



## Applying a social disparities lens to obesity in pregnancy to inform efforts to intervene

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### ABSTRACT

**Objective:** to examine the social correlates of pre-pregnancy overweight and obesity in an Australian population-based sample and consider implications for intervention effectiveness during pregnancy.

**Design:** population-based survey distributed by hospitals to women 6 months after birth.

**Setting:** two states of Australia.

**Participants:** women who gave birth in Victoria and South Australia in September/October 2007.

**Measurements and findings:** surveys were completed by 4,366 women. Pre-pregnancy body mass index (BMI) was calculated from women's self-reported weight in kilograms/(height in metres)<sup>2</sup>. Results showed high rates of overweight (22%) and obesity (14%) among Australian women entering pregnancy. After adjusting for other factors in the model, pre-pregnancy obesity was significantly associated with lower household income levels, less education, the experience of financial stress in pregnancy and increasing parity.

**Key conclusions:** to date, there is little evidence to support the efficacy of interventions to manage problematic weight in pregnancy. Applying a social disparities lens to obesity in pregnancy challenges us to consider social factors that may seem distal to obesity but are highly relevant to efficacious intervention.

**Implications for practice:** pregnancy care offers an opportunity to address social issues on the pathway to obesity. Current clinical care guidelines on maternal overweight and obesity in pregnancy rarely consider social contexts that place some women at risk and are a likely impediment to efficacious intervention.

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### Introduction

The increased risk of poor maternal and perinatal outcomes for women who are obese during pregnancy is well-established. An extensive international literature leaves no doubt about the deleterious consequences of maternal overweight and obesity on women's and babies health during pregnancy, labour and birth (Ramachenderan et al., 2008; Stotland, 2009; Dodd et al., 2011), as well as the early and later postnatal stages (Cnattingius et al., 1998; Sebire et al., 2001; Ruager-Martin, 2010). Overweight and obesity in pregnancy also negatively affect breast-feeding initiation and duration (Amir and Donath, 2007; Kitsantas and Pawloski, 2010), has been linked to an increased risk of postnatal depression (Krause et al., 2008; LaCoursiere et al., 2010), increases

perinatal health-care costs (Colagiuri et al., 2010), and debate continues about potential intergenerational effects (Rooney et al., 2010; Poston et al., 2011). This breadth of evidence has led to increasing pressure in research, practice and policy-making environments to consider appropriate intervention.

Despite a clear desire for prevention by engaging with women prior to conception, finding approaches to modifying risk for women who enter pregnancy overweight or obese requires attention. A recent review of interventions designed to ameliorate adverse health outcomes by targeting overweight and obesity in pregnancy reported a lack of evidence that antenatal dietary and lifestyle modifications are efficacious (Dodd et al., 2010). The authors did not consider the possibility that lifestyle interventions may fail if the social antecedents of overweight and obesity are not addressed. With an abundance of evidence about the social distribution of obesity it is unclear why social inequalities are not widely considered in the obstetric literature. Currently, the evidence-based is dominated by the consequence of maternal overweight and obesity in pregnancy. Studies that collect and

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report on maternal socio-demographic disparities in obesity usually only collect these data to characterise participants or control for their effect (Callaway et al., 2006; CMACE, 2010). Few studies specifically report the social context of maternal populations at risk (Heslehurst et al., 2007, 2010).

This paper builds on existing evidence that overweight and obesity are common among pregnant women by drawing on epidemiological data from an Australian population-based birth cohort to (i) assess social correlates of pre-pregnancy overweight and obesity and (ii) consider how these relationships represent challenges for effective intervention in pregnancy.

## Method

All public and private hospitals ( $n=110$ ) with maternity facilities and homebirth practitioners in two Australian states (South Australia and Victoria) agreed to distribute surveys to women who gave birth under their care in an 8 week study period (September/October 2007). One small public hospital withdrew at the time of the mail out because distribution of the survey coincided with major organisational change to clinical services.

### Procedure

Participating hospitals and homebirth practitioners identified all women giving birth in the pre-defined study period, excluding those who had a stillbirth or whose baby was known to have died, and posted pre-packaged envelopes to women 6 months post-partum. Letters explaining the purpose of the study were in English and in six other community languages (Arabic, Vietnamese, Cantonese, Mandarin, Somali and Turkish). Surveys were in English only. Two reminders were sent at 2-week intervals with the second including a repeat copy of the survey.

### Measures

Pre-pregnancy body mass index (BMI) was calculated from women's self-reported weight in kilograms/(self-reported height in metres)<sup>2</sup> and grouped according to World Health Organisation (WHO) classification guidelines (WHO, 2000): underweight ( $< 18.5$  kGM/m<sup>2</sup>); healthy weight (18.5–24.99 kGM/m<sup>2</sup>); overweight (25–29.99 kGM/m<sup>2</sup>) and obese ( $\geq 30$  kGM/m<sup>2</sup>).

Information was collected on maternal socio-demographics, reproductive history, and maternal and infant birth outcomes, including method of birth and infant birth weight. Socio-economic indices included household income: pre-tax income adjusted for household size and composition according to the modified OECD equivalence scale (Australian Bureau of Statistics, 2007); educational attainment; maternal country of birth; relationship status; hospital admission (private or public patient) and smoking status. We derived a measure of financial stress from a social issues and life events inventory list (e.g., involuntary job loss for participant or partner, not having enough money to buy food, trouble with gambling for participant or partner) and from survey items about support needed during pregnancy (e.g., money or other assistance to buy food). Inclusion of these items was based on previous research using similar items to conceptualise experiences of stress in pregnancy (Lu and Chen, 2004; Braveman et al., 2010).

### Analyses

To assess participant representativeness, the social and obstetric characteristics of the sample were compared with routinely collected data from the Perinatal Outcomes Unit in South

Australia and the Victorian Perinatal Data Collection Unit on all women giving birth in the study period. Social characteristics of women reporting to be in the healthy, overweight and obese weight ranges are described. We used logistic regression to examine whether associations with social factors differed for women reporting to be in a healthy weight range compared to overweight or obese. Unadjusted and adjusted Odds ratios and 95% confidence intervals (CIs) were calculated to determine the strength of these associations. Data were analysed using Stata, version 11 (Statacorp, College Station, TX, USA).

### Ethics approval

This study was approved by the Royal Children's Hospital Human Research Ethics Committee (HREC), Victorian Department of Human Services HREC, the South Australian Department of Health HREC and a number of other hospital-based HRECs.

## Findings

Participating hospitals and homebirth practitioners identified 8,597 eligible women. Several participating hospitals reported difficulties with identification, exclusion and mail out processes. Some hospitals did not mail all questionnaires and/or mailed questionnaires to women who were ineligible. A number of surveys were excluded ( $n=129$ ) because they were 'returned to sender', with dates outside the study period or from women who were ineligible (e.g., due to stillbirth). The adjusted response fraction is 52% (4,366/8,468).

Comparisons with routinely collected perinatal data in both states showed that women taking part in the survey were largely representative of all women giving birth in the study period on key obstetric characteristics including parity, method of birth and infant birth weight. Survey participants included fewer women born overseas of non-English speaking background, Aboriginal and Torres Strait Islander women, single women and women under 25 years (see Table 1).

BMI was calculated for 93% ( $n=4073$ ) of participants. Five per cent of women ( $n=182$ ) had a BMI of less than 18.5 kGM/m<sup>2</sup> (underweight); 59% ( $n=2,399$ ) were in the healthy weight range (18.5–24.99 kGM/m<sup>2</sup>); 22% ( $n=909$ ) were overweight (25–29.99 kGM/m<sup>2</sup>) and 14% ( $n=583$ ) were obese ( $> 30$  kGM/m<sup>2</sup>). As the focus of this paper is the social correlates of overweight and obesity in pregnancy, women reporting to be underweight were not considered in further analyses.

Table 2 summarises data on associations between maternal social characteristics and overweight and obesity. At the univariable level, pre-pregnancy overweight and obesity were associated with a number of socio-economic indicators. In comparison to women in the healthy weight range, women who were overweight or obese were significantly more likely to be in households earning less than \$40,000 per annum; have not completed a tertiary degree, be admitted to hospital as public patients and have experienced financial stress in the 12 months prior to birth. There was a significant increase in the odds of being overweight and obese with increasing parity, but not with increasing age.

Some of these demographic associations were more pronounced for women in the obese group. For example, women on very low household incomes ( $< A\$20,000$ ) were significantly more likely to overweight (OR=1.69; 95% CI 1.3–2.2), but were nearly three-and-a-half times more likely to be obese at the start of pregnancy (OR=3.36; 95% CI 2.4–4.5). Similarly, women who had not completed secondary education were more likely to be overweight (OR=1.60, 95% CI 1.3–1.9) but two-and-a-half times more likely to be obese (OR=2.47, 95% CI=1.9–3.1). Results

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