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To cite this article: S. Viroga, L. Briozzo, G. Tomasso, S. Artucio, F. Nozar, J. P. Gesuele & A. Bianchi (2024) Socioeconomic inequities during COVID 19 pandemic increase preterm birth and low birth weight in the most underprivileged, The Journal of Maternal-Fetal & Neonatal Medicine, 37:1, 2375015, DOI: [10.1080/14767058.2024.2375015](https://doi.org/10.1080/14767058.2024.2375015)

To link to this article: <https://doi.org/10.1080/14767058.2024.2375015>



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Published online: 08 Jul 2024.



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ORIGINAL ARTICLE



Socioeconomic inequities during COVID 19 pandemic increase preterm birth and low birth weight in the most underprivileged

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ABSTRACT

Background: The mitigation measures implemented to face the healthcare emergency brought by COVID 19 pandemic generated an increase in socioeconomic inequities in the most underprivileged population which is also the most threatened in their human rights. In Uruguay, this population is assisted in the public health care system. To analyze how these measures impacted on these mothers and their neonates we selected outcomes that most contributed to neonatal mortality.

Objective: To analyze the incidence of Preterm Birth (PB), Intrauterine Growth Restriction (IUGR) and Low Birth Weight (LBW) in the public health care system in Uruguay, during the period of time in which the strictest measures were adopted to mitigate the COVID 19 pandemic in 2020 (para-pandemic period) compared to the same period in 2019 (pre-pandemic).

Methods: A retrospective, cross sectional, descriptive study was performed to compare PB, IUGR and LBW from 15 March to 30 September 2019 (before COVID 19 pandemic) to the same period of 2020 (when COVID 19 pandemic bloomed), in the public health care subsystem. The analysis was performed with data from the national perinatal database system (SIP).

Results: In 2020, a significative increase in PB, RR: 1.14 (CI 95%: 1.03–1.25), and in LBW, RR: 1.16 (CI 95% 1.02–1.33), was registered compared to 2019 (pre-pandemic period). IUGR also showed an increase, but without statistical significance (4.6% in 2019 vs 5.2% in 2020, RR 1.13 CI 95% 0.98–1.31). The compared groups showed no differences in the distribution of biological confounding variables that could explain the increase in incidence of the main outcomes.

Conclusions: In the absence of other factors that could explain the results we consider that social crisis associated to the restrictive measures implemented in the country to dwindle the effect of the pandemic exacerbated the adverse conditions that affect the reproductive process for those underprivileged women assisted in the public sector, increasing PB and LBW. It is important to consider the future impact of these results on neonatal and infant mortality and to implement social measures to reduce the damage as soon as possible.

ARTICLE HISTORY

Received 9 October 2021

Revised 4 June 2024

Accepted 26 June 2024

KEYWORDS

Mitigation measures;
covid 19; perinatal
results; preterm birth;
LBW; IUGR

Introduction

Preterm Birth (PB) and Intrauterine Growth Restriction (IUGR) are major contributors to neonatal and child mortality and morbidity. As their causes are unknown, PB and IUGR are considered syndromes. Nevertheless, several risk factors are the same for both conditions. Based on this, and from an integrative approach, both syndromes ought to be analyzed together [1–3].

The healthcare emergency was declared in Uruguay on 13 March 2020 because of the COVID 19 pandemic. From March to October 2020, we experienced a stage of low incidence of COVID cases characterized by

outbreaks that were controlled through the combination of non-pharmacological measures and the testing, tracking and isolation of cases (TeTrIs strategy). The restrictive measures implemented known as “Stay at home” were very successful to reduce the effect of the pandemic in the first semester of 2020. No cases of hospitalization in pregnant women were registered in this period but the restrictive measures adopted generated a deep economic, social and psychological crisis which affected the poorest and youngest women from the most disadvantaged socioeconomic sectors [4,5]. This period will be named as “para-pandemic” (few

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cases of infection, but with a great social impact). As relevant consequences, this period registered an increase in gender violence, anxiety and distress, and barriers to access sexual and reproductive health services [6–8].

In our country, these “extraordinary conditions” generate an “experimental model” under which the impact of the adverse social factors may be analyzed in pregnant women belonging to the least privileged sectors during this para-pandemic period if we compare perinatal results before and after COVID pandemic.

In 2008, Uruguay implemented a law creating a national health system that allows people to choose among public providers (public) or individual nonprofit institutions that provide health care services through a pre-paid regime (private). People assisted in the public providers receive medical care free of charge. Accordingly, women who control their pregnancies in the public health care system are the poorest ones, 55% of them belong to income quintiles 1 and 2 and only 8.6% to quintiles 4 and 5 (the richest ones). On the other hand, 91.4% of the wealthiest sectors are assisted in the private sub-sector of health. For this reason, we consider that the health care sector where women control their pregnancies (public or private) fits well with their socioeconomic status and it will be used as a proxy.

Uruguay monitors obstetric care through the Perinatal Information System (SIP, for its acronym in Spanish). This system is part of a PAHO's tool kit for improving the quality of care provided to mothers and newborns [9]. Through SIP, maternities can enter the Clinical History data into a database created with the SIP program. The databases can be consolidated and analyzed nationally to describe the situation of various indicators over time, by geographic area, year or other specific characteristics of the population. Its use is mandatory by law all throughout our national territory, which forces all pregnancies and births to be registered in the SIP.

The objective of this study was to analyze the impact of the measures adopted during the para-pandemic period on pregnant women and their newborns from the most discriminated groups assisted in the public sector of health using the SIP database. We selected outcomes that most contributed to neonatal mortality.

Objective

To compare the incidence of neonatal outcomes with high contribution to perinatal mortality such as PB, LBW and IUGR in the public sector of health care in

two periods of time: pre-pandemic (15 March to 30 September 2019) versus para-pandemic (same period in 2020).

Since during the para-pandemic period no severe SARS COV2 infection cases were reported in pregnant women, our hypothesis was that if specific characteristics of the population (confounders) in the two periods (2020 vs. 2019) were similar, no changes in the incidence of PB, LBW and IUGR would be expected.

Methods

This research was based on the National Database from the Vital Statistics Division of the Public Health Ministry of Uruguay (SIP). SIP national coverage reached $\geq 98\%$ of the Live Birth Certificate (LBC) issued in the country.

A retrospective, cross sectional, descriptive study was performed. We included the records of all women giving birth in the public health care subsystem in Uruguay (pregnancies > 20 weeks and weights > 500 g) recorded in the SIP database from 15 March to 30 September 2019 (before COVID 19 pandemic) and from the same period of 2020 (para-pandemic). We selected the public health care sector as a representative sample of the most vulnerable population since it provides assistance which is free of charge for the users.

Primary outcomes to analyze in both periods were PB (births greater than 20 and lower than 37 weeks of gestational age), LBW (weight lower than 2500 g) and IUGR (registered in the SIP database according to medical criteria of the physician assisting the birth). Women were characterized based on the data available from births registered in SIP for both periods of analysis.

The software used for data processing and statistical analysis was SIP and Epi Info (version 7.2.2.6). All methods were performed in accordance with the Declarations of Helsinki ethical principles. The data used in our study was anonymized.

Results

Uruguay registered 18,497 births during the 2020 semester, from which 7490 (40.5%) occurred in the public sub-sector and 11,007 (59.5%) occurred in the private sub-sector. Meanwhile, the total number of births in the 2019 semester was 18,826, from which 7265 (38.6%) were assisted in the public sub-sector and 11,561 (61.4%) were assisted in the private sub-sector.

Table 1 shows and compares the incidence of preterm birth, low birth weight and intrauterine

growth restriction for the two periods analyzed. In the 2020 semester, the public sub-sector evidenced a significant increase of preterm birth of 14% (CI 95% 3–25%) and low birth weight of 16% (CI 95% 2–33%) compared to 2019. IUGR increased by 13% in 2020, but its increase did not show statistical significance.

The distribution of confounding or prognostic variables associated to the 3 mentioned pathologies is analyzed next for both periods. The variables associated with the studied obstetric syndromes were: Obstetric history, Adverse Social factors, Stress and anxiety, Pathologic maternal conditions (hypertensive and metabolic), Inflammatory-Infectious conditions and Pregnancy conditions (Table 2).

As evidenced in the table, none of the analyzed variables showed statistically significant differences between 2019 and 2020 that may account for the rise of PB and/or LBW, nor were there any cases of SARS COV 2 infections which required hospitalization of pregnant women during this period. Obstetric history, personal history, adverse social factors, stress and anxiety, pathologic maternal conditions and pregnancy conditions were distributed equally in both periods.

Table 1. Prevalence of preterm birth, low birth weight and IUGR in the public sub-sector.

	2019 Pre pandemic N (%)	2020 Para pandemic N (%)	p Value	RR (CI 95%) 2020/2019
Preterm birth	730 (10%)	858 (11.4%)	0.004	1.14 (1.03–1.25)
Low birth weight	395 (5.4%)	476 (6.3%)	0.01	1.16 (1.02–1.33)
IUGR	332 (4.6%)	389 (5.2%)	0.07	1.13(0.98–1.31)

Only in the case of urinary tract infections a statistically significant difference was evidenced, but there was a decrease and not an increase in the para-pandemic period compared to the pre-pandemic period, discarding it as a confounding factor.

Discussion

The evidence of how the crisis affected the reproductive process is uneven, some studies show a decrease in prematurity while others show an increase in it, which varied according to the country or region of study [10–12].

In our study pre-pandemic and para-pandemic populations show similar distribution in all risk factors associated with the analyzed outcomes that could explain the increase in preterm birth and LBW registered in 2020.

How could these results be explained then? The answer may be the economic, psychologic and social crisis associated with the restrictive measures implemented to control the pandemic, which increased the risk in the reproductive process [13]. These crisis situations are not “captured” or registered by the perinatal information system used, which is why the clinical approach and records must be revised in order to make them more efficient to detect these changes.

In Uruguay, with the advent of the health emergency due to the COVID 19 pandemic, the situation leads to a very serious social, economic and psychological crisis, generically called a pandemic in relation to the safety measures imposed mitigation.

Table 2. Different variables grouped by risk conditions for the perinatal syndromes.

CONDITIONS	SIP DATABASE VARIABLES	Pre-pandemic 2019		Para-pandemic 2020		p Value
		N	FR (%)	N	FR (%)	
Obstetric history	Primigravida	2394	33	2456	32.8	NS
	Multiparous: four or more	801	11	835	11.1	NS
Adverse social factors	Adolescent pregnancy	1499	20.6	1537	20.5	NS
	Ethnic identification “non caucasian”: African, half-blood, indigenous	776	14	742	14.4	NS
	Drugs	239	3.3	244	3.3	NS
	Smoking	1612	22.2	1586	21.2	NS
	Alcohol	135	1.9	139	1.9	NS
	Health care access: Without anti-tetanus vaccine	561	7.7	500	6.7	NS
Stress and anxiety	Health care access: With prenatal control	7174	98.7	7362	98.3	NS
	Gender violence	100	1.4	107	1.4	NS
Pathologic maternal conditions (hypertensive and metabolic)	With maternal pathology	3979	54.8	3981	53.2	NS
	Aged mother	711	9.8	734	9.8	NS
	Previous chronic hypertension	181	2.5	211	2.8	NS
	PE – E Syndrome	333	4.6	385	5.1	NS
	Eclampsia	7	0.1	9	0.1	NS
	Diabetes	1186	16.3	1208	16.1	NS
Inflammatory – Infectious conditions	Urinary Tract Infections	1337	18.4	1243	16.6	0.003
Pregnancy conditions	Multiple pregnancy	131	1.8	153	2	NS
	PROM	979	13.5	988	13.2	NS
	Threatened Preterm Labor	564	7.8	541	7.2	NS
	COVID infection that requires hospitalization	0		0		

Economically, it is manifested by several indicators, such as the fall in gross domestic product (GDP) and private consumption, as well as the increase in poverty rates in that period. For its part, the “Gender, Childhood and Use of Free Time” Survey shows a 22% increase in poverty and unemployment in the social sectors with the greatest violation of rights and altered diet, with an increase in the consumption of ultra-processed foods [14].

The para-pandemic could also have affected perinatal control services, especially in the area of public services. Changes in medical control or surveillance systems, such as telephone consultation to protect against viral transmission, causing delays in care, lack of adequate follow-up of patients, and problems of access to care in the most vulnerable social sectors [15].

We consider a theoretical framework must be generated to explain this situation. The proposal of the distal factors model: unemployment growth, mobility restriction, uncertainty and weakening of social networks, which impact on so many other proximal factors (less health care coverage, delay in quality health care and present health care, stress and maternal anxiety, increase in unfavorable dietary conditions and microbiota and others) plausibly applies to the psycho-social factors associated with the increase in PB and LBW in the analyzed period.

It is necessary to focus the research in relation to the causal mechanisms of these syndromes in order to prevent and treat them in individual terms as well as to propose public policies. In the future we will meet numerous health challenges to improve women, children and adolescents' outcomes.

In a previous publication by our team, we had demonstrated how the results of this study were also given in the reference maternity hospital in our country belonging to the public subsector [16].

It is important to note that inequality and discrimination for monetary reasons causes economic, social and health disadvantages which affect women's well-being all throughout the cycle of life that will also impact on the future generations.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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