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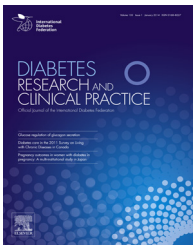

Brief report

# Understanding geographical inequities in diabetes: Multilevel evidence from 114,755 adults in Sydney, Australia

*Thomas Astell-Burt* [a,b,*], *Xiaoqi Feng* [c,d,e], *Gregory S. Kolt* [a], *Mark McLean* [f], *Glen Maberly* [f]

[a] *School of Science and Health, University of Western Sydney, Australia*
[b] *School of Geography and Geosciences, University of St Andrews, United Kingdom*
[c] *School of Health and Society, University of Wollongong, Australia*
[d] *Boden Institute of Obesity, Nutrition, Exercise and Eating Disorders, University of Sydney, Australia*
[e] *Menzies Centre for Health Policy, University of Sydney, Australia*
[f] *Clinical School, University of Western Sydney and Western Sydney Local Health District, Australia*

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ABSTRACT

Multilevel analysis revealed the odds of having diabetes varied geographically by 42% among 114,755 persons. Approximately 9% of this variation was attributable to behavioural risk factors, 41% due to health status and obesity, 26% due to socioeconomic circumstances and 13% to country of birth. Contextual risk factors warrant future investigation.



## 1. Introduction

Diabetes is expected to become the number one burden of disease in Australia within 10 years [1] and already accounts for well over A$10.6 billion in annual health expenditure [2]. Halting the rising prevalence of diabetes and improving access to effective patient management were among the many 'voluntary global targets' set out by the World Health Organisation in 2013 [3]. Although diabetes is preventable [4–6], targeting effective interventions in primary healthcare has proved challenging, partly because those who lead less healthy lifestyles are often also less likely to visit a primary care physician [7]. The analysis of geocoded health data can serve as an aid for understanding in which areas diabetes is particularly challenging and for targeting preventive health interventions accordingly, such as in the US [8] and China [9]. In Australia, recent reports have suggested there are substantial geographical variations in diabetes risk [10]. Accordingly, the purpose of this study was to explore the extent that the odds of having diabetes vary according to where people live and, if so, what are the potential person-level factors which drive these spatial inequities.

* *Corresponding author at*: School of Science and Health, University of Western Sydney, Australia. Tel.: +61 2 4620 3714; fax: +61 2 4620 3714.
E-mail address: T.Astell-Burt@uws.edu.au (T. Astell-Burt).

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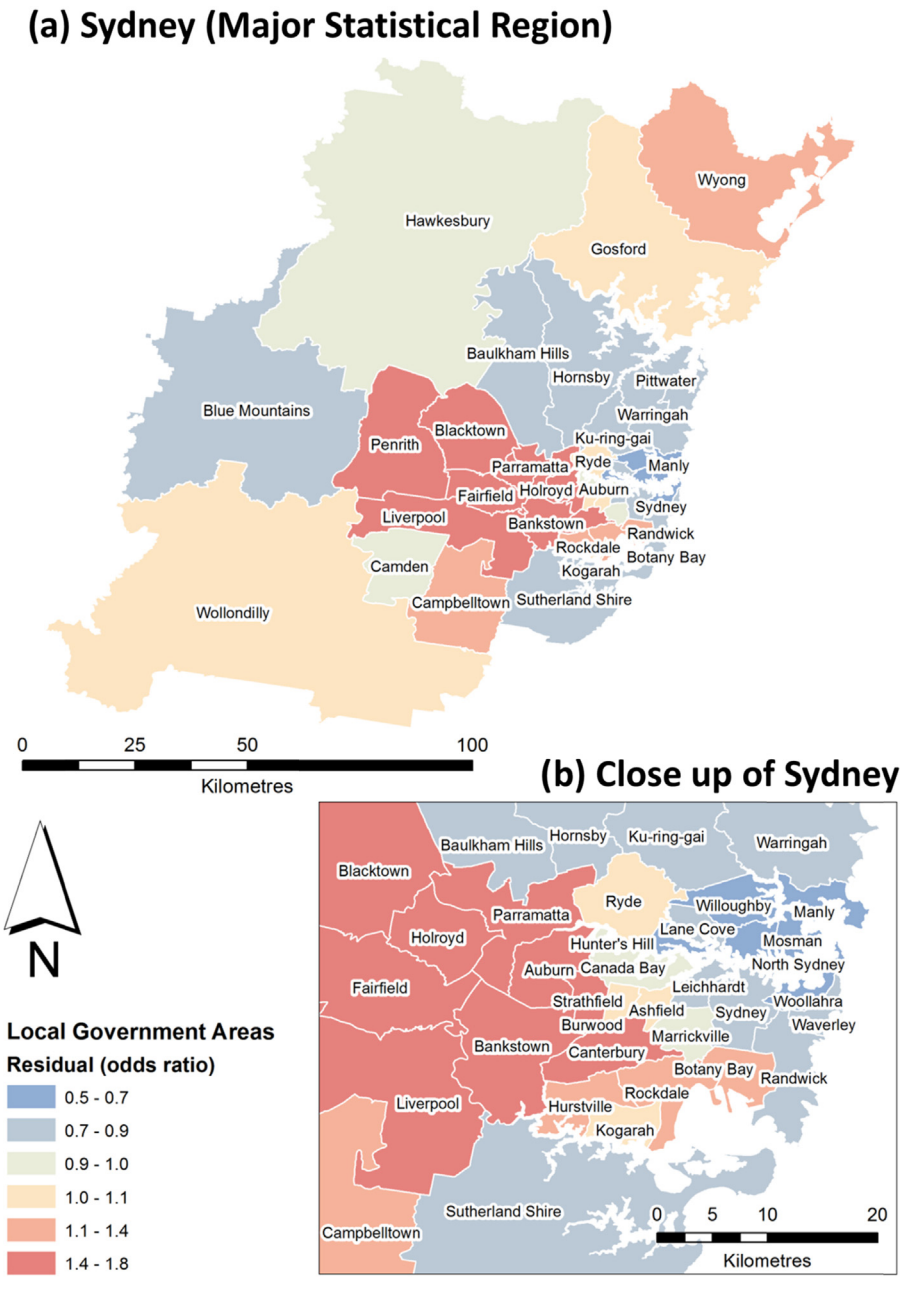
## 2. Data analysis

In New South Wales (NSW), the most populous state in Australia, 267,151 people of 45 years and older responded to The 45 and Up Study baseline questionnaire between 2006 and 2009 [11]. Participants had been randomly selected from the Medicare Australia database, which is the national provider of universal health insurance. Doctor-diagnosed diabetes was self-reported by all participants (responses were ''yes'' or ''no''). The sample for this paper was restricted to respondents living in Local Government Areas (LGAs) within the Sydney major statistical region ($n$ = 114,755). This ensured an 'urban' sample, with Sydney home to over 4.5 million people and the largest, most socioeconomically and culturally diverse city in Australia. The University of New South Wales Human Research Ethics Committee approved The 45 and Up Study.

A multilevel logistic regression [12] adjusted for age and gender was fitted in order to explore potential geographical variation in the odds of reporting diabetes across LGAs via area-level residuals and the median odds ratio (MOR) [13]. The residual for each LGA was exponentiated to an odds ratio and




Note 1: Intervals were used to define chloropleth map strata
Note 2: Map units are Local Government Areas (LGAs)
Note 3: LGAs above/below 1 indicate above/below average diabetes prevalence

**Fig. 1 – Geographic variation in the odds of having diabetes, expressed as residuals.**