A geographic perspective to understanding birthweight variation – Temporal trends and spatial patterns in New South Wales, Australia, 1994 to 2004

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Abstract

Increasingly it is recognised that birthweight is not only a major determinant of infant health, but it also has far reaching implications for adult and generational health. The influences of socio-economic status and remoteness as risk factors have been identified. Despite considerable research into risk factors associated with low birthweight and Small for Gestational Age (SGA) births, there has been little research into Large for Gestational Age (LGA) births, particularly in Australia, and most investigations examining the influence of socio-economic factors and remoteness on birthweight have used large spatial units. This dissertation seeks to address these identified deficiencies using a health geography approach.

The thesis examines the spatial distribution and temporal trends in SGA and LGA births in NSW from 1994 to 2004, and associated individual and contextual risk factors. The data used was geocoded singleton births from the NSW Midwife's Data Collection (n= 891,771 births) which was spatially matched to ecologic socio-economic and remoteness variables extracted from the 2001 Australian Bureau of Statistics Census of Population and Housing at the census collection district level. In addition, an examination of the utility of unit record land valuation data, obtained from the NSW Department of Lands, as a quasi individual level measure of socio-economic status was made for a smaller study area covering the Sydney Urban Centre. Univariate and multivariate logistic regression analyses were used to evaluate the associations between individual and contextual risk factors and SGA and LGA births. The study aims not only to assess the association between SGA and LGA births and socio-economic status, but to also identify the particular aspects of disadvantage that most influenced these birth outcomes.

The analysis has established that while the percentage of SGA births has shown a small reduction, there has been a significant increase in the percentage of LGA births over the study period. This increase is likely to be attributable in part to the increase in the percentage of mothers with gestational diabetes, the reduction in smoking behaviour and the increased number of births to older women. Spatial variations were identified in the concentrations of standardised high and low birthweights, smoking rates and attendance at antenatal care providing evidence of the value of incorporating a spatial approach to both identify areas with higher than expected incidence of adverse birthweight outcomes and for targeting intervention strategies. Individual census variables produced a better model fit than the Index of Relative Socio-Economic Disadvantage and had the advantage of producing more easily interpretable results. Educational attainment, the percentage overseas born and income were identified as the main ecologic variables associated with birthweight outcome.

It is recommended that the focus of birthweight research in Australia is extended to include LGA births and that data collections capture information regarding maternal pre-pregnancy weight, maternal height and pregnancy weight gain to assist this endeavour. In addition, the implementation of routine geocoding of births would also be beneficial to enhance birthweight research and health service delivery.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Danielle Taylor
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Abbreviations

ABS	Australian Bureau of Statistics
AGA	Average for Gestational Age, Birthweight between the 10th and 90th percentile
AIHW	Australian Institute of Health and Welfare
ARC	Australian Research Council
ARIA	Accessibility and Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
ASGS	Australian Statistical Geography Standard
ATSI	Aboriginal and Torres Strait Islander
BMI	Body Mass Index
CCD	Census Collectors District
CI	Confidence Interval
DCDB	Digital Cadastral Data Base
GIS	Geographic Information System
GISCA	The National Centre for Social Applications of Geographical Information Systems, The University of Adelaide.
ID	Index of Dissimilarity
HBW	High Birthweight, birthweight more than 4000g
LBW	Low Birthweight, birthweight less than 2500g
LGA	Large for Gestational Age, birthweight greater than the 90th percentile
MAUP	Modifiable Areal Unit Problem
MDC	Midwives Data Collection

SEIFA IRSD	Socio-Economic Indexes for Areas Index of Relative Socio-Economic Disadvantage
SES	Socio-Economic Status
SD	Statistical Division
SGA	Small for Gestational Age, birthweight less than the 10th percentile
SLA	Statistical Local Area
TFR	Total Fertility Rate
UC	Urban Centre