Analyses of anthropometric data in the Longitudinal Study of Indigenous Children and methodological implications

by

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Declaration

Except where otherwise indicated, this thesis is the result of my own work carried out while I was an MPhil student at the National Centre for Epidemiology and Population Health (NCEPH) at the Australian National University in Canberra.

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Abstract

Although publications in the field of Indigenous health have increased in number in recent decades, their impact remains inadequate (1, 2). This is partially attributable to the continued reliance on descriptive studies (1, 3, 4) and the underrepresentation of urban environments in research. The Longitudinal Study of Indigenous Children (LSIC), administered by the Department of Family and Housing Community Services and Indigenous Affairs (FaHCSIA), addresses both concerns. LSIC is a cohort study of 1,759 Indigenous Australian children from environments ranging from very remote to urban. LSIC's retention rate has remained high; however, the dataset withstands a large amount of missing and implausible data.

In the first section of this thesis, I evaluated the validity of LSIC anthropometric data. I developed a data cleaning method based on World Health Organization protocols, incorporating knowledge gained from interviews I conducted with LSIC data collectors. These conversations served to depict the process of conducting surveys and to exemplify barriers impeding data collection. They shed light upon the importance of the development of a trusting relationship between participants and the LSIC team, a difficult task within the rigid structure requisite of the conduct of a longitudinal study. Based on these interviews and quantitative analysis of the accuracy of LSIC data, I provided recommendations to facilitate the collection of anthropometric data within a variety of settings. After reviewing my data cleaning methods and the final cleaned data, FaHCSIA approved the release of the cleaned anthropometric data for public use on the 4th of December, 2012.

The second part of this thesis contains analyses of the distribution of height, weight, and birth weight in the cleaned sample. In LSIC, 10% of infants were low birth weight and 11% were high birth weight; 6% of children aged three to 106 months were underweight, 74% were in the healthy weight range, 12% were overweight, and 8% were obese according to international Body Mass Index (BMI) cut-offs (5, 6).

The third segment of this thesis explores the impact of birth weight on the growth trajectories of children through eight years of age. Low and high birth weight have both been identified as risk factors for overweight and chronic disease in adulthood, and this association may be mediated by early childhood growth. Multilevel mixed-effects modelling, adjusting for the repeated measurement of children and the study's clustered

sampling, was used to examine the association between birth weight and childhood growth. Birth weight-for-gestational age z-score was a significant predictor of BMI-for-age z-score in childhood, and remained significant (coefficient = 0.166, $p < 0.001$) after accounting for age, gender, Indigenous identity (Aboriginal, Torres Strait Islander, or both), remoteness, breastfeeding duration, and maternal cigarette use during pregnancy. These findings demonstrate a long-lasting impact of birth weight on childhood growth, and suggest that interventions to improve prenatal care may have an effect beyond solely impacting birth weight. Subsequent follow-up of the LSIC cohort will enable examination of the association between of birth weight and childhood growth and later chronic disease incidence.

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