

Maternal Vulnerability and the Risk of Developing Neonatal COVID-19: The Unspoken Risk

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“There is little knowledge about the influence of maternal socioeconomic vulnerability in developing COVID-19 infection in newborns. Described neonatal risk factors are mainly biological and do not include social factors.”

Abstract:

Importance: There is little knowledge about the influence of maternal socioeconomic vulnerability in developing COVID-19 infection in newborns. Described neonatal risk factors are mainly biological and do not include social factors.

Objective: To evaluate the association between maternal socioeconomic vulnerability and the development of COVID-19 in newborns admitted to NICU.

Design: Original research, retrospective cohort study, in newborn-mother bond with one-year follow-up, admitted to NICU during the COVID-19 pandemic between March 2020 and December 2021. The primary endpoint was to evaluate maternal socioeconomic status through the Colombian national survey SISBEN-IV and the development of neonatal COVID-19. Data collectors were blinded about the patients' COVID status.

Participants: 500 mother-child bond records were analyzed and followed for a year. The eligible population required documented SISBEN-IV classification and a newborn nasopharyngeal swab PCR for Sars-Cov-2. The exposed cohort were newborns from mothers with SISBEN-IV A classification (extreme poverty).

Results: 158 (31.8%) mothers were classified in SISBEN-IV group A (extreme poverty). Maternal COVID-19 was higher in the exposed group (8.8% vs 3.8% $p=0.02$). Exposed newborns had higher COVID-19 incidence compared to unexposed (10.1% vs. 4.7%, $p=0.02$). Newborns from vulnerable mothers were 2.2 more likely to develop the disease (adjusted OR: 2.24 95%CI 1.06 - 4.69 $p=0.03$).

Conclusion: Understanding the interaction between biological and social factors is essential to impacting infant morbidity and mortality outcomes. We suggest maternal socioeconomic vulnerability be considered a differentiating risk factor for prenatal care and weight control for neonatal disease.

Background:

The socioeconomic condition of a pregnant woman with a high social vulnerability index (SVI), independent of the used assessment scale, increases her mobility risk. The National Institute of Health (NIH) of the United States has considered health inequalities a risk factor for developing Coronavirus Disease 2019 (COVID-19), affecting mother and child (1-11). Consequently, newborns under one month of age are eight times more likely to be admitted to the Intensive Care Unit (NICU) due to COVID-19 (OR:5,1 IC:1,7-14,9) (1,12-14). Due to the low prevalence of COVID-19 in newborns (<10%) (15), there is little knowledge about the influence of maternal socioeconomic vulnerability in the development of newborn COVID-19 (12,16). Likewise, described neonatal risk factors are mainly biological and do not include social factors (2, 17-19).

“The United States Center for Disease Control and Prevention (CDC) SET-NET 2020-2022 reports a prevalence of neonatal COVID-19 of 5.6%, an infection rate of 13.6% in the perinatal registry; and highlights that children under two months of age account for 25% of all hospitalization in children under four years of age (20).”

The United States Center for Disease Control and Prevention (CDC) SET-NET 2020-2022 reports a prevalence of neonatal COVID-19 of 5.6%, an infection rate of 13.6% in the perinatal registry; and highlights that children under two months of age account for 25% of all hospitalization in children under four years of age (20). Since infant morbidity is an indicator of well-being and development of a country, a study of maternal vulnerability evaluating the socioeconomic risk factors for developing neonatal COVID-19 could provide data to address primary care, and under a salutogenic model guide, public health solutions oriented to reduce social inequality gaps (21-26).

Newborn vulnerability is understood as any biological, psychological, or socioeconomic threat from the maternal environment, the caregiver, or the health system, which can lead to developing newborn COVID-19 (27). Chile studied the pregnant women SVI using a governmental social protection file that records social stratification (4). They found vulnerable mothers with higher susceptibility to health damage when compared to non-vulnerable mothers (4). The CDC has declared “evident health inequalities” as a risk factor for developing infectious diseases. It uses the SVI to help local officials identify communities in need before, during, and after a disaster (2). The Pan-American Health Organization (PAHO) is requesting additional information to monitor health services and

identify the non-prioritized population (27). Colombian data studying the relationship between the vulnerability of the Venezuelan migrant maternal population and their state of health (28) recognized maternal vulnerability as a risk factor for neonatal disease to achieve an effective, safe maternity program.

As per the Colombian Infectious Disease Association, COVID-19 is classified as a Public Health hazard. Due to the nature of the COVID-19 pandemic as a health emergency, there is a knowledge gap about COVID-19 in the neonatal stage and its predisposing factors (1, 18). The present original study seeks to evaluate the association between maternal socioeconomic vulnerability and the development of COVID-19 in newborns admitted to a Newborn Intensive Care Unit (NICU) in Barranquilla, Colombia, during the COVID-19 pandemic.

Materials and Methods:

Study design and participants:

Original research, retrospective cohort study, in newborn-mother bond with one-year follow-up, admitted to a high complexity Newborn Intensive Care Unit in Barranquilla – Colombia (MACSA-NICU), between March 2020 and December 2021. We built a cohort and examined the maternal socioeconomic status through the Colombian national survey SISBEN-IV and evaluated the presence of neonatal COVID-19 by PCR-RT. We reviewed the charts for all 1,100 newborns admitted during the study period.

The primary endpoint was to determine the association between maternal socioeconomic vulnerability and the diagnosis of newborn COVID-19. Secondary endpoints are included to characterize the features of maternal socioeconomic vulnerability and describe the neonatal biological risk factors for developing COVID-19.

Eligible populations included mothers of newborns admitted to the MACSA-NICU during the study period, with documented SISBEN-IV classification and a report of the newborn nasopharyngeal swab (real-time PCR for Sars-Cov-2). The exposed cohort was newborns from mothers with SISBEN-IV A classification, and the unexposed cohort was newborns from mothers with a classification other than A (it meant B, C, or D). Exclusion criteria included records from mothers without the SISBEN classification

survey, newborns without a nasopharyngeal swab PCR-RT for Sars-Cov-2 result, or with dysmorphisms. Five hundred records of newborn-mother bonds met the study criteria and were defined as subjects of study (See Figure 1).

The SISBEN-IV indicates social vulnerability in Colombia and was used to allocate resources to vulnerable populations. It was approved through document CONPES 3877 of 2016 and allows the calculation of the Multidimensional Poverty Index (MPI). This classification is comparable to international indicators such as the American SVI used by the CDC to investigate multilevel environmental and social influences and detect risk behaviors and health outcomes. The SISBEN-IV is carried out in the municipalities through a face-to-face survey by trained personnel, considering five items: housing and public services, education level, health status, and fertility, occupation, and household income. It determines the index of unsatisfied needs such as drinking water, sewage, garbage collection, electricity service, telephone line, literacy level, schooling level, health, and occupation. The classification goes from lowest to highest, where the lowest number has less capacity to generate income (See Figure 2).

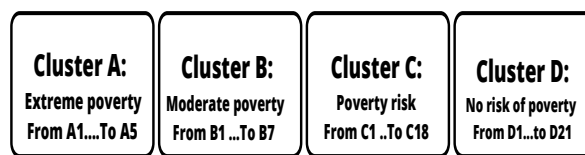


Figure2: SISBEN-IV Colombian classification according to poverty

Group A: Population in extreme poverty (SISBEN-IV A: Vulnerable and exposed population).

Group B: Population of poor households with greater income capacity than group A.

Group C: Population at risk of falling into poverty.

Group D: Population not poor or vulnerable.

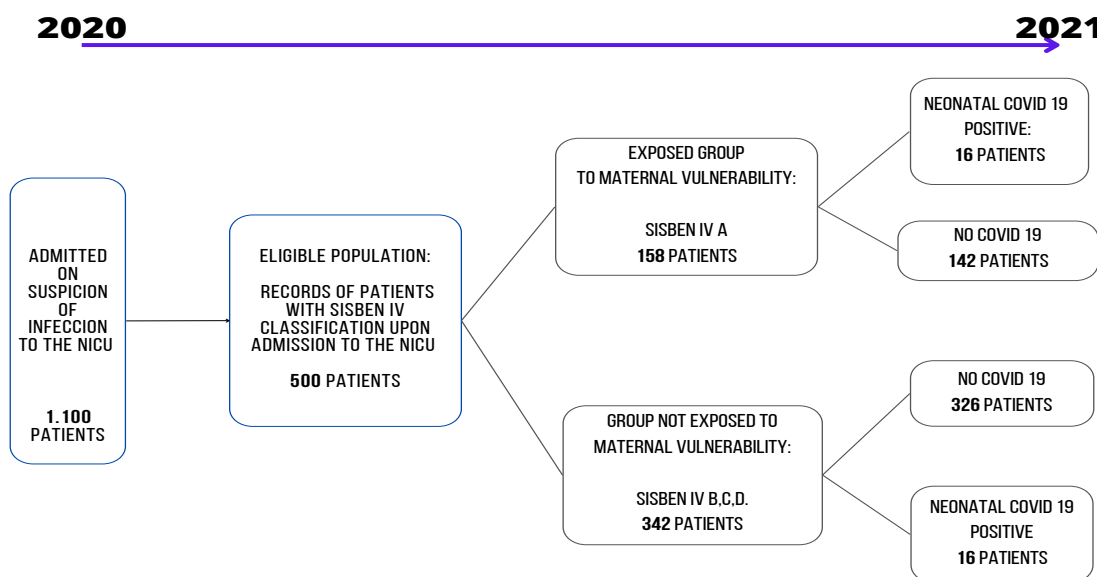


Figure 1: General scheme of the study according to vulnerability exposure March 2020 - December 2021

Maternal and neonatal variables and outcomes:

Maternal vulnerability (Exposure) was analyzed as a dichotomous variable (yes/no), determined according to maternal classification in the SISBEN-IV as group A (extreme poverty). The vulnerability status was considered “Yes” if the mother belonged to SISBEN-IV category A or “No” if she belonged to any category other than A.

The positive neonatal COVID-19 status (outcome) was determined as a dichotomous variable (yes/no) after confirmation of infection by positive PCR-RT for Sars-Cov-2 nasopharyngeal swab. All samples were carried out by authorized laboratories by the Colombian National Institute of Health. The Gold standard test was Real-time polymerase chain reaction (PCR-RT) for Sars-Cov-2. Laboratory results were generated through SemCovid and reported by SisMuestras Information System per resolution 1619 of 2015. Results were reported as “positive” or “negative.”

Cohort follow-up:

A PCR-RT for Sars-Cov-2 nasopharyngeal swab was obtained in all newborns admitted to the NICU during the study period. Due to a delay in getting laboratory results, the mother and relatives left accurate contact information. After the newborn-mother bond was discharged from the hospital, mothers were contacted to consent to the study and carry out their follow-up. Telephone surveys were carried out at one and six months from hospital discharge.

Covariates:

The following maternal covariates were considered: age, ethnicity, nationality, marital status, level of education, underlying diseases, vaccination status for COVID-19, and history of maternal COVID-19 to perform a comprehensive analysis. Environmental covariates included zip code, overcrowding, and type of health insurance. Newborn covariates were appropriate prenatal care (> six visits), type of delivery, gestational age, neonatal age, gender, weight, perinatal complications, nutritional status, type of diet, neonatal underlying diseases, and positive family contact for COVID-19.

“Data was collected using an Excel questionnaire directly fed from the MACSA software, which maintains a daily database of admitted patients. One thousand one hundred medical records were reviewed, and 500 which met inclusion criteria were analyzed.”

The Infectious Diseases Colombian Association criteria were followed to determine the risk factors for the severity of the disease. Mother’s vaccination status was considered complete or incomplete according to the type of vaccine received; however, most mothers were not vaccinated at the delivery time.

Data collection:

Data was collected using an Excel questionnaire directly fed from

the MACSA software, which maintains a daily database of admitted patients. One thousand one hundred medical records were reviewed, and 500 which met inclusion criteria were analyzed. Five follow-up data collectors identified patients by telephone after hospital discharge and filled out the questionnaire. One hundred patients were assigned to each data collector blinded to the patients’ COVID status.

The study followed national and international ethical considerations for human research. Research Ethical Committee (IRB) from Universidad del Norte approved and endorsed it as “less than minimal risk” (Registry No. 2067, May 26, 2022).

Bias control:

Potential sources of bias were controlled as follows:

For data collection, the typing team was masked. Health personnel collected the information in a database without access to the research methodology to control observer bias. Telephone contact was maintained with the mother and relatives or via their health insurance, updating their information every three months to avoid losing follow-up. The total dropout was 1,6%. Only patients registered in the SISBEN-IV government system were included To control selection bias. Each variable was analyzed independently for confusion bias, and the significant ones were included in a binomial logistic regression model. For misclassification bias, the database was double-checked by two different people before its final analysis.

Statistical analysis:

Qualitative variables (frequency and percentage) and quantitative variables (mean and standard deviation) were used to characterize the population. A univariate and bivariate descriptive analysis was carried out based on the effect variable (Positive Neonatal COVID-19). Contingency tables, Chi-square, p-value (significance <0.05), and simple logistic regression were used to establish the association between maternal socioeconomic vulnerability and diagnosis of neonatal COVID-19. Independent variables were analyzed, and then multi-variable analysis provided raw and adjusted ORs with their respective 95% CI. Significant variables were included in a binomial logistic regression model to establish the probabilities of newborns from socioeconomically vulnerable mothers presenting Neonatal COVID-19. A database was created in Excel (version 97-2004) and analyzed in the SPSS program version 2.9 0.0.0 (241).

Results:

Five hundred mother-child bond records were analyzed. Table 1 shows maternal (A), environmental (B), and neonatal (C) demographic characteristics.

“420 (84%) mothers were not vaccinated against COVID-19. At the delivery time, 27 moms (5.4%) had COVID-19.”

Maternal demographic characteristics:

Mother’s average age was 24 years (SD 6.6 years); 281 (56,2%) were Colombians and 219 (43,8%) were Venezuelans. 465 (93%) mothers were “mestiza,” 12 (2,4%) “white,” 8 (1,6%) “Afro,” and 15 (3%) “other races” like native and gypsy. Most mothers were in free union with their partner (n=327 - 65,4%), 107 (21,4%) were single mothers, and 65 (13%) were married. Most mothers

achieved an incomplete high school degree (324 - 64,8%) or an incomplete elementary degree (22 - 4,4%); 23 (4,7%) had no education; 31 (6,2%) completed high school and 54 (10,8%) a bachelor's degree. One hundred fifteen mothers (23%) have at least one comorbidity: Preeclampsia (45 - 9%), Asthma (13 - 2,6%), Diabetes (8 - 1,6%), and Obesity (1 - 0,2%). Thirty-five mothers (7%) had no prenatal control, and 279 (55,8%) a poor-quality control with less than six visits at the time of delivery. 420 (84%) mothers were not vaccinated against COVID-19. At the delivery time, 27 moms (5.4%) had COVID-19.

Environmental characteristics:

271 (54.2%) of the population resides in the urban area of Barranquilla, 179 (35.8%) in the suburbs, and 50 (10%) in the rural areas. 130 (26%) mothers reported living in overcrowding conditions (four or more people sleeping per room at home). 309 (61.8%) mothers had health insurance at hospital admission. 158 (31.8%) mothers were classified as SISBEN-IV group A, considered in extreme poverty and a marker of socioeconomic vulnerability for this cohort. 195 (39%) mothers were classified B, 127 (25.2%) C, and 20 (4%) D or population at not risk of poverty.

Newborn demographic characteristics:

Newborn average age seven days (SD 10.7 days); 278 (55.6%) were male and 222 (44,4%) females; gestational age 37.5 weeks (SD 2.7 weeks); weight 2,889 gms (SD 665 gms); 160 (32%) were preterm. 302 (60.4%) babies were born via cesarean section and 198 (39.6%) had vaginal delivery. 440 (88%) had adequate weight for their gestational age, 14 (2,8%) were small, and 46 (9,2%) were big. 219 (43.8%) newborns were exclusively breastfed. 106 (21.2%) present perinatal complications like neonatal asphyxia, premature membrane rupture, amniotic infection, or requiring reanimation. 32 (6.4%) newborns tested positive for COVID-19: 13 (2.6%) were diagnosed with mild disease, 11(2.2%) with severe, and 8(1.6%) with critical disease. There were no mortalities among the newborns COVID-19 positive.

“In a bivariate analysis, after adjusting for confounding variables, newborns from vulnerable mothers (Exposure/SISBEN-IV A) were 2.2 times more likely to develop COVID-19 when compared to not vulnerable mothers (adjusted OR: 2.24 95%CI 1.06 - 4.69 p-val=0.03). Model 2: β :2,68; DE=0,183; p val<0,001.”

Follow-up Data and Cross-Analysis:

479 (95.8%) newborns were discharged home, 17 (3.4%) were transferred to a higher level of care, and 4 (0.8%) died. No mortalities in COVID-19 patients. There were no deaths at six months and 8 (1.6%) dropouts (See Table 1).

Table 2 shows maternal sociodemographic characteristics and clinical factors according to maternal vulnerability status (exposure/SISBEN-IV A). Homogeneous distribution for the populations

was observed, with p-values > 0.05 for all variables. The presence of positive maternal COVID-19 at the time of delivery was higher for the exposed group (8.8% vs 3.8% p=0.02). Likewise, neonatal demographic characteristics had no statistical difference based on the maternal vulnerability status. Neonatal COVID-19 in the exposed group was higher when compared with the unexposed population (10.1% vs. 4.7%, p=0.02), and the infection was more critical (3.1% vs 0.9%, p=0.04).

In a bivariate analysis, after adjusting for confounding variables, newborns from vulnerable mothers (Exposure/SISBEN-IV A) were 2.2 times more likely to develop COVID-19 when compared to not vulnerable mothers (adjusted OR: 2.24 95%CI 1.06 - 4.69 p-val=0.03). **Model 2:** β :2,68; DE=0,183; p val<0,001 (See Table 3).

“In our study, according to the SISBEN-IV Colombian socioeconomic status, maternal vulnerability was a significant risk factor for developing neonatal COVID-19.”

Discussion:

After overcoming the first stage of the COVID-19 pandemic, the risk behavior for vulnerable populations is more frequently associated with adverse health outcomes. The scarce social and psychological resources that overwhelmed the healthcare systems during the spread of the Sars-CoV-2 virus have been an example of this (20). There is a systematic neglect of the need for equality by gender, social class, or race, which makes people lose trust in institutions, education, and health systems (29). In our study, according to the SISBEN-IV Colombian socioeconomic status, maternal vulnerability was a significant risk factor for developing neonatal COVID-19.

The SISBEN-IV classification serves as an indicator of social vulnerability in Colombia and helps in the allocation of economic resources and benefit plans. This classification is comparable to international indicators like the USA SVI. Our study found that vulnerable mothers who correspond to extreme poverty presented higher incidences of COVID-19 infection at the time of delivery and a statistically significant relationship with the development of newborn COVID-19. Newborns from vulnerable mothers were up to 2.2 times more likely to develop the disease.

Other studies have used SVIs in search of answers to health problems. In 2019, Yee et al. used the SVI as a predictor for adolescent pregnancy (30); the same year in Brazil, Oliveira et al. carried out a case-control study proposing a model to predict preterm birth considering socioeconomic vulnerability, family vulnerability, and non-acceptance of pregnancy (31). As in Oliveira's study, we observed a high proportion of mothers without health insurance and unable to receive appropriate prenatal care.

In our study, the risk of presenting neonatal COVID-19 in the exposed population attributable to maternal socioeconomic vulnerability was 55 per 1,000 newborns. Supporting these vulnerable mothers and identifying their risk in a differentiated prenatal control could reduce the development of neonatal COVID-19 by up to 50% and, indeed, other adverse obstetric events. This intervention would impact the figures for maternal and child morbidity and

mortality and likely NICU expenses.

“According to the World Health Organization (WHO), up to 95% of newborns will present a health problem in vulnerable populations such as ethnic minorities, displaced populations, or without satisfied minimum basic needs. Recognizing maternal vulnerability as a risk factor for neonatal disease may be the first step to achieving childhood social justice.”

One element amenable to improvement in prenatal care is the doctor-patient relationship. A Danish study published in 2022 revealed that even primary care physicians knew that socioeconomic vulnerability has increased in women of childbearing age, were familiar with indicators of vulnerability in pregnancy, and did not identify them during clinical practice. Not detecting vulnerability in pregnancy is a significant risk factor that contributes to maternal-perinatal inequity and generates adverse events (32). During the follow-up for our patients, mothers expressed feelings about their perception of the health team that led them to make appropriate or inappropriate decisions. This was also documented in a case-control study by Songco et al. (33).

According to the World Health Organization (WHO), up to 95% of newborns will present a health problem in vulnerable populations such as ethnic minorities, displaced populations, or without satisfied minimum basic needs. Recognizing maternal vulnerability as a risk factor for neonatal disease may be the first step to achieving childhood social justice.

Limitations and strengths:

One limitation of our study was the inability to verify other COVID-19-positive contacts due to the scarcity of samples during the overwhelming health emergency, and some relatives refused to be tested. The PAHO states that fear, worries, and stress when facing a situation of high uncertainty, such as the COVID-19 pandemic, can be the explanation for these behaviors that affect mental health in general.

This study occurred during the beginning of the COVID-19 pandemic when most mothers were not vaccinated against the disease. We suggest comparative vulnerability research in the maternal population with a complete vaccination scheme to analyze whether the association with neonatal COVID-19 persists or if it would be identified as a protective measure.

The main strengths of our study were the availability of performing all tests by governmental institutions and the national standardized classification for maternal vulnerability through the SISBEN-IV classification. In addition, the MACSA software and database allow a reliable post-discharge follow-up for maternal-newborn

bonds and maintain permanent contact with family members.

Our study had no demographic differences in the exposed and unexposed populations. Although the reference hospital belongs to the governmental service, the reorganization of the health system during the COVID-19 health emergency allowed the care of newborns from all SISBEN-IV classifications. The risk of having COVID-19 in the population studied was 6.2%. This is slightly higher than what has been reported in the literature, as it is a captive population from a departmental reference site (32-34).

“This is the first study to determine the association between maternal socioeconomic vulnerability and neonatal COVID-19. We found a higher risk of having COVID-19 in newborns from socioeconomically vulnerable mothers up to 2.2 times (OR a: 2.24 CI 1.06-4.69 p= 0.03). We suggest maternal socioeconomic vulnerability should be considered as a differentiating risk factor for prenatal care and weight control for neonatal disease; and health professionals to be effectively trained in their active detection. Restructuring and regulating the process of active detection of socioeconomic vulnerability in pregnant women must become a priority goal, guaranteeing time for its management and allowing the creation of a strong doctor-patient relationship in prenatal care.”

Conclusions and Recommendations:

This is the first study to determine the association between maternal socioeconomic vulnerability and neonatal COVID-19. We found a higher risk of having COVID-19 in newborns from socioeconomically vulnerable mothers up to 2.2 times (OR a: 2.24 CI 1.06-4.69 p= 0.03). We suggest maternal socioeconomic vulnerability should be considered as a differentiating risk factor for prenatal care and weight control for neonatal disease; and health professionals to be effectively trained in their active detection.

Restructuring and regulating the process of active detection of socioeconomic vulnerability in pregnant women must become a priority goal, guaranteeing time for its management and allowing the creation of a strong doctor-patient relationship in prenatal care.

TABLE 1

Mothers and Newborns Sociodemographic and Clinical Characteristics

Maternal Sociodemographic Characteristics	N (500)	% (100)
<u>Age</u> (years)	24 (6,6 DE)	
<u>Nationality:</u>		
Colombian	281	56,2
Venezuelan	219	43,8
<u>Zipcode:</u>		
Rural	217	43,4
Suburbs	161	32,2
Rural	122	24,4
<u>Marital status:</u>		
Married	65	13
Single	107	21,4
Divorced or separated	1	0,2
Free union (common law marriage)	327	65,4
<u>SISBEN-IV Classification</u>		
A (Maternal Vulnerability marker)	158	31,6
B	195	39
C	127	25,2
D	20	4
<u>Education</u>		
Incomplete Elementary	22	4,4
Elementary	44	8,8
Incomplete High School	324	64,8
High School	31	6,2
Bachelor's degree	54	10,8
Technician	2	0,4
Professional	23	4,7
<u>Health Assurance</u>		
Yes	309	61,8
No	191	38,2
<u>Overcrowding</u>		
Yes	130	26
No	370	74

Maternal Clinical Characteristics	N (500)	% (100)
<u>Covid 19 vaccination</u>		
None	420	84
One dose	51	10,2
Two doses or more (Complete scheme)	29	5,8
<u>Control Prenatal</u>		
None	35	7
Less than 6 controls	279	55,8
6 or more 6 controls	186	37,2
<u>Maternal Covid-19 (during delivery)</u>		
Yes	27	5,4
No	473	94,6
<u>Comorbidity</u>		
None	385	77
Preeclampsia	45	9
Diabetes	8	1,6
Obesity	1	0,2
Asma	13	2,6
Other	24	9,6
Neonatal Sociodemographic Characteristics		
<u>Age (Days)</u>	N(500) % (100)	
<u>Gestational age (weeks)</u>	7 (10,7 DE) 37,5 SEM (2,7 DE)	
<u>Gender</u>		
Female	222	44,4
Male	278	55,6
<u>Gestational age</u>		
Pre- term	160	32
Full Term	337	67,4
Post-term	3	0,6
<u>Weight (in grams at admission)</u>	2,889 (665 DE)	

Neonatal Clinical Features	N (500)	% (100)
<u>Birth Route</u>		
Vaginal	198	39,6
Cesárea	302	60,4
<u>Nutritional status (weight)</u>		
Appropriate birth weight	440	88
Low birth weight (IUGR)	14	2,8
Large birth weight	46	9,2
<u>Feeding</u>		
Exclusive breast milk	219	43,8
Formula	147	29,4
Mixed	1.34	26,8
<u>Risk Factors for Severity</u>		
Prematurity	25	5
Low birth weight (IUGR)	13	2,6
Low weight after birth	18	3,6
Bronchopulmonary dysplasia	1	0,2
Major malformation	3	0,6
More Than One Factor	60	12
None	380	76
<u>Perinatal complications</u>		
Asphyxia	19	3,8
Premature Membranes Rupture (PMR)	27	5,4
Intra-amniotic infection	22	4,4
Reanimation	17	3,4
2 or more complications	21	4,2
None	394	78,8

Covid -19 neonatal

Yes	32	6,4
No	468	93,6

Covid 19 Classification

Negative	468	93,6
Mild	13	2,6
Severe	11	2,2
Critical	8	1,6

Status at hospital discharge

Home	479	95,8
Transferred to higher level of care	17	3,4
Deceased	4	0,8

Status 6 months after discharge (496)

Alive	488	98,3
Deceased	0	0
No data	8	1,6

TABLE 2*Characteristics of Population According To Maternal Vulnerability Exposure*

Maternal vulnerability					
(SISBEN A/extreme poverty)	Yes (158)	%	No (342)	%	P-val
<u>Maternal Nationality</u>					
Colombian	94	59,1	187	54,8	0,313
Venezuelan	64	40,9	155	45,2	
<u>Marital status</u>					0,081
Married	12	7,6	53	15,5	
Single	38	24	69	20,1	
Separate	0	0	1	0,3	
Free union (Common-law marriage)	108	68,4	219	64,1	
<u>Education</u>					
Complete Elementary	15	9,5	29	8,5	0,832
Incomplete Elementary	7	4,4	15	4,4	
Completed High School	11	7	20	5,8	
Incomplete High School	96	60,7	228	66,6	
Technician	18	11,3	36	10,5	
Professional	1	0,6	1	0,3	

None	10	6,5	13	3,9	
<u>Overcrowding</u>					
Yes	44	27,9	86	25,1	0,522
No	114	72,1	256	74,9	
<u>Ethnicity</u>					
Mongrel	152	96,2	313	91,5	0,061
Afro	2	1,3	6	1,7	
White	4	2,5	8	2,3	
Other	0	0	15	4,5	
<u>Health Assurance</u>					
Yes	99	62,6	210	61,4	0,788
No	59	37,4	132	38,6	
<u>Mother vaccinated for Covid 19</u>					
None	134	84,8	286	83,6	0,459
One dose	14	8,8	37	10,8	
Two doses or more (Complete scheme)	10	6,4	19	5,6	
<u>Maternal Comorbidity</u>					0,155
None	113	71,5	272	79,5	
Preeclampsia	16	3,8	29	0,2	
Diabetes	1	0,6	7	2	
Obesity	0	0	1	0,3	
Asthma	7	4,4	6	1,7	
Other	10	6,3	12	3,5	
Two or more	11	13,4	15	12,8	
<u>Mother Covid 19 (during Delivery)</u>					0,020
Yes	14	8,8	13	3,8	
No	144	91,2	329	96,2	
<u>Control prenatal</u>					0,147
None	6	3,7	29	8,5	
Less than 6 controls	89	56,3	190	26,3	
More than 6 controls	63	40	123	65,2	

Newborn Gender	n(158)	%	n(342)	%	P-val
Female	67	42,4	155	45,3	0,542
Male	91	57,6	187	54,7	
<u>Birth Path</u>					
Vaginal	63	39,9	135	39,4	0,932
Cesarean Section	95	60,1	207	60,6	
<u>Neonatal perinatal complications</u>					
Asphyxia	9	5,7	10	3	0,321
Premature rupture of membranes	8	5	19	2,6	
Intraamniotic infection	10	6,3	12	3,5	
Post-resuscitation	7	4,4	10	3	
2 or more	5	3,1	16	4,7	
None	119	75,5	275	83,2	0,867
<u>Newborn Nutritional Status</u>					
Appropriate birth weight	138	87,3	302	88,3	
Low birth weight (IUGR)	4	2,5	10	3	0,021
Large birth weight	16	10,2	30	8,7	
<u>Risk for severe neonatal Covid-19</u>					
Prematurity	10	6,3	15	4,4	0,660
Growth restriction	4	2,5	9	2,6	
Low weight	4	2,5	14	4	
Bronchopulmonary dysplasia	0	0	1	0,3	
Major malformation	2	1,2	1	0,3	
More than 1 risk factor	20	12,6	40	11,7	0,106
No risk factors	118	74,9	269	76,7	
<u>Neonatal Covid-19 positive</u>					
Yes	16	10,1	16	4,7	0,106
No	142	89,9	326	95,3	
<u>Classification of neonatal Covid-19</u>					
Mild	6	3,8	7	2	0,106
Severe	5	3,2	6	1,8	
Critical	5	3,2	3	0,9	
No Covid	142	89,9	3260	95,3	

TABLE 3

Relationship between crude and adjusted ORs from significant variables

(β:2.24; SD=0.183; p value<0.001)

** Covid 19 neonatal positive	OR	IC 95%	Adjusted OR	IC95%	P-val
Maternal Vulnerability (SISBÉN A)	1,6	1,13 – 2,39	2,24	1,06 – 4,69	0,033
Colombian Nationality	2,3	1,07 – 5,10	2,22	0,96– 5,11	0,61
Newborn small weight	1,3	0,48 – 3,60	1,45	0,47- 4,50	0,51
Newborn big weight	0,65	0,32 – 1,34	0,22	0,04 – 1,14	0,072
Covid -19 Family Contact	2,83	1,08 – 7,43	2,91	0,86- 9,80	0,83

*Sisbén A (extreme poverty): Yes/No

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Disclosure: The authors have no conflicts of interests to disclose.

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