

Barcelona Life Cohort Study a study of pregnant women, their offspring and partners exposed to urban pollution

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Objective

To explain the BiSC project design and follow-up. The main objectives of the study are to evaluate the effect of prenatal exposure to urban air pollution on pre- and postnatal brain development and on fetal growth and birth weight.

Methods

The BiSC project is a multicentric prospective cohort study which is conducted in three Barcelona major hospitals. The sample size required is 1,200 pregnant women. Participants with singleton pregnancy will be recruited in the hospitals during the first pregnancy visit. The follow-up will be during their attendance in the hospitals for their routine pregnancy visits. As part of the study, lifestyle characterization will be led through measurements of maternal stress (hair cortisol levels and questionnaires), socioeconomic status (questionnaires) and physical activity (using smartphones and physical activity monitors). Green spaces surrounding maternal residency will be characterized by a map of greenness. For the assessment of air pollution, nitrogen dioxide (NO₂) and Particulate Matter 2.5 (PM_{2.5}) monitors will be placed in participants' house for one week, once during the first trimester and once during weeks 33-36 of pregnancy. The noise exposure will be measured by home-outdoor noise monitors and modeled microenvironmental levels of noise. The evaluation of fetal growth will be assessed by ultrasound and anthropometric measurements at Birth. The placental function will be performed by Doppler ultrasound and the presence of air particles in the placenta will be studied by magnetometry and electron microscopy. The pre- and postnatal brain development will be analysed by neurosonography at week 32 of gestation, neonatal MRI (in a selected subsample of 400 children) and neurodevelopment tests (mainly Bayley Scale) at month 6 and 18.

Results

BiSC project is now in the recruitment phase.

Conclusion

Air pollution is an important threat which is currently affecting human health. The aims of this project are to contribute to the knowledge of the impact on fetal brain development and fetal growth and to generate evidence and information for implementing protection policies.