A computing approach to understanding relationships between antenatal fetal ultrasound measurements and postnatal outcomes.

Anthony Chapman, University of Aberdeen, r01ac14@abdn.ac.uk

Dr Steve Turner, Dr Wei Pang

Intro:

There is a large body of evidence linking reduced birth weight and increased risk for non communicable diseases (NCD) such as type II diabetes and asthma, and this implicates factors driving fetal growth in NCD aetiology. There is an emerging literature describing associations between fetal size and growth and NCD. We are exploring the potential for a computing approach to relating repeated measurements of fetal size during a pregnancy to post natal outcomes using routinely acquired data for the population of Grampian.

Related work:

Our group have related fetal measurements to postnatal outcomes in childhood which include asthma and eczema in a local population and also one from Saudi Arabia. Our work and a systematic review of the literature demonstrates that small absolute fetal size and either accelerating or faltering fetal growth are all associated with adverse outcomes. My job is to find efficient computational approaches to solve such problems in a greater scale.

Problem Statement:

The main question we would like to answer is: What is the relationship between fetal and maternal characteristics to non-communicable diseases in children and adults? An early hypothesis is that change of growth will be associated with increased risk for postnatal NCD compared to steady growth . Issues we will need to address include missingness of data, comparison between different anthropometric measurements for the same individual and the anticipation that different growth trajectories will be associate with the same increased risk for NCS.

Approach:

Routinely acquired data will be linked and approvals sought. The current approach is as follows: using multiple imputation, we will address missing data. After the data are ready for processing, clustering will be used to split the data into subsets with similar traits. Each subset will be statistically analysed and outcomes will be derived by their antenatal measurements. The outcomes of interest are NCD which can be determined in children and include obesity, asthma, eczema, epilepsy and type I diabetes.

Evaluation and conclusion:

We are four months into this project and linkage and approvals are currently in progress. Our approach to these data is likely to provide novel insight into the emerging field of “fetal epidemiology”.