

# Investigating links between heavy metals in menstrual hygiene products and reproductive hormonal health

Neasa Nic Corcráin

Supervisors: Professor Laurence Gill and Professor Joseph Roche

## Introduction

This study investigates whether menstrual products release toxic metals like lead and arsenic, potentially contributing to PCOS, endometriosis, and menstrual irregularities.

147 participants were surveyed and four products were tested for metal leaching in synthetic vaginal fluid using ICP-MS.

The results indicated brand-dependent differences in metal content, underscoring the need for improved safety and transparency in menstrual product regulation.

## Materials and methods

This study used two approaches:

### Survey

Collected responses from menstruating individuals (ages 18–55) across multiple countries to assess product use, symptoms, and chemical awareness.

Age Group	Total Respondents	Tampon Users	Reported Symptoms from Tampons*
18-24	101	47	38
25-34	22	10	8
35-44	2	0	0
45-55	4	1	1

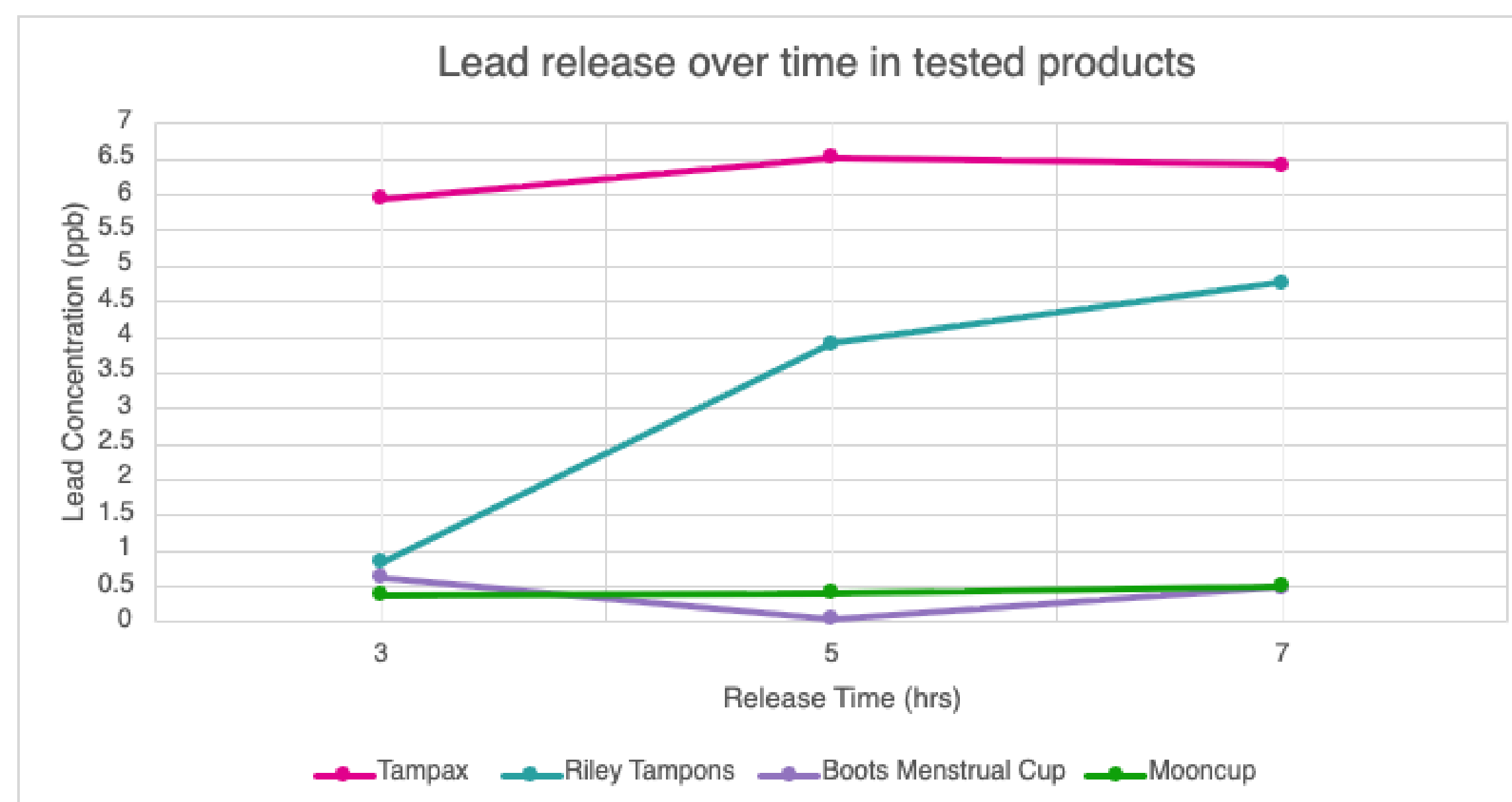
### Lab Testing

Incubated four menstrual products in synthetic vaginal fluid and analyzed metal leaching (Pb & As) at 3, 5, and 7 hours using ICP-MS. Results were compared across brands and benchmarked against safety limits.

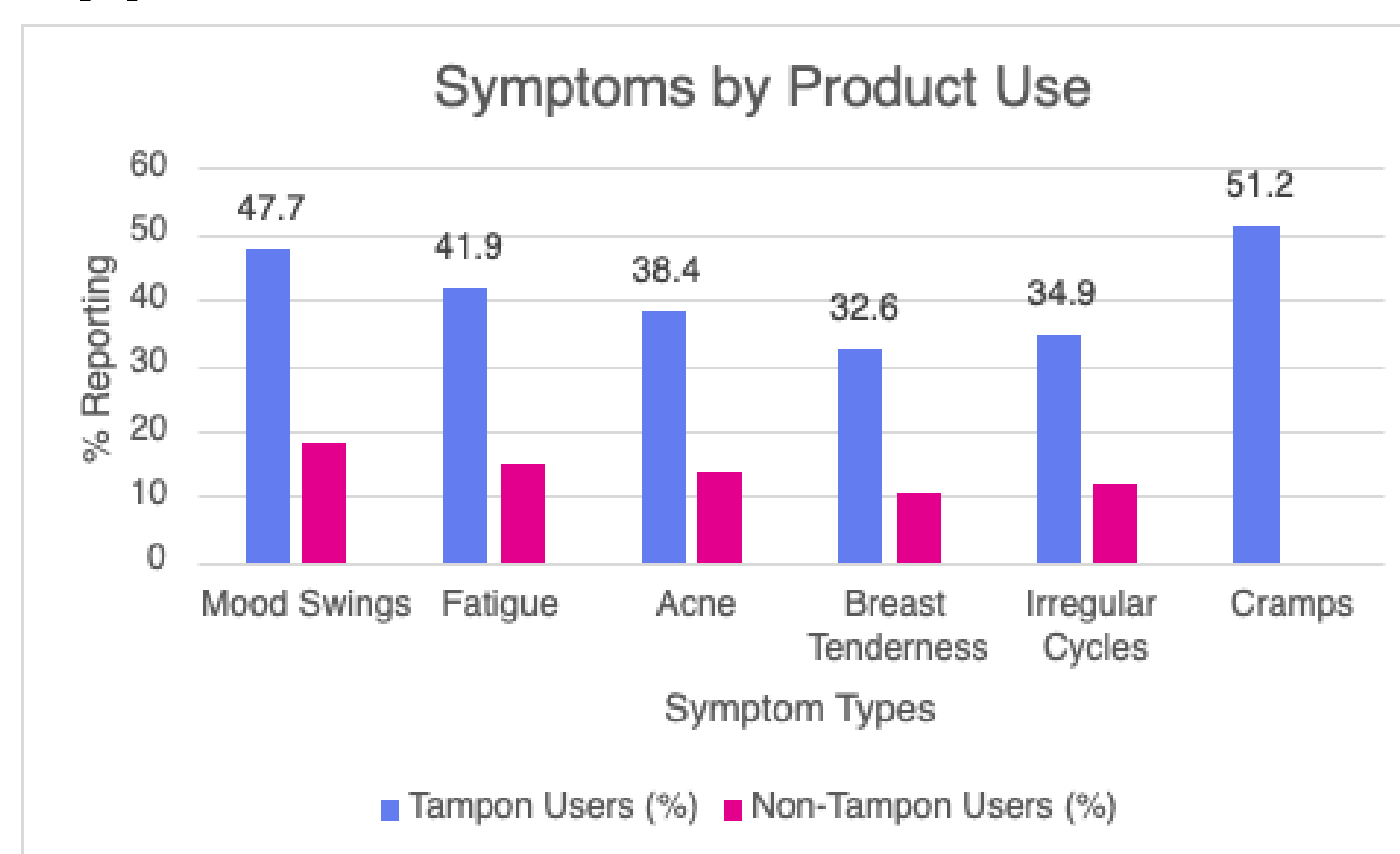
\*Symptoms include cramping, irritation, discomfort, mood changes, and other tampon-related issues mentioned in the "Hormonal Symptoms" and "Symptom Burden Score" fields.

## Results

The ICP-MS procedure demonstrated high precision and sensitivity for lead, though arsenic detection was compromised by background contamination. All menstrual products dissolved cleanly in simulated vaginal fluid, maintaining stable pH with no visible precipitates, except for faint cloudiness in one tampon replicate. In lab tests, tampons released substantially more lead (0.66–6.35 ppb) than cups (<1 ppb), with levels plateauing over time [2]

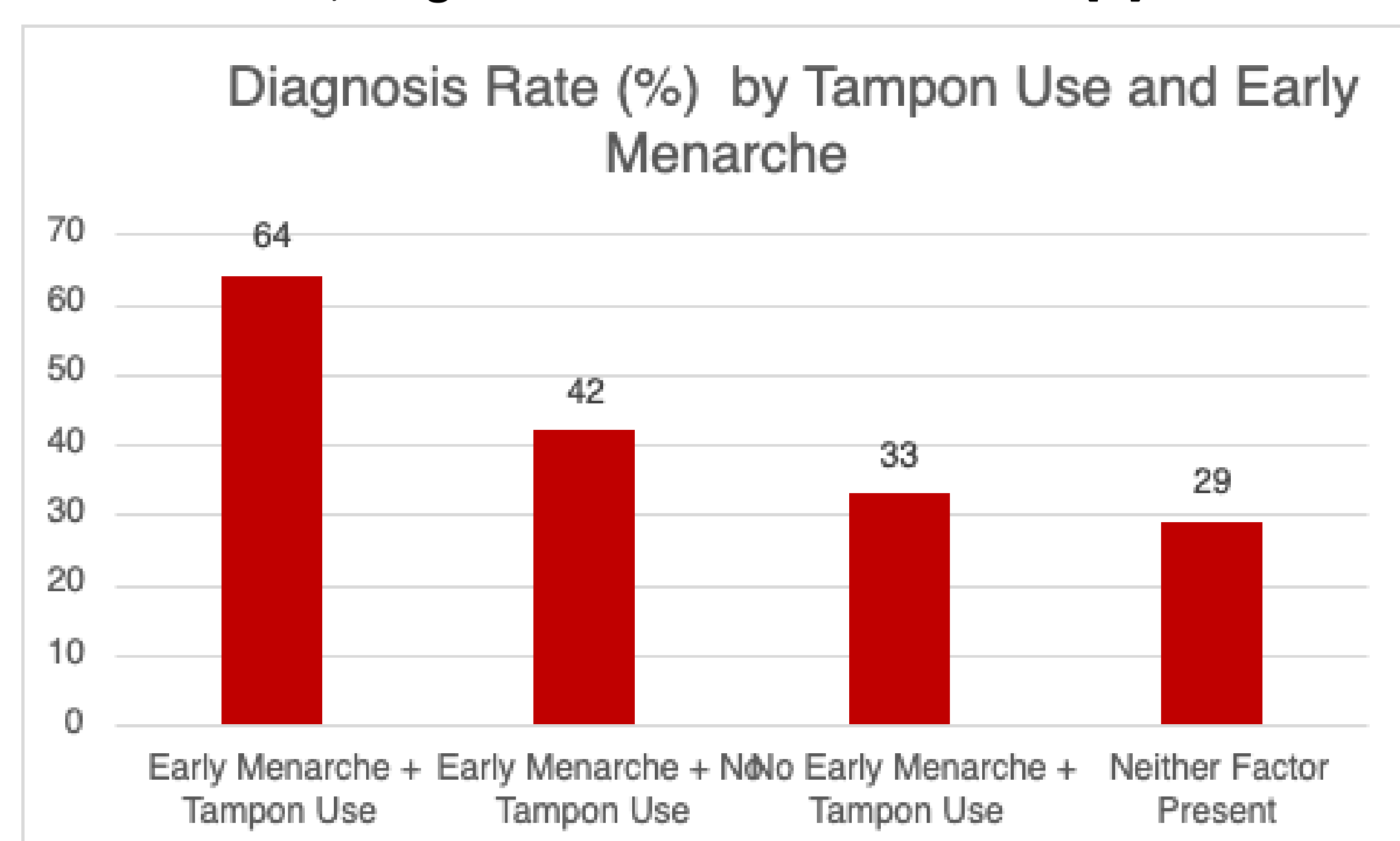


Concurrently, survey responses spanned diverse age groups, offering rich insights into menstrual experiences. Qualitative feedback showed tampon users frequently reported more intense mood swings, fatigue, and pain, while period-underwear users consistently experienced fewer hormonal symptoms. [1]



Quantitative analyses confirmed these impressions. Symptom burden was significantly higher among tampon users (M = 5.1) compared to pads (M = 4.3) and period underwear (M = 3.2)

When tampon use was combined with early menarche, diagnosis likelihood rose to 64% [1]



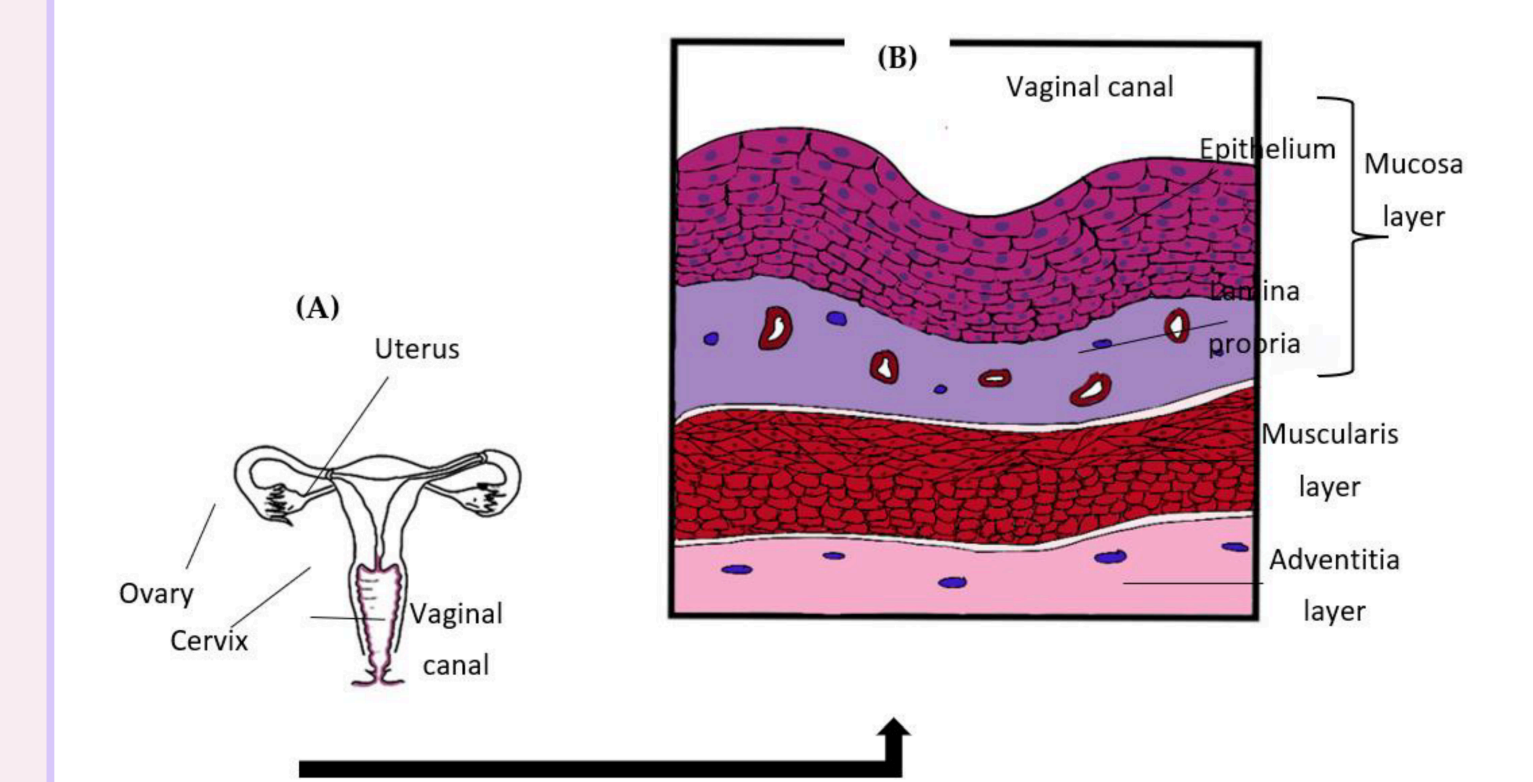
### Literature cited

- Nic Corcráin, N. (2025, June 26). Menstruation and reproductive health survey. Trinity College Dublin. <https://forms.office.com/Pages/DesignPageV2.aspx>
- Nic Corcráin, N. (2025). Investigating the link between heavy metals in menstrual hygiene products and reproductive hormonal health [Unpublished undergraduate research report]. Trinity College Dublin, Laidlaw Foundation.
- Balakrishnan, S. N., Yamang, H., Lorenz, M. C., Chew, S. Y., & Than, L. T. L. (2022). Role of Vaginal Mucosa, Host Immunity and Microbiota in Vulvovaginal Candidiasis. *Pathogens*, 11(6), 618. <https://doi.org/10.3390/pathogens11060618>

## Conclusions

This study uncovers a critical exposure pathway: lead leaches from all tested tampon brands under simulated vaginal conditions, reaching concerning levels. Tampon users, especially those with early menarche, reported significantly more endocrine-related symptoms than non-users, suggesting menstrual products may contribute to reproductive health disorders. [1]

The vaginal mucosa's high permeability enables direct systemic absorption of metal ions, bypassing first-pass metabolism. [3]



These findings expand toxicological theory and move beyond prior research focused solely on product content, offering a more holistic view of exposure and health outcomes. Chronic low-dose metal exposure in real-world organisms can disrupt hormonal balance, fertility, and development.

With tampons widely used and safer alternatives not equally accessible, this social justice issue demands urgent public health attention.

### Future Research

Future research should prioritize biomonitoring, in vitro absorption assays, and longitudinal studies to quantify internal dose and guide regulation. Menstrual product safety must receive stronger scientific scrutiny and regulatory oversight.

Scan to read the full report:



### Acknowledgments

Thank you to the Laidlaw Undergraduate Leadership and Research Programme for funding this project.

Thank you also to my two supervisors, Professors Laurence and Joseph, for their support and guidance throughout this process.