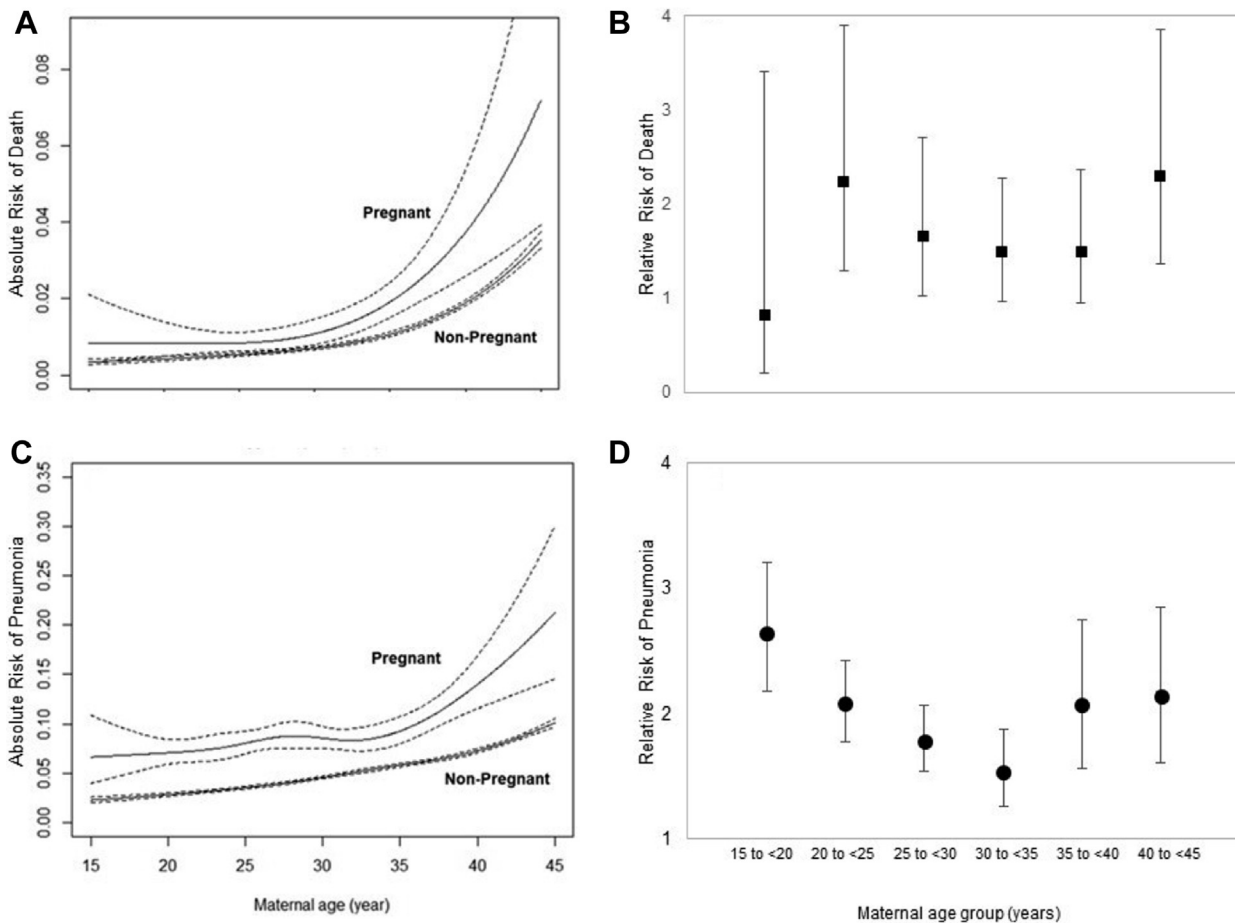


Young pregnant women are also at an increased risk of mortality and severe illness due to coronavirus disease 2019: analysis of the Mexican National Surveillance Program

OBJECTIVE: There is conflicting information regarding whether pregnant women are at increased risk of severe complications from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We sought to understand whether

pregnant women are at increased risk of death or severe illness owing to coronavirus disease 2019 (COVID-19) compared with nonpregnant women and whether that risk varies by age.

FIGURE
Risk of death and pneumonia among pregnant and nonpregnant women



A, Absolute risk of death and 95% confidence intervals by patient age, stratified by pregnant and nonpregnant women (nonlinear relationship between the risk of death and age modeled using restricted cubic splines). **B,** Relative risk of death of pregnant and nonpregnant women with COVID-19 by age categories. **C,** Absolute risk of pneumonia and 95% confidence intervals by patient age, stratified by pregnant and nonpregnant women (nonlinear relationship between the risk of death and age modeled using restricted cubic splines). **D,** Relative risk of pneumonia of pregnant and nonpregnant women with COVID-19 by age categories.

COVID-19, coronavirus disease 2019.

Martinez-Portilla. Young pregnant women are also at an increased risk of mortality and severe illness due to coronavirus disease 2019. *Am J Obstet Gynecol* 2020.

STUDY DESIGN: Data were extracted from the epidemiologic surveillance system of viral respiratory diseases of Mexico, which included 475 monitoring hospitals that are components of the Mexican Public Health Network, including the National Mexican Institute of Social Security, Institute of Security and Social Services for State Workers, Secretary of National Defense, Secretary of the Navy of the Mexican Republic, and the National Health Department. These monitoring hospitals were given the approval to perform reverse transcription polymerase chain reaction analysis for SARS-CoV-2 in Mexico and are, therefore, the reference centers for all patients with suspected COVID-19. We included 7028 pregnant and 255,721 nonpregnant women aged 15 to 45 years diagnosed as having COVID-19 between February 1, 2020, and October 27, 2020.

RESULTS: We found that the risk of death and pneumonia increased with age for both pregnant and nonpregnant women (Figure, A and C). The adjusted case fatality rate for pregnant women was 1.3% overall but rose to 2.1% and 5.9% for those aged 35 to 39 years and 40 to 44 years, respectively. Pregnant women with COVID-19 consistently had a higher

risk of death and pneumonia than nonpregnant women of similar age with COVID-19 (adjusted relative risk [RR] of death, 1.68; 95% confidence interval [CI], 1.36–2.08; adjusted RR of pneumonia, 1.97; 95% CI, 1.82–2.13) (Figure; Table). Although the risk was highest among older pregnant women, the highest RRs appeared among both younger and older pregnant women (Figure, B and D).

CONCLUSION: Earlier reports suggested that mortality may not be higher in pregnant women with COVID-19.¹ However, a recent US study found a 1.7-fold increased risk of death in pregnant women (n=34) with COVID-19 compared with nonpregnant women (n=447).¹ We confirm that pregnancy puts the women at increased risk of COVID-19–related death and pneumonia, as we have suggested in our previous article using a propensity score matching analysis.² What was striking about our results was that although the risk was highest among older pregnant women, the RR was high among younger pregnant women aged between 20 and 30 years. This likely reflected both the excess risk conferred by pregnancy and the low baseline risk of death and severe disease among younger nonpregnant women. The finding

TABLE

Relative risk of death and pneumonia between pregnant and nonpregnant women with coronavirus disease 2019 (age, 15–44 years)

Variables	Pregnancy			Nonpregnant			RR (95% CI)	P value	Adjusted RR (95% CI) ^a	P value
	Events	Total	Risk per 100,000	Events	Total	Risk per 100,000				
Death ^b										
Overall	93	7028	1320	3221	255,721	1260	1.61 (1.28–2.02)	<.001	1.68 (1.36–2.08)	<.001
Age 15–<20 y	2	451	444	58	10,844	530	0.83 (0.20–3.38)	.79	0.83 (0.20–3.41)	.80
Age 20–<25 y	16	1505	1060	128	29,257	440	2.43 (1.45–4.08)	.0008	2.24 (1.29–3.90)	.004
Age 25–<30 y	18	2102	860	255	49,592	510	1.67 (1.03–2.68)	.04	1.66 (1.02–2.71)	.04
Age 30–<35 y	23	1768	1300	474	53,377	890	1.47 (0.97–2.22)	.07	1.49 (0.97–2.27)	.07
Age 35–<40 y	20	963	2080	709	52,246	1360	1.53 (0.99–2.38)	.06	1.50 (0.95–2.36)	.08
Age 40–<45 y	14	239	5860	1597	60,405	2640	2.22 (1.32–3.69)	.002	2.30 (1.37–3.85)	.002
Pneumonia ^c										
Overall	611	7028	8.7	14,332	255,716	5.60	1.96 (1.81–2.12)	<.001	1.97 (1.82–2.13)	<.001
Age 15–<20 y	32	451	7.1	249	6804	3.66	2.45 (1.72–3.48)	<.0001	2.42 (1.70–3.46)	<.0001
Age 20–<25 y	110	1505	7.3	627	18,750	3.34	2.63 (2.17–3.19)	<.0001	2.64 (2.18–3.21)	<.0001
Age 25–<30 y	169	2102	8.0	1508	34,162	4.41	2.07 (1.78–2.41)	<.0001	2.08 (1.78–2.42)	<.0001
Age 30–<35 y	167	1768	9.5	2285	37,422	6.11	1.79 (1.54–2.08)	<.0001	1.78 (1.54–2.07)	<.0001
Age 35–<40 y	91	963	9.5	2636	37,134	7.10	1.52 (1.25–1.85)	<.0001	1.54 (1.26–1.88)	<.0001
Age 40–<45 y	42	239	17.6	4271	43,252	9.87	2.03 (1.54–2.68)	<.0001	2.07 (1.56–2.75)	<.0001

CI, confidence interval; RR, relative risk.

^a Modified Poisson model adjusted for obesity, hypertension, diabetes, and smoking; ^b P value for interaction (maximum likelihood test comparing full and reduce models, 5 degrees of freedom) between pregnancy and age (5-year age bin categories) is equal to .46; ^c P value for interaction (maximum likelihood test comparing full and reduce models, 5 degrees of freedom) between pregnancy and age (5-year age bin categories) is equal to .002.

Martinez-Portilla. Young pregnant women are also at an increased risk of mortality and severe illness due to coronavirus disease 2019. *Am J Obstet Gynecol* 2020.

was concerning. Younger populations have been reassured that they are at lower risk of experiencing COVID-19–related complications, and pregnant women may falsely believe that their young age protects them against severe diseases. Such inadequate health advice may render this vulnerable group to seek medical care too late, and care may not be prioritized appropriately if they are perceived to be at lower risk. Therefore, pregnancy puts the woman at an increased risk of COVID-19–related death and pneumonia. All pregnant women, irrespective of age, should be informed about the health risks associated with COVID-19 and should seek medical help at the earliest opportunity. ■

Raigam Jafet Martinez-Portilla, MSc
Clinical Research Division
National Institute of Perinatology
National Autonomous University of Mexico
Mexico City, Mexico
rjmartinez@clinic.cat

Emily R. Smith, PhD
Siran He, PhD
Department of Global Health
Milken Institute School of Public Health
The George Washington University
Washington, DC

Johnatan Torres-Torres, MPH
Salvador Espino-Y-Sosa, MSc
Clinical Research Division
National Institute of Perinatology

Mexico City, Mexico
National Autonomous University of Mexico
Mexico City, Mexico

Juan Mario Solis-Paredes, PhD
Department of Human Genetics and Genomics
National Institute of Perinatology
Mexico City, Mexico

Liona C. Poon, MD
Department of Obstetrics and Gynaecology
The Chinese University of Hong Kong
Hong Kong Special Administrative Region
People's Republic of China

R.J.M.P. and E.R.S. contributed equally to this work.

The authors report no conflict of interest.

REFERENCES

1. Zambrano LD, Ellington S, Strid P, et al. Update: characteristics of symptomatic women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status—United States, January 22–October 3, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1641–7.
2. Martinez-Portilla RJ, Sotiriadis A, Chatzakis C, et al. Pregnant women with SARS-CoV-2 infection are at higher risk of death and severe pneumonia: propensity score-matched analysis of a nationwide prospective cohort study (COV19Mx). *Ultrasound Obstet Gynecol* 2020. [Epub ahead of print].

© 2020 Elsevier Inc. All rights reserved. <https://doi.org/10.1016/j.ajog.2020.12.1197>