

# INTERNSHIP PROPOSAL, year 2025-2026

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**Duration:** 4-6 months

**The internship will be located in (city, country):** Paris, France

## Description of the internship topic

### Background

Perinatal mental health problems (PMH), including depression, anxiety, and stress-related disorder, affect approximately one in four pregnant women worldwide and represent a major public health concern. During pregnancy, employment can act as a protective factor, yet many women continue to experience exposure to occupational hazards such as chemicals, biological agents, ergonomic and physical constraints, and psychosocial stressors. Although regulations exist to protect pregnant workers, occupational exposures remain common, and evidence increasingly supports their role in PMH. Research has linked exposure to environmental chemicals (e.g., endocrine disruptors, metals), physical constraints (e.g., prolonged standing, heavy lifting), and psychosocial stressors (e.g., high job strain, low job control) to increased risk of depressive and anxiety symptoms during pregnancy and postpartum. Crucially, occupational exposures are not equally distributed across the workforce. Women, particularly those in lower socioeconomic positions, precarious jobs, or gendered sectors such as care, cleaning, retail, or hospitality, are disproportionately exposed to multiple concurrent hazards. These inequalities may amplify vulnerability to PMH problems, yet this interaction between exposure patterns and socioeconomic disadvantage has rarely been analyzed comprehensively.

This internship will leverage detailed exposure estimates reconstructed through several Job-Exposure Matrices (JEMs) in the ELFE and EDEN French birth cohorts. These matrices characterize chemical, biological, physical/biomechanical, ergonomic, and psychosocial hazards linked to occupational codes during pregnancy. Understanding how inequalities shape exposure and PMH risk is essential for identifying vulnerable groups and informing preventive policies.

### Objectives

1. To examine associations between prenatal occupational exposures (chemical, biological, ergonomic, physical, and psychosocial) and perinatal mental health outcomes in the ELFE and EDEN cohort.
2. To evaluate how social inequalities, such as socioeconomic position, job category, employment conditions, and gendered occupational sectors, contribute to or modify these associations.

The student will initially focus on one exposure family (e.g., chemical, biological, biomechanical, psychosocial) but may extend to others depending on progress.

## Methods

The analysis will use data from the ELFE and EDEN mother child cohorts in France, which include rich information on maternal occupational codes, socioeconomic indicators, perinatal mental health assessments, and relevant covariates. Multiple JEMs will be available at the start of the internship to derive standardized exposure metrics.

## Activities to be conducted

- Literature review and development of a conceptual framework integrating occupational exposures, socioeconomic inequalities, and PMH.
- Data management and analysis of ELFE/ EDEN cohort data (variable construction, selection of covariates, construction of a DAG, treatment of missing data, etc.).
- Implementation of statistical analyses: univariate/multivariate models, potential interaction analyses (inequality  $\times$  exposure), and sensitivity analyses.
- Depending on progress, exploration of cumulative exposure indicators or multiple exposure families.
- Preparation of the master's thesis according to the university guidelines.

A scientific publication of the results is possible.

## Requested competences/qualities:

- Capacity to work independently, sense of organization
- Familiarity with statistical analysis in R
- Good knowledge of basic statistical modelling, and interest in applying more complex methods
- Good knowledge of English

## Selected literature

- **Tartaglia M, Costet N, Audignon-Durand S, et al.** Profiles of the maternal occupational exposome during pregnancy and associations with intrauterine growth: Analysis of the French Longitudinal Study of Children(ELFE). *Environmental Research* 2025;267:120669.**doi:**<https://doi.org/10.1016/j.envres.2024.120669>
- **Tartaglia M, Costet N, Audignon-Durand S, et al.** Multiple maternal occupational exposures during pregnancy and intrauterine growth: Analysis of the French Longitudinal Study of Children (ELFE cohort), using data-driven approaches. *International Journal of Hygiene and Environmental Health*. 2025;270:114666. **doi:** <https://doi.org/10.1016/j.ijheh.2024.114666>
- **Manangama G, Galera C, Audignon-Durand S, Tartaglia M, et al.** Maternal occupational exposure to carbonaceous nanoscale particles and neurodevelopmental outcomes in early childhood: The French ELFE Study. *Environmental Research*. 2024;248:118364.**doi:** <https://doi.org/10.1016/j.envres.2024.118364>
- **Gyamfi P, Kjøllestad M, Eilertsen MEB, et al.** Prenatal work stress and risk of perinatal depression and anxiety: Findings from the Norwegian Mother, Father and Child Cohort Study (MoBa). *Journal of Affective Disorders*. 2022;309:21-29. **doi:** <https://doi.org/10.1016/j.jad.2022.04.031>
- **Cox JL, Holden JM, et al.** Job strain, low control, and psychosocial stressors at work as predictors of perinatal depression: A systematic review and meta-analysis. *Occupational and Environmental Medicine*. 2023;80(2):71-80. **doi:** <https://doi.org/10.1136/oemed-2022-108567>
- **Choi KW, Velez MP, Moodie EEM, et al.** Work-related stress, job insecurity, and perinatal psychological distress: A longitudinal cohort study. *Social Psychiatry and Psychiatric Epidemiology*. 2023;58:1421-1431. **doi:** <https://doi.org/10.1007/s00127-023-02459-0>