

BMI'S IMPACT ON OBSTETRIC AND PERINATAL MORBIDITY IN PREGNANT WOMEN TREATED AT THE PROVINCIAL HOSPITAL OF TETE, MOZAMBIQUE



INTRODUCTION

Gestation is defined as the fetus development inside the maternal uterus. This development is strongly determined by maternal nutritional status, assessed through the **Body Mass Index (BMI)** variable and classifies pregnant women into four groups (underweight, normal weight, overweight and obesity). In pregnant women in developed countries, such as Spain, 'overweight and obesity' are increasing their incidence. While in pregnant women in developing countries or countries with medium and low income (LMICs), predominate the 'underweight and normal weight' groups.

An insufficient as well as an excessive increase in maternal weight gain during pregnancy increase the risk of different obstetric and maternal-fetal perinatal complications. This weight gain is studied through the **Gestational Weight Gain (GWG)** variable (according to the values recommended by the Institute of Medicine of USA (IOM) of 2009 and accepted by the World Health Organization (WHO)) that divides the gain into three groups (insufficient, adequate and excessive) for each BMI group. The IOM recommendations were updated in order to reduce maternal-fetal perinatal complications, recommending lower weight gains to women with higher pre-pregnancy BMI.

Table 1. Transgestational weight gain in respect to the body mass index according to the IOM recommendations in 2009 and accepted by the WHO.

PREGESTATIONAL BMI	GESTATIONAL WEIGHT GAIN
Underweight (<18.5)	12.5-18 kg
Normal weight (18.5-24.9)	11.5-16 kg
Overweight (25-29.9)	7-11.5 kg
Obesity (>30)	5-9 kg

Justification

In the health area of the city of Tete, there are no studies on the nutritional status of pregnant women or on transgestational weight gain and its impact on obstetric and perinatal morbidity.

OBJECTIVES

- To determine the nutritional status of the woman and the relationship of the gestational BMI and transgestational weight gain with obstetric and perinatal morbidity in pregnant women treated at Provincial Hospital of Tete (PHT), Mozambique.

- To compare the relationship of gestational BMI, as well as the maternal weight gain during pregnancy, with the appearance of maternal-fetal perinatal effects through several maternal, infectious, gestational, gynecological, neonatal and sociocultural variables.

MATERIAL AND METHODS

Descriptive observational epidemiological study of cross-sectional design in which 129 pregnant women from Tete (Mozambique) with a single gestation and only women whose first control was observed in the first twenty weeks of pregnancy were included. Data collection was realized in the period between July and September 2018 in the *Maternity Services on the PHT*.

Exclusion criteria:

- Women who did not want to participate in the study.
- Pregnant women who did not speak Portuguese when there were no interpreters (e.g. auxiliary staff, students, etc.) for the local languages (Nhungue, Cinhanja and Sena).
- Multiple gestations (n=11).
- Mothers in whom complete information could not be registered.

Restriction criteria:

- Single gestation women whose date of the first weight collected in the first gestational control consultation was before the first twenty weeks of gestational age.

The main independent variables of this study are pregestational BMI and Gestational Weight Gain (GWG). The rest of the variables were analyzed according to filiation characteristics, maternal antecedents, infectious diseases/ indirect morbidity, gestational control, current gestation-partum, neonatal data and sociodemographic characteristics.

Statistical analysis

Statistical significance was set at $p < 0.05$. Data were analyzed firstly with *univariate analysis* and then with *multivariate analysis* using the R package.

ABSTRACT

Introduction. Fetal growth during pregnancy, is largely determined by maternal nutritional status, valued through Pregestational BMI and Gestational Weight Gain. In Tete, 36.4 % of women giving birth did not have a normal BMI and 72.88 % had inadequate gain, which is responsible for an increased risk of obstetric and perinatal morbidity.

Objetives. 1) Determine the nutritional status of the pregnant woman and the relationship of both maternal BMI and weight gain to obstetric and perinatal morbidity at Provincial Hospital of Tete, Mozambique. 2) To compare their relationship with various sociodemographic, infectious, gynecological-obstetric and neonatal variables.

Methods. Descriptive observational epidemiological study of cross-sectional design by collecting data at the time of pregnancy and postpartum of all women admitted to Provincial Hospital of Tete between July to September 2018.

Results. The study included 129 women. 11.6% were underweight, 63.3% had normal weight and 24.8% were obese. 59.7% presented insufficient gain, 27.12% adequate gain and 13.18% excessive gain. 75.7% came from urban areas, 50.4% had a secondary education and 79.8% were housewives. There was 48.1% adolescent pregnancy, and the risk of excessive gain increased with maternal age ($p=0.007$). 16.4 % were uncontrolled pregnancies and 57.4 % were nulliparous. Direct morbidity was 22.5%, the most frequent obstetric complication was episiotomy (10.3%), but not significantly. There were 27.6% of cesarean sections, done only in 28.1% of overweight women. Neonatal height was significantly lower in women with insufficient gain ($p=0.019$) and 17.1% had low neonatal weight, specially in women with insufficient gain, but not significantly. About neonatal complications, there was 13.6% prematurity, 4.7% severe asphyxia and 5.4% mortinatum.

Conclusions. The obstetric morbidity had no significant correlation with previous nutritional status and weight gain. On perinatal morbidity, the neonatal height was statistically significant lower in newborns of women with insufficient gain. The majority had a normal weight and controlled pregnancy, despite this, a high percentage had significantly insufficient gain. The majority came from urban areas, had secondary education and were housewives. Women who did not have access to potable water had a higher percentage of insufficient gain. Maternal age was higher in obese mothers and in pregnant women with excessive gain. In addition, overweight women had more percentage of multiparity.

RESULTS

The prevalence of underweight pregnant women was 11.6%, 63.6% had normal weight and 24.8% were overweight/obese pregnant women. More than half of the study sample (59.7 %) had insufficient gain, 27.12 % adequate gain and 13.18 % had excessive gain.

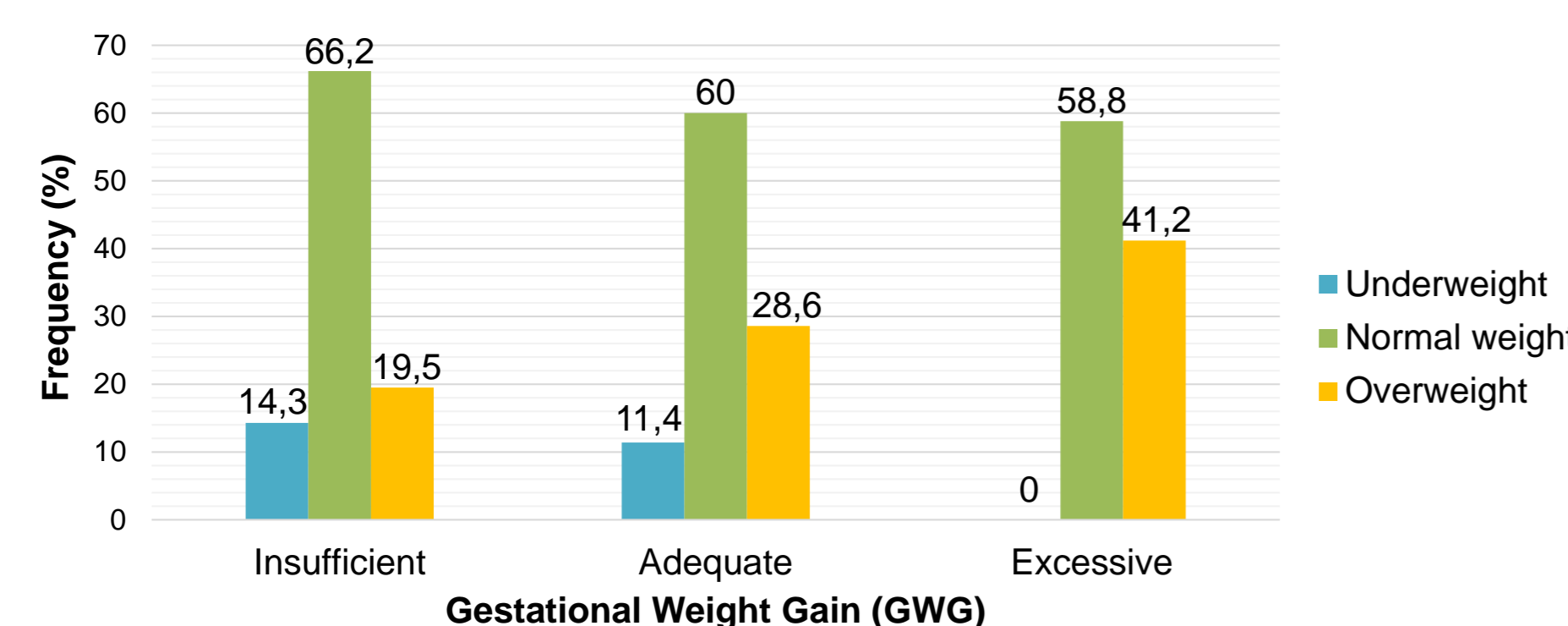


Figure 1. Percentage distribution of GWG in relation to pregestational BMI.

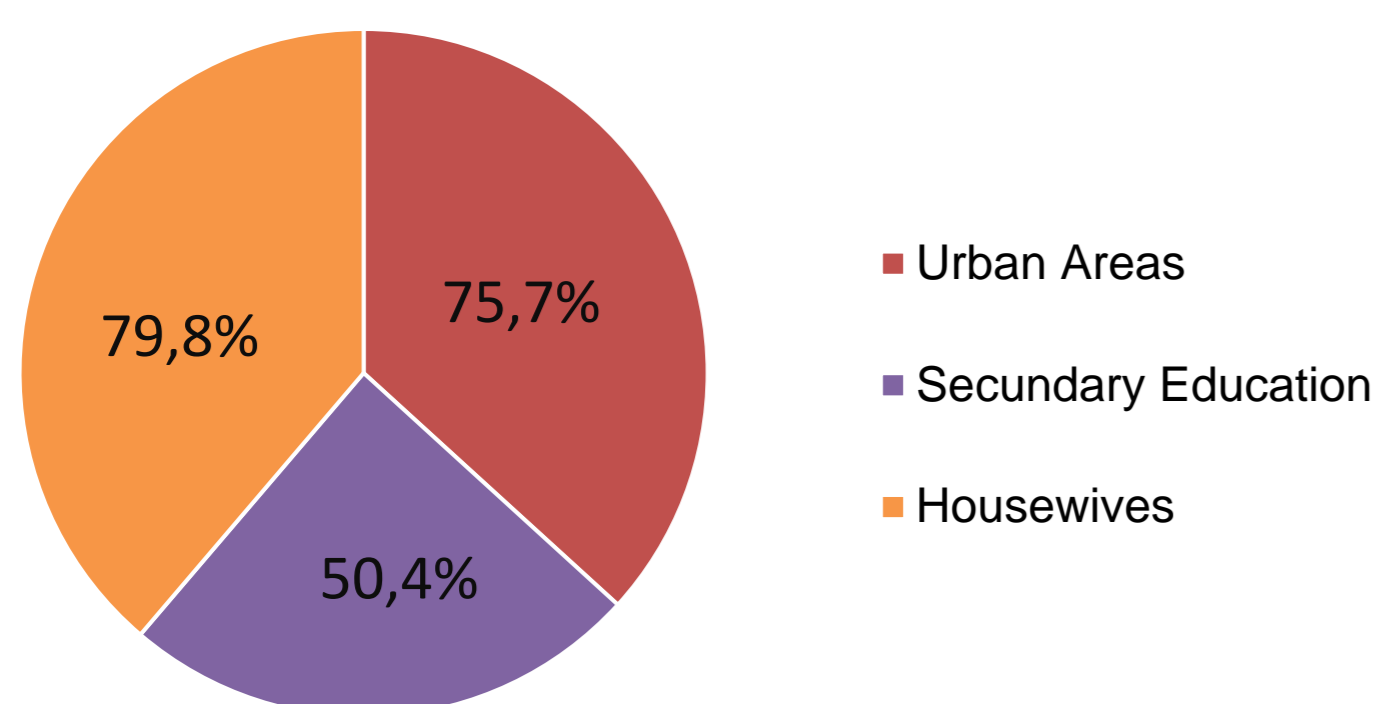


Figure 2. Sociodemographic characteristics in relation to maternal BMI.

Table 2. Sociodemographic characteristics according to gain weight.

	Gestational Weight Gain, kg				P
	Overall N = 129	Insufficient N = 77	Adequate N = 35	Excessive N = 17	
Water font					0.036
Common font	21 (17.5)	12 (17.1)	7 (20.0)	2 (13.3)	
Canalised water	87 (72.5)	53 (75.7)	24 (68.6)	10 (66.7)	
Protected	2 (1.7)	0	1 (2.9)	1 (6.7)	
Water outdoor air	4 (3.3)	2 (2.9)	0	2 (13.3)	
River/lake/well	3 (2.5)	3 (4.3)	0	0	
Other	3 (2.5)	0	3 (8.6)	0	

Table 3. Characteristics of actual gestation in relation to maternal BMI.

	Body Mass Index, kg/m ²				P
	Overall N = 129	Underweight N = 15	Normal weight N = 82	Overweight N = 32	
Age, years	21.7 ± 5.6	18.9 ± 2.1	20.8 ± 5.2	25.1 ± 6.5	<.001
Weight Gain	9.4 ± 5.8	10.9 ± 3.0	10.0 ± 5.9	7.1 ± 6.1	0.03
Gestational Age					0.707
Preterm	17 (13.2)	3 (20.0)	10 (12.2)	4 (12.5)	
Term	112 (86.8)	12 (80.0)	72 (87.8)	28 (87.5)	
Controlled pregnancy					0.016
No	21 (16.4)	0	19 (23.5)	2 (6.2)	
Yes	107 (83.6)	15 (100)	62 (76.5)	30 (93.8)	
Previous pregnancies					0.03
Nulliparous	74 (57.4)	12 (80)	49 (59.8)	13 (40.6)	
Multiparous	55 (42.6)	3 (20)	33 (40.2)	19 (59.4)	

The age of the pregnant women in the study sample was statistically significant in relation to pregestational BMI ($p=0.001$) and to gestational weight gain ($p=0.007$). The prevalence of adolescent were 48.1%, 48.8% were adult women and 3.1% elderly pregnant women.

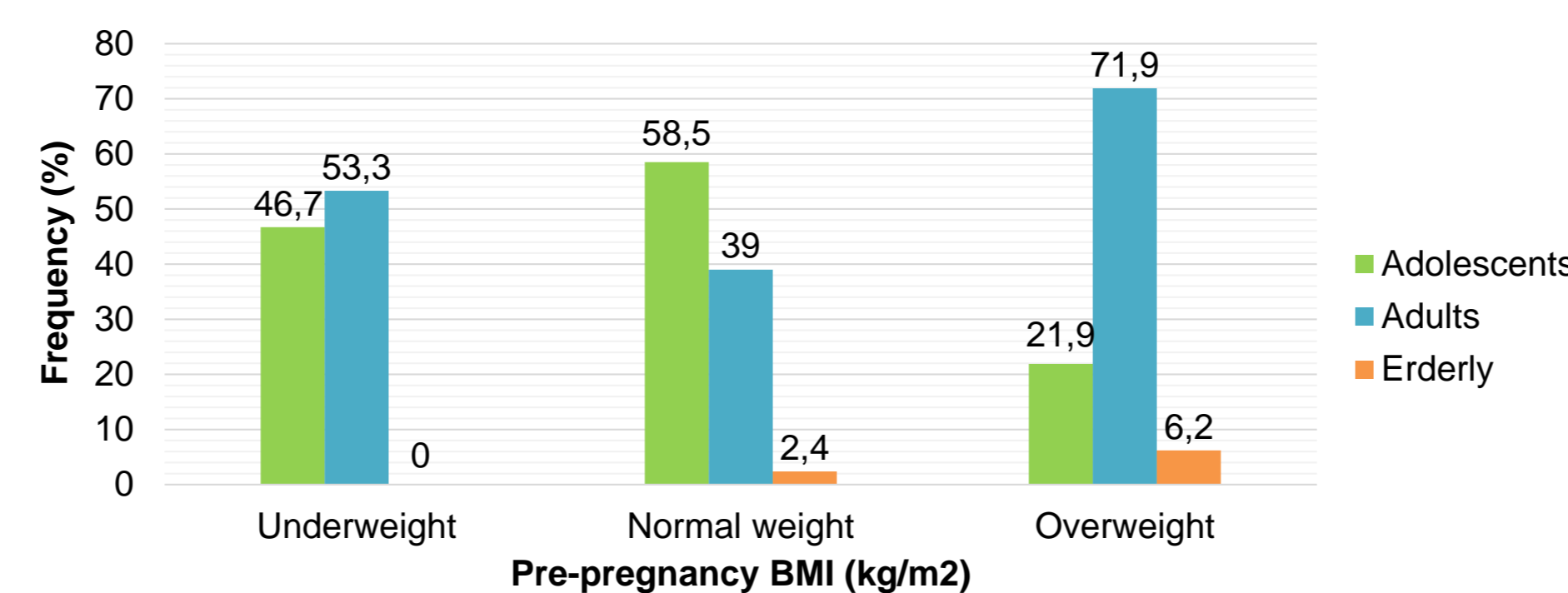


Figure 3. Percentage distribution of pregestational BMI according to maternal age.

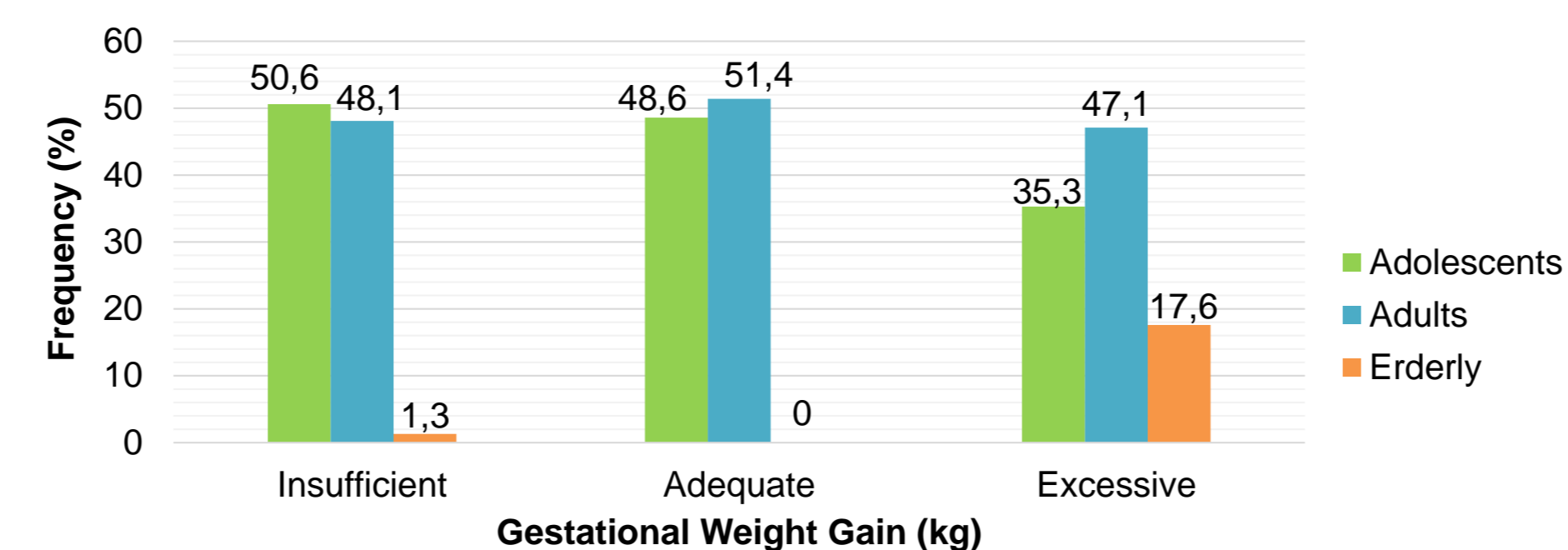


Figure 4. Percentage distribution of weight gain in relation to maternal age.

Table 4. Multivariate linear regression for pregestational BMI considered in continuous scale.

	Coefficient (SE)	P
(Intercept)	17.451 (1.223)	<0.001
Age (years)	0.259 (0.057)	<0.001

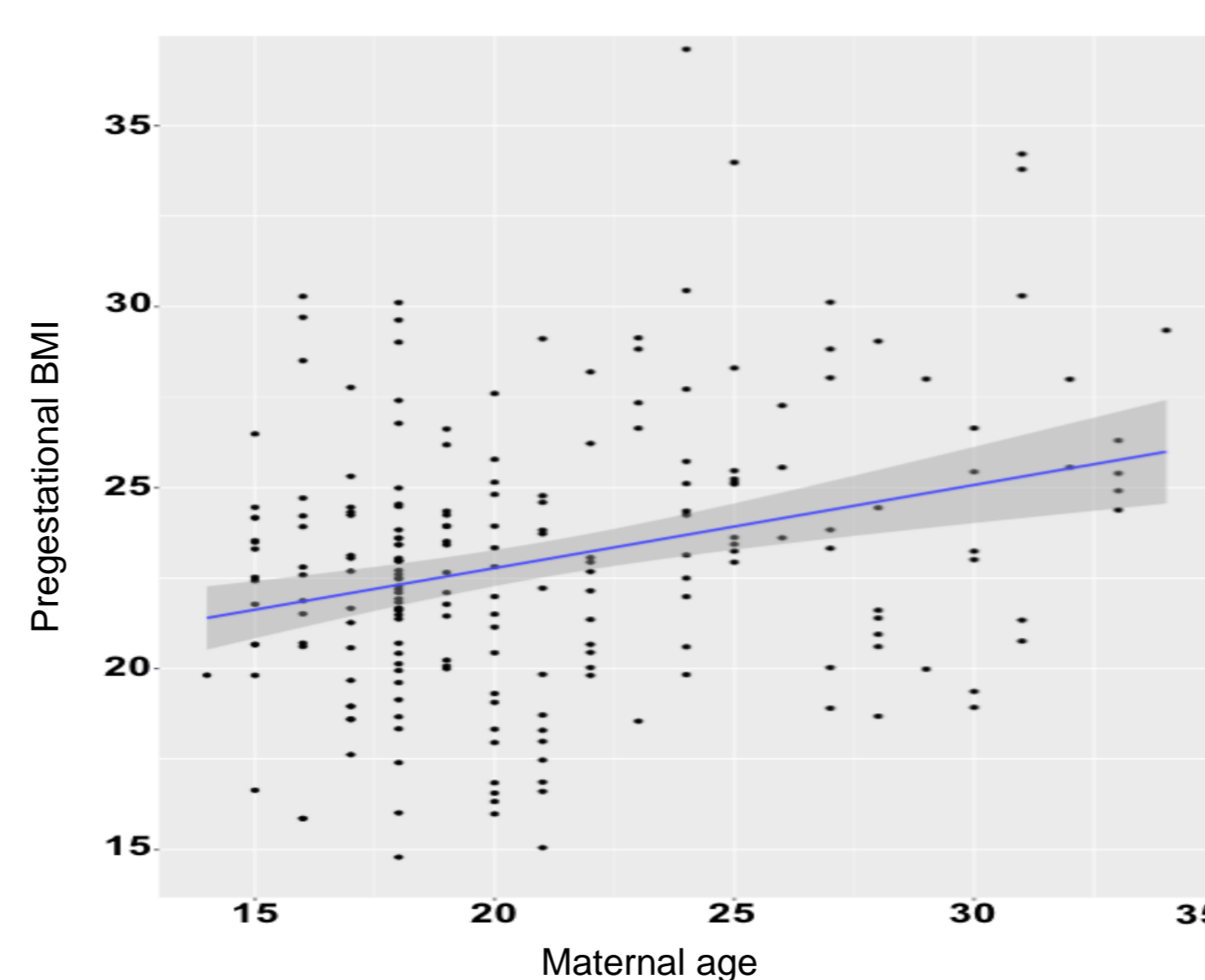


Figure 5. Pregestational BMI increases according to mother's age.

Table 5. Multivariate linear regression for GWG considered in continuous scale.

	Coefficient (SE)	P
(Intercept)	-36.150 (12.108)	0.004
Height newborn (cm)	0.308 (0.137)	0.026
Gestational age (week)	0.828 (0.353)	0.021

Table 6. Neonatal characteristics in relation to gestational weight gain.

	Gestational Weight Gain, kg				P
	Total N = 129	Insufficient N = 77	Adequate N = 35	Excessive N = 17	
Mortinatum	7 (5.4)	3 (3.9)	3 (8.6)	1 (5.9)	0.456
Newborn weight					0.108
Extremely low	1 (0.8)	1 (1.3)	0	0	
Very low	1 (0.8)	1 (1.3)	0	0	
Low	22 (17.1)	17 (22.1)	4 (11.4)	1 (5.9)	
Normal	103 (79.8)	58 (75.3)	29 (82.9)	16 (94.1)	
High	2 (1.6)	0	2 (5.7)	0	
Newborn height	47.9 ± 4.0	47.0 ± 4.0	49.4 ± 4.3	48.6 ± 2.8	0.019
Cephalic perimeter	34.3 ± 2.7	34.1 ± 3.1	34.7 ± 2.1	34.8 ± 1.5	0.464



CONCLUSIONS

- The obstetric morbidity, direct and indirect, had no significant correlation with previous nutritional status and transgestational weight gain. However, according to perinatal morbidity, the neonatal height was statistically significant lower ($p=0.019$) in newborns of women with insufficient gain.
- The majority of pregnant women had a normal body mass index at the beginning of pregnancy and had a controlled pregnancy ($p=0.016$). Despite this, a high percentage had significantly insufficient gain. Globally, the majority came from urban areas, had secondary education and were housewives.
- According to gestational weight gain, women who did not have access to potable water ($p=0.036$) had a higher percentage of insufficient gain.
- Maternal age was higher in overweight/obese mothers and in pregnant women with excessive gain. In addition, at the pre-pregnancy BMI, overweight women had more percentage of multiparity ($p=0.03$).

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