

## 2023 PhD Projects

<b>Project title</b>	Early prediction of gestational diabetes Mellitus (GDM) and adverse birth outcomes
<b>Principal supervisor</b>	Dr Yonas Weldeselassie
<b>Second supervisor</b>	Prof Ponnusammy Saravanan (Warwick Medical School) Dr Fadlalla Elfadaly
<b>Discipline</b>	Statistics
<b>Research area/keywords</b>	Medical statistics, Gestational diabetes mellitus, Bayesian network, prediction
<b>Suitable for</b>	Full time applicants

### Project background and description

A condition which is usually considered as a precursor to type 2 diabetes is Gestational diabetes mellitus (GDM), high glucose level that occurs during pregnancy. It is one of the most common conditions during pregnancy and is usually diagnosed in the third trimester, between 24 and 28 weeks of pregnancy using a 75g oral glucose tolerance test (OGTT).

Undetected GDM may significantly harm the pregnant woman and her offspring, both in short and long-term. GDM women are at higher risk of developing GDM in subsequent pregnancies, higher caesarean section rates and adverse psychological effects. About half of women with a history of GDM will develop type 2 diabetes within five to ten years after delivery. Offspring born to mothers with GDM also have risk of being too big [macrosomia or large for gestational age (LGA)] or too small (small for gestational age, SGA), shoulder damage during delivery, respiratory distress, still birth, a higher lifetime risk of obesity and developing type 2 diabetes and cardiovascular disease. Accurate prediction has a potential to lead to the development of interventions to reduce the burden of GDM and its related complications for women and children.

The PhD student will work in identifying risk factors for adverse birth outcomes and quantify the direct and/or indirect effects through GDM. Early GDM and adverse birth outcome prediction models will be developed. New methods and/or extensions of existing methods will be investigated. Bayesian network methods could also be used. Unique datasets on more 10,000 women, who were followed from early pregnancy to delivery, in the UK, India, and Kenya are available for this project. Data on ongoing study from Thailand and Malaysia may also be used for validation of the proposed models. All these studies were funded by Medical Research Council (MRC), UK.

The suitable candidate is expected to have strong theoretical and applied statistical knowledge. Programming skills in R and/or Python are desirable.

### Background reading/references

- Saravanan P, Sukumar N, Adaikalakoteswari A, Goljan I, Venkataraman H, Gopinath A, Bagias C, Yajnik CS, Stallard N, Ghebremichael-Weldeselassie Y, Fall CHD. Association of maternal vitamin B12 and folate levels in early pregnancy with gestational diabetes: a prospective UK cohort study (PRiDE study). *Diabetologia*. 2021 Oct;64(10):2170-2182. doi:

10.1007/s00125-021-05510-7. Epub 2021 Jul 22. PMID: 34296321; PMCID: PMC8423653.

- Saravanan P, Diabetes in Pregnancy Working Group, Maternal Medicine Clinical Study Group, Royal College of Obstetricians and Gynaecologists, UK Gestational diabetes: opportunities for improving maternal and child health. *Lancet Diabetes Endocrinol.* 2020;8(9):793–800. doi: 10.1016/S2213-8587(20)30161-3.