

Effect of overweight/obesity on caesarean section occurrence among reproductive-aged women in Ethiopia: a secondary data analysis

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ABSTRACT

Background The burden of overweight/obesity increased worldwide and it has unpredictable effect on maternal morbidity and mortality. Different adverse perinatal outcomes observed in overweight/obese women, of those caesarean section occurred frequently. In Ethiopia, the national caesarean section and overweight/obesity rate among reproductive-aged women increased tremendously. Therefore, we intend to assess the association between overweight/obesity with caesarean section in Ethiopia.

Method The data were extracted from the 2016 Ethiopia Demographic and Health Survey in nine regions and two city administrations. A stratified two-stage random sampling design was used to collect data. The exposure variable was overweight/obesity, and the outcome variable was a caesarean section. The final analytical sample consisted of 6928 participants. SPSS V.23 was used to analyse the data. Descriptive statistics and cross-tabulation were performed to describe the study variables. Univariable and multivariable logistic regression models were regressed.

Results The prevalence of caesarean section among women aged between 15–49 years old who gave birth in the last 5 years was 245 (3.54%). The occurrence of caesarean section among overweight/obese women was 2.05 higher as compared with normal-weight women (AOR: 2.05, 95% CI: 1.09 - 3.83).

Conclusion and recommendation Promoting weight reduction programmes throughout the country would have a greater contribution to reduce caesarean section rate and health cost, and to improve the health of the mother.

BACKGROUND

Obesity is now considered as non-communicable pandemic disease in the entire world. It is a significant health issue for women during pregnancy and the puerperium period. Maternal obesity is associated with an increased risk of antenatal, perinatal, puerperium and neonatal complications.¹

Globally, caesarean section (CS) rate has increased by 3.7% each year between 2000 and 2015. Delivery through CS accounted for 12% of all live births in 2000 and 21% of live

births in 2015.² The minimum and maximum rates of CS still do not have an exact cut-off value, but some scholars recommended the CS rates that belong to 5%–15% of all births are tolerable. A WHO research findings publication reported that the global average CS rate increased from 12.4% to 18.6% from 1990 to 2014. The CS rate was high in developed and low in the developing world.³

In Ethiopia, the national CS rate increased from 0.7% in 2000 to 1.9% in 2016, which increased threefold.^{4 5} Simultaneously, the proportion of overweight/obese (OWO) has increased from 3% in 2000 to 8% in 2016 among reproductive-aged women.^{4 5}

Maternal obesity is associated with increased risks of complications in late pregnancy such as caesarean delivery and shoulder dystocia. Obese women are almost two times more likely to experience induction of labour compared with women with a body mass index (BMI) <25 kg/m². Women with a pre-pregnancy BMI ≥30 kg/m² were three times more likely to experience CS distress as compared with women who had normal BMI.⁶ Obesity is a well-established risk factor for maternal and neonatal morbidity. Among the different adverse perinatal outcomes observed in OWO women, the incidence of CS accounted high percentage.⁷

High BMI and accumulation of body fat mass are an important predictor for the metabolic disorder,⁸ obesity during pregnancy leads to an adverse neonatal outcome (skeletal muscle injury, respiratory distress syndrome, injury to the peripheral nervous system, bacterial sepsis, convulsion, hypoglycaemia)^{9–11} and maternal morbidity.¹²

In Ethiopian context, studies conducted previously on OWO and CS were descriptive and founded on pocket area which make it difficult to generalise. Therefore, the purpose

of this study was to analyse the Ethiopia Demographic and Health Survey (EDHS) data to assess the association between OWO and CS. The findings of the current study will generate evidence for policymakers, programme designer and health professionals to take appropriate actions among reproductive-aged women in Ethiopia.

METHODS

Study setting and design

The 2016 EDHS was designed to provide up-to-date estimates of key demographic and health indicators in Ethiopia. The data are collected from nine regions and two city administrations every 5 years. A detailed description of the study design and methodology of 2016 is found elsewhere.⁵ In brief, a stratified two-stage random sampling design was used to collect data from a nationally representative sample. In the first stage, a total of 645 enumeration areas (EAs) (202 in urban areas and 443 in rural areas) were selected with probability proportional to EA size and with independent selection in each sampling stratum. In the second stage, a fixed number of 28 households per cluster were selected with an equal probability systematic selection from the newly created household listing. A total of 15 683 women aged 15–49 years were interviewed in the 2016 EDHS, of which 6928 women had at least one live birth in the last 5 years before the survey. We excluded women with missing data on the question related to the outcomes of interest, like women's twin pregnancy.⁵

Outcome of interest

The outcome of interest was a CS which was assessed by asking the mother to recall 'Whether the last child born in the last 3/5 years was born by CS or not', which has binary outcome. Women who responded 'Don't know' were excluded.⁵

Exposure variable

OWO was categorised based on BMI result; thus, BMI was calculated by dividing weight in kilograms by height in metres squared (Kg/M^2). The classification of BMI is taken from the WHO standard, that is, $\text{BMI} < 18.5 \text{ kg}/\text{m}^2$, 'underweight'; $\text{BMI} = 18.5\text{--}24.9 \text{ kg}/\text{m}^2$, 'normal weight'; $\text{BMI} \geq 25\text{--}29.9 \text{ kg}/\text{m}^2$ considered as overweight and $\text{BMI} \geq 30 \text{ kg}/\text{m}^2$ categorised as obese. The BMI level was recorded at the time of data collection.⁵

Covariates

Based on previous researches, the following covariates were selected: age of mother, household wealth index, educational level, occupational status, marital status, anaemia level, antenatal care visit, administrative region and smoking habit.^{10 11 13}

Statistical analysis

SPSS V.23 was used to analyse the data. Descriptive statistics and cross-tabulation were performed to describe the study variables. Univariable and multivariable logistic

regression models were regressed to determine the association between OWO and CS. Crude Odds Ratio and Adjusted Odds Ratio (AOR) were presented with 95% CIs. Each covariate was included in the multivariable model regardless of their statistical significance in the univariable analysis. Finally, the association between OWO and CS was declared statistically significant at p value of < 0.05 .¹⁴

RESULT

Table 1 displays the characteristics of the study sample. The prevalence of CS among women aged between 15 and 49 years old who gave birth in the last 3/5 years was 245 (3.54%). Regarding residence, 5504 (79.4%) were rural dwellers and 4202 (60.6%) had no formal education. More than half, 4051 (58.5%), of women did not have any work, and 1391 (20%) were engaged in agricultural work. Anaemia status was assessed through haemoglobin (HGB) level; 4565 (65.9%) had normal HGB levels.

According to EDHS 2016, 4242 (61.2%) women delivered in their home, 2686 (38.7%) women delivered in a health institution and 98 (1.4%) women delivered in other places. Among 6928 women, 4847 (70%) did not use any family planning method currently, 2037 (29.4) used modern contraceptive currently and 44 (0.6%) used traditional family planning methods. Regarding alcohol consumption, 4894 (70.6) women did not take any alcohol in lifetime ever and 2034 (29.4%) women drank alcohol before the survey.

Being OWO was significantly associated with CS. The odds of CS among OWO women were 2.05 higher as compared with normal-weight women (AOR: 2.05, 95% CI: 1.09 to 3.83) (table 2 and online supplemental file 1).

DISCUSSION

This study assessed the association between OWO and CS delivery. The result showed that OWO was significantly associated with CS. The current study is the first to examine the association between OWO and CS in Ethiopia at the national level.

Being OWO increased the odds of CS rate 2.05 times as compared with those women with normal weight (table 2). This finding is consistent with a study conducted in Greece,⁹ Iraq, Nigeria,^{10 13} India¹⁵ and an experimental study in the UK.¹⁶ This might be because of OWO women have an abnormal or excessive fat accumulation that narrows the pelvic cavity. Additionally, the excess accumulation of fat among women also increases the weight of the fetus which results in macrocosmic baby. CS is highly prevalent among OWO women and a major obstetric complication.¹⁷ Obese women are at higher risk of complications at the time of labour and delivery. The rate of successful vaginal delivery decreases progressively as maternal BMI increases. A meta-analysis of 33 studies showed that the occurrence of CS delivery was 1.46, 2.05 and 2.89 times more among overweight,

Table 1 Characteristics of the study sample cross-tabulated with caesarean section among reproductive-aged women in Ethiopia (n=6928)

Variables	Category	Caesarean section	
		No	Yes
Age in years	15–24	1735	43
	25–34	3286	141
	35–49	1662	61
Residence	Urban	1243	181
	Rural	5440	64
Educational status	No education	4163	39
	Primary	1804	82
	Secondary	493	54
	Higher	223	70
Marital status	Single	46	9
	Married	6119	217
	Living with a partner	81	1
	Widowed	100	1
	Divorced	260	10
Occupation	Separated	77	7
	Agriculture	1391	20
	Sales and services	812	11.7
	Skilled manual	244	3.5
	Professional	140	2
	Unskilled manual	97	1.4
	Clerical	41	0.6
Wealth index	Not working	4051	58.5
	Poor	3459	29
	Middle	988	13
Anaemia level	Rich	2236	203
	Non-anaemic	4380	185
	Mild	1470	39
	Moderate	618	9
Smokes cigarettes	Severe	103	2
	No	66115	243
	Yes	68	2

Table 2 The univariable and multivariable logistic regression analyses of body mass index with caesarean section among reproductive-aged women in Ethiopia

Variables		Caesarean section		Crude OR	95% CI	Adjusted OR	95% CI	P value
		No	Yes					
Body mass index	Underweight	1609	20	0.55	0.25 to 1.19	0.78	0.30 to 1.67	0.14
	Normal	4477	130	Reference		Reference	Reference	
	OWO	597	95	4.95	3 to 8.19	2.05	1.09 to 3.83	0.033

Statistically significant at p<0.05.

Adjusted for age, marital status, wealth index, anaemia, occupation, administrative region, smoking habit and educational status of women. OWO, overweight/obese.

obese and severely obese women, respectively, as compared with normal-weight pregnant women.¹⁸ This is also supported by another study which stated that obese women had higher odds of complications at delivery such as prolonged pregnancy (post-term), induced deliveries and CS. The study conducted in England proves that obstetric complications were higher among women in high BMI category as compared with women whose BMI is in the normal range.¹⁹ As women develop obesity, they have high probability of developing birth complication and birth injury. Even if CS is one mode of delivery but the complication is high, managing the root cause like OWO is essential.

The current national survey has some limitations. First, the cross-sectional nature of the study precludes concluding the influence of OWO with CS. Additionally, this study is prone to residual confounding and misclassification bias. The relatively large sample size, availability of detailed data on confounders, standardised instruments and high-quality data collection techniques were the strengths of the current study.

CONCLUSION

OWO was significantly associated with CS. Promoting weight reduction programmes throughout the country would have a greater contribution to lower CS rate and health cost, and improve the health of the mother.

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Contributors MLE conceived and designed the study, extracted and analysed the data, and drafted the manuscript. MLE, GD, HA and BLE analysed the data and wrote the manuscript.

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