100 g NaCl). Titrate 50 mL sample (pH 12–13) to blue endpoint. (BIS, 1991).

Calcium (mg/L) = $(A \times 0.4008 \times 1000) / V$

Where A = EDTA volume (mL), 0.4008 = mg Ca per mL EDTA.

2.3.7 Total Hardness: EDTA titration (IS: 3025 Part 21) with 0.01 M EDTA. Ammonia buffer (67.5 g NH_4Cl + 570 mL NH_4OH→1L H_2O). Eriochrome Black T (EBT) indicator (0.5 g/100 mL ethanol). Titrate 50 mL sample to blue endpoint. (BIS, 1983).

Hardness (mg/L as $CaCO_3$) = $(B \times 1000) / V$

Where B = EDTA volume (mL).

2.4. Microbiological Analysis Methods (ISO 15185:2016)

Yeast/Mold:

Membrane filtration (0.22 µm pore size) of 250 mL sample. Chloramphenicol Yeast Extract Glucose Agar (CYEGA) used as media. Incubation at 25°C for 3–5 days. Identification: Velvet/powdery colonies (mold); black/round colonies (yeast).

***E. coli* and Coliforms**:

Membrane filtration (0.22 µm) of 250 mL sample Chromogenic Coliform Agar (CCA) used as media. Incubation at 37°C for 24 h. *E. coli*: White/black colonies; coliforms: Pink/red colonies.

2.4 Statistical Analysis

Data presented as mean values. Trends analyzed descriptively against Indian drinking water standards (IS 10500:2012).

3. Results

3.1 Physicochemical Parameters. Table 1 shows the temporal variations in physicochemical parameters of water stored in different materials over 10 days

3.1.1 pH

Water stored in plastic exhibited a progressive decline in pH from an initial 6.13 to 5.42 by day 10, rendering it acidic (pH < 6.5). Conversely, stainless steel showed a moderate rise (6.13→7.12), while copper (6.13→7.18) and earthen pots (6.13→7.27) demonstrated alkaline shifts. All materials except plastic-maintained pH within WHO potable limits (6.5–8.5).

3.1.2 Total Dissolved Solids (TDS)

Plastic and stainless-steel reduced TDS (118.7→103.5 mg/L and 118.7→106.8 mg/L, respectively), indicating minimal mineral leaching. In contrast, copper (118.7→212.5 mg/L) and earthen pots (118.7→ 225.9 mg/L) significantly elevated TDS due to mineral dissolution, though values remained below the 300 mg/L safety threshold.

3.1.3 Turbidity

Plastic, stainless steel, and copper increased turbidity (e.g. plastic: 2.4→3.2 NTU), suggesting particulate release or microbial growth. Earthen pots uniquely reduced turbidity by 62.5% (2.4→0.9 NTU), leveraging their porous structure to filter impurities.

3.1.4 Alkalinity and Chloride

Alkalinity decreased in plastic (75→55 mg/L) and stainless steel (75→64 mg/L) but rose in copper (75→89 mg/L) and earthen pots (75→132 mg/L). Similarly, chloride declined in plastic/steel (plastic: 9.9→8.1 mg/L) but increased in copper (9.91→11.94 mg/L) and earthen pots (9.91→23.4 mg/L), all within safe limits (<200 mg/L).

3.1.5 Calcium and Hardness

Calcium diminished in plastic (1.7→1.0 mg/L) and stainless steel (1.7→0.8 mg/L) but surged in copper (1.7→5.5 mg/L) and earthen pots (1.7→5.6 mg/L). Total hardness mirrored this trend: plastic/steel showed slight reductions (plastic: 56→50 mg/L), while copper (56→180 mg/L) and earthen pots (56→190 mg/L) intensified hardness due to mineral leaching.

Table1. Temporal variations in physicochemical parameters of water stored in different materials over 10 days

Parameter	*Material*	*0 d*	*1 d*	*3 d*	*5 d*	*7 d*	*10 d*	*Δ (0–10 d)*
pH	Plastic	6.13 ± 0.03	6.11 ± 0.03	5.90 ± 0.03	5.75 ± 0.02	5.65 ± 0.03	5.42 ± 0.04	↓ 11.6%
	Stainless Steel	6.13 ± 0.02	6.14 ± 0.03	6.32 ± 0.03	6.68 ± 0.03	6.96 ± 0.03	7.12 ± 0.05	↑ 16.2%
	Copper	6.13 ± 0.03	6.28 ± 0.03	6.46 ± 0.03	6.79 ± 0.04	6.98 ± 0.03	7.18 ± 0.03	↑ 17.1%
	Earthen Pot	6.13 ± 0.02	6.31 ± 0.04	6.53 ± 0.04	6.86 ± 0.05	7.03 ± 0.04	7.27 ± 0.04	↑ 18.6%
TDS (mg/L)	Plastic	118.7 ± 1.1	117.8 ± 1.1	115.2 ± 1.1	111.7 ± 1.1	106.8 ± 1.1	103.5 ± 1.2	↓ 12.8%
	Stainless Steel	118.7 ± 0.8	117.4 ± 0.8	116.1 ± 0.8	113.5 ± 0.8	109.7 ± 0.8	106.8 ± 0.7	↓ 10.0%
	Copper	118.7 ± 1.0	121.7 ± 1.0	139.5 ± 1.0	158.5 ± 1.0	183.45 ± 1.0	212.5 ± 1.5	↑ 79.0%
	Earthen Pot	118.7 ± 0.9	129.8 ± 0.9	136.5 ± 0.9	154.7 ± 0.9	192.5 ± 0.9	225.9 ± 1.8	↑ 90.3%
Hardness (mg/L)	Plastic	56.0 ± 0.5	56.0 ± 0.5	56.0 ± 0.5	54.0 ± 0.5	52.0 ± 0.5	50.0 ± 0.6	↓ 10.7%
	Stainless Steel	56.0 ± 0.6	56.0 ± 0.6	53.0 ± 0.6	49.0 ± 0.6	47.0 ± 0.6	45.0 ± 0.3	↓ 19.6%
	Copper	56.0 ± 0.4	64.0 ± 0.4	78.0 ± 0.4	112.0 ± 0.4	150.0 ± 0.4	180.0 ± 1.2	↑ 221.4%
	Earthen Pot	56.0 ± 0.7	73.0 ± 0.7	87.0 ± 0.7	128.0 ± 0.7	156.0 ± 0.7	190.0 ± 1.4	↑ 239.3%
Turbidity (NTU)	Plastic	2.4 ± 0.1	2.4 ± 0.1	2.6 ± 0.1	2.9 ± 0.1	2.4 ± 0.1	3.2 ± 0.2	↑ 33.3%
	Stainless Steel	2.4 ± 0.1	2.4 ± 0.1	2.6 ± 0.1	2.8 ± 0.1	2.4 ± 0.1	3.1 ± 0.2	↑ 29.2%
	Copper	2.5 ±	2.8 ±	3.2 ±	3.6 ±	2.5 ± 0.1	3.9 ±	↑ 56.0%

		0.1	0.1	0.1	0.1		0.2	
	Earthen Pot	2.2 ± 0.1	1.9 ± 0.1	1.6 ± 0.1	1.1 ± 0.1	2.2 ± 0.1	0.9 ± 0.1	↓ 59.1%
Alkalinity	Plastic	75.0 ± 0.1	75.0 ± 0.1	70.0 ± 0.1	66.0 ± 0.1	58.0 ± 0.1	55.0 ± 0.1	↓ 26.7%
	Stainless Steel	75.0 ± 0.1	77.0 ± 0.1	74.0 ± 0.1	69.0 ± 0.1	67.0 ± 0.1	64.0 ± 0.1	↓ 14.7%
	Copper	75.0 ± 0.1	71.0 ± 0.1	79.0 ± 0.1	82.0 ± 0.1	85.0 ± 0.1	89.0 ± 0.1	↑ 18.7%
	Earthen Pot	75.0 ± 0.1	79.0 ± 0.1	86.0 ± 0.1	98.0 ± 0.1	113.0 ± 0.1	132.0 ± 0.1	↑ 76.0%
Chlorides	Plastic	9.9 ± 0.1	9.9 ± 0.1	9.7 ± 0.1	9.2 ± 0.1	8.6 ± 0.1	8.1 ± 0.1	↓ 18.2%
	Stainless Steel	9.91 ± 0.1	9.8 ± 0.1	9.2 ± 0.1	8.9 ± 0.1	8.35 ± 0.1	7.89 ± 0.1	↓ 20.4%
	Copper	9.91 ± 0.1	10.23 ± 0.1	10.53 ± 0.1	11.02 ± 0.1	11.32 ± 0.1	11.94 ± 0.1	↑ 20.5%
	Earthen Pot	9.91 ± 0.1	11.6 ± 0.1	13.9 ± 0.1	17.8 ± 0.1	20.6 ± 0.1	23.4 ± 0.1	↑ 136.1%
Calcium	Plastic	1.7 ± 0.1	1.7 ± 0.1	1.6 ± 0.1	1.3 ± 0.1	1.1 ± 0.1	1.0 ± 0.1	↓ 41.2%
	Stainless Steel	1.7 ± 0.1	1.7 ± 0.1	1.4 ± 0.1	1.3 ± 0.1	1.0 ± 0.1	0.8 ± 0.1	↓ 52.9%
	Copper	1.7 ± 0.1	2.6 ± 0.1	3.5 ± 0.1	3.9 ± 0.1	4.9 ± 0.1	5.5 ± 0.1	↑ 223.5%
	Earthen Pot	1.7 ± 0.1	2.4 ± 0.1	3.1 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	5.6 ± 0.1	↑ 229.4%

*↓/↑: Decrease/increase from baseline

Table 2: Physicochemical Trends Over 10 Days

Parameter	***Plastic***	***Stainless Steel***	***Copper***	***Earthen Pot***
pH	6.13 → 5.42 (↓)*	6.13 → 7.12 (↑)	6.13 → 7.18 (↑)	6.13 → 7.27 (↑)
TDS (mg/L)	118.7 → 103.5 (↓)	118.7 → 106.8 (↓)	118.7 → 212.5 (↑)	118.7 → 225.9 (↑)
Turbidity (NTU)	2.4 → 3.2 (↑)	2.4 → 3.1 (↑)	2.4 → 3.9 (↑)	2.4 → 0.9 (↓)
Hardness (mg/L)	56 → 50 (↓)	56 → 45 (↓)	56 → 180 (↑)	56 → 190 (↑)

*↓/↑: Decrease/increase from baseline; *pH < 6.5 (acidic) by day 5.

Copper/Earthen Pots:

- TDS increased by 79–90% (mineral leaching: Cu^{2+}, Ca^{2+}, Mg^{2+}).
- Enriched minerals (↑Ca^{2+}, hardness, alkalinity) but elevated TDS; copper uniquely delayed microbial growth. Demonstrated optimal microbiological safety despite mineral leaching.
- Hardness rose 221–239% (copper: 56→180 mg/L; earthen: 56→190 mg/L).
- pH became alkaline (7.18–7.27).

Plastic:

- Reduced minerals and acidification (plastic); permitted early microbial colonization.
- pH acidified to 5.42 (↓11.6%; polymer degradation).
- TDS declined by 12.8% (adsorption to container walls).

Earthen Pot:

- Improved clarity (↓turbidity) but accelerated biological contamination.
- Turbidity decreased by 62.5% (2.4 → 0.9 NTU; natural filtration).

3.2 Microbial Contamination

Yeast/mold appeared earliest in earthen pots (day 3), followed by plastic/stainless steel (day 5), and was delayed in copper (day 10). *E.coli* growth followed a similar pattern: earthen pots (day 3), plastic (day 5), steel (day 7), and copper (day 10). Coliforms were absent in all materials throughout the study.

- **Copper**: Delayed microbial growth until day 10 (antimicrobial effect of Cu^{2+} ions).
- **Earthen Pots**: Rapid contamination (day 3) due to porosity.
- **Coliforms**: Undetected in all materials (initial water free of fecal contamination).

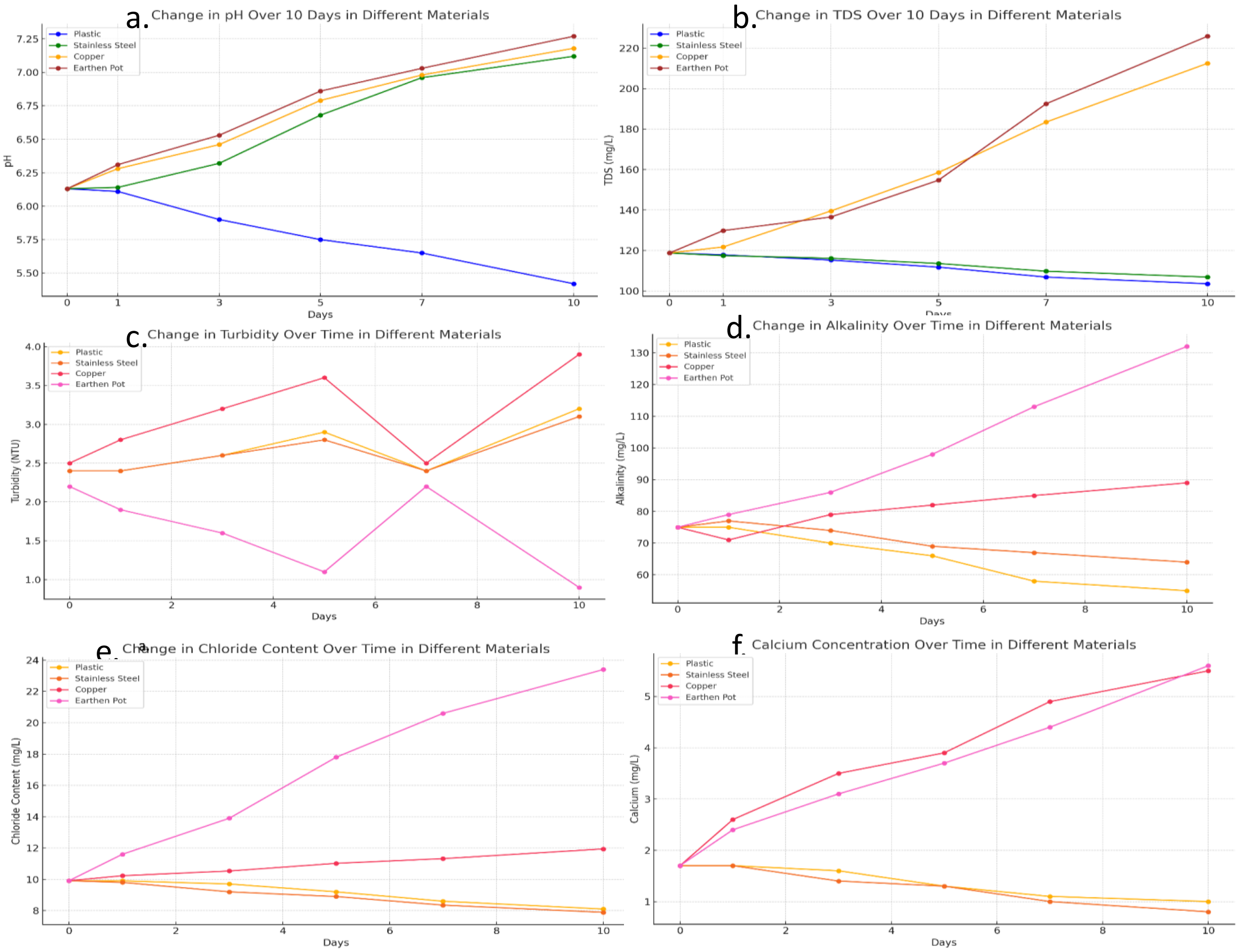
Table 3: Microbial Growth Onset (Days) and Colony Characteristics

Material	*Yeast/Mold*	*E. coli*	*Coliforms*
Plastic	Day 5 (fuzzy colonies)	Day 5 (white colonies)	Absent
Stainless Steel	Day 5 (fuzzy colonies)	Day 7 (white colonies)	Absent
Copper	Day 10 (sparse growth)	Day 10 (sparse growth)	Absent
Earthen Pot	Day 3 (dense growth)	Day 3 (dense growth)	Absent

3.3. Compliance with Standards

- All materials-maintained parameters within WHO/Indian standards except:
  - **Plastic**: pH (5.42) and turbidity (3.2 NTU) exceeded limits by day 10.
  - **Copper/Earthen Pots**: Hardness (180–190 mg/L) approached permissible limits (200 mg/L).

Fig 1: The graphs a, b, c, d, e and f show the changes in pH, TDS, turbidity, alkalinity, chloride and calcium content respectively over 10 days for different materials (Plastic, Stainless Steel, Copper, and Earthen Pot)



4. Discussion

Material-Specific Mechanisms and Implications

Copper Vessels demonstrated superior **antimicrobial efficacy**, delaying microbial growth (*E. coli*, yeast/mold) until day 10. This aligns with copper's oligodynamic effect, where Cu^{2+} ions disrupt microbial cell membranes and inhibit enzyme activity (Mohanan et al., 2017). Mineral leaching (e.g., calcium increased by 223%, hardness by 221%) contributed to elevated TDS (212.5 mg/L) but remained within WHO safety limits (TDS<300 mg/L). Copper's dual role—microbial inhibition and mineral enrichment—validates its traditional use in Ayurveda and positions it as a viable solution for rural households (Packiyam et al., 2016).

Earthen Pots uniquely **reduced turbidity** (62.5% decrease) through natural filtration via micropores, while enriching water with calcium, magnesium, and bicarbonates (hardness increased by 239%). However, their porosity facilitated early microbial colonization (*E. coli* and yeast/mold by day 3), emphasizing the need for daily cleaning and sun-drying to mitigate biofilm formation (Naddafi et al., 2005). These pots remain ideal for mineral-deficient regions but require stringent hygiene.

Plastic Bottles induced significant **acidification** (pH 5.42 by day 10) and early microbial contamination (day 5), likely due to polymer degradation and leached additives (e.g., phthalates). Declining TDS (−12.8%) and mineral loss suggest adsorption onto plastic surfaces, reducing water nutritive value. These risks, coupled with environmental persistence, necessitate regulatory limits on plastic use for water storage (Maske et al., 2024).

Stainless Steel maintained physicochemical stability but offered **no antimicrobial protection**, permitting *E. coli* growth by day 7. Its inertness makes it suitable for short-term storage but inadequate for long-term use in contaminated settings.

5. Public Health and Policy Recommendations

For optimal water safety in diverse settings, material selection is crucial; copper is highly recommended for high-risk areas like flood-prone or endemic zones due to its inherent passive disinfection properties; earthen pots can offer mineral benefits but must be integrated with specific hygiene education, such as regular scrubbing using ash or vinegar, to ensure safe usage; plastic requires stringent regulation due to potential leaching, making alternatives like glass or certified BPA-free containers preferable; and while durable, stainless steel necessitates complementary disinfection methods, such as solar treatment, particularly for long-term water storage.

6. Conclusion

The choice of water storage material critically determines post-collection water safety and quality. Copper vessels emerged as the most effective for microbiological control, delaying contamination by up to 10 days due to inherent antimicrobial properties, making them indispensable for resource-limited regions. Earthen pots enhanced mineral content and reduced turbidity but required rigorous hygiene to counter early microbial growth. Stainless steel maintained physicochemical stability but lacked microbial inhibition, while plastic degraded water quality through acidification and contamination. These findings underscore the need for context-specific storage strategies: promoting copper in high-risk areas, integrating earthen pots with community hygiene programs, regulating plastic use, and pairing stainless steel with disinfection. Policymakers and public health initiatives must prioritize material-aware storage solutions to advance global water security.

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Ethics approval and consent to participate
The author(s) declare that it is not applicable.

Consent for publication
The author(s) declare that this is not applicable.

Competing interests
The author(s) declare that they have no competing interests.

References

1. Bureau of Indian Standards (BIS). (1983). Methods of sampling and test (physical and chemical) for water and wastewater: Part 21 Total hardness (IS 3025-21:1983). New Delhi, India.
2. Bureau of Indian Standards (BIS). (1984). Methods of sampling and test (physical and chemical) for water and wastewater: Part 10 Turbidity (IS 3025-10:1984). Part 11 pH value (IS 3025-11:1984). New Delhi, India.
3. Bureau of Indian Standards (BIS). (1986). Methods of sampling and test (physical and chemical) for water and wastewater: Part 23 Alkalinity (IS 3025-23:1986). New Delhi, India.
4. Bureau of Indian Standards (BIS). (1988). Methods of sampling and test (physical and chemical) for water and wastewater: Part 32 Chlorides (IS 3025-32:1988). New Delhi, India.
5. Bureau of Indian Standards (BIS). (1991). Methods of sampling and test (physical and chemical) for water and wastewater: Part 40 Calcium (IS 3025-40:1991). New Delhi, India.
6. Bureau of Indian Standards (BIS). (2003). Methods of sampling and test (physical and chemical) for water and wastewater: Part 16 Total dissolved solids (IS 3025-16:2003). New Delhi, India.
7. Patton, C. J., & Reeder, W. J. (1956). New indicator for titration of calcium with (ethylenedinitrilo) tetraacetate. Analytical Chemistry, 28(6), 1026–1028. https://doi.org/10.1021/ac60114a018

8. Addisie, M. B. (2022). Evaluating drinking water quality using water quality parameters and esthetic attributes. *Air, Soil and Water Research*, *15*, 11786221221075005. https://doi.org/10.1177/11786221221075005
9. Chalchisa, D., Megersa, M., & Beyene, A. (2017). Assessment of the quality of drinking water in storage tanks and its implication on the safety of urban water supply in developing countries. *Environmental Systems Research*, *6*(1), 12. https://doi.org/10.1186/s40068-017-0089-2
10. Gadgil, A. (1998). Drinking water in developing countries. *Annual Review of Energy and the Environment*, *23*(1), 253–286. https://doi.org/10.1146/annurev.energy.23.1.253
11. Ikeokwu, O. M. (2021). Effect of storage container on the bacteriological quality of water from different sources. *Journal of Microbial Experimentation*, *9*(2), 47–53. https://doi.org/10.15406/jmen.2021.09.00317
12. Maske, P. D., Shivankar, V. T., Raut, L. R., Badwaik, C. B., & Lade, U. B. (2024). Water quality in different storage containers: A comparative study of materials. *International Journal of Environmental Health Research*. Advance online publication. https://doi.org/10.1080/09603123.2024.2342234
13. Mohanan, N., Manju, E. K., & Jacob, S. (2017). The effect of different types of storage vessels on water quality. *International Journal of Innovative Research in Science, Engineering and Technology*, *6*(10), 19796–19801.
14. Naddafi, K., Mahvi, A. M., Nasseri, S., Mokhtari, M., & Zeraati, H. (2005). Evaluation of the efficiency of clay pots in removal of water impurities. *Iranian Journal of Environmental Health Science & Engineering*, *2*(2), 51–56.
15. Ogbozige, F. J., Adie, D. B., & Ibrahim, F. B. (2015). Chemistry of potable water during storage: The Northwestern Nigeria perspective. *International Journal of Scientific & Engineering Research*, *6*(6), 1338–1346.
16. Packiyam, R., Kananan, S., Pachaiyappan, S., & Narayanan, U. (2016). Effect of storage containers on coliforms in household drinking water. *International Journal of Current Microbiology and Applied Sciences*, *5*(1), 461–477. https://doi.org/10.20546/ijcmas.2016.501.047
17. Prescott, L. M., Harley, J. P., & Klein, D. A. (1999). *Microbiology* (4th ed.). McGraw-Hill.
18. Schafer, C. A., & Mihelcic, J. R. (2012). Effect of storage tank material and maintenance on household water quality. *Journal of the American Water Works Association*, *104*(9), E521–E529. https://doi.org/10.5942/jawwa.2012.104.0127

19. World Health Organization. (2017). *Guidelines for drinking-water quality* (4th ed.). https://wssww.who.int/publications/i/item/9789241549950
20. Ziadat, A. H. (2005). Impact of storage tanks on drinking water quality in Al-Karak Province, Jordan. *Journal of Applied Sciences*, *5*(4), 634–638. https://doi.org/10.3923/jas.2005.634.638
21. Balasooriya, B. M. J. K., Rajapakse, J., & Gallage, C. (2023). A review of drinking water quality issues in remote and indigenous communities in rich nations with special emphasis on Australia. *Science of the Total Environment*, 903, Article 166559. https://doi.org/10.1016/j.scitotenv.2023.166559
22. Zhang, P., Yang, M., Lan, J., Huang, Y., Zhang, J., Huang, S., Yang, Y., & Ru, J. (2023). Water quality degradation due to heavy metal contamination: Health impacts and ecofriendly approaches for heavy metal remediation. Toxics, 11(10), Article 828. https://doi.org/10.3390/toxics11100828
23. Aralappanavar, V. K., Mukhopadhyay, R., Yu, Y., Liu, J., Bhatnagar, A., Praveena, S. M., Li, Y., Paller, M., Adyel, T. M., Rinklebe, J., Bolan, N. S., & Sarkar, B. (2024). Effects of microplastics on soil microorganisms and microbial functions in nutrients and carbon cycling–A review. Science of the Total Environment, 924, Article 171435. https://doi.org/10.1016/j.scitotenv.2024.171435
24. Barone, G. D., Rodríguez-Seijo, A., Parati, M., Johnston, B., Erdem, E., Cernava, T., Zhu, Z., Liu, X., Axmann, I. M., Lindblad, P., & Radecka, I. (2024). Harnessing photosynthetic microorganisms for enhanced bioremediation of microplastics: A comprehensive review. Environmental Science and Ecotechnology, 20, Article 100407. https://doi.org/10.1016/j.ese.2024.100407
25. Issac, M. N., & Kandasubramanian, B. (2021). Effect of microplastics in water and aquatic systems. Environmental Science and Pollution Research International, 28(16), 1954419562. https://doi.org/10.1007/s11356-021-13184-2.