

Impacts of COVID-19 mitigation measures on pregnancy and birth outcomes in Scotland: a protocol for a natural experiment study using administrative data

Paul M. Henery, Ruth Dundas, Alastair H. Leyland, Anna Pearce

Why this study?

- The early years are crucial to long-term health and wellbeing
- The COVID-19 pandemic, and resultant mitigation measures, has impacted antenatal care in Scotland, as well as professional and social support for parents
- Trend data collected during mitigation has shown increased abortion and stillbirths, and lower gestational age
- Socially disadvantaged families and first time mothers, will be disproportionately affected

What do we aim to find out?

We propose a study which makes use of a linked national cohort of mothers and children to achieve the following:

- Determine the **quality of early years data** collected over the COVID-19 period in Scotland
- **Identify different pandemic ‘exposure’ groups**, based on trimester and exposure to differing mitigation levels
- Investigate **prevalence of early years outcomes** for the pandemic exposure groups as compared to pre-COVID
- Examine whether this **varies in different social groups** (e.g. ethnic minorities/first time mothers)

What data do we have?

The study population is ~650,000 mother and child pairs for births in Scotland between March 2010 and August 2021.

The below birth datasets (Fig. 1) were linked together using the Community Health Index, a population register used for health care in Scotland. Each person on the CHI has a unique identification number.

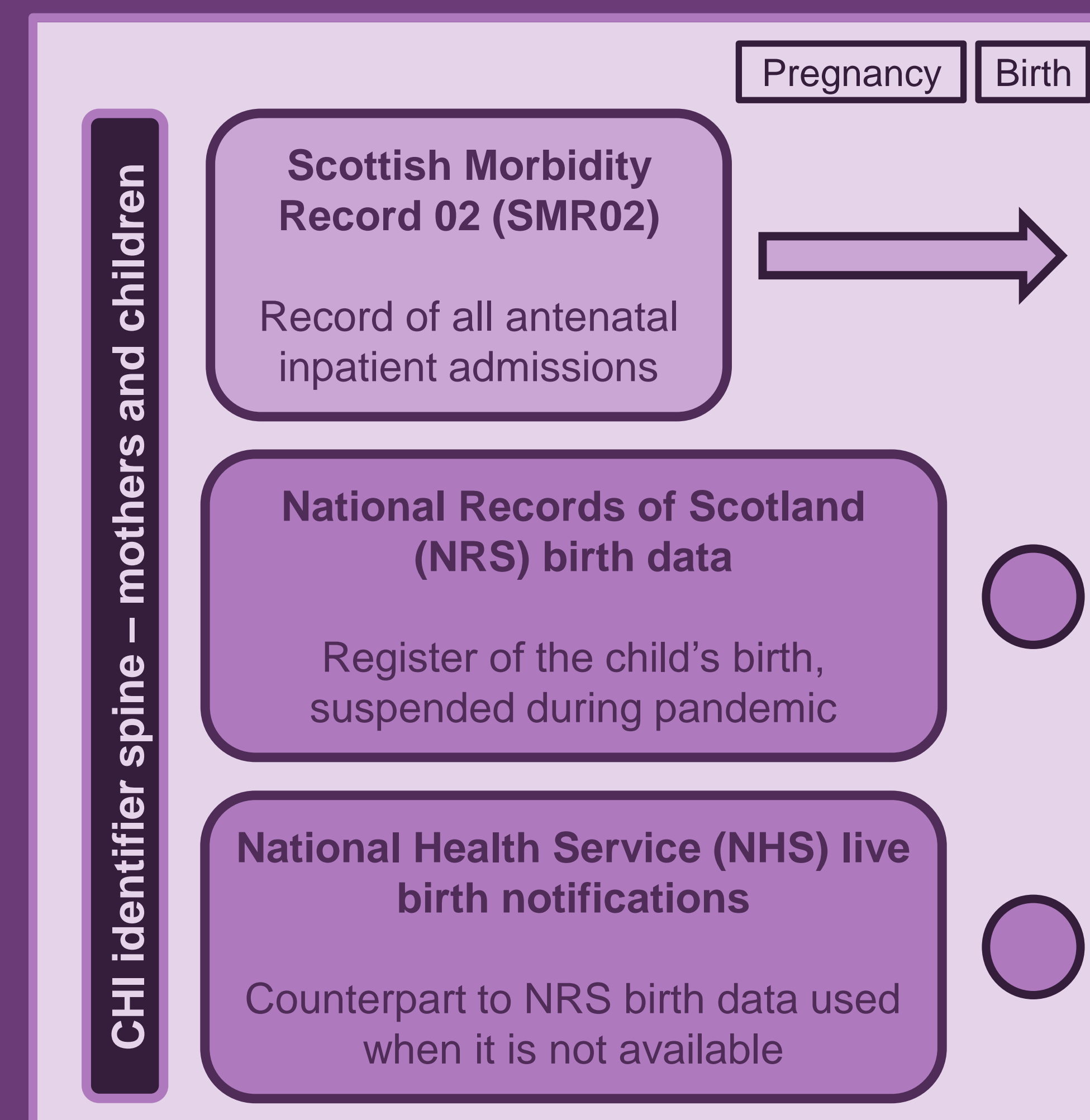


Fig. 1: Overview of datasets used in the study (SMR02, NRS births and NHS birth alerts)

Linking these datasets together provides us with information on birth characteristics, antenatal services, maternal behaviour, and socio-economic and demographic characteristics.

How are we measuring exposure?

We will compare an unexposed cohort (where pregnancy and birth occurred prior to lockdown) to a number of exposed cohorts. Exposure will be defined by duration and timing of exposure to lockdown and partial relaxation measures during pregnancy, birth, and infancy; the complexity will be dependent on frequency of cases.

It should be noted that services available were not consistent throughout each mitigation period; Fig. 2 serves as a low-level example of different kinds of cohorts, but we expect there to be far greater complexity.

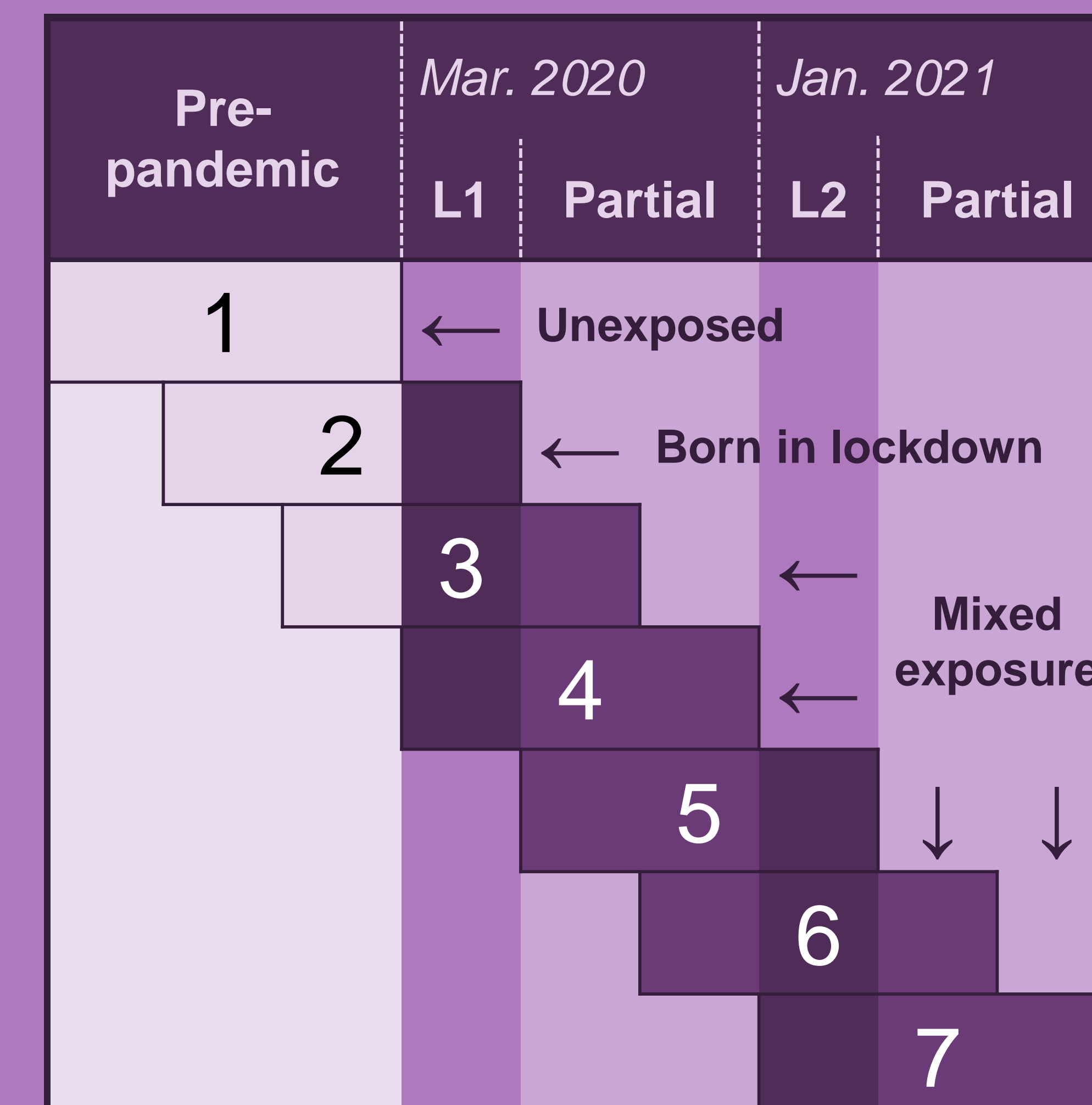


Fig. 2: Overview of potential exposure cohorts in our study. Each block represents a pregnancy with the endpoint denoting birth. Each shade represents COVID-19 mitigation measures (none, lockdown and partial lockdown).

What are our outcomes?

We will examine three groups of outcomes, all of which are both impacted by lockdown, and crucial for long-term health and development:

- **Maternal behaviour**, e.g. smoking or alcohol use in pregnancy, infant feed status
- **Birth characteristics**, e.g. birth weight, gestational age, head circumference
- **Service use**, e.g. doctor/midwife present during delivery, inpatient admissions during pregnancy, length of HOSPITAL stay during birth

What are our analyses?

- **Checks for missing data by year** (to examine whether the pandemic impacted data quality)
- **Prevalence of outcomes** by exposure windows outlined in Fig. 2.
- **Interrupted time series analyses** to examine the risk difference in outcomes in births born during/after lockdown compared to the baseline group.
- **Effect modification** will examine if any elevated risk related to pregnancy/birth during lockdown varied across social groups.