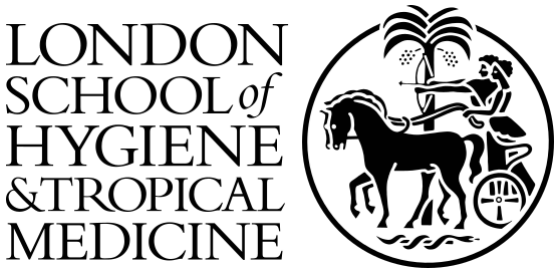

RESEARCH ARTICLE

Sociodemographic, obstetric and psychological determinants of obesity among women in early to mid-pregnancy in South India [version 1; peer review: 2 approved with reservations]

Shubhashree Venkatesh [1], Anita Nath [1], Sheeba Balan[1], Vindhya J[1], Chandra S. Metgud [2], Gudlavalleti Venkata Satyanarayana Murthy [3]

[1]Indian Institute of Public Health, Public Health Foundation of India, Bangalore, India
[2]Community Medicine, J.N.Medical College, Belagavi, India
[3]Indian Institute of Public Health, Public Health Foundation of India, Hyderabad, India

v1 **First published:** 04 Jan 2019, **4**:2 (https://doi.org/10.12688/wellcomeopenres.14954.1)
Latest published: 04 Jan 2019, **4**:2 (https://doi.org/10.12688/wellcomeopenres.14954.1)

Abstract

Background: Worldwide, the occurrence of obesity has markedly increased over the past decades with serious public health consequences. Obese pregnant women are more likely to develop hypertension, pre-eclampsia and gestational diabetes, resulting in obstetric complications which in turn may contribute to an increase in adverse child outcomes and maternal mortality. The present study was done to determine the prevalence of obesity and its association with socio-demographic variables, obstetric history and mental health.
Methods: This study was nested within an ongoing cohort study, CASCADE, in a public hospital in Bangalore. The study participants comprised of 280 pregnant women who were 18 years of age and above, with a gestational age of less than 24 weeks, enrolled between a period of August 1st, 2017 until April 30th, 2018. Weight and height were measured using calibrated devices to calculate the body mass index.
Results: The prevalence of obesity was observed to be 33.9% among the pregnant mothers. Obesity was found to be significantly associated with age, history of abortion, gravidity on multivariate logistic regression. No association was found with depression and anxiety.
Conclusions: Obesity is an important health concern among urban pregnant women in the region of South India. The prevalence is much higher than that reported in other studies. Increasing age, multigravidity and past history of abortion were significantly associated with maternal obesity.

Keywords

Obesity, pregnancy, prevalence, risk factors, India

This article is included in the Wellcome Trust/DBT India Alliance gateway.

Open Peer Review

Reviewer Status ? ?

	Invited Reviewers	
	1	**2**
version 1 published 04 Jan 2019	? report	? report

1 **Bani T. Aeri**, University of Delhi, India, New Delhi, India

2 **Hasse Karlsson**, University of Turku, Turku, Finland

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Anita Nath (anitanath@iiphh.org)

Author roles: Venkatesh S: Writing – Original Draft Preparation; **Nath A**: Conceptualization, Funding Acquisition, Writing – Review & Editing; **Balan S**: Formal Analysis; **J V**: Formal Analysis; **Metgud CS**: Supervision, Writing – Review & Editing; **Murthy GVS**: Resources, Supervision

Competing interests: No competing interests were disclosed.

Grant information: This project was funded by the Wellcome Trust/DBT India Alliance (Clinical and Public Health Research Fellowship) (1A/CPH1/16/1/502634).
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

How to cite this article: Venkatesh S, Nath A, Balan S *et al.* **Sociodemographic, obstetric and psychological determinants of obesity among women in early to mid-pregnancy in South India [version 1; peer review: 2 approved with reservations]** Wellcome Open Research 2019, **4**:2 (https://doi.org/10.12688/wellcomeopenres.14954.1)

First published: 04 Jan 2019, **4**:2 (https://doi.org/10.12688/wellcomeopenres.14954.1)

Introduction

Worldwide, the occurrence of obesity has markedly increased over the past decade, and the World Health Organization (WHO) has termed it as a "global epidemic" with serious public health consequences[1]. According to a recent estimate, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2016[1]. Using the WHO classification, body mass index (BMI) is estimated by dividing a person's weight in kilograms by the square of height in meters (kg/m^2) and is used to classify an individual as being underweight, normal overweight or obese; accordingly, obesity is defined as having a BMI greater than or equal to 30[2].

In low- and middle-income countries (LMIC), the prevalence of obesity ranges from being as low as 3.4 % to as high as 73.7% among women in the reproductive age group[3,4]. With the improving economy and better standard of living, the prevalence of overweight and obesity surpass that of underweight on a global scale[5]. In India, according to the National Family Survey-4 (NFHS-4), the prevalence of obesity is shown to be in the range of 13–50 % in an urban population while the range for rural areas is slightly less in the range of 8–38%[6]. This, in turn has resulted in a steep incline in the burden of non-communicable diseases (NCD's)[7].

Obese pregnant women are more likely to develop hypertension, pre-eclampsia and gestational diabetes[8,9], resulting in obstetric complications which in turn may contribute to an increase in the maternal mortality[10,11]. Moreover, the offspring of obese women tend to be large for gestational age and have a higher incidence of birth injuries and congenital abnormalities[12].

As obesity is a modifiable risk factor, it is imperative to identify this early so as to avoid any adverse consequence. While it is known that intake of calorie rich diet is an important risk factor for obesity, it is important to explore the ecological risk factors that could be of regional interest. The present study was done to determine the prevalence of obesity and its association with socio-demographic variables, obstetric history and mental health.

Methods

Study setting and participants

This study was nested within the ongoing 'CASCADE' cohort study, which is analyzing the effect of prenatal exposure to maternal cortisol, depression and anxiety on infant development in Bangalore, the protocol of which has already been published[13,14]. The cohort study is being conducted at Jayanagar General Hospital in Bangalore, which is a sub-district hospital. The study participants comprised of pregnant women, 18 years of age and above, with a gestational age of less than 24 weeks. High-risk pregnancies and women with a history of intake of steroidal drugs over the past year were not eligible to participate according to the study protocol's eligibility criteria. Data was analyzed for a study period of 9 months from August 1st 2017 until April 30th 2018, for those women who had completed their baseline visit; the number of these amounted to 280.

Electronic data capture was done using an Android-based application (CASCADE App version- 6). Data pertaining to socio-demographic factors and obstetric history was obtained. The socio-demographic variables included age, religion, education, occupation and socio-economic status of the study respondents.

The study participants were screened for depression using the Edinburg Postnatal Depression Scale (EPDS), the scores of which range from 0 to 30 points[15]. The 10-item Pregnancy Related Anxiety (PRAQ) scale was used to measure anxiety[16]. The data collected was uploaded and stored in a cloud server.

Calculation and categorization of BMI

Weight was recorded in kg using a TANITA HD 318, Class III electronic weighing scale, which was calibrated using standard weights from time-to-time. The scale was place on a stable part of the ground. The digital display was checked for 'zero' reading. The women were asked to stand bare-feet on the scale with minimal clothing and look straight ahead. One reading to the nearest 100 g was taken.

Height was measured in cm using a stadiometer. The participant was asked to remove her shoes and stand as tall and straight as possible with feet together, arms held loosely by the side and shoulders relaxed with her back, including the posterior surface of the head and heels applied to the wall. The head was positioned in the Frankfurt plane, such that an imaginary line joining the upper margin of the external auditory meatus and lower border of the orbit of the eye was placed horizontal. The head plate of the stadiometer, fixed to the wall, was pulled down and placed horizontal. Height was recorded to the nearest 0.1cm.

BMI was estimated by dividing the recorded weight in kg by the height in m^2, and classified using the WHO criteria[2].

Data analysis

Data were downloaded from the cloud server and cleaned before analysis. Statistical analysis was done using SPSS version 23. The prevalence of obesity was calculated by means of descriptive statistics in terms of proportion. The association between independent variables and obesity (dependent variable) was determined using bivariate analysis and reported in terms of crude odd's ratio (COR). The independent variables were dichotomized into two categories for the purpose of analysis. Those variables with P-value of ≤ 0.2 on the univariate analysis were entered into multivariate logistic regression model to calculate the adjusted odd's ratio and to eliminate the effect of confounding. Those variables with $p<0.05$ in the multivariate analysis were considered to be significant.

Ethical approval

Ethics committee approval was taken from the Institutional Ethics Committee of Indian Institute of Public Health-Bangalore [IIPHHB/TRCIEC/118/2017] and permission from the study hospital was taken prior to start of the study. Written informed consent was taken from all the respondents and they were assured of privacy and confidentiality of their data.

Results

Raw data for this study are available on OSF[17].

Socioeconomic profile

The socioeconomic profile of the study respondents is shown in Table 1. Most of the respondents were more than 20 years of age (72.9%). More than 90% were housewives. A total of 57.5% of subjects belonged to upper lower class and 72.1% were Muslims.

Prevalence of obesity

The prevalence of obesity was observed to be 33.9% among the pregnant mothers, with a mean BMI of 23.8±4.8 (kg/m^2) (Figure 1; Table 1).

Association of socio demographic variables with obesity

Association between sociodemographic variables with obesity showed that respondents who were more than 20 years of age were prone to obesity during pregnancy (adjusted odd's ratio: 2.412 (1.091-5.333); p=0.030) than those who were less than 20 years of age (Table 2).

Association of obstetric variables with obesity

In total, 41.7% of the multigravida women were obese (Figure 2). Table 3 shows the association between the obstetric variables with obesity. We found that gravidity and obesity were significantly associated wherein multigravida women were four times more likely to be obese (adjusted odd's ratio: 4.375 (1.184-16.161); p=0.027); The strength of association with other

Table 1. Sociodemographic profile of study participants.

Sociodemographic variable		N (%)
Age, years	≤ 20	76 (27.1%)
	≥ 20	204 (72.9%)
Religion	Hindu	73 (26.1%)
	Muslim	202 (72.1%)
	Christian	5 (1.8%)
Respondent education	≤ high school	203 (72.5%)
	≥ high school	77 (27.5%)
Respondent occupation	Working	23 (8.2%)
	Housewife	257 (91.8%)
Socio-economic status	Upper-middle class	36 (12.9%)
	Lower-middle class	83 (29.6%)
	Upper-lower class	161 (57.5%)

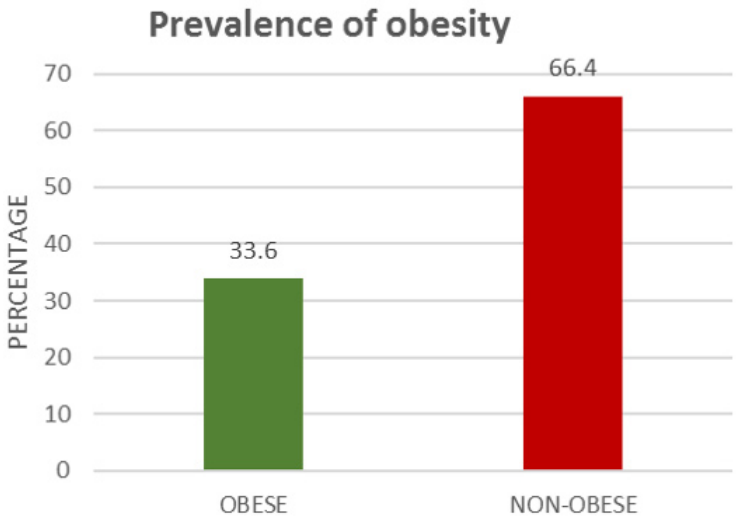

Figure 1. Prevalence of obesity.

Table 2. Association of socio-demographic variables with obesity.

Variables		Non-obese, n (%)	Obese, n (%)	Crude odds ratio (CI)	p-value	Adjusted odds ratio (CI)	p-value
Total		186 (100)	94 (100)				
Age	≤ 20 years (total, n=76)	59 (77.6)	17 (22.4)	1		1	
	≥ 20 (total, n=204)	127 (62.3)	77 (37.7)	2.069 (1.007-4.252)	0.048	2.412 (1.091-5.333)	0.030
Respondent's years of schooling	≤ 10 years (total, n=203)	133 (65.5)	70 (34.5)	1			
	≥10 years (total, n=77)	53 (68.8)	24 (31.2)	0.929 (0.444-1.945)	0.846		
Respondent's occupation	Working (total, n=23)	16 (69.6)	7 (30.4)	1			
	Housewife (total, n=257)	170 (66.1)	87 (33.9)	1.170 (0.464-2.950)	0.740		
Socioeconomic class	Upper middle class (total, n=36)	22 (61.1)	14 (38.9)	1			
	Lower middle class (total, n=83)	59 (71.1)	24 (28.9)	0.45 (0.163-1.278)	0.135	0.533 (0.223-1.275)	0.157
	Upper lower class (total, n=161)	105 (65.2)	56 (34.8)	0.528 (0.197-1.417)	0.205	0.671 (0.303-1.483)	0.324

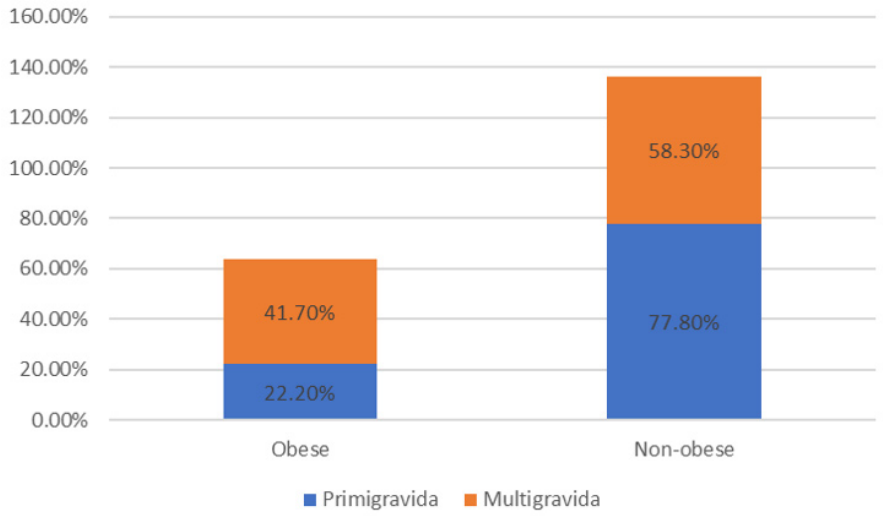

Figure 2. Distribution of obesity with gravida status.

variables such as history of abortions, parity and number of children was rather weak.

Association of psychological variables with obesity

No association was found between obesity with either depression (crude odds ratio: 0.933 (0.499-1.741); p=0.826] or with anxiety [crude odds ratio: 0.653 (0.309-1.377); p=0.263) during pregnancy (Table 4).

Discussion

In this study we estimated the prevalence of obesity among women during early to mid-pregnancy and its association with socio-demographic, obstetric and psychological variables. The prevalence of obesity among these women was 33.6%. Vittal *et al.* observed much lower prevalence rate of 8.2% in their study done among pregnant women in Hyderabad[18]. Likewise, about 11.7% of the pregnant women in Kozhikode were found to be obese[19]. In western countries, the prevalence of maternal obesity is found to range from 1.8% to 25.3%[20]. The higher prevalence of obesity in our study could be attributed to higher pre-pregnancy values of BMI, which was not estimated in this study. Women with higher pre-pregnancy BMI are at a higher risk of obesity during pregnancy[21,22]. According to an estimate from the year 2014, about 20 million women were reported

Table 3. Association of obstetric variables with obesity.

Variables		Non-obese, n (%)	Obese, n (%)	Crude odds ratio (CI)	p- value	Adjusted odds ratio (95% CI)	p- value
Total		186 (100)	94 (100)				
Unplanned pregnancy	No (total, n=154)	97 (63)	57 (37)	1			
	Yes (total, n=126)	89 (70.6)	37 (29.4)	0.551 (0.296-1.026)	0.060	0.531 (0.277-1.019)	0.115
Gravida	Primigravida (total, n=117)	91 (77.8)	26 (22.2)	1			
	Multigravida (total, n=163)	95 (58.3)	68 (41.7)	4.675 (1.367-15.987)	0.014	4.375 (1.184-16.161)	0.027
Parity	Nullipara (total, n=129)	97 (75.2)	32 (24.8)	1			
	Para (total, n=151)	89 (58.9)	62 (41.1)	0.606 (0.162-2.276)	0.452		
H/O Abortion	No abortion (total, n=218)	147 (67.4)	71 (32.6)	1			
	Abortion (total, n=62)	39 (62.9)	23 (37.1)	0.498 (0.212-1.169)	0.109	0.388 (0.94-1.447)	0.36
Number of living children	None (total, n=144)	106 (73.6)	38 (26.4)	1			
	1 or more (total, n=136)	80 (58.8)	56 (41.2)	0.611 (0.173-2.155)	0.444		

Table 4. Association of psychological variables with obesity.

Variables		Non-Obese, n (%)	Obese	Crude odds ratio (CI)	p-value
Total		186 (100)	94 (100)	N/A	N/A
Depression	Depressed (total, n=100)	69 (69)	31 (31)	0.933 (0.499-1.741)	0.826
	Not depressed (total, n=180)	117 (65)	63 (35)	1	
Pregnancy-related Anxiety	Anxious (total, n=124)	82 (66.1)	42 (33.9)	0.653 (0.309-1.377)	0.263
	Non-anxious (total, n=156)	104 (66.7)	52 (33.3)	1	

to be obese in India[23]. This is mostly ascribed to the changing lifestyles, with particular reference to dietary habits comprising of high intake of processed foods and poor intake of essential micronutrients and fiber, known as 'nutritional transition[24]. Moreover, obesity tends to be concentrated in urban women, largely from better socio-economic background[25]. However, in our study, lower income appeared to increase the risk; this finding has been corroborated by other studies[21].

In our study, among the socio-demographic variables, only age appeared to be significantly associated with obesity wherein women above the age of 20 years were more likely to be obese. Misra *et al.* also observed that increasing age contributed to a rise in the prevalence of obesity[7]. Analysis of NFHS data also indicates a similar trend[26]. Among the obstetric variables' gravidity appeared to have a significant relationship with obesity. The likelihood of multigravida womenbeing obese was significantly higher in our study; other studies have also cited synonymous findings[21,27]. While other studies have shown that obese women were at a greater risk of pregnancy loss[28,29], in the present study, the strength of association between past history of abortion and obesity was found to be weak.

We did not observe any link between mental morbidities such as anxiety, depression and obesity. Anxiety and depression may result in weight gain in some instances[30] and some studies have shown the existence of a modest association[31,32].

Obesity is a multifactorial health-related condition. Since the present study was nested within an ongoing cohort study, as described in the study section, we could collect data pertaining to a few selected risk factors relevant to obesity from the baseline study tool. Also, we could not analyze gestational weight gain as the pre-pregnancy BMI value was not available. Moreover, in lower-income settings, majority of the pregnant women report to the antenatal clinic later in pregnancy and hence

the BMI during early pregnancy may not always be obtained. As a part of the study protocol, women with severe obstetric complications and those with a history of recent intake of steroidal medication were excluded from the study which could have impacted our study findings and limited the generatability of the study results.

The present study highlights obesity as an important health concern among urban pregnant women of this region of South India. The prevalence is much higher than that reported in other studies. Increasing age, multigravidity and past history of abortion were significantly associated with maternal obesity.

Data availability

Raw data for this study, including answers to the questionnaire, the BMI and EPDS and PRAQ scores, are available on OSF. DOI: https://doi.org/10.17605/OSF.IO/FB5MS[17].

Grant information

This project was funded by the Wellcome Trust/DBT India Alliance (Clinical and Public Health Research Fellowship) (1A/CPH1/16/1/502634).

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgments

We thank all the staff from Jayanagar General Hospital for supporting us during the period of data collection.

References

1. World Health Organization: **Obesity: Preventing and managing the global epidemic**. Geneva: World Health Organization, 2000.
Reference Source
2. World Health Organization: **Facts about overweight and obesity**. [last accessed on 7th August 2018].
Reference Source
3. Finucane MM, Stevens GA, Cowan MJ, *et al.*: **National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants.** *Lancet.* 2011; **377**(9765): 557–67.
PubMed Abstract | Publisher Full Text | Free Full Text
4. Lopez-Arana S, Burdorf A, Avendano M: **Trends in overweight by educational level in 33 low- and middle-income countries: the role of parity, age at first birth and breastfeeding.** *Obes Rev.* 2013; **14**(10): 806–17.
PubMed Abstract | Publisher Full Text | Free Full Text
5. Black RE, Victora CG, Walker SP, *et al.*: **Maternal and child undernutrition and overweight in low-income and middle-income countries.** *Lancet.* 2013; **382**(9890): 427–51.
PubMed Abstract | Publisher Full Text
6. International Institute for Population Sciences (IIPS) and ICF: **National Family Health Survey (NFHS-4), 2015-16: India**. Mumbai: IIPS. 2017.
Reference Source
7. Misra A: **Ethnic-Specific Criteria for Classification of Body Mass Index: A Perspective for Asian Indians and American Diabetes Association Position Statement.** *Diabetes Technol Ther.* 2015; **17**(9): 667–71.
PubMed Abstract | Publisher Full Text | Free Full Text
8. Weycker D, Nichols G, O'Keeffe-Rosetti M, *et al.*: **Excess risk of diabetes in persons with hypertension.** *J Diabetes Complications.* 2009; **23**(5): 330–6.
PubMed Abstract | Publisher Full Text
9. Torloni MR, Betrán AP, Horta BL, *et al.*: **Prepregnancy BMI and the risk of gestational diabetes: a systematic review of the literature with meta-analysis.** *Obes Rev.* 2009; **10**(2): 194–203.
PubMed Abstract | Publisher Full Text
10. Poulter N: **Global risk of cardiovascular disease.** *Heart.* 2003; **89 Suppl 2**: ii2–5; discussion ii35–7.
PubMed Abstract | Publisher Full Text | Free Full Text
11. Agrawal S, Singh A: **Obesity or Underweight-What is Worse in Pregnancy?** *J Obstet Gynaecol India.* 2016; **66**(6): 448–452.
PubMed Abstract | Publisher Full Text | Free Full Text
12. Mandal D, Manda S, Rakshi A, *et al.*: **Maternal obesity and pregnancy outcome: a prospective analysis.** *J Assoc Physicians India.* 2011; **59**: 486–9.
PubMed Abstract
13. Nath A, Murthy GVS, Babu GR, *et al.*: **Effect of prenatal exposure to maternal cortisol and psychological distress on infant development in Bengaluru, southern India: a prospective cohort study.** *BMC Psychiatry.* 2017; **17**(1): 255.
PubMed Abstract | Publisher Full Text | Free Full Text
14. **Cohort study on Association of Stress and Cortisol level in Antenatal women with Developmental Effects in the off-spring**.
Reference Source
15. Cox JL, Holden JM, Segovsky R: **Edinburgh Postnatal Depression Scale (EPDS).** *Adapted from the Br J of Psychiatry.* 1987; **150**.
Reference Source
16. Huizink AC, Delforterie MJ, Scheinin NM, *et al.*: **Adaption of pregnancy anxiety questionnaire-revised for all pregnant women regardless of parity: PRAQ-R2.** *Arch Womens Ment Health.* 2016; **19**(1): 125–132.
PubMed Abstract | Publisher Full Text | Free Full Text
17. Venkatesh S, Sheeba B, Vindhya J, *et al.*: **Sociodemographic, Obstetric and Psychological Determinants of Obesity among Women in Early to Mid-Pregnancy in South India.** *OSF.* 2018.
http://www.doi.org/10.17605/OSF.IO/FB5MS
18. Vittal DS, Rani VU: **Maternal obesity and its outcome in the fetus.** *Int J Adv Med.* 2016; **3**(1): 125–9.
Publisher Full Text
19. Kumar HSA, Chellamma VK: **Effect of Maternal Body Mass Index on Pregnancy Outcome.** *Int J Sci Stud.* 2017; **4**(10): 81–84.
Reference Source
20. Guelinckx I, Devlieger R, Beckers K, *et al.*: **Maternal obesity: pregnancy complications, gestational weight gain and nutrition.** *Obes Rev.* 2008; **9**(2): 140–150.
PubMed Abstract | Publisher Full Text
21. Gaillard R, Durmuş B, Hofman A, *et al.*: **Risk factors and outcomes of maternal obesity and excessive weight gain during pregnancy.** *Obesity (Silver Spring).* 2013; **21**(5): 1046–55.
PubMed Abstract | Publisher Full Text
22. Grammatikopoulou MG, Pritsa AA, Badeka S, *et al.*: **A pilot study on the prevalence of maternal obesity in selected Greek counties.** *Endocrinol Nutr.* 2013; **60**(9): 507–12.
PubMed Abstract | Publisher Full Text
23. NCD Risk Factor Collaboration (NCD-RisC): **Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants.** *Lancet.* 2016; **387**(10027): 1513–1530.
PubMed Abstract | Publisher Full Text | Free Full Text
24. Popkin BM, Adair LS, Ng SW: **Global nutrition transition and the pandemic of obesity in developing countries.** *Nutr Rev.* 2012; **70**(1): 3–21.
PubMed Abstract | Publisher Full Text | Free Full Text
25. Lopez-Arana S, Burdorf A, Avendano M: **Trends in overweight by educational level in 33 low- and middle-income countries: the role of parity, age at first birth and breastfeeding.** *Obes Rev.* 2013; **14**(10): 806–817.
PubMed Abstract | Publisher Full Text | Free Full Text
26. Gouda J, Prusty RK: **Overweight and Obesity among Women by Economic Stratum in Urban India.** *J Health Popul Nutr.* 2014; **32**(1): 79–88.
PubMed Abstract | Free Full Text
27. Kanguru L, McCaw-Binns A, Bell J, *et al.*: **The burden of obesity in women of**

reproductive age and in pregnancy in a middle-income setting: A population based study from Jamaica. *PLoS One.* 2017; **12**(12): e0188677.
PubMed Abstract | Publisher Full Text | Free Full Text

28. Lashen H, Fear K, Sturdee DW: **Obesity is associated with increased risk of first trimester and recurrent miscarriage: matched case-control study.** *Hum Reprod.* 2004; **19**(7): 1644–1646.
PubMed Abstract | Publisher Full Text

29. Metwally M, Ong KJ, Ledger WL, *et al.*: **Does high body mass index increase the risk of miscarriage after spontaneous and assisted conception? A meta-analysis of the evidence.** *Fertil Steril.* 2008; **90**(3): 714–726.
PubMed Abstract | Publisher Full Text

30. Torres SJ, Nowson CA: **Relationship between stress, eating behavior, and obesity.** *Nutrition.* 2007; **23**(11–12): 887–894.
PubMed Abstract | Publisher Full Text

31. Luppino FS, de Wit LM, Bouvy PF, *et al.*: **Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies.** *Arch Gen Psychiatry.* 2010; **67**(3): 220–9.
PubMed Abstract | Publisher Full Text

32. DiPietro L, Anda RF, Williamson DF, *et al.*: **Depressive symptoms and weight change in a national cohort of adults.** *Int J Obes Relat Metab Disord.* 1992; **16**(10): 745–53.
PubMed Abstract

Open Peer Review

Current Peer Review Status: ? ?

Version 1

Reviewer Report 15 May 2019

https://doi.org/10.21956/wellcomeopenres.16311.r35273

?

Hasse Karlsson
FinnBrain Birth Cohort Study, Turku Brain and Mind Center, Institute of Clinical Medicine, University of Turku, Turku, Finland

This is a study from India reporting on some determinants of obesity among Indian pregnant women. The paper is clearly written and adds knowledge to this increasingly common phenomenon. I have some questions and comments:

1. Firstly, in the methods section no information is given about how consent was obtained, if an ethics committee statement was requested or how many women declined to participate.

2. Secondly, the numbers in the text and Figure 1 do not match. In the text the prevalence of obesity is 33.9% and in the table it is 33.6%.

3. Thirdly, reference 14 is deficient as the journal is lacking.

4. Altogether I would expect a more thorough discussion of the results. It is known that the prevalence of obesity among pregnant women is highest in the world in India (Chen *et al.*, 2018[1]). Why is this so? Why was education not measured, as in previous studies it has had a clear association with obesity? Why did the authors not find an association between psychiatric symptoms and obesity, as has been found in many previous studies?

References

1. Chen C, Xu X, Yan Y: Estimated global overweight and obesity burden in pregnant women based on panel data model.*PLoS One*. 2018; **13** (8): e0202183 PubMed Abstract | Publisher Full Text

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Pregnancy cohort, prenatal stress

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 25 April 2019

https://doi.org/10.21956/wellcomeopenres.16311.r35286

?

Bani T. Aeri
Department of Food and Nutrition, Institute of Home Economics,, University of Delhi, India, New Delhi, Delhi, India

The authors have meticulously documented the work done and have clarified that the results presented are part of a larger on-going project.

Some observations:

1. In the discussions the authors have mentioned that pre-pregnancy weight was not known and hence the classification of pregnant women being overweight and obese was done on weight taken during the course of their pregnancy (most likely well into the 2nd trimester). However, it is expected that pregnant women gain some weight by their 24th week of gestation. So, on the basis of their current weight, classifying them as obese seems a bit too simple a process. Is it possible for the authors to segregate them on the basis of their gestational period? If many are before 20 weeks of gestation, then, as per the literature, the weight can be taken as pre-pregnancy weight.

2. The age has been stratified as below 20 years and above 20 years. Below 20 years would in fact mean cases of teenage pregnancy. These young women are anyway undernourished. The numbers in this group are also less (27%). Anyone above 20 years, up to the maximum age of the subjects of the study, has been grouped together. This too seems like a very simplistic and basic

analysis, which would give some co-relation, but does not add to the understanding. The increase in weight with age is well known.

3. Similarly, for gravidity the analysis is either primigravida or multi. It can be assumed that the women who have more than 1 child would be also older in age.

4. The data showed that women belonging to lower SES were in fact more obese. This could be highlighted that even the LSES has the problem of overweight and obesity. The authors can also provide the criteria/basis/classification of division of the SES.

References

1. Arora P, Tamber Aeri B: Gestational Weight Gain among Healthy Pregnant Women from Asia in Comparison with Institute of Medicine (IOM) Guidelines-2009: A Systematic Review.*J Pregnancy*. 2019; **2019**: 3849596 PubMed Abstract | Publisher Full Text

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal nutrition, NCD management, Diet and heath, adolescent health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.