# 1 Introduction

## Background

The economic and social implications of low birth weights (LBW) amongst newborn babies are problematic (Walker *et al.,* 2009). According to the World Health Organisation (2012), LBW is defined as an infant mass of less than 2500 g (up to and including 2499 g) or five pounds 8.2 ounces. Such occurrences can lead to post-natal medical problems and even contribute to lower literacy levels (Walker *et al.,* 2009).

External factors, such as smoking, during pre-natal development have additionally raised concerns in the past. An American study by MacMahon *et al.,* (1965), proposed that cigarette smoke is a key genetic mutagen and that significant detriment to a smoking mother’s foetus, resulting in neonatal LBW. This was a profound, yet unappreciated insight into human development. However, from the 786 individual infants, it was also concluded that smoking lowered infant birthweight but no subsequent affects to the baby were stated (MacMahon *et al.,* 1965). More recent studies have indicated contradictory views (Lawoyin, 2001; Adegboye *et al.,* 2010). Factors acquired maternally such as genetic endowment, particular medical (for example hypertension, anaemia, UTI), or even socio-cultural practices have indicated various significance in impacting progressive pre-natal development. Lawoyin, (2001) and Adegboye *et al.,* (2010) stated that such maternal factors have led to the possibility of infant LBW, birth asphyxia or premature births – all concerns relating to increased infant mortality. Abrevaya (2006) also stated that both social and economic inequality can be detrimentally affected by low birthweights as mothers of a lower socio-economic backgrounds are more at risk of their baby having a low birth weight.

Primary studies have provided identification of key factors that contribute to LBW with aid from numerous retrospective studies. However, many social, economic and biological factors can contribute to lower birth weights, thus it has been difficult to isolate or identify unique factor as more important than others (Makhija *et al.,* 1998; Negi *et al.,* 2006). With large data sets available, recording both births and information about the mothers health and background, it is important for studies to continue to examine the relationships between various social, economic and biological factors and low birth weights as finding causal factors could help alleviate the social and economic costs of low birth weights (Makhija *et al.,* 1989; Walker *et al.,* 2009). Linear models will most likely be extremely important for attempting to determine causal relationships and thus it is important the models are tested and selected to work best with the variables.

* 1. *Aims and Research Questions*

Given the importance of understanding and assessing relationships between various social, economic and biological variables and birth weight, this study will use a data set from the Child Health and Development Studies (CHDS) containing such variables to assess relationships. Following initial data exploration for identify interesting relationships between variables, a linear model will be produced to assess potential drivers of low birth weight babies. Various model selection tests and bootstrapping will be used to determine the best linear model to assess relationships within the data set. The aim of this report will provide an insight into the following research question:

What relationships are there between the measured variables and the birth weight of babies?

All the statistical computing and analysis within this report will be performed using the RStudio® V1.2.1335.

# References

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