

Original Research Article

Pregnancy outcomes in women with excessive gestational weight gain in Dschang health district of Cameroon

Skinner Lekelem Nguefack^{1,2*}, Jackson Jr Ndenkeh^{3,4}, Cavin Bekolo¹, Bruno Kenfack¹

¹Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Cameroon,

²Institute of Medical Technology of Nkolondom, Yaoundé, Cameroon

³Center of International Health, Ludwig Maximilian University of Munich, Germany

⁴Dschang District Hospital, west region, Cameroon

Received: 14 January 2021

Accepted: 10 February 2021

*Correspondence:

Dr. Skinner Lekelem Nguefack,
E-mail: lekelemn@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Excessive gestational weight gain (EGWG) during pregnancy can lead to adverse outcomes for the mother and/or the new-born. The aim of the study was to determine the prevalence of EGWG as well as its effect on pregnancy outcomes amongst pregnant women at the health district of Dschang in Cameroon.

Methods: This was a cross sectional study conducted from January to June 2019 and targeting all consenting pregnant women in Dschang District Hospital. They were administered a prepared questionnaire followed by their body mass index measurements for times at the beginning and the end of gestation to measure GWG. Logistic regression was used to determine the association of the EGWG to some particular pregnancy outcomes, adjusting for other factors with significance set at 5%.

Results: A total of 400 women were included in this study with a mean age of 27±5years, 59.2% being married and 34.8% still being students. Also it was noted that 24.8% of these women were obese while 25.3% had EGWG. Furthermore, EGWG was independently associated to prolonged labour (aOR=2.4; CI: 1.3-4.6; p value=0.007), genital tract laceration (aOR=2.0; CI: 1.0-3.8; p value=0.036) and foetal macrosomia (aOR=7.3; CI: 3.5-15.2; p value<0.001).

Conclusions: The prevalence of EGWG was high and it was associated with prolonged labour, genital tract laceration and foetal macrosomia. There is thus the need to improve the awareness of these women on EGWG as well as a constant follow up all through gestational period so as to regulate their GWG. The above measures will help to reduce occurrence of these complications, and consequently reduce maternal and neonatal mortality.

Keywords: Excessive gestational weight gain, Pregnancy outcomes, Cameroon

INTRODUCTION

Pre-pregnancy obesity and excessive weight gain during pregnancy can lead to adverse outcomes for the mother and/or new-born. The amount of weight that a woman can expect to gain during pregnancy varies depending on the woman's existing body mass index.^{1,2} In 2009 the institute of medicine in USA recommended weight gain during pregnancy according to the pre pregnancy BMI: a

tolerable weight gain ranging between 12-18 kg for body mass index (BMI) <18.5 kg/m² to between 5-9 kg for BMI >30 kg/m².^{3,4} Maternal obesity before and during pregnancy is widely recognised to have immediate implications in terms of pregnancy complications. This is of great concern especially as a drastic increase in the prevalence of overweight and obesity in women of child bearing age is generally being noticed, making some women to attribute obesity to child bearing.^{5,6}

Maternal obesity traditionally considered a health problem of high-income countries, in recent years has received more attention from low and middle-income countries a good number of which now face a double burden of malnutrition.^{7,8} Notwithstanding, obesity is higher in high-income countries but becoming significantly high in low and middle-income contexts and with severe consequences.^{9,10} In most of these latter countries, more women are overweight or obese (BMI ≥ 25 kg/m²) than are underweight (BMI < 18.5 kg/m²) showing thus trends of significant increase of overweight or obese adults living in sub-Saharan Africa by 2030.^{11,12} A survey from 27 countries in sub-Sahara Africa by Cresswell et al in 2012 showed 19.1% and 5.3% of women of child bearing age were over weighted and obese respectively.¹¹ A systematic review by Onubi et al in 2015 showed that the prevalence of maternal obesity in Africa ranged from 6.5%-50.7% while also underlining that older and multiparous mothers were more likely to be obese.¹³ It is estimated that 1/3 of women in South Africa are obese and a direct link between obesity and adverse maternal and perinatal outcomes is being reported.¹⁴ Similarly, overweight and obesity are being increasingly common in Cameroon; a survey in 2012 showed that 32% of women of child bearing age were over weighted or obese with urban residency, higher age and availability of TV sets (leading to more sedentary lifestyle) being independently related.¹⁵

While the effects of maternal under-nutrition are well known, there is still not enough information on the effects of maternal obesity in the context of Cameroon. This study was thus implemented to determine the prevalence of EGWG as well as its effect on pregnancy outcomes amongst pregnant women from Dschang Health District.

METHODS

This was a hospital based cross sectional study conducted in Dschang District Hospital and which lasted 6months from January to June 2019. The above hospital was selected as the most frequented in the Dschang Health District in terms of antenatal consultation receiving a minimum of 12 pregnant women daily and coming from all the corners of the district. Sample size for this study was calculated using the following formula which gave a minimum of 327:

$$n = \frac{Z^2pq}{\alpha^2}$$

where Z=Z-value which is 1.96, p=anticipated prevalence of excess gestational weight gain of 30.6% as per Halle-Ekane et al in 2015, q=1-p and α =Significance level set at 5%.¹⁶ Furthermore, there was need to ensure that there were enough cases in each group for a possible identification of independently associated outcomes. For that aspect we used the formula for comparing proportions while adopting 22.6% and 8.0% as the prevalence of adverse effect in EGWG and NGWG

groups respectively as was determined by Mbu et al.¹ It was thus determined that a minimum of 92 participants were needed in each sample group to be able to identify the outcomes of EGWG.

Included in this study were all pregnant women who delivered at the Dschang District Hospital with recorded pre-pregnancy weight or weights measured on or before thirteen weeks of gestation. These women were approached and upon giving their formal consent, a prepared questionnaire was administered to gather their socio-demographic and medical characteristics. In accordance to 2009 IOM guidelines, women with excessive weight gain were those with GWG of >18 kg amongst women having BMI less than 18.5kg/m², >16 kg for those with BMI between 18.5-24.9kg/m², >11.5 kg for those with BMI between 25-29.9kg/m² and >9 kg for those with BMI more than 30kg/m².^{3,4} The two groups were then followed up in labour using the partogram opened in active phase of labour. Delivery was conducted by birth attendants (medical doctors, midwives) who routinely conduct deliveries in the hospitals. The two groups were then compared for birth outcomes. These included maternal outcomes (duration of labour, mode of delivery, labour induction/augmentation, pre-term and term deliveries, premature rupture of membranes, genital tract laceration and tears, episiotomy, uterine rupture, pre-eclampsia/ eclampsia, post-partum haemorrhage and gestational diabetes) and foetal outcomes (abgar score, birth weight, birth traumas on baby, neonatal asphyxia, and perinatal death)

All the data collected were keyed in a data entry spread sheet using Epi Info v7 software and analysed using the software SPSS v23. The descriptive results were presented in proportions for EGWG and NGWG respectively. The Chi-square test was used to identify potential outcomes associated to EGWG, followed by confirmation as well as identification of other factors associated to the identified outcome using the bivariate logistic regression. The effect of EGWG was then adjusted (in each identified outcome) for the effect of all the other identified associated factors in a multivariate logistic regression analysis. The significance of all the above tests set at 5%.

RESULTS

Socio demographic characteristics of participants

A total of 400 participants were included in this study whose ages ranged from 16 to 39 years with a mean age of 27 ± 5 years and more than 65% of them being in 20-30yrs age group. A majority of 166 (41.5%) and 152 (38.0%) had secondary and higher education levels respectively while 122 (30.5%) and 54 (13.5%) were working in the informal and formal sectors respectively. Half of these women had delivered 3 children and more. It is worth noting that in overall 167 (41.8%) and 99 (24.8%) of these women had pre-pregnancy overweight

and obesity respectively while 101 (25.3%) had EGWG. Amongst the 134 (13.5%) that had normal pre-pregnancy BMI, just a small proportion of 5.2% had EGWG while amongst those with pre-pregnancy overweight and obesity, 33% and 38.4% respective had EGWG which was statistically significant (p value<0.001). Also, 238

(59.2%) of the participants were married and a great majority (81.1%) of them had normal gestational weight gain (NGWG) as compared to 65.4% of NGWG amongst unmarried participants difference which was statistically significant with p-value <0.001 (Table 1).

Table 1: Socio-demographic characteristics participants.

Characteristics	Total (n=400) N (%)	EGWG (n=101) N(%)	NGWG (n=299) N (%)	P value
Age groups (in years)				0.907
<20	21 (5.3)	4 (19.0)	17 (81.0)	
20-25	151 (37.8)	40 (26.5)	111 (73.5)	
26-30	124 (31.0)	32 (25.8)	92 (74.2)	
31-35	74 (18.5)	19 (25.7)	55 (74.3)	
36-40	30 (7.5)	6 (20.0)	24 (80.0)	
Marital status				<0.001
Married	238 (59.5)	45 (18.9)	193 (81.1)	
Single	162 (40.5)	56 (34.6)	106 (65.4)	
Level of education				0.102
Primary education	82 (20.5)	26 (31.7)	56 (68.3)	
Secondary education	166 (41.5)	45 (27.1)	121 (72.9)	
Higher education	152 (38.0)	30 (19.7)	122 (80.3)	
Occupation				0.139
Unemployed	85 (21.3)	28 (32.9)	57 (67.1)	
Student	139 (34.8)	37 (26.6)	102 (73.4)	
Informal sector	122 (30.5)	23 (18.9)	99 (81.1)	
Formal sector	54 (13.5)	13 (24.1)	41 (75.9)	
Pre-pregnancy BMI				<0.001
Obesity	99 (24.8)	38 (38.4)	61 (61.6)	
Overweight	167 (41.8)	56 (33.5)	111 (66.5)	
Normal	134 (33.5)	7 (5.2)	127 (94.8)	
Parity				0.249
>5	50 (12.5)	15 (30.0)	35 (70.0)	
3-5	154 (38.5)	32 (20.8)	122 (79.2)	
1-2	196 (49.0)	54 (27.6)	142 (72.4)	

EGWG=excessive gestational weight gain, NGWG= normal gestational weight gain and BMI=body mass index

Table 2: Maternal and foetal outcomes.

Characteristics	Total (n=400) N (%)	EGWG (n=101) N(%)	NGWG (n=299) N (%)	P value
Prolonged labour				0.007
No	345 (86.3)	79 (78.2)	266 (89.0)	
Yes	55 (13.8)	22 (21.8)	33 (11.0)	
Mode of delivery				0.303
Caesarian section	29 (7.3)	5 (5.0)	24 (8.0)	
Vaginal	371 (92.8)	96 (95.0)	275 (92.0)	
Genital tract lacerations				0.02
No	351 (87.8)	82 (81.2)	269 (90.0)	
Yes	49 (12.3)	19 (18.8)	30 (10.0)	
Uterine rupture				0.561
No	399 (99.8)	101 (100)	298 (99.7)	
Yes	1 (0.2)	0 (0)	1 (0.3)	
Post-partum hemorrhage				0.082
No	384 (96.0)	94 (93.1)	290 (97.0)	

Continued.

Characteristics	Total (n=400) N (%)	EGWG (n=101) N(%)	NGWG (n=299) N (%)	P value
Yes	16 (4.0)	7 (6.9)	9 (3.0)	
Gestational diabetes				0.868
No	387 (97.2)	97 (97.0)	290 (93.7)	
Yes	11 (2.8)	3 (3.0)	8 (2.7)	
Pre-eclampsia/Eclampsia				0.005
No	395 (98.8)	97 (96.0)	298 (99.7)	
Yes	5 (1.3)	4 (4.0)	1 (0.3)	
Pre-term delivery				0.584
No	389 (97.3)	99 (98.0)	290 (97.0)	
Yes	11 (2.8)	2 (2.0)	9 (3.0)	
Birthweight of newborn				<0.001
Low birth weight	14 (3.5)	0 (0)	14 (4.7)	
Normal birth weight	334 (83.5)	70 (69.3)	264 (88.3)	
Macrosomia	52 (13.0)	31 (30.7)	21 (7.0)	
Low abgar score				0.279
No	393 (98.3)	98 (97.0)	295 (98.7)	
Yes	7 (1.8)	3 (3.0)	4 (1.3)	
Neonatal asphyxia				0.252
No	396 (99.0)	99 (98.0)	297 (99.3)	
Yes	4 (1.0)	2 (2.0)	2 (0.7)	

Table 3: Adjusted effect of excessive GWG on prolonged labour.

Characteristics	Total (n=400)	Prolonged labour (n=55)	Bivariate logistic regression		Multivariate logistic regression	
	N (%)	N (%)	OR (95%CI)	P-value	aOR (95%CI)	P value
Excessive weight gain*				0.008		0.007
Yes	101 (25.3)	22 (21.8)	2.2 (1.2-4.1)		2.4 (1.3-4.6)	
No (Ref)	299 (74.8)	33 (11.0)	1		1	
Pre-pregnancy obesity				0.006		0.012
Yes	99 (24.8)	22 (22.2)	2.3 (1.3-4.2)		2.2 (1.2-4.2)	
No (Ref)	301 (75.2)	33 (11.0)	1		1	
Education				0.022		0.063
Primary education	82 (20.5)	6 (7.3)	0.6 (0.2-1.7)		0.5 (0.2-1.4)	
Secondary education	166 (41.5)	32 (19.3)	2.0 (1.0-3.6)		1.5 (0.8-3.0)	
Higher education (Ref)	152 (38.0)	17 (11.2)	1		1	
Gestational age (weeks)				0.012		0.012
<37weeks	35 (8.8)	4 (11.4)	1.0 (0.3-3.0)		1.1 (0.4-3.6)	
>40weeks	61 (15.3)	16 (26.2)	2.7 (1.4-5.3)		3.0 (1.4-6.3)	
37-40weeks (Ref)	304 (76.0)	35 (11.5)	1		1	

Excessive weight gain* is the main factor of interest

Maternal delivery outcomes

A list of maternal outcomes was tested for any unadjusted association with EGWG as shown on Table 2. In overall, 55 (13.8%) of the participants had prolonged labour while amongst those with EGWG it was observed that 22 (21.8%) had prolonged labour as compared to 33 (11.0%) amongst those with NGWG (p-value=0.007). Also in overall 49 (12.3%) of the participants had genital tract lacerations while amongst those with EGWG it was observed that 19 (18.8%) had genital tract lacerations as

compared to 30 (10.0%) in the group with NGWG. Another maternal outcome worth taking note of was post-partum hemorrhage which in overall was 16 (4.0%) and was 7 (6.9%) amongst those who had EGWG as compared to 9 (3.0%) amongst those who had NGWG (p-value=0.082). The distributions of the other maternal outcomes were not significantly different between the two groups.

Pre-pregnancy obesity, education and gestational age were also identified to be associated to prolonged labour

as shown on Table 3. When adjusted for the above identified factors it was observed that women who had excessive gestational weight gain were 2.4 times more liable to have had prolonged labour (aOR = 2.4, CI; 1.3-4.6, p-value <0.007). Other independently associated factors were pre-pregnancy obesity and post term delivery with participants respectively being 2.2 times (aOR=2.2, CI; 1.2-4.2, p-value=0.012) and 3 times more liable to have had prolonged labour (aOR=3.0, CI; 1.4-6.3 as compared to term delivery with overall p

value=0.012). When adjusted for other identified factors (age of mother, marital status and parity) as shown on Table 4, EGWG was independently associated to genital tract lacerations. Participants who had EGWG were 2 times more liable to have had genital tract lacerations (aOR=2.0, CI; 1.0-3.8, p value=0.036). It is worth noting that in this study there was no association between child birth weight and genital tract lacerations with a p-value of 0.332.

Table 4: Adjusted effect of excessive GWG on genital tract lacerations.

Characteristics	Total (n=400)	GTL (n=49)	Bivariate logistic regression		Multivariate logistic regression	
	N (%)	N (%)	OR (95%CI)	P value	aOR (95%CI)	P value
Age of mother	-	-	0.9 (0.9-1.0)	0.008	0.9 (0.9-1.0)	0.209
Excessive weight gain*				0.022		0.036
Yes	101 (25.3)	19 (18.8)	2.1 (1.1-3.9)		2.0 (1.0-3.8)	
No (Ref)	299 (74.8)	30 (10.0)	1		1	
Marital status				0.058		0.281
Married	238 (59.5)	23 (9.7)	0.6 (0.3-1.0)		0.7 (0.4-1.3)	
Single (Ref)	162 (40.5)	26 (16.0)	1		1	
Parity				0.057		0.235
>5	50 (12.5)	1 (2.0)	0.1 (0.0-0.8)		0.2 (0.0-1.4)	
3-5	154 (38.5)	17 (11.0)	0.7 (0.4-1.2)		0.9 (0.4-2.0)	
1-2 (Ref)	196 (49.0)	31 (15.8)	1		1	
Birth weight of newborn				0.332		NA
Low birth weight	14 (3.5)	2 (14.3)	1.1 (0.2-5.1)			
Macrosomia	52 (13.0)	3 (5.8)	0.4 (0.1-1.4)			
Normal birth weight (Ref)	334 (83.5)	44 (13.2)	1			

GTL=Genital tract lacerations

Table 5: Adjusted effect of excessive GWG on macrosomia.

Characteristics	Total (n=400)	Macrosomia (n=52)	Bivariate logistic regression		Multivariate logistic regression	
	N (%)	N (%)	OR (95%CI)	P value	aOR (95%CI)	P value
Excessive weight gain*				<0.001		<0.001
Yes	101 (25.3)	31 (30.7)	5.8 (3.2-10.9)		7.3 (3.5-15.2)	
No (Ref)	299 (74.8)	21 (7.0)	1		1	
Pre-pregnancy BMI				0.072		0.367
Obesity	99 (24.8)	15 (15.2)	2.2 (1.0-5.2)		0.7 (0.2-1.9)	
Overweight	167 (41.8)	27 (16.2)	2.4 (1.1-5.1)		1.2 (0.5-3.0)	
Normal (Ref)	134 (33.5)	10 (7.5)	1		1	
Parity				0.45		NA
>5	50 (12.5)	8 (16.0)	1.1 (0.5-2.7)			
3-5	154 (38.5)	16 (10.4)	0.7 (0.4-1.3)			
1-2 (Ref)	196 (49.0)	28 (14.3)	1			
Gestational diabetes				<0.001		<0.001
Yes	11 (2.8)	8 (72.7)	20.8 (5.3-83.3)		38.5 (8.8-166.7)	
No (Ref)	387 (97.2)	44 (11.4)	1		1	

Foetal outcomes

A list of foetal outcomes was tested for any unadjusted association with EGWG as shown on Table 2. In overall,

52 (13.0%) and 14 (3.5%) of the new born children had macrosomia and low birth weight respectively while amongst those who had EGWG it was observed that 31 (30.7%) had macrosomia as compared to 21 (7.0%) in the group with NGWG (p value<0.001). Pre-eclampsia/Eclampsia was prevalent in 5 (1.3%) of the participants and was 4 (4.0%) amongst those who had EGWG as compared to 1 (0.3%) amongst those who had NGWG (p value=0.005). It was also observed in a bivariate analysis that EGWG was significantly associated to pre-eclampsia/eclampsia (OR=12.3; CI: 1.4-111.1; p value=0.026) but the prevalence of pre-eclampsia/eclampsia was too low (5/400) for the effect of EGWG to be adjusted for other associated factors (data not shown).

Pre-pregnancy overweight and obesity as well as gestational diabetes were also identified to be associated to macrosomia as shown in Table 5. When adjusted for the above identified factors it was observed that women who had excessive gestational weight gain were 7.3 times more liable to have had a child with macrosomia (aOR=7.3, CI; 3.5-15.2, p value<0.007). Another independently associated factor was gestational diabetes with participants who had gestational diabetes being 38.5 times more liable to have had a child with macrosomia (aOR=38.5, CI; 8.8-166.7, p value<0.001).

DISCUSSION

To successfully improve on maternal and infant health, there is absolute need for a mother to be able to safely put to birth her baby and with minimal consequences as possible. It is in that light that this study was implemented to assess the effect of excessive gestational weight gain on pregnancy outcomes. This study was conducted on 400 participants whose ages range from 17 to 39 years with a mean of 27±5 years. A majority of the women were within the age range of 20-30years while adolescent pregnancy was observed in 5.3% of the participants. The age distribution above was somewhat similar to other studies conducted in Cameroon and other parts of Africa whose measured mean age ranged from 27-31 years.¹⁶⁻¹⁹ The high population prevalence within the age range of 20–30years is likely due to the fact that this is the age range for high reproductive activity. The proportion of adolescent pregnancy was however relatively lower to the 6.8% reported in Yaoundé, Cameroon by Nana et al in 2009.¹⁸ This difference can be explained by the differences between Dschang town and Yaoundé city in terms of lifestyle.

About 60%, 80% and 45% of the women were either married or cohabiting, had atleast secondary education and were working respectively. Also about half of these women had 3 or more children. Marital status was significantly associated to gestational weight weight gain with only 18.9% of married/cohabiting women having EGWG as compared to 34.6% of EGWG in single women. This latter aspect was contrary to the study by

Ekane et al which despite showing association between marital status and obesity, did not show any significant association between marital status and EGWG.¹⁶ It is not well understood how exactly marital status influences obesity and/or gestational weight gain but it is thought to have an indirect impact through improvement in economic status but even so, it is still inconclusive. Notwithstanding, this study showed result contrary to Essome et al who found in Yaoundé that married women had significantly higher chances of having EGWG.²⁰ Maybe other factors played a role in this observation as it was unadjusted for confounders. A majority of the participants had atleast secondary education with an observed 38% having been to a higher institute and an observed 34.8% still being students. This can be explained by the fact Dschang is a university and a commercial town thus many of the participants were university students or business women going closer to the student population. However, education was not associated to EGWG as opposed to a review by O'Brien et al in 2018 which indicated that women who were less well educated were most at risk of gaining weight during gestation.²¹

The prevalence of pre-pregnancy obesity was 24.8% (99/400) and women who had EGWG were 25.3% (101/400). The prevalence of pre-pregnancy obesity in this study despite being higher than the estimated prevalence of obesity in Cameroon's urban population which was 17.1% in 2002, it was lower than the 30.6% observed by Halle-Ekane et al in 2015.¹⁶ This different can be due to the fact that our study was carried out in a rural zone with different nutritional habits. Pre-pregnancy BMI is a strong predictor of gestational weight gain as women with overweight or obesity are more liable to have EGWG.²²⁻²⁴ It was seconded by preliminary analysis of this study which showed a strong association between pre-pregnancy BMI and EGWG with a p value<0.001. This aspect however, disagrees with Mbu et al as well as Tabot et al in 2013 who both reported an inverse relationship between pre-pregnancy BMI and gestational weight gain stating that obese and overweight women tend to gain less weight in pregnancy.^{1,25} This difference could be explained by the fact that this study was conducted in a peripheral town where a considerate proportion of these women don't often monitor their weight so are not aware of their BMI status which could have gone a long way to help them limit their gestational weight gain.

Upon adjustment for the effects of other factors in a multivariate logistic regression, we observed that EGWG was significantly associated prolonged labour (aOR=2.4; CI: 1.3-4.6; p value=0.007), genital tract laceration (aOR=2.0; CI: 1.0-3.8; p value=0.036) and foetal macrosomia (aOR=7.3; CI: 3.5-15.2; p value<0.001). Despite not being able to adjust for other factors (due to small observed numbers of cases), it was observed in a bivariate analysis that EGWG was significantly associated to pre-eclampsia/eclampsia (OR=12.3; CI: 1.4-

111.1; p value=0.026). These results agree with other studies which showed association between EGWG and hypertensive disorders as well as macrosomia in newborns with the latter in tend leading to genital tract lacerations during birth.^{1,16,24,27} Hypertensive disorders during pregnancy include pregnancy-induced hypertension, pre-eclampsia, and eclampsia. The risk for pregnancy-induced hypertension is even higher among women who enter pregnancy already overweight or obese.³ Some studies have identified association between EGWG and prolonged labor but still yet considered a weak association as both studies lacked control for confounders.^{3,27} Unlike this study, other studies identified significant associations between EGWG and induced labor, gestational diabetes, increased rates of blood loss and the need for caesarian section.^{1,3,26,27}

CONCLUSION

In overall, the prevalence of EGWG was significantly high in women of Dschang Health District. This EGWG was also found to be independently associated with prolonged labour, genital tract laceration and foetal macrosomia. Despite identifying non-significant or unadjusted associations of EGWG to other adverse birth outcomes like post-partum hemorrhage and pre-eclampsia/eclampsia, it is worth noting that both had higher occurrence in women with EGWG. Excessive gestational weight gain therefore remains a risk factor for many maternal and foetal adverse outcomes. There is thus the need to improve the awareness of these women on EGWG and its impact on their health or that of their unborn babies. In addition to awareness, these women have to be educated on how to self-monitor their weights before, during and after gestation through weight regulation programs organized at the community level especially in rural settings. Also, a constant follows up of these women all through their gestational period during antenatal visits by health personnel so as to regulate their GWG is a recommendation. The above measures will help to reduce occurrence of these complications, and consequently reduce maternal and neonatal mortality. Research-wise, there is need for further research at a large scale and a more representative population of the country for evidence based health policy making.

ACKNOWLEDGEMENTS

The authors heartily appreciate the administration of Dschang District Hospital for having eased in carrying out of this study as well as their teams working at the Obstetrics and Gynecology Units. Sincere thanks equally go to all women who enabled us to obtain all necessary information toward the publishing of this study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Mbu RE, Fouedjio HJ, Tabot M, Fouelifack FY, Tumassang FN, Tonye RN, et al. Effects of gestational weight gain on the outcome of labor at the Yaounde central hospital maternity, Cameroon. *O J Obstet Gynecol.* 2013;3:648-652.
2. Harriette C, Bronwen P, Kass O, Elizabeth A, Aimee H. Guidance for healthy weight gain in pregnancy. Ministry of Health, New Zealand 2014(ISBN 978 0 478 42836-0).
3. In: Rasmussen KM, Yaktine AL, editors. Weight Gain During Pregnancy: Reexamining the Guidelines. The National Academies Collection: Reports funded by National Institutes of Health. Washington (DC)2009.
4. Gilmore LA, Redman LM. Weight gain in pregnancy and application of the 2009 IOM guidelines: toward a uniform approach. *Obesit Silv Spr.* 2015;23(3):507-11.
5. Shub A, Huning EY, Campbell KJ, McCarthy EA. Pregnant women's knowledge of weight, weight gain, complications of obesity and weight management strategies in pregnancy. *Bio Med Cent Res Notes.* 2013;6:278.
6. Norman JE, Reynolds RM. The consequences of obesity and excess weight gain in pregnancy. *Proc Nutr Soc.* 2011;70(4):450-6.
7. Haddad L, Cameron L, Barnett I. The double burden of malnutrition in SE Asia and the Pacific: priorities, policies and politics. *Heal Pol Plan.* 2015;30(9):1193-206.
8. Steyn NP, McHiza ZJ. Obesity and the nutrition transition in Sub-Saharan Africa. *Ann N Y Acad Sci.* 2014;1311:88-101.
9. Knight JA. Diseases and disorders associated with excess body weight. *Ann Clin Lab Sci.* 2011;41(2):107-21.
10. Kulie T, Slattengren A, Redmer J, Counts H, Eglash A, Schragger S. Obesity and women's health: an evidence-based review. *J Am Board Fam Med.* 2011;24(1):75-85.
11. Cresswell JA, Campbell OM, De Silva MJ, Filippi V. Effect of maternal obesity on neonatal death in sub-Saharan Africa: multivariable analysis of 27 national datasets. *Lancet.* 2012;380(9850):1325-30.
12. Kelly T, Yang W, Chen CS, Reynolds K, He J. Global burden of obesity in 2005 and projections to 2030. *Int J Obes (Lond).* 2008;32(9):1431-7.
13. Onubi OJ, Marais D, Aucott L, Okonofua F, Poobalan AS. Maternal obesity in Africa: a systematic review and meta-analysis. *J Pub Heal.* 2016;38(3):e218-31.
14. Nieuwoudt M, Merwe JL, Harvey J, Hall DR. Pregnancy outcomes in super-obesewomen. An even bigger problem? A prospective cohort study. *S Afr JOG.* 2014;20(2):54-9.
15. Engle-Stone R, Nankap M, Ndjebayi AO, Friedman A, Tarini A, Brown KH, et al. Prevalence and predictors of overweight and obesity among

- Cameroonian women in a national survey and relationships with waist circumference and inflammation in Yaoundé and Douala. *Mater Child Nutr.* 2018;14:e12648.
16. Halle-Ekane GE, Nsom BJ, Atashili J, Palle JN, Nsagha DS, Nguefack CT, et al. Outcome of Pregnancy in Patients with Excessive Gestational Weight Gain in Two District Hospitals in Douala, Cameroon. *SM J Gynecol Obstet.* 2015;1(1):1004.
 17. Kruger HS, Van Graan A. The influence of pre-pregnancy BMI and weight gain during pregnancy on pregnancy outcomes. *South Afric J Clinic Nutr.* 2007;20(3):112-7.
 18. Nana PN, Wandji JC, Fomulu JN, Mbu RE, Tonye R, Ako SN, et al. Materno-foetal outcome of labour in obese women in Yaounde, Cameroon. *Clinic Mother Child Heal.* 2009;6(1).
 19. Kamadjeu RM, Edwards R, Atanga JS, Kiawi EC, Unwin N, Mbanya JC. Anthropometry measures and prevalence of obesity in the urban adult population of Cameroon: an update from the Cameroon Burden of Diabetes Baseline Survey. *Bio Med Cent Pub Heal.* 2006;6:228.
 20. Essome H, Mve VN, Ekono M, Boten M, Engbang JP, Bewekedi M, et al. Excessive Weight Gain during Pregnancy and Prognosis of Childbirth in Douala (Cameroun). *Op J Obstet Gynecol.* 2019;2:242-50.
 21. O'Brien EC, Alberdi G, McAuliffe FM. The influence of socioeconomic status on gestational weight gain: a systematic review. *J Pub Heal.* 2018;40(1):41-55.
 22. Samura T, Steer J, Michelis LD, Carroll L, Holland E, Perkins R. Factors Associated With Excessive Gestational Weight Gain: Review of Current Literature. *Glob Adv Health Med.* 2016;5(1):87-93.
 23. Stamnes Koepp UM, Frost Andersen L, Dahl-Joergensen K, Stigum H, Nass O, Nystad W. Maternal pre-pregnant body mass index, maternal weight change and offspring birthweight. *Acta Obstet Gynecol Scand.* 2012;91(2):243-9.
 24. Vinturache A, Moledina N, McDonald S, Slater D, Tough S. Pre-pregnancy Body Mass Index (BMI) and delivery outcomes in a Canadian population. *Bio Med Cent Pregn Childbirth.* 2014;14:422.
 25. Tabot M. The Effects of Gestational Weight Gain on the Outcome of Delivery at the Central Maternity of the Yaounde Central Hospital. *J Medic Heal Sci.* 2013;3:6-8.
 26. McHugh A, Burke N, Burke G, Breathnach FM, McAuliffe FM, Morrison JJ, et al. 562: The effect of excessive gestational weight gain on mode of delivery and intrapartum complications. *Am J Obstet Gynecol.* 2017;216(1):S331-2.
 27. Johnson JW, Longmate JA, Frentzen B. Excessive maternal weight and pregnancy outcome. *Am J Obstet Gynecol.* 1992;167(2):353-70-2.

Cite this article as: Nguefack SL, Ndenkeh JJ, Bekolo C, Kenfack B. Pregnancy outcomes in women with excessive gestational weight gain in Dschang health district of Cameroon. *Int J Sci Rep* 2021;7(4):239-46.