

# Occurrence of non-tuberculous mycobacteria in households and urbanised environments

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Of the approximately 240 non-tuberculous mycobacteria (NTM) species identified to date, majority are free-living saprophytes that may, under certain conditions, act as opportunistic pathogens in humans and animals. However, the exact sources of NTM infections are still ill-defined.

**The aim of this study was to examine the occurrence of NTM in households and urbanised environments in Poland.**

## MATERIAL

Out of **109 samples** (Fig. 1), **75 (68.8%)** were collected from **20 households** and **34 (31.2%)** were originating from **16 urbanised or natural environments** in two major cities in Poland, i.e. Warsaw and Cracow, between April and July 2023.

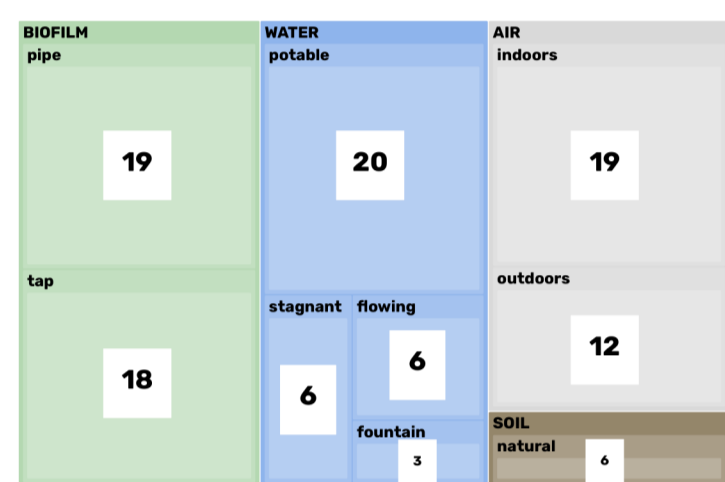
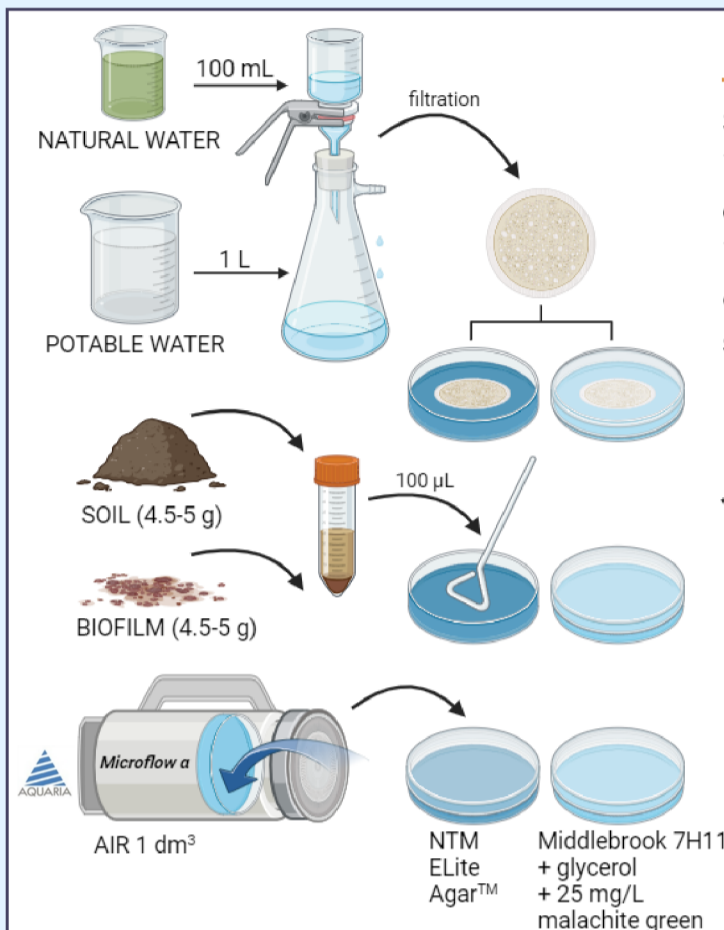


Fig. 1. Number of samples of each type.



## METHODS

Samples were decontaminated and cultivated\* on two types of media, i.e. **NTM ELite Agar** (bioMerieux, Poland) and modified **Middlebrook 7H11** (BD, Poland) agar, as shortly described on Fig. 2. The incubation was carried out at 30°C for 6 weeks in the dark. Colonies suspected of being mycobacteria, upon macromorphology observations, were subjected to **Ziehl-Neelsen staining**. Acid-fast bacilli cultures were selected and identified to the species level by **PCR-sequencing of the hsp65 gene**.

\*For more details, please see poster no. P0635

Fig. 2. Methodology: preparation of water, soil and air samples, cultivation, selection and species identification using PCR-sequencing.

## RESULTS

Of all **109 samples**, **61 (56.0%)** yielded myco-bacterial growth. This number included **47/75 (62.7%) household** (Fig. 3) and **14/34 (41.2%) urbanised and natural** (Fig. 4) samples.

Among **household** sources, the most abundant in NTM was **air (84.7%)**, followed by **tap water (68.4%)**, **biofilm of pipe sludge (52.6%)** and **tap (44.4%)**. In all households NTM were present.

As for the **urbanised and natural environments**, the highest recovery of NTM was observed for **municipal fountain water (100%)**, followed by **flowing water (50.0%)** and **soil (50.0%)**, **stagnant water (33.3%)** and **air (8.3%)**. **All drinking water fountains** (included in the potable water sources) were NTM-positive.

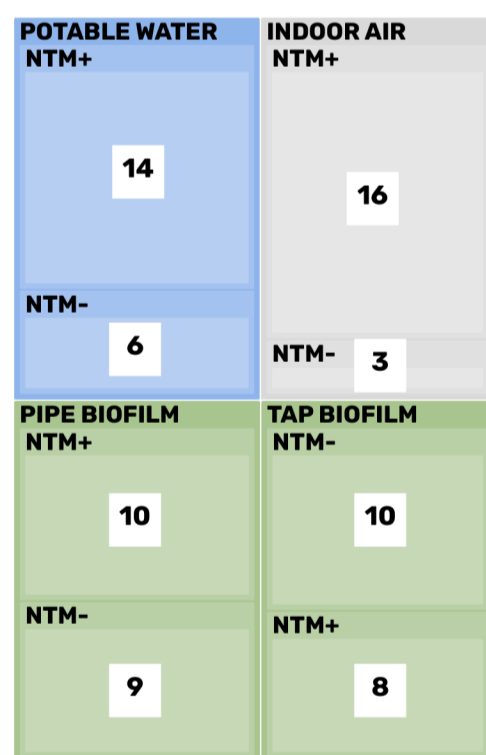


Fig. 3. Distribution of NTM-positive and NTM-negative household samples.

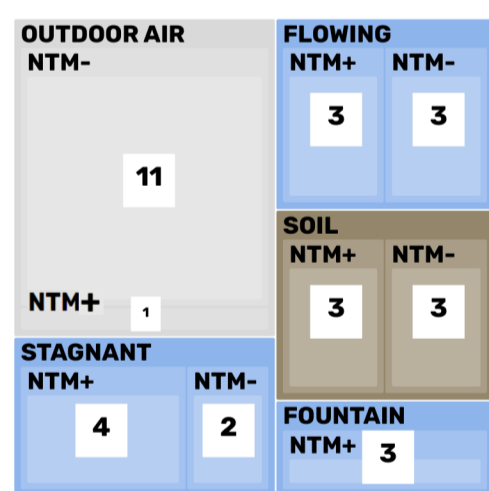


Fig. 4. Distribution of NTM-positive and NTM-negative environmental samples.

In total, **67 isolates** were recovered - **48 (71.6%)** originating from **households** and **19 (28.4%)** of **environmental** sources. Species distribution varied between **household** (Fig. 5) and **environmental** (Fig. 6) samples. The most frequently occurring household species were **Mycobacterium gordonae (25.0%)** and **M. paragordona (16.7%)**. Environmental samples were dominated by **Mycobacterium boenickei (15.8%)** and **Mycobacterium chelonae (15.8%)**.

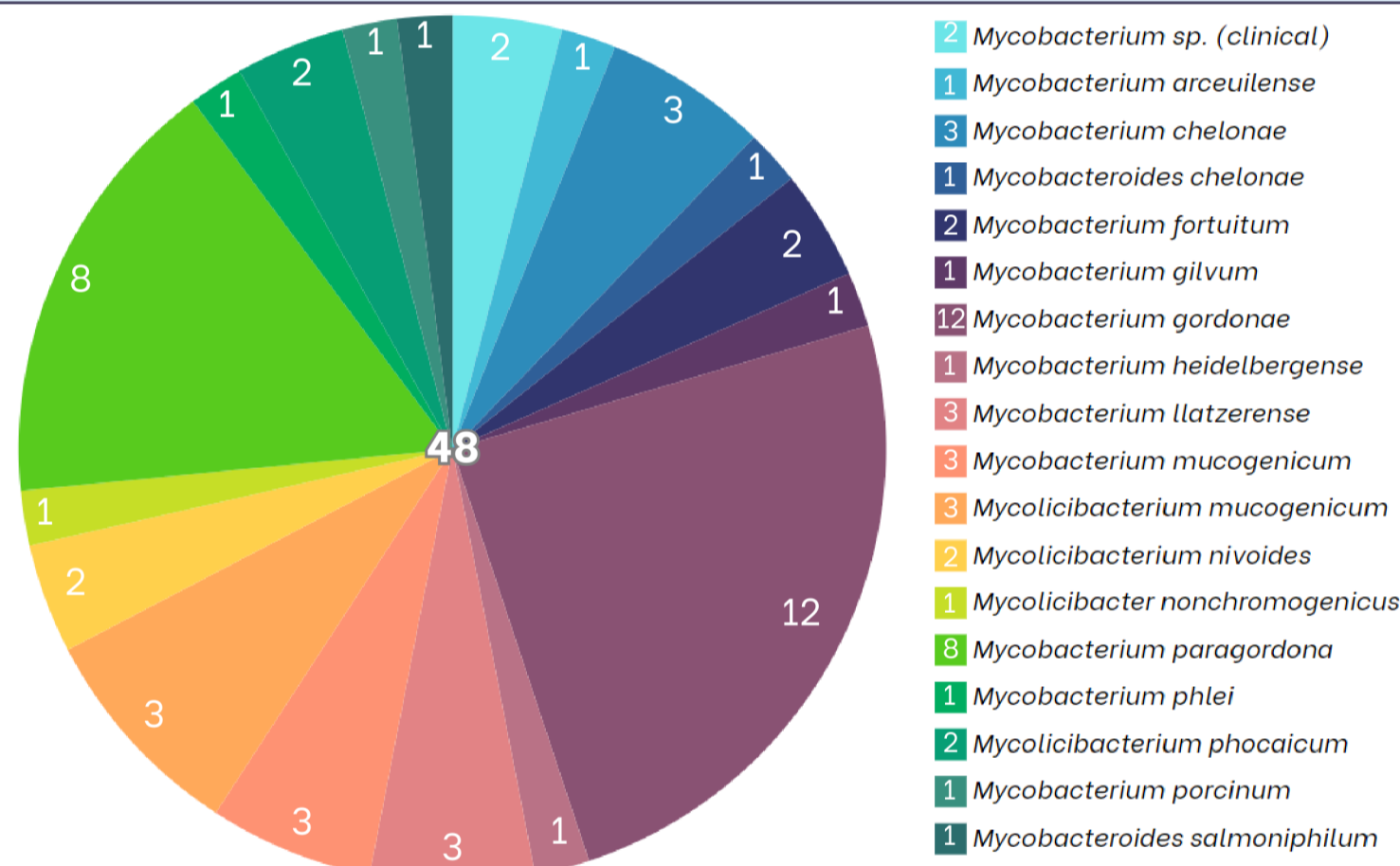


Fig. 5. Number of isolates from household samples. Count of identified isolates of each species is given on the chart and in the color-coded square. Two isolates identified as mycobacterial clinical strains were isolated.

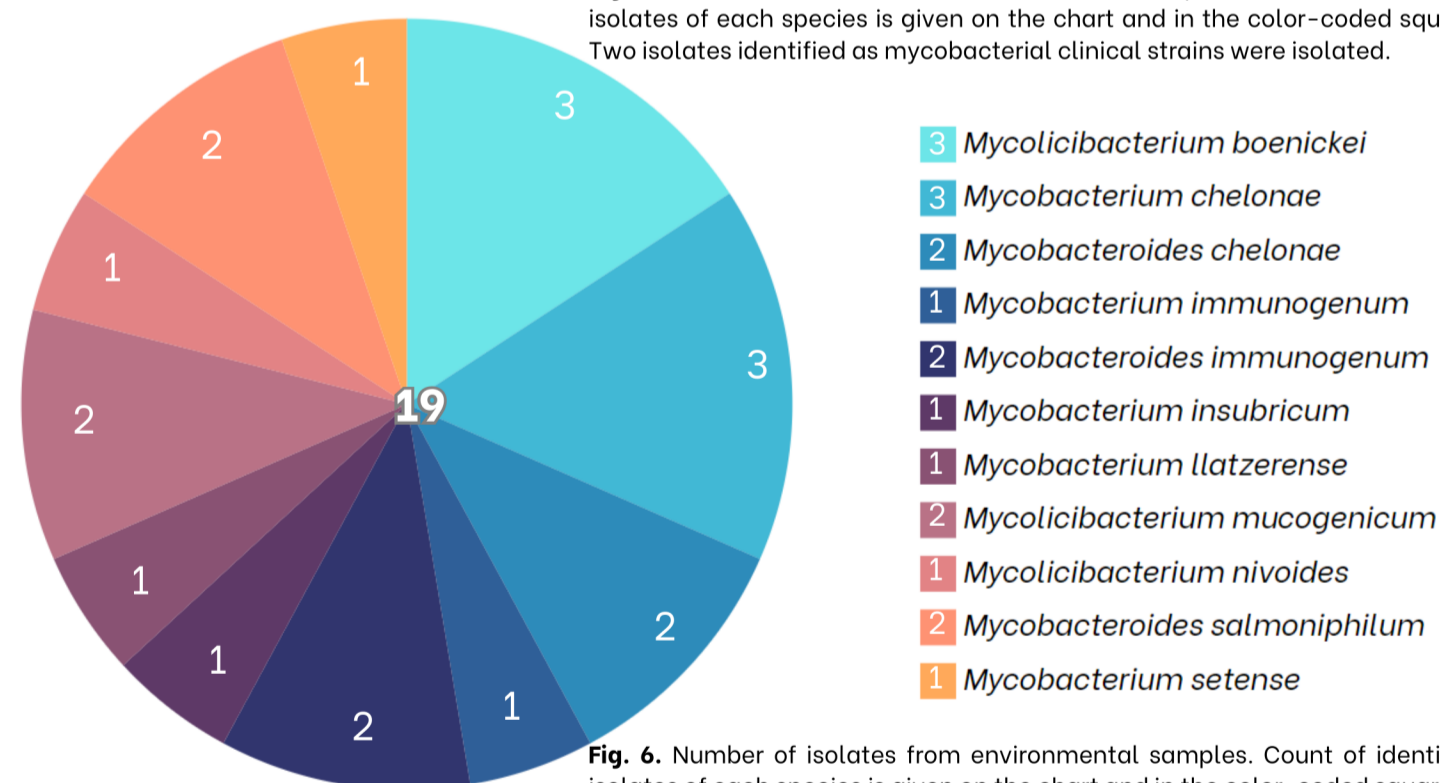
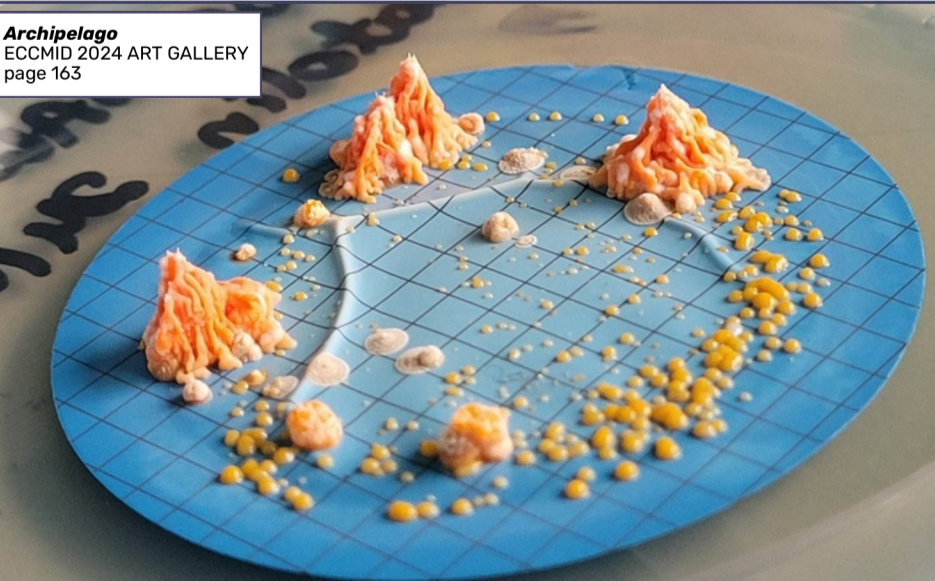


Fig. 6. Number of isolates from environmental samples. Count of identified isolates of each species is given on the chart and in the color-coded square.



## CONCLUSIONS

- This study provides the first investigation into the occurrence of NTM in household and environmental sources in Poland.
- Overall, **NTM were highly abundant** in both natural and anthropogenic environments.
- Importantly, various pathogenic species, such as **M. arceuilense**, **M. boenickei**, **M. chelonae**, **M. fortuitum** and **M. porcinum**, were identified in the analysed samples, including **soil**, **drinking fountain** and **tap water**.
- Interestingly, **multiple NTM species** were isolated from each **fountain** and **flowing water** samples
- Further WGS-based investigations are required to establish the potential sources of NTM infections.