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PSYCHO-SOCIAL FACTORS IN MOTHERS THAT AFFECT THE BIRTH OF LOW-WEIGHT AND/OR SMALL-FOR-GESTATIONAL-AGE INFANTS, 2020-2022

Concepción Elena Amador-Ahumada

Universidad de Córdoba. Colombia. concepcionamador@correo.unicordoba.edu.co

ORCID.https://orcid.org/0009-0000-7497-7808

Lurky Esther Cadavid Velásquez

Universidad de Córdoba. Montería, Colombia. lcadavidv@correo.unicordoba.edu.co

ORCID. https://orcid.org/0000-0002-7020-8873

Concepción Herrera-Gutiérrez.

Universidad de Córdoba, Colombia. cherreragutierrez@correo.unicordoba.edu.co.

ORCID. https://orcid.org/0009-0000-7497-7808.

Abstract

Introduction. The birth weight curve according to gestational age represents a categorical statistical association that naturally implies that boys and girls should increase their body weight as the weeks of gestation increase, without any stagnation, delays, or restrictions. **Objective**: analyze the possible relationships between psychosocial determinants and low birth weight (LBW) and/or small for gestational age (SGA). **Methods.** This is a study within the positivist paradigm, non-experimental, descriptive, analytical, and retrospective, on children with LBW and/or SGA born to mothers receiving primary and secondary care between 2020 and 2022. The unit of analysis is the psychosocial determinants of mothers with LBW or LBN infants in a clinical/epidemiological setting comprising 10, 528 births in three years. To this end, relevant information was extracted from the low-birth-weight records of the National Institute of Health (INS) for 2019, filed as "Cod INS 110," as well as from the psychosocial and demographic maternal risk variables extracted from prenatal records (history of violence, psychoactive substance use, unwanted pregnancy, single motherhood, educational level, occupation, socioeconomic status, and health insurance status). For the bivariate analysis, the presence of the main maternal psychosocial factors associated with the presence of PEG and/or BPN classifications was taken into consideration. **Results.** The median weight of all newborns from 2020 to 2022 was 3250 grams, with 27.6% having low birth weight and/or being small for gestational age (representing the study subjects with a value of n= 2901) and 1.6% being macrosomic; 96% were "full-term" according to gestational age according to gestational age. The predominant maternal variables in LBW and SGA are proportionally identified in the professional educational level (33.5%), average (29.81%), and post-graduate (28.99%); 75% of pregnant women who had PEG and/or BPN children have a history of or have been exposed to some form of domestic violence in the form of physical, psychological, and even sexual abuse; 65.90% of the pregnancies of these PEG and/or BPN children were unplanned/unwanted.

Conclusion. (OR: 3) The predictor variable is the mother's educational level, and the condition of the child (PEG or BPN) is the outcome or result. This value is interpreted to mean that among professional mothers or those with postgraduate education, there is a three times higher risk of PEG and/or BPN at term than in other educational levels.

Keywords (DeCS): newborn, Apgar score, maternal health

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Resumen

Introducción. La curva de peso al nacer según la edad gestacional, representa una asociación estadística categórica que de manera natural implica que niños y niñas deben aumentar su peso corporal en la medida en que aumentan las semanas de gestación, sin producirse estancamientos, retrasos o restricciones. **Objetivo**: analizar las posibles relaciones entre los condicionantes psicosociales y el Bajo Peso al Nacer (BPN) y/o Pequeños para la Edad Gestacional (PEG). **Métodos.** Estudio dentro del paradigma positivista, no experimental, descriptivo, analítico y retrospectivo acerca del niño con BPN y/o PEG productos de madres atendidas en el primer y segundo nivel de atención durante los años 2020 a 2022. La unidad de análisis son los condicionantes psicosociales de las madres con niños PEG o con bajo peso al nacer, en un escenario clínico/epidemiológico conformado por 10.528 nacimientos en tres años; para tal fin se extrajo la información pertinente de las fichas de bajo peso al nacer del Instituto Nacional de Salud (INS) de 2019, radicada como "Cod INS 110" así como de las variables psicosociales y demográficas de riesgo maternas que fueron extraídas de las historias prenatales (antecedentes de violencia, consumo de psicoactivas, embarazo no deseado, madre solterismo, nivel educativo, ocupación, estrato, filiación al régimen de salud); para el análisis bivariado se tuvo en consideración la presencia de los principales factores maternos psicosociales asociados con la presencia de clasificaciones de PEG y/o BPN. **Resultados.** La mediana del peso de la totalidad de los recién nacidos del periodo 2020 a 2022 fue de 3250 gramos, 27,6% con bajo peso al nacer y/o pequeños para la edad gestacional (representan los sujetos del estudio con valor de n= 2901) y 1,6% macrosómicos; 96% con edad gestacional "a término" según las semanas de gestación. Las variables maternas predominantes en BPN y PEG se identifican proporcionalmente en el nivel educativo profesional (33.5%), media (29.81%) y post gradual (28,99%); 75% de las gestantes que tuvieron niños PEG y/o BPN tienen antecedentes o han estado expuestas a alguna forma de violencia doméstica en sus versiones de maltrato físico, psicológico e incluso sexual, 65,90% las gestaciones de estos niños PEG y/o BPN no fueron planeadas / deseadas. **Conclusión.** (OR: 3) siendo la variable predictora el nivel educativo de la madre y la condición del niño PEG o BPN el resultado o desenlace; este valor se interpreta en el sentido que entre las madres profesionales o con educación posgradual hay 3 veces más riesgo de producto PEG y/o BPN a término que en los otros niveles educativos.

Palabras clave (DeCS): recién nacido, escala de Apgar, salud materna

Introduction

The classification of children with low birth weight (LBW) corresponds to a heterogeneous group that includes full-term newborns with low weight for gestational age, which is synonymous with intrauterine malnutrition understood as intrauterine growth restriction (IUGR) leading to children with intrauterine growth retardation or small for gestational age (SGA), as well as preterm infants who may be classified as SGA or have adequate weight for age (AWA). It is noteworthy that the prevalence of multiple gestational products in cases of low birth weight is approximately 46%, as indicated by the multiple gestational condition.

Generally speaking, birth weight is regarded as the primary anthropometric metric for evaluating fetal growth. According to the World Health Organization (WHO), this concept involves measuring weight in grams at birth, with a value below 2,500 grams being indicative of low birth weight (LBW). In addition to serving as an indicator, LBW is also regarded as a predictive factor most frequently associated with mortality[1]. It is acknowledged as a risk factor that can increase the probability of neonatal death by up to 40 times in comparison with a newborn of normal weight[2].

Weight for gestational age (WGA) is defined as a ratio expressed as the product of the relationship between weight (in grams) and height in centimeters. When applying the formula WGA = [(weight/length3) x 100], if the ratio is below P10 for gestational age, an asymmetry between weight and gestational age is considered to exist, and the infant may be classified as "small" or "large" for gestational age. The term "asymmetrical" is used to describe a shape or design that is not uniform or balanced, but rather has one side or element that is different from or does not match the other side or element.

[1] Verrier M, Spears W, Ying J, Kerr GR. Patterns of infant mortality in relation to birth weight, gestational age, parity, and prenatal care in Texas' triethnic population. 1984 through 1986. Tex Med 1994; 90: 50-6.

[2] Mestre-Mestre, MA y Escobar-Velásquez KD. "Bajo peso al nacer en Colombia según condiciones socioeconómicas de la madre." *Duazary* 20.2 (2023): 40-47.

Figura 1. Curvas de peso al nacer para ambos géneros

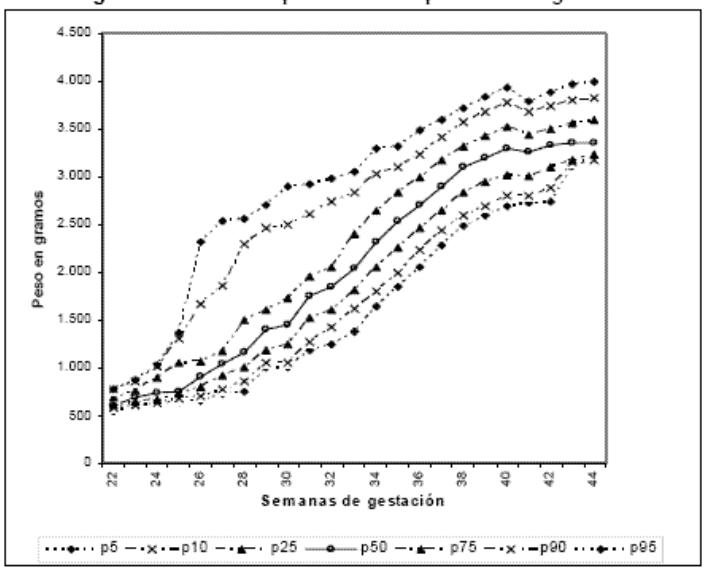

Figure 1. Birth weight curves for both genders

Source: Montoya-Restrepo and Correa Morales. [3]

Children classified as PEG are born with low birth weight, a condition that can be caused by prematurity and/or being born small for their gestational age. This condition is due to intrauterine growth restriction (IUGR), which may be caused by a specific perinatal pathology, the result of insufficient genetic development, or external causes related to the mother's condition, such as malnutrition, anemia, and similar conditions that have been sufficiently studied. Based on this evidence, it is understood that premature children who also have IUGR have the worst prognosis in terms of survival and quality of life[4]. The global target for 2025 has been set to reduce the number of children with birth weight below 2500 grams to one-third of the baseline g[5].

The present study draws from data spanning three years (2020 to 2022) from a category five territorial entity, as determined by its population distribution and GDP. The subject of interest pertains to children with LBW who also meet the criteria for LBW and low birth weight (LBW-LBW). LBW statistics reveal that 9% of newborns in Latin America and the Caribbean are born with low birth weight, contributing to approximately 60-80% neonatal mortality, constituting a global public health problem.

[3] Montoya-Restrepo Nora E, Correa-Morales Juan C. Curvas de Peso al Nacer. Rev. salud pública [Internet]. 2007 Mar [cited 2024 Feb 19] ; 9(1): 1-10.
[4] UNICEF. Normal birthweight is critical to future health and development. Overview. En: http://www.childinfo.org/low_birthweight.html.
[5] Organización Mundial de la Salud. Metas mundiales de nutrición 2025: documento normativo sobre bajo peso al nacer. En: https://www.who.int/es/publications/i/item/WHO-NMH-NHD-14.5

The birth weight curve, delineated according to gestational age, manifests a categorical statistical association that inherently suggests that male and female infants should incrementally augment their body weight in accordance with the weeks of gestation, devoid of stagnation, delays, or restrictions. As illustrated in Figure 1, the subject is characterized by the following attributes:

In a similar vein, Navarro offers comparable patterns of gestational weight behavior in relation to gestational age, incorporating the measurement of weeks in the preterm, term, and post-term categories (Figure 2).

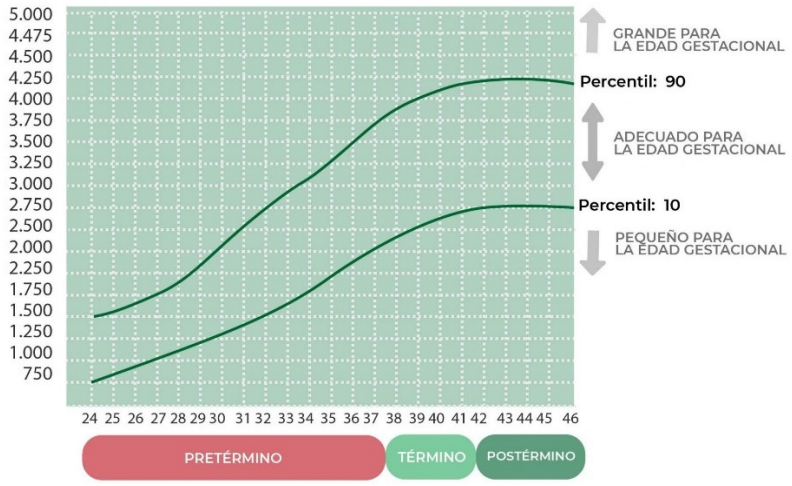

Figure 2. Weight curves according to gestational age
Source: Navarro [6]

On both scales, a newborn that falls within the "normal weight for gestational age" range is called Appropriate for Gestational Age (AGA), which for full-term infants can range from 2. 500 grams (about 5.5 pounds or 2.5 kg) and less than 4,000 grams (7.8 pounds or 4 kg). Weight measurements at 37 weeks vary between 2,800 g and 3,100 g and between 3,400 g and 3,700 g at 40 weeks[6].

Newborns whose weight is below the 10th percentile for gestational age are classified as Small for Gestational Age (SGA)[7]. Meanwhile, babies born weighing more than the 90th percentile for gestational age are classified as large for gestational age, a condition known as macrosomia[8].

[6] Navarro P. Clasificación del recién nacido: facilitar el diagnóstico y prevenir complicaciones. En: https://campusvygon.com/clasificacion-rn/
[7] Stanford Medicina. Childrens Healt. Pequeño para la edad gestacional. En el portal web: https://www.stanfordchildrens.org/es/topic/default?id=smallforgestationalage-90-P05520
[8] Lattari A. Recién nacido grande para la edad gestacional. En: https://www.msdmanuals.com/es/professional/pediatr%C3%ADa/problemas-perinatales/reci%C3%A9n-nacido-grande-para-la-edad-gestacional-geg

PEG newborns may appear mature, but upon observation, they are identified as smaller than other children of the same gestational age. They may also have a normal height or length within the expected range, but with low weight and/or lower body mass, thus meeting the criteria for low birth weight. Newborns classified as PEG may have been born prematurely or before 37 weeks of pregnancy, at term or between 37 and 41 weeks, or post-term when birth occurred after 42 weeks of gestation[8].

Among the factors associated with small-for-gestational-age (SGA) infants, certain anthropometric, nutritional, sociocultural, and demographic characteristics of the mother have been identified. Similarly, the negative influence of obstetric history and pathological conditions that affect the adequacy and functionality of the placenta has been demonstrated, as well as certain alterations specific to the gestational product.

With regard to alterations specific to newborns, an early screening assessment is the Apgar test, which assesses the vitality and ability of the newborn to adapt to extrauterine life, which is generally associated with gestational age. Gestational age is not the actual age of the embryo but is considered a universal standard value among obstetricians and neonatologists for assessing fetal maturation[8]. The Apgar test is performed during the first minute of life and should be repeated five minutes later if the initial result is unsatisfactory. The Apgar scale rates the condition of the newborn from 0 to 10, taking into account variables such as pulse, gestures, activity, appearance, and breathing[9]. Based on the score obtained, the newborn is classified as: Uncomplicated with a score above 7, with moderate difficulties if the score is between 4-6, and with marked difficulties if the score is equal to or less than 3 points[10]. In this regard, it has been documented that low-birth-weight infants are more likely to have lower IQ scores and experience cognitive disabilities in the future[11].

Regarding the relationship between the fetal biophysical profile and the Apgar test in full-term newborns, in which the sensitivity of the Apgar test was identified as 100% and specificity as 91%, with a positive predictive value of 15% and a negative predictive value of 100%, and a Chi-square test <0.05, the authors conclude that this test has a high probability of identifying abnormalities present at birth in fetuses with a normal biophysical profile, demonstrating a statistically significant relationship between the study variables[12].

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[9] Hernández Torrento, M. A., & Rivera De Mendoza, A. M. (2013). *El perfil biofísico como prueba diagnóstica fetal, su principal indicación y su relación con el APGAR del recién nacido* (Doctoral dissertation, Universidad de El Salvador).

[10] Chiclla, M. A. C., Castillo, K. E. A., & Árias, J. P. S. (2021). Predictores perinatales de Apgar persistentemente bajo a los 5 minutos en un hospital peruano. *Revista de la Facultad de Medicina Humana*, *21*(1), 40-49.

[11] González Pantoja Y, Álvarez Sánchez A. Comportamiento del bajo peso al nacer en la parroquia "Castor Nieves Ríos". Venezuela. Rev Cubana Med Gen Integr. 2010;26(3):5-7.

[12] García Rodríguez, C. (2020). Sensibilidad y Especificidad Del Perfil Biofísico Fetal En Relación Al Test De Apgar En Recién Nacidos De Gestantes A Término Del Hospital Nacional Hipólito Unanue. Julio–Diciembre Del 2017.

For LBW, the mother's age has been considered a risk factor, particularly important when the pregnant woman is outside the reproductive age range because she is very young. It should be noted that the highest rates of prematurity and LBW are found among girls under 15 years of age[13]; Similarly, BPN has been associated with MBP in elderly primiparous women or with late pregnancies[14] [15]. This risk is also increased when the pregnant woman is under 18 years of age, is multiparous, and does not adhere to prenatal care. Statistically significant differences have been identified between the prevalence of LBW by age (p-value 0.002) associated with mothers at extreme ages (OR 1.29, 95% CI 1.10-1.51) and with the mother's educational level (OR 1.11, 95% CI 0.949445-1.306799)[2]. Bortman also identified through epidemiological studies that the strength of the association between inadequate and late prenatal care and LBW was also notable[16].

In this regard, Tuñón analyzed the relationship between maternal factors and low birth weight in full-term newborns in Argentina, finding significant associations between low birth weight and maternal age (p-value = 0.0274), type of delivery (p-value = 0.0033), folate intake (p-value = 0.0289), and maternal age (p-value = 0.0274). (p-value=0.0274), type of delivery (p-value=0.0033), folate consumption (p-value=0.0289), and gestational age (p-value<0.001). The association between low birth weight and mothers under 18 years of age was very significant (p-value = 0.0239); however, no association was detected between low birth weight and maternal preconception weight (p-value = 0.3845). Tuñón concludes that there are maternal factors associated with low birth weight, such as being a primiparous woman, delivery by cesarean section, and gestation of less than 40 weeks.[17]

Heredia and Munares (2016) found associations between LBW and a history of eclampsia (OR: 5.8; 95% CI: 1.9-17.4), 1 to 3 prenatal checkups (OR: 5.7; 95% CI: 2.6-12.3), multiple gestation (OR: 4.7; 95% CI: 1.3-17.0), prematurity (OR: 12.0; 95% CI: 1.5-94.3), and tobacco use (OR: 3.8; 95% CI: 1.5-9.8), adolescent age group (OR: 0.3; 95% CI: 0.1-0.6), and having a short intergenetic interval (OR: 0.2; 95% CI: 0.1-0.7). Other risk factors for LBW include multiple pregnancies, adolescent age, and a short intergenetic interval, as well as attending between 1 and 3 prenatal checkups.[18]

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[13] Eisner V, Brazie JV, Pratt MW, Hexter AC. The risk of low birth weight. Am J Public Health 1979; 69: 887-93

[14] Ventura SJ. Trends and variations in first borth to older women. United States 1970-1986. Vital Health Stat 1989; 47: 1-27.

[15] Cooper LG, Leland Nl, Alexander G. Effect of maternal age on birth outcomes among young adolescents. Soc Biol 1995; 42: 22-35.

[16] Bortman, M. (1998). Factores de riesgo de bajo peso al nacer. Revista panamericana de salud publica, 3, 314-321.

[17] Tuñón, SA. Relación entre factores maternos y el bajo peso al nacer de recién nacidos a término en un Hospital Materno Infantil de Baja Complejidad de La Matanza, Buenos Aires, Argentina. En: http://repositoriocyt.unlam.edu.ar/handle/123456789/1487

[18] Heredia-Olivera K, Munares-García O. Factores maternos asociados al bajo peso al nacer. Rev Med Inst Mex Seguro Soc. 2016;54(5):562-567.

Among other psychosocial variables, the current emotional state was classified as stressful among mothers of low-birth-weight infants (x= 2.38 ± 1.3; p< 0.001). in this regard, some of the problems related to work also show an influence on LBW (x= 1.73 ± 1.3; p= 0.004); the evidence indicates that stress during pregnancy is associated with low birth weight in newborns. [p= 0.003; OR= 5.6; 95% CI = 1.6 - 19.7].[19]

METHODS

Type of study. A study within the positivist, non-experimental, descriptive, analytical, and retrospective paradigm on children with LBW and/or small for gestational age (SGA) born to mothers receiving primary and secondary care between 2020 and 2022.

Study setting. The Primary Data Generating Units (UPGD) located in the study setting and their reports of low birth weight occurring in the Obstetrics and Gynecology or Neonatology Service during the period between January 1, 2020, and December 31, 2022.

The unit of analysis is the psychosocial determinants of mothers with PEG children or low birth weight, in a clinical/epidemiological setting comprising 10,528 births over three years. To this end, relevant information was extracted from the low birth weight records of the National Institute of Health (INS) for 2019, filed as "Cod INS 110." as well as from the psychosocial and demographic maternal risk variables that were extracted from prenatal records (history of violence, psychoactive substance use, unwanted pregnancy, single motherhood, educational level, occupation, socioeconomic status, health insurance status).

Sources of information. Due to its retrospective nature, the information corresponds to secondary sources, through information reported and included in 10,528 prenatal records and files within the observation window. The information organized in a statistical database (Excel version 6.0) was cleaned up for clarity and reliability and underwent processes to ensure completeness, consistency, accuracy, and veracity.

Population and sample. Information is presented from a random sample of low-birth-weight cases identified during the observation window in the Epidemiological Surveillance System.

Definition of criteria and cut-off points. For the classification of low birth weight, the WHO concept is taken into consideration, as well as the more specific weight-for-gestational-age criterion, which is as follows:

- The WHO concept establishing a global dichotomy independent of gestational age was applied. The measurement categories were: low birth weight (between 1,500 and 2,499 g) or very low birth weight (equal to or less than 1,499 g).
- Classification of newborn weight according to gestational age using the table proposed by Navarro6; for the purposes of the database, it was categorized as

[19] Aguilar-Aguilar S, Barja-Ore J, Cerda-Sanchez M. Stress during pregnancy as a risk factor for low weight in the newborn. Rev Cub Med Mil [Internet]. 2020 Jun [citado 2024 Feb 19]; 49(2): e620. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0138-65572020000200006&lng=es. Epub 01-Jun-2020.

follows: weight appropriate for gestational age, small for gestational age, and large for gestational age (or macrosomia).

Using PEG data, information relating to the APGAR score at one minute was screened to determine vitality and adaptability according to gestational age, using this criterion to confirm the development of the product with the highest number of weeks of gestation.

- Gestational age (GA) calculated from the date of the last menstrual period was divided into three ranges of interest: preterm with GA equal to or less than 36 weeks, term with 37 to 40 weeks, and post-term with 41 or more weeks.

To identify psychosocial risk factors for maternal health, data on associated maternal factors were extracted from prenatal records, as well as:

- Based on gynecological and obstetric indicators, women's ages were categorized as early pregnancy (18 years or younger), reproductive age (19 to 34 years), and late pregnancy (35 years or older). obstetric risk according to maternal age was classified as High Obstetric Risk (HOR) for women aged 18 years or younger or 35 years or older and those with associated morbidity.
- The mother's educational level was classified into the categories "Basic," "Intermediate," "Professional," and "Postgraduate." Those who completed between 5 and 8 grades were classified as "basic," those who completed between 9 and 11 grades were classified as "intermediate," those who graduated from technological and professional university programs were classified as "professional," and those who reported specializations, master's degrees, or doctorates were classified as "postgraduate."

For the purposes of measuring psychosocial determinants, a dichotomous scheme (presence/absence of risk) was used, taking as a reference previous studies that have elucidated the possible relationship between maternal risk factors and low birth weight. The following table details the indicators for each factor that were considered potential indicators of the presence of psychosocial risk factors for low birth weight:

Table 1. Categorization of determining factors

Variable: psychosocial determinants		
Variable categories	**Options**	**Risk indicator for low birth weight**
Marital status	Single (separated), married, common-law marriage	Single (separated)
Habits	Alcohol, tobacco, or other psychoactive substance use	Regular consumer
History of domestic violence	Physical, psychological, or mixed abuse; sexual violence	History of the condition
Acceptance of pregnancy	Unplanned/unwanted pregnancy, planned/wanted pregnancy	Unplanned or unwanted pregnancy

Variable: psychosocial determinants		
Variable categories	**Options**	**Risk indicator for low birth weight**
Occupation	Employed (formal work), homemaker, informal work	Employed (formal job), informal work
Health insurance status	Contributory (contributor, beneficiary)	Contributor, head of household, not affiliated
Educational level	Subsidy recipient (head of household, beneficiary)	Basic, secondary education
Socioeconomic status	Not affiliated	Strata I and II

Source: interpretation of the study's cut-off points

Data processing. For the grouped analysis of information derived from monitoring low birth weight in the study setting, data were grouped in simple and contingency tables, and multivariate analysis was performed using the chi-square test and Spearman's correlation.

For the bivariate analysis, the presence of the main maternal psychosocial factors associated with the variables low birth weight vs. maternal age, risk, ARO, health regime, level of education, and occupation was taken into consideration.

To measure birth weight related to gestational age, data on “small for gestational age” were taken, and epidemiological measures of risk ratio (OR), incidence, and general and specific prevalence were applied, as well as bivariate analysis statistics for the variables “small for gestational age” vs. maternal age, risk, ARO, health regime, level of education, occupation.

Ethical and intellectual property issues. The research, which is predicated on records and secondary source information, has been classified as "without ethical risk" in accordance with the parameters established in Resolution 8430 of 1993 of Colombia. The right to privileged access to information was respected by requesting informed consent from the entities with which the 10,528 notification forms and prenatal records were to be shared, which were selected from the years under study. These records were purged of any records that could allow for the identification of those involved.

RESULTS

As illustrated in Table 1, the study encompasses the aggregate behavior of all cases from 2020 to 2022 (n = 10,528) or the distribution of the factors identified in mothers, irrespective of the weight of their newborns. In relation to the mother's educational attainment, the predominant level is basic (45%). With regard to marital status, the majority of the subjects are single or separated, i.e., without a partner (66.3%). In terms of socioeconomic status, the majority fall between levels III and IV. Furthermore, the majority are affiliated with the contributory scheme as direct contributors (32.8%) and with the subsidized scheme (39%) as heads of household.

In the context of a comprehensive study on psychosocial factors in a cohort of pregnant women (n = 10,528), the following findings were observed: 28.5% of the participants reported psychoactive substance use, 31.8% indicated experiences of psychological abuse, and 39% of the pregnancies were either planned or desired. Additionally, it was noted that 54.9% of the women were of reproductive age, with 33.8% experiencing an early pregnancy.

Table 1. Maternal conditions of births registered during the period.

Variable (n=10.528)		**Category**		**N°**	**%**
Mother's educational level		Basic		4793	45,5
		Intermediate		1736	16,5
		Professional		1714	16,3
		Postgraduate		2285	21,7
Marital status		Single (Separated)		6977	66,3
		Married / Common-law		3551	33,7
Stratum		I o II		3512	33,4
		III to IV		5845	55,5
		V - VI		1171	11,1
Occupation		Employee		3538	33,6
		Informal work		4115	39,1
		Housewife		2875	27,3
How to enroll in the health insurance plan		Contributory	Contributor	3458	32,8
			Beneficiary	2735	26,0
		Subsidized	Head of household	4109	39,0
			Beneficiary	116	1,1
		Not related	Without insurance	110	1,0
Psychosocial determinants	Use of psychoactive substances	Regular consumption		3105	29,5
	History of domestic violence	Physical abuse		412	3,9
		Psychological abuse		3345	31,8
		Mixed		1509	14,3
		Sexual violence		312	3,0
	Acceptance of pregnancy	Planned/desired		4107	39,0
		Unplanned/undesired		6421	61,0
	Mother's age	Early pregnancy		3561	33,8
		Women of reproductive age		5784	54,9
		Late pregnancies		1183	11,2

Source: Study data

As demonstrated in Figure 1, the data set under consideration includes information regarding the prenatal care attendance of 10,528 pregnant women. A particularly noteworthy finding is that nearly one-third of all mothers attended a maximum of five check-ups, thereby underscoring the low percentage of those who complied with the check-ups indicated in this protocol.

The median weight of all newborns in the period 2020 to 2022 was 3,250 grams, with 3,180 grams recorded for male newborns and 3,040 grams for female newborns. The study found that 70.8% of the subjects had adequate weight for gestational age, 27.6% were low birth weight and/or small for gestational age (representing the study subjects with a value of n= 2901), and 1.6% were macrosomic.

Table 2. Distribution of conditions related to birth weight

Variable	Category	N°	%
Weight for gestational age (n=10,528)	Suitable for gestational age	7457	70,8
	Small for gestational age	2901	27,6
	Large for gestational age	170	1,6
Birth weight (WHO) (n=2,901)	Low birth weight	2858	98,5
	Very low birth weight	43	1,5
Gestational age	Full term	10103	96
	Post term	311	3
	Pre term	114	1,1
(n=10,528)	3 to 5	431	4,1
	6 to 7	635	6
	8 to 10	9462	89,9

Source: Study data

Among the 10,528 pregnancies, 2,901 (27.6%) cases of small-for-gestational-age (SGA) infants were reported. When classified according to the World Health Organization (WHO) categories for low birth weight (LBW), 98.5% of the subjects corresponded to LBW, and 1.5% to very low birth weight. This final group exhibits a 0.5% increase in the percentage of preterm infants according to gestational age compared to the previous group.

A significant proportion of the newborns were of "full-term" gestational age, estimated based on weeks of gestation. The APGAR "without complications" score predominated (89.9%), with scores ranging from 8 to 10 points. However, 10.1% of the newborns exhibited some degree of depression in this indicator of gestational product vitality. Please refer to Table 2.

The ensuing analysis will focus on figures related to children who are either PEG or LBW (n:2901). The predominant maternal variables in LBW and PEG are identified proportionally in the professional educational level (33.5%), secondary (29.81%), and postgraduate (28.99%) categories. The contributory regime, with 63.42%, reports that these mothers either work or are beneficiaries of an employee in the formal sector of the economy.

Among the psychosocial factors that influence interest in the maternal variables PEG and/or BPN is the habitual consumption of socially acceptable psychoactive substances, such as alcohol and caffeine. Notably, Group 15.2% of the population consumes stimulants, including bazuco and marijuana. Please refer to Table 3.

Table 3. Variables of mothers of children with PEG and/or BPN

Variable		**Small (2901)**	
Mother's educational level		N°	%
Basic		221	7,61
Intermediate		865	29,81
Professional		974	33,57
Postgraduate		841	28,99
Regime			
Contributory		1840	63,42
Subsidized		1043	35,95
Unrelated		18	0,620
Psychosocial factors	Regular use	1479	50,98
	Physical abuse	315	10,85
	Psychological abuse	1557	53,67
	Mixed	404	13,92
	Sexual violence	100	3,447
	Planned/desired	1912	65,90
	Unplanned/undesired	989	34,09
	Early pregnancy	874	30,12
	Women of reproductive age	1245	42,91
	Late pregnancies	782	26,95

Source: Study data

It is estimated that approximately 75% of pregnant women who subsequently have a child with a PEG and/or BPN history have been exposed to some form of domestic violence, including physical, psychological, and even sexual abuse.

With respect to other psychosocial factors, it has been identified that 65.90% of pregnancies among children with these conditions were unplanned or unwanted. In regard to the behavior of this variable in relation to maternal age, slight variations were identified in the relative frequencies between one reproductive age group and another.

Consequently, the demographic profile of mothers with children who have undergone gastrostomy or biliopancreatic diversion includes women of reproductive age who are engaged in professional activities, economically active, consumers of substances permitted nationally, and have a history of some form of domestic violence. In the context of late pregnancy, a positive correlation was identified between educational attainment at the professional and/or postgraduate level and the child's condition, defined as either PEG or BPN. This association was found to have an odds ratio of 3, indicating that for every one-unit increase in the mother's

educational level, there was a 3-fold increase in the likelihood of the child exhibiting the aforementioned condition. This value is interpreted to mean that among professional mothers or those with postgraduate education, there is a three times higher risk of PEG and/or BPN at term than in other educational levels.

Table 4. Pearson's chi-square test for PEG and/or BPN

Variable	GL	Test	Chi-square	p-value	Interpretation
Mother's educational level	4	Pearson	22,536	0.004	There is a relationship
		Plausibility ratio	23,744	0.067	
Marital status	2	Pearson	2,079	0,846	
		Plausibility ratio	3,054	0,847	
Socioeconomic status	3	Pearson	20,915	0,412	
		Plausibility ratio	21,758	0,394	
Psychoactive substance use	2	Pearson	0,038	0,003	There is a relationship
		Plausibility ratio	0,037	0,002	
History of domestic violence	3	Pearson	20,915	0,001	There is a relationship
		Plausibility ratio	21,758	0,000	
Acceptance of pregnancy	2	Pearson	0,038	0,000	There is a relationship
		Plausibility ratio	0,037	0,000	
Occupation	3	Pearson	0,003	0,000	There is a relationship
		Plausibility ratio	0,003	0,000	
Type of health insurance coverage	5	Pearson	2,377	0,521	
		Plausibility ratio	2,417	0,530	
Mother's age	3	Pearson	4,136	0,126	
		Plausibility ratio	3,986	0,136	
High obstetric risk	2	Pearson	0,088	0,002	There is a relationship
		Plausibility ratio	0,037	0,865	

Source: statistical analysis of data

The maternal profile that results in very low birth weight (VLBW) children, according to the World Health Organization (WHO) categories, corresponds to women with pregnancies at the extremes of reproductive age, either early or late, with premature birth and abruptio placentae (AP), especially in repeated spontaneous abortions.

Statistically significant associations were identified between PEG and/or BPN and the psychosocial determinants of pregnant women, including professional/postgraduate educational level, regular use of permissible psychoactive substances, formal employment,

acceptance of pregnancy (unplanned/unwanted), and high obstetric risk. The p-value was less than 0.005 for all of these associations. Please refer to Table 4.

DISCUSSION

The results of the present study coincide with the results of Eisner, Brazie, et al.[13] in terms of higher rates of prematurity and LBW in mothers with early pregnancies; likewise, the effect of pregnancy outside the so-called "reproductive age" or maternal age has been consistently confirmed as a risk factor by Ventura[14,] Cooper[15], Mestre and Escobar[2], Tuñón[17],

Failure to attend check-ups after the second trimester (when the fetus grows and gains weight) was the common pattern among the various studies compared with this one; this has also been demonstrated by Mestre and Escobar[2], Bortman[16], Heredia and Munares[18]; similarity that provides internal consistency and external congruence to the findings.

Considering that 96% of PEG and/or BPN children are born at term and with an Apgar score greater than 7, it is possible to report on the potential effect of maternal psychosocial determinants; in this regard, there are similarities with the results of Aguilar-Aguilar et al.[19] Regarding the association between maternal stress factors (work, family) and low birth weight, this study also found a significant OR value (3.62) between the highest levels of maternal education and ARO conditions. These findings suggest that maternal stress has a negative impact on the normal development of the fetus, possibly causing intrauterine growth restriction (IUGR) associated with the continued effect of high stress levels on placental exchange function.

The results of the combination of pregnancy and domestic violence coincide with the findings of Nuñez-Rivas et al., who identified that among women exposed to violence, the attributable fraction of LBW was 69.7%[20].

Due to the mothers' failure to attend the six final check-ups of the cycle, the IUGR was not identified early, but only when the newborn's anthropometric measurements were taken. However, it was also noted that the Apgar test for SGA and/or LBW children born at term in this study was within the expected values for their corresponding gestational age, indicating that at least until birth, the weight *per se* PEG and/or BPN have not had a symmetrical influence on fetal maturation in these children, which is why the predicted risk of cognitive problems (lower IQ, cognitive disabilities, or developmental disorders in children demonstrated in children with BPN) may be related to environmental or external factors during or after birth, such as psycho-affective deprivation, malnutrition at an early age, insufficient stimulation, or may also be caused by intrapartum incidents such as neonatal hypoxia, anoxia, or prolonged labor. The above assessment is based on the findings of Apgar sensitivity and predictive tests that have been demonstrated by authors such as Hernández et al.[9] and García Rodríguez[12].

[20] Núñez-Rivas, H. P., Monge-Rojas, R., Gríos-Dávila, C., Elizondo-Ureña, A. M., & Rojas-Chavarría, A. (2003). La violencia física, psicológica, emocional y sexual durante el embarazo: riesgo reproductivo predictor de bajo peso al nacer en Costa Rica. *Revista panamericana de salud Pública*, *14*(2), 75-83.

CONCLUSION

There are psychosocial factors in pregnant women that lead to the birth of low birth weight or small for gestational age babies associated with higher levels of education in the mother, which can have an impact both due to the risks associated with late gestational age and due to ongoing stress in the workplace. PEG and/or BPN babies qualify for an appropriate Apgar score at one minute, indicating that intrauterine growth restriction (IUGR) appears to be related to external causes other than intrinsic problems of the newborn, and is therefore understood to be associated with psychosocial factors affecting the mother during pregnancy (consumption of psychoactive substances regulated in the country, such as caffeine, history of domestic violence, unplanned/unwanted pregnancies, and as a possible biological cause, High Obstetric Risk (HOR), which also showed OR with the mother's professional/postgraduate educational level, thus inferring the influence of maternal stress on IUGR, which leads to LBN and/or LBW infants.

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