

BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

Association between intimate partner violence and prenatal anxiety and depression in pregnant women: A cross-sectional survey during the COVID-19 epidemic in Shenzhen, China

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-055333
Article Type:	Original research
Date Submitted by the Author:	09-Jul-2021
Complete List of Authors:	<p>Wu, Fei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare; Southern Medical University, Department of Epidemiology, School of Public Health</p> <p>Zhou, Lin; Shenzhen Centre for Disease Control and Prevention, Department of Information Technology</p> <p>Chen , Caiyun; Southern Medical University, Department of Epidemiology, School of Public Health</p> <p>Lin, Wei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare</p> <p>Liu, Peiyi; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare</p> <p>Huang, Weikang; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare</p> <p>Zhong, Chuyan; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University,, Department of Healthcare</p> <p>Zhang, Minyi; Southern Medical University, Department of Epidemiology, School of Public Health</p> <p>LI, Qiushuang; Southern Medical University, Department of Epidemiology, School of Public Health</p> <p>Chen, Qing; Southern Medical University, Department of Epidemiology, School of Public Health</p> <p>Wang, Yue-Yun; Southern Medical University, Department of Healthcare</p>
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, COVID-19

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3
4 **Association between intimate partner violence and prenatal**
5 **anxiety and depression in pregnant women: A cross-sectional**
6 **survey during the COVID-19 epidemic in Shenzhen, China**
7
8
9
10
11
12
13

14 Fei Wu^{1,3}, Lin Zhou², Caiyun Chen³, Wei Lin¹, Peiyi Liu¹, Weikang Huang¹, Chuyan Zhong¹,

15
16
17 Minyi Zhang³, Qiushuang Li³, Qing Chen^{3*}, Yueyun Wang^{1*}
18
19
20
21

22 ¹Department of Healthcare, Affiliated Shenzhen Maternity and Child Healthcare Hospital,
23
24 Southern Medical University, Shenzhen 518048, Guangdong, China
25
26

27 ²Department of Information Technology, Shenzhen Centre for Disease Control and
28
29 Prevention, Shenzhen 518055, China
30
31

32 ³Department of Epidemiology, School of Public Health, Southern Medical University,
33
34 Guangzhou 510515, Guangdong, China
35
36
37
38
39

40 *Correspondence to:

41
42 Yueyun Wang

43
44 Email: wangyueyun@126.com
45
46

47
48 Phone: +86-0755-82889999
49
50
51

52
53 Qing Chen

54
55 Email: qch.2009@163.com
56
57

58
59 Phone: +86-20-61648312
60

Abstract

Objectives: Intimate partner violence (IPV) against women remains a major global public health problem with harmful consequences for individuals and society. People's lifestyles have been greatly affected by the coronavirus disease 2019 (COVID-19) pandemic. This study investigated the prevalence of and relationship between IPV and anxiety and depression in pregnant Chinese women during the pandemic.

Design: This cross-sectional study was conducted in Shenzhen City, Guangdong Province, China from September 15 to December 15, 2020. A total of 3434 pregnant women were screened with the Abuse Assessment Screen Questionnaire to evaluate IPV and General Anxiety Disorder and Patient Health Questionnaire to evaluate symptoms of anxiety and depression, respectively. The primary outcomes were the incidence of IPV and association between IPV and prenatal anxiety and depression. Data were analysed with the chi-squared test and by logistic regression analysis.

Results: The prevalence of IPV among pregnant women was 2.2%. Mental violence was the most common type of violence (2.2%), followed by physical (0.6%) and sexual (0.7%) violence. The prevalence of anxiety and depression symptoms was 9.8% and 6.9%, respectively. After adjusting for covariates, there was a statistically significant association between IPV and prenatal anxiety (odds ratio OR=4.136, 95% confidence interval CI: 2.436, 7.022) and depression (OR=4.136, 95% CI: 2.436, 7.022).

Conclusions: IPV increased the risk of prenatal anxiety and depression in pregnant women in China during the COVID-19 pandemic. Efforts should be made by the government and civil society to promote long-lasting antenatal interventions to ensure the safety and protect the

1
2
3
4 mental health of pregnant women.
5
6
7
8

9 **Strengths and limitations of this study**
10

- 11 1. This is the first investigation of the relationship between IPV and prenatal anxiety and
12 depression in pregnant women during the COVID-19 pandemic in China.
13
14 2. Causality between these two outcomes was not established.
15
16 3. Symptoms of depression and anxiety were assessed only once in the study.
17
18 4. IPV was likely under-reported by the study participants.
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1. Introduction

Intimate partner violence (IPV) against women including physical, mental, and sexual abuse is an important clinical and public health issue^{1,2}. In 2016, the World Health Organization highlighted various forms of interpersonal violence, particularly those occurring in the home and inflicted by intimate partners and other family members and remaining hidden, stigmatized, and largely unrecognized by health and other service providers³. A previous study showed that pregnant women were vulnerable to the initiation or exacerbation of IPV⁴ and were 2.7 to 3.9 times more likely to be victims of physical violence and twice as likely to be subjected to sexual violence compared to non-pregnant women⁵. In China, IPV prevalence in pregnant women has been reported as 18.32% in Wuhan⁶ and 11.3% in Changsha⁷. Prenatal depression and anxiety are common sequelae of IPV^{8,9}.

The coronavirus disease 2019 (COVID-19) outbreak began in December 2019 in Wuhan City, Hubei Province, China¹⁰ and suddenly and radically altered the population's habits and lifestyles, with a drastic reduction in any form of socialization. Physical distancing and self-isolation strongly impacted people's lives¹¹, including those of pregnant women and their partners. Protecting the physical and mental wellbeing of pregnant women is important for a healthy society. However, only one study to date¹² has examined the prevalence of IPV among pregnant women since the start of the COVID-19 pandemic, and there have been no studies investigating the association between IPV and prenatal anxiety and depression in this group.

Shenzhen is one of the most economically developed and populous cities in mainland China whose activities have been severely impacted by the restrictions imposed in response

1
2
3
4 to the pandemic. The present study aimed to establish the prevalence of IPV among pregnant
5
6 women in Shenzhen during the COVID-19 pandemic and the association between IPV and
7
8 prenatal anxiety and depression.
9
10

11 12 13 14 **2. Methods**

15 16 17 **2.1 Research design and study population**

18
19 This cross-sectional survey was conducted from September 15 to December 15, 2020 and
20
21 enrolled pregnant women in Shenzhen City, Guangdong Province, China. A multi-stage
22
23 random sampling method was used to recruit participants. We sampled a certain number of
24
25 pregnant women in maternity and child healthcare hospitals in each district of Shenzhen as
26
27 described in our earlier study¹³. Pregnant women with perinatal health records at Shenzhen
28
29 District Maternity and Child Healthcare Hospitals who consented to participate were enrolled.
30
31 Women with psychotic disorders such as schizophrenia, mania, or substance dependence
32
33 were excluded. The sample size calculation formula for cross-sectional studies was used to
34
35 determine the minimum theoretical sample size for this study. The admissible error was 0.15,
36
37 $\alpha=0.05$, and based on previous studies, the expected prevalence was 5%¹⁴; 3416 people were
38
39 therefore required to represent the population of Shenzhen. A total of 3437 women who met
40
41 the inclusion criteria were enrolled; those who completed the questionnaire in less than 100 s
42
43 were excluded, leaving 3434 women in the study. Thus, the response rate was 99.9%
44
45 (3434/3437). The study was approved by the Institutional Review Board of Shenzhen
46
47 Maternity and Child Healthcare Hospitals and was conducted in Shenzhen.
48
49
50
51
52
53
54
55
56
57
58
59
60

2.2 Measurements

2.2.1 General characteristics of the study population

General information obtained on each participant included age, education level, partner's education level, work status after pregnancy, partner's work status, marital status, living situation, psychological counselling before pregnancy, vaginal bleeding and pregnancy complications, pregnancy intention, intimacy between partners since COVID-19, and household income since COVID-19.

2.2.2 Family care

The Family Adaptation Partnership Growth and Resolved (APGAR) index was used for family care assessment¹⁵. The APGAR has five items, each answered on a 3-point Likert scale from "Often" (2 points) to "Rarely" (0 points). The total score was 0–10 points. A high APGAR score (7–10 points) indicated good family functioning; a mid-range score (4–6 points) indicated moderate family dysfunction; and a low score (0–3) indicated severe family dysfunction.

2.2.3 Lifestyle characteristics

Lifestyle characteristics including smoking and drinking by a pregnant woman and her partner, exercise, and sitting time per day were recorded. Smoking was defined as an average of one cigarette a day in recent years. Drinking was defined as consuming alcohol once a week on average. Exercise was defined as having engaged in walking, yoga, or other physical activities more than three times during the past week. The above definitions were in

1
2
3
4 accordance with previous research¹⁶. Sitting time per day was categorized as ≤ 1 , 1 to <3 , 3 to
5
6 <5 , 5 to <10 , and ≥ 10 h.
7
8
9

10 11 **2.2.4 Assessment of IPV**

12
13
14 The Abuse Assessment Screen Questionnaire was used to assess IPV during pregnancy. This
15
16 scale is widely used as a tool to screen IPV in pregnant women and has good validity and
17
18 reliability¹⁷. The scale assesses three aspects of domestic violence—i.e., mental, physical, and
19
20 sexual—and has eight items. The response to each item was “Yes” or “No.” If the respondent
21
22 answered “Yes” to one or more of questions 5 to 7, she was identified as a victim of domestic
23
24 violence during pregnancy¹⁸.
25
26
27
28
29
30
31

32 33 **2.2.5 Assessment tool for prenatal anxiety**

34
35 The 7-Item Generalized Anxiety Disorder scale (GAD-7)¹⁹ is used as a screening tool for
36
37 GAD in primary care patients and is easily understood and can be completed quickly. The
38
39 scale has seven items, each scored on a 4-point scale ranging from 0 to 3 for a total score
40
41 between 0 and 21, with a higher score indicating more severe anxiety symptoms. A GAD-7
42
43 score ≥ 7 was the cut-off for prenatal anxiety.
44
45
46
47
48
49
50

51 52 **2.2.6 Assessment tool for prenatal depression**

53
54 Prenatal depression was assessed with the 9-Item Patient Health Questionnaire (PHQ-9),
55
56 which consists of nine questions pertaining to depression symptoms over the prior 2 weeks,
57
58 each with four possible responses: “Not at all,” “Several days,” “More than half of the days,”
59
60

1
2
3
4 and “Nearly every day,” corresponding to 0, 1, 2, and 3 points, respectively. The total score
5
6 ranges from 0 to 27²⁰. Participants with a score ≥ 10 were considered to have perinatal
7
8 depression.
9

10 11 12 13 14 **2.3 Statistical analysis**

15
16 Data were kept anonymous and non-identifiable and were analysed using SPSS v25.0 (SPSS
17
18 Inc, Chicago, IL, USA). Some continuous variables such as age and family care (APGAR),
19
20 prenatal anxiety (GAD-7), and prenatal depression (PHQ-9) scores were treated as
21
22 categorical variables. The chi-squared test, calibration chi-squared test, or Fisher’s exact test
23
24 was used to compare baseline characteristics between women who had experienced IPV (IPV
25
26 group) and those who had not (No-IPV group). Multivariate logistic regression with the enter
27
28 method was used to estimate odds ratio (OR) and 95% confidence interval (CI) of
29
30 associations between IPV and prenatal anxiety and depression. A two-tailed test with $P < 0.05$
31
32 was considered statistically significant.
33
34
35
36
37
38
39
40
41
42

43 **2.4 Patients or public involvement statement**

44
45 FW was involved in all stages of the study and wrote the paper. Other co-authors were
46
47 consulted at the planning and design stages of the study and contributed to the interpretation
48
49 and dissemination of the findings. Neither the patients nor the public were involved in the
50
51 design, conduct, reporting, or dissemination of this work.
52
53
54
55
56
57

58 **3. Results**

Of 3437 pregnant women who completed the electronic questionnaire, three were excluded because their completion time was <100 s. Thus, 3434 participants were ultimately included in the analysis. The mean age of the participants was 28.97±4.57 years (Table 1). There were significant differences in age, professional psychological counselling, family care, pregnancy complications, partner intimacy since COVID-19, household income since COVID-19, smoking habits, the participant and her partner's drinking habits, exercise, and sitting time per day between the IPV and No-IPV groups, whereas no intergroup differences were observed in the participant and her partner's education level, work status, and other characteristics. A total of 77 participants (2.2%) experienced at least one form of IPV during pregnancy; mental violence was the most common (n=57, 1.7%), followed by physical (n=19, 0.6%) and sexual (n=7, 0.7%) violence.

Table 1. General characteristics of the study participants

Variable	No-IPV	IPV	χ^2	<i>P</i> *
Age (years)			17.528	0.002
≤19	28 (0.8)	4 (5.2)		
20–24	507 (15.1)	13 (16.9)		
25–29	1341 (39.9)	30 (39.0)		
30–34	1096 (32.6)	19 (24.7)		
≥35	385 (11.5)	11 (14.3)		
Education level			4.895 ^a	0.418
Master's degree or higher	140 (4.2)	7 (9.1)		
Undergraduate	919 (27.4)	18 (23.4)		
College degree	912 (27.2)	21 (27.3)		
High school degree	699 (20.8)	14 (18.2)		
Junior high school diploma	670 (20.0)	17 (22.1)		
Primary school or lower	17 (0.5)	0 (0.0)		
Partner's education level			6.761 ^a	0.215
Master's degree or higher	202 (6.0)	6 (7.8)		
Undergraduate	998 (29.7)	22 (28.6)		
College degree	844 (25.1)	18 (23.4)		

1					
2					
3	High school degree	698 (20.8)	13 (16.9)		
4	Junior high school diploma	600 (17.9)	16 (20.8)		
5	Primary school or lower	15 (0.4)	2 (2.6)		
6					
7	Work status after pregnancy			0.007	0.933
8	Employed	2065 (61.5)	47 (61.0)		
9	Unemployed	1292 (38.5)	30 (39.0)		
10					
11	Partner's working status			0.024 ^b	0.876
12	Employed	3217 (95.8)	73 (94.8)		
13	Unemployed	140 (4.2)	4 (5.2)		
14					
15	Marital status			0.440	0.507
16	Married	3118 (92.9)	70 (90.9)		
17	Unmarried/divorced/widowed	239 (7.1)	7 (9.1)		
18					
19	Living situation			3.337	0.189
20	Couple alone	2263 (67.4)	54 (70.1)		
21	Living with in-laws	844 (25.1)	14 (18.2)		
22	Living with parents	250 (7.4)	9 (11.7)		
23					
24	Professional psychological counselling			17.816	<0.001
25	Not received	3125 (93.1)	62 (80.5)		
26	Received	232 (6.9)	15 (19.5)		
27					
28	Family care			45.788	<0.001
29	Good functioning	1992 (59.3)	18 (23.4)		
30	Moderately dysfunction	872 (26.0)	31 (40.3)		
31	Severe dysfunction	493 (14.7)	28 (36.4)		
32					
33	Gestational age			0.944	0.624
34	First trimester	1122 (33.4)	22 (28.6)		
35	Second trimester	1122 (33.4)	29 (37.7)		
36	Third trimester	1113 (33.2)	26 (33.8)		
37					
38	Vaginal bleeding			2.623	0.105
39	No	2537 (75.6)	52 (67.5)		
40	Yes	820 (24.4)	25 (32.5)		
41					
42	Pregnancy complications			6.730	0.009
43	No	2601 (77.5)	50 (64.9)		
44	Yes	756 (22.5)	27 (35.1)		
45					
46	Pregnancy intention			3.641 ^a	0.144
47	Planned conception	1796 (53.5)	33 (42.9)		
48	Unplanned pregnancy	1452 (43.3)	41 (53.2)		
49	Artificial insemination	109 (3.2)	3 (3.9)		
50					
51	Intimacy with partner since COVID-19			64.846	<0.001
52	Essentially unchanged	2554 (76.1)	47 (61.0)		
53	Strained	65 (1.9)	12 (15.6)		
54	More intimate	738 (22.0)	18 (23.4)		
55					
56	Household income since COVID-19			12.921 ^a	0.004
57	Essentially unchanged	1805 (53.8)	30 (39.0)		
58	Increased	60 (1.8)	5 (6.5)		
59					
60					

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Decreased by 20%–50%	1165 (34.7)	30 (39.0)		
Decrease by \geq 50%	327 (9.7)	12 (15.6)		
Smoking			19.565 ^b	<0.001
No	3302 (98.4)	70 (90.9)		
Yes	55 (1.6)	7 (9.1)		
Partner's smoking habits			1.217	0.270
No	2082 (62.0)	43 (55.8)		
Yes	1275 (38.0)	34 (44.2)		
Drinking			8.892 ^b	0.003
No	3195 (95.2)	67 (87.0)		
Yes	162 (4.8)	10 (13.0)		
Partner's drinking habits			7.672	0.006
No	2441 (72.7)	45 (58.4)		
Yes	916 (27.3)	32 (41.6)		
Exercise			4.327	0.038
No	2412 (71.8)	47 (61.0)		
Yes	945 (28.2)	30 (39.0)		
Sitting time per day, h			14.533	0.006
\leq 1	454 (13.5)	19 (24.7)		
1–3	1069 (31.8)	21 (27.3)		
3–5	829 (24.7)	11 (14.3)		
5–10	831 (24.8)	18 (23.4)		
\geq 10	174 (5.2)	8 (10.4)		

Data are presented as n (%).

^aFisher's exact test.

^bCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

There were differences in the prevalence of anxiety and depression between IPV and No-IPV groups. Among the participants, 337 (9.8%) were positive for prenatal anxiety and 238 (6.9%) experienced depression (Tables 2 and 3). Participants who experienced mental, physical, and sexual violence had higher rates of prenatal anxiety and depression than those who did not report IPV.

Table 2. Prevalence of anxiety among study participants

IPV or IPV subtype	No prenatal anxiety	Prenatal anxiety	χ^2	P^*
--------------------	---------------------	------------------	----------	-------

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Overall IPV			97.172	<0.001
No	3053 (98.6)	304 (90.2)		
Yes	44 (1.4)	33 (9.8)		
Mental violence			83.936	<0.001
No	3066 (99.0)	311 (92.3)		
Yes	31 (1.0)	26 (7.7)		
Physical violence			44.591 ^a	<0.001
No	3089 (99.7)	326 (96.7)		
Yes	8 (0.3)	11 (3.3)		
Sexual violence			13.594 ^a	<0.001
No	3082 (99.5)	329 (97.6)		
Yes	15 (0.5)	8 (2.4)		
Total	3097 (90.2)	337 (9.8)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

IPV, intimate partner violence.

Table 3. Prevalence of depression among study participants

IPV or IPV subtype	No prenatal depression	Prenatal depression	χ^2	P^*
Overall IPV			64.257	<0.001
No	3142 (98.3)	215 (90.3)		
Yes	54 (1.7)	23 (9.7)		
Mental violence			36.892 ^a	<0.001
No	3155 (98.7)	222 (93.3)		
Yes	41 (1.3)	16 (6.7)		
Physical violence			31.369 ^a	<0.001
No	3185 (99.7)	230 (96.6)		
Yes	11 (0.3)	8 (3.4)		
Sexual violence			23.669 ^a	<0.001
No	3181 (99.5)	230 (96.6)		
Yes	15 (0.5)	8 (3.4)		
Total	3196 (93.1)	238 (6.9)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

IPV, intimate partner violence.

After adjusting for potential confounding factors, IPV was significantly associated

with prenatal anxiety in the multivariate logistic regression analysis (Table 4). Participants who had experienced IPV were 4.207 times more likely to have experienced prenatal anxiety (OR=4.207, 95% CI: 2.469, 7.166). Mental violence (OR=4.394, 95% CI: 2.444, 8.179) and physical violence (OR=8.869, 95% CI: 3.224, 26.102) were significantly associated with prenatal anxiety; however, there was no association between sexual violence and anxiety.

Table 4. Association between intimate partner violence and prenatal anxiety

Variable	OR (95% CI)	P
IPV ^a	4.207 (2.469, 7.166)	<0.001
Mental violence ^b	4.471 (2.444, 8.179)	<0.001
Physical violence ^b	9.174 (3.224, 26.102)	<0.001
Sexual violence ^b	2.018 (0.733, 5.556)	0.174

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

In the logistic regression analysis, participants who reported IPV were more likely to develop prenatal depression after adjusting for confounding factors (OR=3.864, 95% CI: 2.095, 7.125). Mental violence (OR=3.259, 95% CI: 1.590, 6.678), physical violence (OR=10.176, 95% CI: 3.495, 29.627), and sexual violence (OR=4.121, 95% CI: 1.457, 11.659) were all associated with an increased risk of prenatal depression (Table 5).

Table 5. Association between intimate partner violence and prenatal depression

Variable	OR (95% CI)	P
IPV ^a	3.864 (2.095, 7.125)	<0.001
Mental violence ^b	3.259 (1.590, 6.678)	0.001
Physical violence ^b	10.176 (3.495, 29.627)	<0.001
Sexual violence ^b	4.121 (1.457, 11.659)	0.008

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

4. Discussion

The prevalence of IPV during the COVID-19 pandemic among pregnant women in Shenzhen, China, was 2.2%. This is comparable to the rate reported in a cross-sectional study conducted in London, UK (3%)²¹ but much lower than that reported in Pakistan (35%)²². The disparities in prevalence are likely attributable to cultural, economic, and regional differences. During the pandemic, physical distancing and self-isolation strongly impacted the lives of pregnant women in that they spent more time with their partners, which likely influenced the prevalence of reported IPV.

Mental violence (1.7%) was the most common form of IPV among the study participants, which is consistent with findings from other studies conducted in China⁷, Thailand²³, and Ethiopia²⁴. We observed similar rates of physical (0.6%) and sexual (0.7%)

1
2
3
4 violence, although these were lower than that reported in Ethiopia during the COVID-19
5
6 pandemic¹². The difference may be explained by the Chinese cultural norm of avoiding
7
8 discussion of unpleasant personal circumstances in order to “save face”¹⁶, with the result that
9
10 violence during pregnancy is frequently underreported²⁵. It is worth noting that our results
11
12 may have been biased by the fact that outcomes were assessed by self-report²⁶.
13
14
15

16
17 We observed a significant and positive association between IPV and prenatal anxiety
18
19 and depression during the COVID-19 pandemic. This is consistent with other reports^{6 7 9 27} in
20
21 which IPV was identified as a chronic stressful condition that increased the risk of depression
22
23 and anxiety during pregnancy. We also found that IPV subtypes had different effects on
24
25 prenatal anxiety and depression; for instance, mental violence was associated with an
26
27 increased risk of both conditions. A higher rate of psychological (emotional and verbal) abuse
28
29 was shown to be more closely associated with mental health outcomes than physical
30
31 violence²⁸, possibly because psychological violence directly attacks a person’s
32
33 self-perception and can cause post-traumatic stress disorder and anxiety through mechanisms
34
35 such as guilt, self-hatred, and regret²⁹. The adverse consequences of physical violence such as
36
37 fractures, lacerations, and head trauma are amplified during pregnancy and increased the risk
38
39 of prenatal anxiety and depression in our cohort. Sexual violence did not appear to be
40
41 associated with prenatal anxiety in our research, which contradicts earlier findings³⁰; this may
42
43 be due to participants’ reluctance to report this form of IPV according to the norms of
44
45 Chinese culture.
46
47
48
49
50
51
52
53
54
55
56
57

58 **Strengths and limitations**

59
60

1
2
3
4 This study is the first investigation of the relationship between IPV and prenatal anxiety and
5
6 depression in pregnant women during the COVID-19 pandemic in China. The participants
7
8 were representative of the entire population of Shenzhen. However, there were several
9
10 limitations to our study. Firstly, we were unable to establish causality between the two
11
12 outcomes because of the cross-sectional study design. Secondly, symptoms of depression and
13
14 anxiety were evaluated only once and therefore, it was not possible to detect any trends over
15
16 the course of pregnancy. Thirdly, non-pregnant women should have been included as controls
17
18 to obtain a more comprehensive view of the effects of IPV on pregnant women. These issues
19
20 can be addressed in future studies with a prospective, longitudinal, meditational, and mixed
21
22 method designs that also examine the mental health consequences of IPV for pregnant
23
24 women.
25
26
27
28
29
30
31
32
33
34

35 **Conclusion**

36
37 The prevalence of IPV in pregnant women in China cannot to be underestimated. Our results
38
39 suggest that IPV among pregnant women during the COVID-19 pandemic was associated
40
41 with prenatal anxiety and depression. Prenatal care can identify pregnant women who
42
43 experience IPV so that they can be connected with services that offer protection. Eliminating
44
45 violence against pregnant women requires practical and long-term interventions by the
46
47 government and civil society starting from education within the family.
48
49
50
51
52
53
54

55 **Acknowledgments**

56
57 The authors thank the participants for their time and effort.
58
59
60

Data Availability Statement

The datasets generated and analysed during the current study are not publicly available due to privacy restrictions but are available from the corresponding author on reasonable request.

Contributors

All authors made substantial contributions to this study. FW, WL, PL, and MZ were responsible for study conception and initiation, design, and supervised implementation. FW, CC, QL, WH, and CZ acquired the data. FW, WL, YW, and QC interpreted the data and performed statistical analyses. FW drafted the manuscript. All authors contributed to the critical revision of the manuscript and gave final approval for its publication.

Funding

This work was supported by the Shenzhen Science and Technology Innovation Committee (grant no. JCYJ20170307091451207) and China Maternal and Child Health Association (project no. 21). The funder was not involved in any part of the study process, from design to submission of the article for publication.

Competing interests

None declared.

Ethics approval

1
2
3
4 The Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospital
5
6 approved this study (authorization no. SFYLS [2020] 032) and granted an amended approval
7
8
9 in 2020.
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For peer review only

References

1. Goodwin MM, Gazmararian JA, Johnson CH, et al. Pregnancy intendedness and physical abuse around the time of pregnancy: findings from the pregnancy risk assessment monitoring system, 1996-1997. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. *Maternal and child health journal* 2000;4(2):85-92. doi: 10.1023/a:1009566103493 [published Online First: 2000/09/20]
2. Dahlen HG, Munoz AM, Schmied V, et al. The relationship between intimate partner violence reported at the first antenatal booking visit and obstetric and perinatal outcomes in an ethnically diverse group of Australian pregnant women: a population-based study over 10 years. *BMJ open* 2018;8(4):e019566. doi: 10.1136/bmjopen-2017-019566 [published Online First: 2018/04/27]
3. Organisation WH. Global plan of action to strengthen the role of the health system within a national multisectoral response to address interpersonal violence, in particular against women and girls, and against children. *Geneva: WHO Press* 2016
4. Chan KL, Brownridge DA, Fong DY, et al. Violence against pregnant women can increase the risk of child abuse: a longitudinal study. *Child abuse & neglect* 2012;36(4):275-84. doi: 10.1016/j.chiabu.2011.12.003 [published Online First: 2012/05/09]
5. Brownridge DA, Taillieu TL, Tyler KA, et al. Pregnancy and intimate partner violence: risk factors, severity, and health effects. *Violence against women* 2011;17(7):858-81. doi: 10.1177/1077801211412547 [published Online First: 2011/07/22]
6. Yu H, Jiang X, Bao W, et al. Association of intimate partner violence during pregnancy, prenatal depression, and adverse birth outcomes in Wuhan, China. *BMC pregnancy*

- 1
2
3
4 *and childbirth* 2018;18(1):469. doi: 10.1186/s12884-018-2113-6 [published Online
5
6
7 First: 2018/12/05]
8
- 9 7. Zhang Y, Zou S, Cao Y, et al. Relationship between domestic violence and postnatal
10
11 depression among pregnant Chinese women. *International journal of gynaecology*
12
13 *and obstetrics: the official organ of the International Federation of Gynaecology and*
14
15 *Obstetrics* 2012;116(1):26-30. doi: 10.1016/j.ijgo.2011.08.011 [published Online First:
16
17 2011/10/26]
18
19
- 20 8. Connelly CD, Hazen AL, Baker-Ericzén MJ, et al. Is screening for depression in the
21
22 perinatal period enough? The co-occurrence of depression, substance abuse, and
23
24 intimate partner violence in culturally diverse pregnant women. *Journal of women's*
25
26 *health (2002)* 2013;22(10):844-52. doi: 10.1089/jwh.2012.4121 [published Online
27
28 First: 2013/08/13]
29
30
- 31 9. Navarrete L, Nieto L, Lara MA. Intimate partner violence and perinatal depression and
32
33 anxiety: Social support as moderator among Mexican women. *Sexual & reproductive*
34
35 *healthcare : official journal of the Swedish Association of Midwives* 2021;27:100569.
36
37 doi: 10.1016/j.srhc.2020.100569 [published Online First: 2020/11/07]
38
39
- 40 10. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive
41
42 symptoms in pregnant women: a preliminary study. *The journal of maternal-fetal &*
43
44 *neonatal medicine : the official journal of the European Association of Perinatal*
45
46 *Medicine, the Federation of Asia and Oceania Perinatal Societies, the International*
47
48 *Society of Perinatal Obstet* 2020:1-7. doi: 10.1080/14767058.2020.1763946
49
50
51
52
53
54
55
56
57
58 [published Online First: 2020/05/19]
59
60

- 1
2
3
4 11. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during
5
6 COVID-19 lockdown: an Italian survey. *Journal of translational medicine*
7
8 2020;18(1):229. doi: 10.1186/s12967-020-02399-5 [published Online First:
9
10 2020/06/10]
11
12
13
14 12. Teshome A, Gudu W, Bekele D, et al. Intimate partner violence among prenatal care
15
16 attendees amidst the COVID-19 crisis: The incidence in Ethiopia. *International*
17
18 *journal of gynaecology and obstetrics: the official organ of the International*
19
20 *Federation of Gynaecology and Obstetrics* 2021;153(1):45-50. doi:
21
22 10.1002/ijgo.13566 [published Online First: 2020/12/29]
23
24
25
26
27 13. Wu F, Lin W, Liu P, et al. Prevalence and contributory factors of anxiety and depression
28
29 among pregnant women in the post-pandemic era of COVID-19 in Shenzhen, China.
30
31 *Journal of affective disorders* 2021;291:243-51. doi: 10.1016/j.jad.2021.05.014
32
33 [published Online First: 2021/05/30]
34
35
36
37 14. Devries KM, Kishor S, Johnson H, et al. Intimate partner violence during pregnancy:
38
39 analysis of prevalence data from 19 countries. *Reproductive health matters*
40
41 2010;18(36):158-70. doi: 10.1016/s0968-8080(10)36533-5 [published Online First:
42
43 2010/11/30]
44
45
46
47 15. Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family APGAR as a
48
49 test of family function. *The Journal of family practice* 1982;15(2):303-11. [published
50
51 Online First: 1982/08/01]
52
53
54
55 16. Yu Y, Zhu X, Xu H, et al. Prevalence of depression symptoms and its influencing factors
56
57 among pregnant women in late pregnancy in urban areas of Hengyang City, Hunan
58
59
60

- Province, China: a cross-sectional study. *BMJ open* 2020;10(9):e038511. doi: 10.1136/bmjopen-2020-038511 [published Online First: 2020/09/03]
17. Leung WC, Leung TW, Lam YY, et al. The prevalence of domestic violence against pregnant women in a Chinese community. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics* 1999;66(1):23-30. doi: 10.1016/s0020-7292(99)00053-3 [published Online First: 1999/08/24]
18. Zheng B, Zhu X, Hu Z, et al. The prevalence of domestic violence and its association with family factors: a cross-sectional study among pregnant women in urban communities of Hengyang City, China. *BMC public health* 2020;20(1):620. doi: 10.1186/s12889-020-08683-9 [published Online First: 2020/05/07]
19. Tong X, An D, McGonigal A, et al. Validation of the Generalized Anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy research* 2016;120:31-6. doi: 10.1016/j.eplepsyres.2015.11.019 [published Online First: 2015/12/29]
20. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *Jama* 1999;282(18):1737-44. doi: 10.1001/jama.282.18.1737 [published Online First: 1999/11/24]
21. Bacchus L, Mezey G, Bewley S. Domestic violence: prevalence in pregnant women and associations with physical and psychological health. *European journal of obstetrics, gynecology, and reproductive biology* 2004;113(1):6-11. doi: 10.1016/s0301-2115(03)00326-9 [published Online First: 2004/03/24]

- 1
2
3
4 22. Habib S, Abbasi N, Khan B, et al. Domestic Violence Among Pregnant Women. *Journal*
5
6
7 *of Ayub Medical College, Abbottabad : JAMC* 2018;30(2):237-40. [published Online
8
9 First: 2018/06/26]
10
11
12 23. Saito A, Creedy D, Cooke M, et al. Effect of intimate partner violence on antenatal
13
14 functional health status of childbearing women in Northeastern Thailand. *Health care*
15
16 *for women international* 2013;34(9):757-74. doi: 10.1080/07399332.2013.794459
17
18 [published Online First: 2013/06/25]
19
20
21
22 24. Fekadu E, Yigzaw G, Gelaye KA, et al. Prevalence of domestic violence and associated
23
24 factors among pregnant women attending antenatal care service at University of
25
26 Gondar Referral Hospital, Northwest Ethiopia. *BMC women's health* 2018;18(1):138.
27
28 doi: 10.1186/s12905-018-0632-y [published Online First: 2018/08/16]
29
30
31
32 25. Oweis A, Gharaibeh M, Alhourani R. Prevalence of violence during pregnancy: findings
33
34 from a Jordanian survey. *Maternal and child health journal* 2010;14(3):437-45. doi:
35
36 10.1007/s10995-009-0465-2 [published Online First: 2009/03/28]
37
38
39
40 26. Perry AR, Fromuth ME. Courtship violence using couple data: characteristics and
41
42 perceptions. *Journal of interpersonal violence* 2005;20(9):1078-95. doi:
43
44 10.1177/0886260505278106 [published Online First: 2005/07/30]
45
46
47
48 27. Belay S, Astatkie A, Emmelin M, et al. Intimate partner violence and maternal depression
49
50 during pregnancy: A community-based cross-sectional study in Ethiopia. *PloS one*
51
52 2019;14(7):e0220003. doi: 10.1371/journal.pone.0220003 [published Online First:
53
54 2019/08/01]
55
56
57
58
59
60

- 1
2
3
4 28. Coker AL, Davis KE, Arias I, et al. Physical and mental health effects of intimate partner
5
6 violence for men and women. *American journal of preventive medicine*
7
8 2002;23(4):260-8. doi: 10.1016/s0749-3797(02)00514-7 [published Online First:
9
10 2002/10/31]
11
12
13
14 29. Street AE, Arias I. Psychological abuse and posttraumatic stress disorder in battered
15
16 women: examining the roles of shame and guilt. *Violence and victims*
17
18 2001;16(1):65-78. [published Online First: 2001/04/03]
19
20
21
22 30. Silva RP, Leite FMC. Intimate partner violence during pregnancy: prevalence and
23
24 associated factors. *Revista de saude publica* 2020;54:97. doi:
25
26 10.11606/s1518-8787.2020054002103 [published Online First: 2020/11/05]
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5,6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6,7
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6,7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	8
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	8
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	5,6,7
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	13,14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14,15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Association between intimate partner violence and prenatal anxiety and depression in pregnant women: A cross-sectional survey during the COVID-19 epidemic in Shenzhen, China

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-055333.R1
Article Type:	Original research
Date Submitted by the Author:	04-Mar-2022
Complete List of Authors:	Wu, Fei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare; Southern Medical University, Department of Epidemiology, School of Public Health Zhou, Lin; Shenzhen Centre for Disease Control and Prevention, Department of Information Technology Chen , Caiyun; Southern Medical University, Department of Epidemiology, School of Public Health Lin, Wei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Liu, Peiyi; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Huang, Weikang; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Zhong, Chuyan; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University,, Department of Healthcare Zhang, Minyi; Southern Medical University, Department of Epidemiology, School of Public Health LI, Qiushuang; Southern Medical University, Department of Epidemiology, School of Public Health Chen, Qing; Southern Medical University, Department of Epidemiology, School of Public Health Wang, Yue-Yun; Southern Medical University, Department of Healthcare
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Mental health
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, COVID-19

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3
4 **Association between intimate partner violence and prenatal**
5 **anxiety and depression in pregnant women: A cross-sectional**
6 **survey during the COVID-19 epidemic in Shenzhen, China**
7
8
9
10
11
12
13

14 Fei Wu^{1,3}, Lin Zhou², Caiyun Chen³, Wei Lin¹, Peiyi Liu¹, Weikang Huang¹, Chuyan Zhong¹,

15
16
17 Minyi Zhang³, Qiushuang Li³, Qing Chen^{3*}, Yueyun Wang^{1*}
18
19
20
21

22 ¹Department of Healthcare, Affiliated Shenzhen Maternity and Child Healthcare Hospital,
23 Southern Medical University, Shenzhen 518048, Guangdong, China
24
25

26
27 ²Department of Information Technology, Shenzhen Centre for Disease Control and
28 Prevention, Shenzhen 518055, China
29
30

31
32 ³Department of Epidemiology, School of Public Health, Southern Medical University,
33 Guangzhou 510515, Guangdong, China
34
35
36
37
38
39

40 *Correspondence to:

41
42 Yueyun Wang

43
44 Email: wangyueyun@126.com

45
46
47 Phone: +86-0755-82889999
48
49
50
51

52
53 Qing Chen

54
55 Email: qch.2009@163.com

56
57
58 Phone: +86-20-61648312
59
60

Abstract

Objectives: Intimate partner violence (IPV) against women remains a major global public health problem with harmful consequences for individuals and society. People's lifestyles have been greatly affected by the coronavirus disease 2019 (COVID-19) pandemic. This study investigated the prevalence of and relationship between IPV and anxiety and depression in pregnant Chinese women during the pandemic.

Design: Cross-sectional study.

Setting: This investigation was conducted in Shenzhen City, Guangdong Province, China from September 15 to December 15, 2020.

Participants: A total of 3434 pregnant women were screened with the Abuse Assessment Screen Questionnaire to evaluate IPV and General Anxiety Disorder and Patient Health Questionnaire to evaluate symptoms of anxiety and depression, respectively. Pregnant women with perinatal health records at Shenzhen District Maternity and Child Healthcare Hospitals who consented to participate were enrolled. Women with psychotic disorders such as schizophrenia, mania, or substance dependence and pregnant women who refused to participate were excluded. Data were analysed with the chi-squared test and by logistic regression analysis.

Results: The prevalence of IPV among pregnant women was 2.2%. Mental violence was the most common type of violence (2.2%), followed by physical (0.6%) and sexual (0.7%) violence. The prevalence of anxiety and depression symptoms was 9.8% and 6.9%, respectively. After adjusting for covariates, there was a statistically significant association between IPV and prenatal anxiety (odds ratio OR=4.136, 95% confidence interval CI: 2.436,

1
2
3
4 7.022) and depression (OR=4.136, 95% CI: 2.436, 7.022).
5

6 Conclusions: IPV increased the risk of prenatal anxiety and depression in pregnant women in
7
8 China during the COVID-19 pandemic. Efforts should be made by the government and civil
9
10 society to promote long-lasting antenatal interventions to ensure the safety and protect the
11
12 mental health of pregnant women.
13
14
15

16 17 18 19 **Strengths and limitations of this study** 20

- 21
22 1. This is the first investigation of the relationship between IPV and prenatal anxiety and
23
24 depression in pregnant women during the COVID-19 pandemic in China.
25
26
- 27 2. Causality between these two outcomes was not established.
28
29
- 30 3. IPV was likely under-reported by the study participants.
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1. Introduction

Intimate partner violence (IPV) against women including physical, mental, and sexual abuse is an important clinical and public health issue^{1,2}. In 2016, the World Health Organization highlighted various forms of interpersonal violence, particularly those occurring in the home and inflicted by intimate partners and other family members and remaining hidden, stigmatized, and largely unrecognized by health and other service providers³. A previous study showed that pregnant women were vulnerable to the initiation or exacerbation of IPV⁴ and were 2.7 to 3.9 times more likely to be victims of physical violence and twice as likely to be subjected to sexual violence compared to non-pregnant women⁵. In China, IPV prevalence in pregnant women has been reported as 18.32% in Wuhan⁶ and 11.3% in Changsha⁷. Prenatal depression and anxiety are common sequelae of IPV^{8,9}.

The coronavirus disease 2019 (COVID-19) outbreak began in December 2019 in Wuhan City, Hubei Province, China¹⁰ and suddenly and radically altered the population's habits and lifestyles, with a drastic reduction in any form of socialization. Physical distancing and self-isolation strongly impacted people's lives¹¹, including those of pregnant women and their partners. Protecting the physical and mental wellbeing of pregnant women is important for a healthy society. However, only one study to date¹² has examined the prevalence of IPV among pregnant women since the start of the COVID-19 pandemic, and there have been no studies investigating the association between IPV and prenatal anxiety and depression in this group.

Shenzhen is one of the most economically developed and populous cities in mainland China whose activities have been severely impacted by the restrictions imposed in response

1
2
3
4 to the pandemic. The present study aimed to establish the prevalence of IPV among pregnant
5
6 women in Shenzhen during the COVID-19 pandemic and the association between IPV and
7
8 prenatal anxiety and depression.
9
10

11 12 13 14 **2. Methods**

15 16 17 **2.1 Research design and study population**

18
19 This cross-sectional survey was conducted from September 15 to December 15, 2020 and
20
21 enrolled pregnant women in Shenzhen City, Guangdong Province, China. Shenzhen is an
22
23 economic centre of China and has long been the fourth largest city in mainland China in
24
25 terms of economic aggregate. Shenzhen has fewer migrant workers and most of its population
26
27 is urban. Based on the characteristics of Shenzhen, the research objects of this study were
28
29 recruited from 10 administrative areas of Shenzhen, which are representative to a certain
30
31 extent and can provide reference value for similar areas in other countries. There are ten
32
33 administrative regions in Shenzhen city, the present study recruited pregnancy women in
34
35 Maternity and Child Healthcare Hospitals in each ten administrative area. A multi-stage
36
37 random sampling method was used to recruit participants¹³. Briefly, pregnant women came to
38
39 the hospital for regular check-ups were recruited during September 15 to December 15, 2020.
40
41 A full description of the objectives, contents, procedures, associated benefits, and risks of the
42
43 present study was provided at the beginning of the electronic questionnaire. They filled out
44
45 an electronic questionnaire when registering for the check-up. Investigators composed of
46
47 trained doctors, nurses or medical students guided the filling process. Pregnant women with
48
49 perinatal health records at Shenzhen District Maternity and Child Healthcare Hospitals who
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4 consented to participate were enrolled. Women with psychotic disorders such as
5
6 schizophrenia, mania, or substance dependence and pregnant women who could not finish
7
8 questionnaire within the allotted time were excluded. The sample size calculation formula for
9
10 cross-sectional studies was used to determine the minimum theoretical sample size for this
11
12 study. The admissible error was 0.15, $\alpha=0.05$, and based on previous studies, the expected
13
14 prevalence was 5%¹⁴; 3416 people were therefore required to represent the population of
15
16 Shenzhen. A total of 3437 women who met the inclusion criteria were enrolled; those who
17
18 completed the questionnaire in less than 100 s were excluded, leaving 3434 women in the
19
20 study. Thus, the response rate was 99.9% (3434/3437). The study was approved by the
21
22 Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospitals and was
23
24 conducted in Shenzhen.
25
26
27
28
29
30
31
32
33
34

35 **2.2 Measurements**

36 **2.2.1 General characteristics of the study population**

37
38 General information obtained on each participant included age, education level, partner's
39
40 education level, work status after pregnancy, partner's work status, marital status, living
41
42 situation, psychological counselling before pregnancy, vaginal bleeding and pregnancy
43
44 complications, pregnancy intention, intimacy between partners since COVID-19, and
45
46 household income since COVID-19.
47
48
49
50
51
52
53
54
55

56 **2.2.2 Family care**

57
58 The Family Adaptation Partnership Growth and Resolved (APGAR) index was used for
59
60

1
2
3
4 family care assessment¹⁵. The APGAR has five items, each answered on a 3-point Likert
5
6 scale from “Often” (2 points) to “Rarely” (0 points). The total score was 0–10 points. A high
7
8 APGAR score (7–10 points) indicated good family functioning; a mid-range score (4–6
9
10 points) indicated moderate family dysfunction; and a low score (0–3) indicated severe family
11
12 dysfunction.
13
14
15
16
17
18
19

20 **2.2.3 Lifestyle characteristics**

21
22 Lifestyle characteristics including smoking and drinking by a pregnant woman and her
23
24 partner, exercise, and sitting time per day were recorded. Smoking was defined as an average
25
26 of one cigarette a day in recent years. Drinking was defined as consuming alcohol once a
27
28 week on average. Exercise was defined as having engaged in walking, yoga, or other physical
29
30 activities more than three times during the past week. The above definitions were in
31
32 accordance with previous research¹⁶. Sitting time per day was categorized as ≤ 1 , 1 to <3 , 3 to
33
34 <5 , 5 to <10 , and ≥ 10 h.
35
36
37
38
39
40
41
42

43 **2.2.4 Assessment of IPV**

44
45 The Abuse Assessment Screen Questionnaire was used to assess IPV during pregnancy. This
46
47 scale is widely used as a tool to screen IPV in pregnant women and has good validity and
48
49 reliability¹⁷. The scale assesses three aspects of domestic violence—i.e., mental, physical, and
50
51 sexual—and has eight items. The response to each item was “Yes” or “No.” If the respondent
52
53 answered “Yes” to one or more of questions 5 to 7, she was identified as a victim of domestic
54
55 violence during pregnancy¹⁸.
56
57
58
59
60

2.2.5 Assessment tool for prenatal anxiety

The 7-Item Generalized Anxiety Disorder scale (GAD-7)¹⁹ is used as a screening tool for GAD in primary care patients and is easily understood and can be completed quickly. The scale has seven items, each scored on a 4-point scale ranging from 0 to 3 for a total score between 0 and 21, with a higher score indicating more severe anxiety symptoms. A GAD-7 score ≥ 7 was the cut-off for prenatal anxiety.

2.2.6 Assessment tool for prenatal depression

Prenatal depression was assessed with the 9-Item Patient Health Questionnaire (PHQ-9), which consists of nine questions pertaining to depression symptoms over the prior 2 weeks, each with four possible responses: “Not at all,” “Several days,” “More than half of the days,” and “Nearly every day,” corresponding to 0, 1, 2, and 3 points, respectively. The total score ranges from 0 to 27²⁰. Participants with a score ≥ 10 were considered to have prenatal depression.

2.3 Statistical analysis

Data were kept anonymous and non-identifiable and were analysed using SPSS v25.0 (SPSS Inc, Chicago, IL, USA). Some continuous variables such as age and family care (APGAR), prenatal anxiety (GAD-7), and prenatal depression (PHQ-9) scores were treated as categorical variables. The chi-squared test, calibration chi-squared test, or Fisher’s exact test was used to compare baseline characteristics between women who had experienced IPV (IPV

1
2
3
4 group) and those who had not (No-IPV group). Multivariate logistic regression with the enter
5
6 method was used to estimate odds ratio (OR) and 95% confidence interval (CI) of
7
8 associations between IPV and prenatal anxiety and depression. A two-tailed test with $P<0.05$
9
10 was considered statistically significant.
11
12
13

14 15 16 17 **2.4 Patients or public involvement statement**

18
19 FW was involved in all stages of the study and wrote the paper. Other co-authors were
20
21 consulted at the planning and design stages of the study and contributed to the interpretation
22
23 and dissemination of the findings. Neither the patients nor the public were involved in the
24
25 design, conduct, reporting, or dissemination of this work.
26
27
28
29
30
31

32 33 **3. Results**

34
35 Of 3437 pregnant women without psychotic disorders who completed the electronic
36
37 questionnaire, three were excluded because their completion time was <100 s. Thus, 3434
38
39 participants were ultimately included in the analysis. The mean age of the participants was
40
41 28.97 ± 4.57 years (Table 1). There were significant differences in age, professional
42
43 psychological counselling, family care, pregnancy complications, partner intimacy since
44
45 COVID-19, household income since COVID-19, smoking habits, the participant and her
46
47 partner's drinking habits, exercise, and sitting time per day between the IPV and No-IPV
48
49 groups, whereas no intergroup differences were observed in the participant and her partner's
50
51 education level, work status, and other characteristics. A total of 77 participants (2.2%)
52
53 experienced at least one form of IPV during pregnancy; mental violence was the most
54
55
56
57
58
59
60

common (n=57, 1.7%), followed by physical (n=19, 0.6%) and sexual (n=7, 0.7%) violence.

Table 1. General characteristics of the study participants

Variable	No-IPV	IPV	χ^2	<i>P</i> *
Age (years)			17.528	0.002
≤19	28 (0.8)	4 (5.2)		
20–24	507 (15.1)	13 (16.9)		
25–29	1341 (39.9)	30 (39.0)		
30–34	1096 (32.6)	19 (24.7)		
≥35	385 (11.5)	11 (14.3)		
Education level			4.895 ^a	0.418
Master's degree or higher	140 (4.2)	7 (9.1)		
Undergraduate	919 (27.4)	18 (23.4)		
College degree	912 (27.2)	21 (27.3)		
High school degree	699 (20.8)	14 (18.2)		
Junior high school diploma	670 (20.0)	17 (22.1)		
Primary school or lower	17 (0.5)	0 (0.0)		
Partner's education level			6.761 ^a	0.215
Master's degree or higher	202 (6.0)	6 (7.8)		
Undergraduate	998 (29.7)	22 (28.6)		
College degree	844 (25.1)	18 (23.4)		
High school degree	698 (20.8)	13 (16.9)		
Junior high school diploma	600 (17.9)	16 (20.8)		
Primary school or lower	15 (0.4)	2 (2.6)		
Work status after pregnancy			0.007	0.933
Employed	2065 (61.5)	47 (61.0)		
Unemployed	1292 (38.5)	30 (39.0)		
Partner's working status			0.024 ^b	0.876
Employed	3217 (95.8)	73 (94.8)		
Unemployed	140 (4.2)	4 (5.2)		
Marital status			0.440	0.507
Married	3118 (92.9)	70 (90.9)		
Unmarried/divorced/widowed	239 (7.1)	7 (9.1)		
Living situation			3.337	0.189
Couple alone	2263 (67.4)	54 (70.1)		
Living with in-laws	844 (25.1)	14 (18.2)		
Living with parents	250 (7.4)	9 (11.7)		
Professional psychological counselling			17.816	<0.001
Not received	3125 (93.1)	62 (80.5)		
Received	232 (6.9)	15 (19.5)		
Family care			45.788	<0.001

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Good functioning	1992 (59.3)	18 (23.4)		
Moderately dysfunction	872 (26.0)	31 (40.3)		
Severe dysfunction	493 (14.7)	28 (36.4)		
Gestational age			0.944	0.624
First trimester	1122 (33.4)	22 (28.6)		
Second trimester	1122 (33.4)	29 (37.7)		
Third trimester	1113 (33.2)	26 (33.8)		
Vaginal bleeding			2.623	0.105
No	2537 (75.6)	52 (67.5)		
Yes	820 (24.4)	25 (32.5)		
Pregnancy complications			6.730	0.009
No	2601 (77.5)	50 (64.9)		
Yes	756 (22.5)	27 (35.1)		
Pregnancy intention			3.641 ^a	0.144
Planned conception	1796 (53.5)	33 (42.9)		
Unplanned pregnancy	1452 (43.3)	41 (53.2)		
Artificial insemination	109 (3.2)	3 (3.9)		
Intimacy with partner since COVID-19			64.846	<0.001
Essentially unchanged	2554 (76.1)	47 (61.0)		
Strained	65 (1.9)	12 (15.6)		
More intimate	738 (22.0)	18 (23.4)		
Household income since COVID-19			12.921 ^a	0.004
Essentially unchanged	1805 (53.8)	30 (39.0)		
Increased	60 (1.8)	5 (6.5)		
Decreased by 20%–50%	1165 (34.7)	30 (39.0)		
Decrease by \geq 50%	327 (9.7)	12 (15.6)		
Smoking			19.565 ^b	<0.001
No	3302 (98.4)	70 (90.9)		
Yes	55 (1.6)	7 (9.1)		
Partner's smoking habits			1.217	0.270
No	2082 (62.0)	43 (55.8)		
Yes	1275 (38.0)	34 (44.2)		
Drinking			8.892 ^b	0.003
No	3195 (95.2)	67 (87.0)		
Yes	162 (4.8)	10 (13.0)		
Partner's drinking habits			7.672	0.006
No	2441 (72.7)	45 (58.4)		
Yes	916 (27.3)	32 (41.6)		
Exercise			4.327	0.038
No	2412 (71.8)	47 (61.0)		
Yes	945 (28.2)	30 (39.0)		
Sitting time per day, h			14.533	0.006
\leq 1	454 (13.5)	19 (24.7)		
1–3	1069 (31.8)	21 (27.3)		

3-5	829 (24.7)	11 (14.3)
5-10	831 (24.8)	18 (23.4)
≥10	174 (5.2)	8 (10.4)

Data are presented as n (%).

^aFisher's exact test.

^bCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

There were differences in the prevalence of anxiety and depression between IPV and No-IPV groups (table 2 and table 3). Among the participants, according to the GAD-7 scale standard, the incidence of mild anxiety symptoms was 15.2% (523/3434), moderate anxiety symptom was 2.5% (85/3434), and severe anxiety symptoms was 1.0% (35/3434). When the cut-off value was 7, the incidence of anxiety symptoms was 9.8% (337/3434). According to the PHQ-9 scale standard, the incidence of mild depressive symptoms was 22.0% (757/3434), moderate depressive symptoms was 6.1% (210/3434), and severe depressive symptoms was 0.8% (28/3434). When the cut-off value was 10, The incidence of depressive symptoms was 6.9% (238/3434). Participants who experienced mental, physical, and sexual violence had higher rates of prenatal anxiety and depression than those who did not report IPV.

Table 2. Prevalence of anxiety among study participants

IPV or IPV subtype	No prenatal anxiety	Prenatal anxiety	χ^2	P^*
Overall IPV			97.172	<0.001
No	3053 (98.6)	304 (90.2)		
Yes	44 (1.4)	33 (9.8)		
Mental violence			83.936	<0.001
No	3066 (99.0)	311 (92.3)		
Yes	31 (1.0)	26 (7.7)		
Physical violence			44.591 ^a	<0.001
No	3089 (99.7)	326 (96.7)		
Yes	8 (0.3)	11 (3.3)		
Sexual violence			13.594 ^a	<0.001

No	3082 (99.5)	329 (97.6)
Yes	15 (0.5)	8 (2.4)
Total	3097 (90.2)	337 (9.8)

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

Table 3. Prevalence of depression among study participants

IPV or IPV subtype	No prenatal depression	Prenatal depression	χ^2	P^*
Overall IPV			64.257	<0.001
No	3142 (98.3)	215 (90.3)		
Yes	54 (1.7)	23 (9.7)		
Mental violence			36.892 ^a	<0.001
No	3155 (98.7)	222 (93.3)		
Yes	41 (1.3)	16 (6.7)		
Physical violence			31.369 ^a	<0.001
No	3185 (99.7)	230 (96.6)		
Yes	11 (0.3)	8 (3.4)		
Sexual violence			23.669 ^a	<0.001
No	3181 (99.5)	230 (96.6)		
Yes	15 (0.5)	8 (3.4)		
Total	3196 (93.1)	238 (6.9)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

After adjusting for potential confounding factors, IPV was significantly associated with prenatal anxiety in the multivariate logistic regression analysis (Table 4). Participants who had experienced IPV were 4.207 times more likely to have experienced prenatal anxiety (OR=4.207, 95% CI: 2.469, 7.166). Mental violence (OR=4.394, 95% CI: 2.444, 8.179) and physical violence (OR=8.869, 95% CI: 3.224, 26.102) were significantly associated with prenatal anxiety; however, there was no association between sexual violence and anxiety.

Table 4. Association between intimate partner violence and prenatal anxiety

Variable	OR (95% CI)	P
IPV ^a	4.207 (2.469, 7.166)	< 0.001
Mental violence ^b	4.471 (2.444, 8.179)	< 0.001
Physical violence ^b	9.174 (3.224, 26.102)	< 0.001
Sexual violence ^b	2.018 (0.733, 5.556)	0.174

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

In the logistic regression analysis, participants who reported IPV were more likely to develop prenatal depression after adjusting for confounding factors (OR=3.864, 95% CI: 2.095, 7.125). Mental violence (OR=3.259, 95% CI: 1.590, 6.678), physical violence (OR=10.176, 95% CI: 3.495, 29.627), and sexual violence (OR=4.121, 95% CI: 1.457, 11.659) were all associated with an increased risk of prenatal depression (Table 5).

Table 5. Association between intimate partner violence and prenatal depression

Variable	OR (95% CI)	P
IPV ^a	3.864 (2.095, 7.125)	< 0.001
Mental violence ^b	3.259 (1.590, 6.678)	0.001
Physical violence ^b	10.176 (3.495, 29.627)	< 0.001
Sexual violence ^b	4.121 (1.457, 11.659)	0.008

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counseling, family

1
2
3 care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention,
4 intimacy with partner since COVID-19, household income since COVID-19, participant and
5 her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting
6 time per day, and IPV subtype.

7
8 ^bAdjusted for age, participant and her partner's education level, participant and her partner's
9 work status, marital status, living situation, professional psychological counseling, family
10 care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention,
11 intimacy with partner since COVID-19, household income since COVID-19, participant and
12 her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting
13 time per day, and IPV subtype.

14
15 *Values in bold face are statistically significant at $P < 0.05$.

16
17 CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

18 19 20 21 22 **4. Discussion**

23
24 The prevalence of IPV during the COVID-19 pandemic among pregnant women in Shenzhen,
25 China, was 2.2%. This is comparable to the rate reported in a cross-sectional study conducted
26 in London, UK (3%)²¹ but much lower than that reported in Pakistan (35%)²². The disparities
27 in prevalence are likely attributable to cultural, economic, and regional differences. The
28 COVID-19 has radically changed the lives of individuals. During quarantine due to the
29 COVID-19, everyone is experimenting with new ways of relating to others, home risks to
30 become a very dangerous place for victims of domestic violence, because they are required to
31 stay the more time with partners and away from people who can validate their experiences
32 and give help. For another, IPV can further deteriorate due to economic crisis linked to
33 COVID emergence for some pregnancy women have difficulty to leave partners for
34 economic reasons²³, which likely influenced the prevalence of reported IPV. However, do not
35 consistently screen for IPV due to limited time and resources, reluctance to possibly offend
36 the pregnancy women, insufficient training and reimbursement, and perceived lack of
37 institutional support. Thus, it is increasingly essential that healthcare professionals address
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4 safety and violence at home, telehealth provides a novel opportunity for longer conversations
5
6 related to IPV screening and resource provision, contraceptive counselling, and mental
7
8 health²⁴.
9

10
11 Mental violence (1.7%) was the most common form of IPV among the study
12
13 participants, which is consistent with findings from other studies conducted in China⁷,
14
15 Thailand²⁵, and Ethiopia²⁶. We observed similar rates of physical (0.6%) and sexual (0.7%)
16
17 violence, although these were lower than that reported in Ethiopia during the COVID-19
18
19 pandemic¹². The difference may be explained by the Chinese cultural norm of avoiding
20
21 discussion of unpleasant personal circumstances in order to “save face”¹⁶, with the result that
22
23 violence during pregnancy is frequently underreported²⁷. It is worth noting that our results
24
25 may have been biased by the fact that outcomes were assessed by self-report²⁸. Although we
26
27 had told the subjects that the survey result was only for scientific research purposes and that
28
29 they filled in the electronic questionnaire anonymously, it was still possible that the subjects
30
31 concealed or avoided reporting their experiences of violence. On the other hand, the main
32
33 research results of the present survey were based on the subjects' recall of past events.
34
35 Pregnant women may forget the experience of IPV, especially psychological violence, and
36
37 may ignore the abuse, belittling and ridicule of their partners, which may also lead to the low
38
39 reporting rate of IPV.
40
41
42
43
44
45
46
47
48
49

50 We observed a significant and positive association between IPV and prenatal anxiety
51
52 and depression during the COVID-19 pandemic. This is consistent with other reports^{6 7 9 29} in
53
54 which IPV was identified as a chronic stressful condition that increased the risk of depression
55
56 and anxiety during pregnancy. We also found that IPV subtypes had different effects on
57
58
59
60

1
2
3
4 prenatal anxiety and depression; for instance, mental violence was associated with an
5
6 increased risk of both conditions. A higher rate of psychological (emotional and verbal) abuse
7
8 was shown to be more closely associated with mental health outcomes than physical
9
10 violence³⁰, possibly because psychological violence directly attacks a person's
11
12 self-perception and can cause post-traumatic stress disorder and anxiety through mechanisms
13
14 such as guilt, self-hatred, and regret³¹. The adverse consequences of physical violence such as
15
16 fractures, lacerations, and head trauma are amplified during pregnancy and increased the risk
17
18 of prenatal anxiety and depression in our cohort. Sexual violence did not appear to be
19
20 associated with prenatal anxiety in our research, which contradicts earlier findings³²; this may
21
22 be due to participants' reluctance to report this form of IPV according to the norms of
23
24 Chinese culture. There was also the possibility that the positive rate is too low to show an
25
26 association between sexual violence and prenatal anxiety. Future studies can be guided to
27
28 increase the sample size to verify the results of the present study.
29
30
31
32
33
34
35
36
37
38
39

40 **Strengths and limitations**

41
42 This study is the first investigation of the relationship between IPV and prenatal anxiety and
43
44 depression in pregnant women during the COVID-19 pandemic in China. The participants
45
46 were representative of the entire population of Shenzhen. However, there were several
47
48 limitations to our study. Firstly, we were unable to establish causality between the two
49
50 outcomes because of the cross-sectional study design. Secondly, symptoms of depression and
51
52 anxiety were evaluated only once and therefore, it was not possible to detect any trends over
53
54 the course of pregnancy. Thirdly, non-pregnant women should have been included as controls
55
56
57
58
59
60

1
2
3
4 to obtain a more comprehensive view of the effects of IPV on pregnant women. Finally, the
5
6 present study reported a low prevalence of IPV, which may lead to false negative results in analysing
7
8 correlations. Future studies should expand the sample size to verify the results of this study. These
9
10 issues can be addressed in future studies with a prospective, longitudinal, meditational, and
11
12 mixed method designs that also examine the mental health consequences of IPV for pregnant
13
14 women.
15
16
17
18
19
20
21

22 **Conclusion**

23
24 Violence against women represents a key priority in achieving gender equality around the
25
26 world. The prevalence of IPV in pregnant women in China cannot to be underestimated. Our
27
28 results suggest that IPV among pregnant women during the COVID-19 pandemic was
29
30 associated with prenatal anxiety and depression. Prenatal care can identify pregnant women
31
32 who experience IPV so that they can be connected with services that offer protection.
33
34 Eliminating violence against pregnant women requires practical and long-term interventions
35
36 by the government and civil society starting from education within the family.
37
38
39
40
41
42
43
44

45 **Acknowledgments**

46
47 The authors thank the participants for their time and effort.
48
49
50
51
52

53 **Data Availability Statement**

54
55 The datasets generated and analysed during the current study are not publicly available due to
56
57 privacy restrictions but are available from the corresponding author on reasonable request.
58
59
60

Contributors

All authors made substantial contributions to this study. FW, WL, PL, and MZ were responsible for study conception and initiation, design, and supervised implementation. FW, CC, QL, WH, and CZ acquired the data. FW, WL, LZ, YW, and QC interpreted the data and performed statistical analyses. FW drafted the manuscript. All authors contributed to the critical revision of the manuscript and gave final approval for its publication.

Funding

This work was supported by the Shenzhen Science and Technology Innovation Committee (grant no. JCYJ20170307091451207) and China Maternal and Child Health Association (project no. 21). The funder was not involved in any part of the study process, from design to submission of the article for publication.

Competing interests

None declared.

Ethics approval

The Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospital approved this study (authorization no. SFYLS [2020] 032) and granted an amended approval in 2020.

References

1. Goodwin MM, Gazmararian JA, Johnson CH, et al. Pregnancy intendedness and physical abuse around the time of pregnancy: findings from the pregnancy risk assessment monitoring system, 1996-1997. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. *Maternal and child health journal* 2000;4(2):85-92. doi: 10.1023/a:1009566103493 [published Online First: 2000/09/20]
2. Dahlen HG, Munoz AM, Schmied V, et al. The relationship between intimate partner violence reported at the first antenatal booking visit and obstetric and perinatal outcomes in an ethnically diverse group of Australian pregnant women: a population-based study over 10 years. *BMJ open* 2018;8(4):e019566. doi: 10.1136/bmjopen-2017-019566 [published Online First: 2018/04/27]
3. Organisation WH. Global plan of action to strengthen the role of the health system within a national multisectoral response to address interpersonal violence, in particular against women and girls, and against children. *Geneva: WHO Press* 2016
4. Chan KL, Brownridge DA, Fong DY, et al. Violence against pregnant women can increase the risk of child abuse: a longitudinal study. *Child abuse & neglect* 2012;36(4):275-84. doi: 10.1016/j.chiabu.2011.12.003 [published Online First: 2012/05/09]
5. Brownridge DA, Taillieu TL, Tyler KA, et al. Pregnancy and intimate partner violence: risk factors, severity, and health effects. *Violence against women* 2011;17(7):858-81. doi: 10.1177/1077801211412547 [published Online First: 2011/07/22]
6. Yu H, Jiang X, Bao W, et al. Association of intimate partner violence during pregnancy, prenatal depression, and adverse birth outcomes in Wuhan, China. *BMC pregnancy*

- 1
2
3
4 *and childbirth* 2018;18(1):469. doi: 10.1186/s12884-018-2113-6 [published Online
5
6
7 First: 2018/12/05]
8
- 9 7. Zhang Y, Zou S, Cao Y, et al. Relationship between domestic violence and postnatal
10
11 depression among pregnant Chinese women. *International journal of gynaecology*
12
13 *and obstetrics: the official organ of the International Federation of Gynaecology and*
14
15 *Obstetrics* 2012;116(1):26-30. doi: 10.1016/j.ijgo.2011.08.011 [published Online First:
16
17 2011/10/26]
18
19
- 20 8. Connelly CD, Hazen AL, Baker-Ericzén MJ, et al. Is screening for depression in the
21
22 perinatal period enough? The co-occurrence of depression, substance abuse, and
23
24 intimate partner violence in culturally diverse pregnant women. *Journal of women's*
25
26 *health (2002)* 2013;22(10):844-52. doi: 10.1089/jwh.2012.4121 [published Online
27
28 First: 2013/08/13]
29
30
- 31 9. Navarrete L, Nieto L, Lara MA. Intimate partner violence and perinatal depression and
32
33 anxiety: Social support as moderator among Mexican women. *Sexual & reproductive*
34
35 *healthcare : official journal of the Swedish Association of Midwives* 2021;27:100569.
36
37 doi: 10.1016/j.srhc.2020.100569 [published Online First: 2020/11/07]
38
39
- 40 10. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive
41
42 symptoms in pregnant women: a preliminary study. *The journal of maternal-fetal &*
43
44 *neonatal medicine : the official journal of the European Association of Perinatal*
45
46 *Medicine, the Federation of Asia and Oceania Perinatal Societies, the International*
47
48 *Society of Perinatal Obstet* 2020:1-7. doi: 10.1080/14767058.2020.1763946
49
50
51
52
53
54
55
56
57
58 [published Online First: 2020/05/19]
59
60

- 1
2
3
4 11. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during
5
6 COVID-19 lockdown: an Italian survey. *Journal of translational medicine*
7
8 2020;18(1):229. doi: 10.1186/s12967-020-02399-5 [published Online First:
9
10 2020/06/10]
11
12
13
14 12. Teshome A, Gudu W, Bekele D, et al. Intimate partner violence among prenatal care
15
16 attendees amidst the COVID-19 crisis: The incidence in Ethiopia. *International*
17
18 *journal of gynaecology and obstetrics: the official organ of the International*
19
20 *Federation of Gynaecology and Obstetrics* 2021;153(1):45-50. doi:
21
22 10.1002/ijgo.13566 [published Online First: 2020/12/29]
23
24
25
26
27 13. Wu F, Lin W, Liu P, et al. Prevalence and contributory factors of anxiety and depression
28
29 among pregnant women in the post-pandemic era of COVID-19 in Shenzhen, China.
30
31 *Journal of affective disorders* 2021;291:243-51. doi: 10.1016/j.jad.2021.05.014
32
33 [published Online First: 2021/05/30]
34
35
36
37 14. Devries KM, Kishor S, Johnson H, et al. Intimate partner violence during pregnancy:
38
39 analysis of prevalence data from 19 countries. *Reproductive health matters*
40
41 2010;18(36):158-70. doi: 10.1016/s0968-8080(10)36533-5 [published Online First:
42
43 2010/11/30]
44
45
46
47 15. Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family APGAR as a
48
49 test of family function. *The Journal of family practice* 1982;15(2):303-11. [published
50
51 Online First: 1982/08/01]
52
53
54
55 16. Yu Y, Zhu X, Xu H, et al. Prevalence of depression symptoms and its influencing factors
56
57 among pregnant women in late pregnancy in urban areas of Hengyang City, Hunan
58
59
60

- Province, China: a cross-sectional study. *BMJ open* 2020;10(9):e038511. doi: 10.1136/bmjopen-2020-038511 [published Online First: 2020/09/03]
17. Leung WC, Leung TW, Lam YY, et al. The prevalence of domestic violence against pregnant women in a Chinese community. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics* 1999;66(1):23-30. doi: 10.1016/s0020-7292(99)00053-3 [published Online First: 1999/08/24]
18. Zheng B, Zhu X, Hu Z, et al. The prevalence of domestic violence and its association with family factors: a cross-sectional study among pregnant women in urban communities of Hengyang City, China. *BMC public health* 2020;20(1):620. doi: 10.1186/s12889-020-08683-9 [published Online First: 2020/05/07]
19. Tong X, An D, McGonigal A, et al. Validation of the Generalized Anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy research* 2016;120:31-6. doi: 10.1016/j.eplesyres.2015.11.019 [published Online First: 2015/12/29]
20. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *Jama* 1999;282(18):1737-44. doi: 10.1001/jama.282.18.1737 [published Online First: 1999/11/24]
21. Bacchus L, Mezey G, Bewley S. Domestic violence: prevalence in pregnant women and associations with physical and psychological health. *European journal of obstetrics, gynecology, and reproductive biology* 2004;113(1):6-11. doi: 10.1016/s0301-2115(03)00326-9 [published Online First: 2004/03/24]

- 1
2
3
4 22. Habib S, Abbasi N, Khan B, et al. Domestic Violence Among Pregnant Women. *Journal*
5
6
7 *of Ayub Medical College, Abbottabad : JAMC* 2018;30(2):237-40. [published Online
8
9 First: 2018/06/26]
10
11
12 23. Mazza M, Marano G, Lai C, et al. Danger in danger: Interpersonal violence during
13
14 COVID-19 quarantine. *Psychiatry research* 2020;289:113046. doi:
15
16 10.1016/j.psychres.2020.113046 [published Online First: 2020/05/11]
17
18
19 24. Zero O, Geary M. COVID-19 and Intimate Partner Violence: A Call to Action. *Rhode*
20
21 *Island medical journal (2013)* 2020;103(5):57-59. [published Online First: 2020/06/03]
22
23
24 25. Saito A, Creedy D, Cooke M, et al. Effect of intimate partner violence on antenatal
25
26 functional health status of childbearing women in Northeastern Thailand. *Health care*
27
28 *for women international* 2013;34(9):757-74. doi: 10.1080/07399332.2013.794459
29
30 [published Online First: 2013/06/25]
31
32
33 26. Fekadu E, Yigzaw G, Gelaye KA, et al. Prevalence of domestic violence and associated
34
35 factors among pregnant women attending antenatal care service at University of
36
37 Gondar Referral Hospital, Northwest Ethiopia. *BMC women's health* 2018;18(1):138.
38
39 doi: 10.1186/s12905-018-0632-y [published Online First: 2018/08/16]
40
41
42
43 27. Oweis A, Gharaibeh M, Alhourani R. Prevalence of violence during pregnancy: findings
44
45 from a Jordanian survey. *Maternal and child health journal* 2010;14(3):437-45. doi:
46
47 10.1007/s10995-009-0465-2 [published Online First: 2009/03/28]
48
49
50
51 28. Perry AR, Fromuth ME. Courtship violence using couple data: characteristics and
52
53 perceptions. *Journal of interpersonal violence* 2005;20(9):1078-95. doi:
54
55 10.1177/0886260505278106 [published Online First: 2005/07/30]
56
57
58
59
60

- 1
2
3
4 29. Belay S, Astatkie A, Emmelin M, et al. Intimate partner violence and maternal depression
5
6 during pregnancy: A community-based cross-sectional study in Ethiopia. *PloS one*
7
8 2019;14(7):e0220003. doi: 10.1371/journal.pone.0220003 [published Online First:
9
10 2019/08/01]
11
12
13
14 30. Coker AL, Davis KE, Arias I, et al. Physical and mental health effects of intimate partner
15
16 violence for men and women. *American journal of preventive medicine*
17
18 2002;23(4):260-8. doi: 10.1016/s0749-3797(02)00514-7 [published Online First:
19
20 2002/10/31]
21
22
23
24 31. Street AE, Arias I. Psychological abuse and posttraumatic stress disorder in battered
25
26 women: examining the roles of shame and guilt. *Violence and victims*
27
28 2001;16(1):65-78. [published Online First: 2001/04/03]
29
30
31
32 32. Silva RP, Leite FMC. Intimate partner violence during pregnancy: prevalence and
33
34 associated factors. *Revista de saude publica* 2020;54:97. doi:
35
36 10.11606/s1518-8787.2020054002103 [published Online First: 2020/11/05]
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5,6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7,8,9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5,6
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6,7,8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8,9
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	9
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	8,9
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10,11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6,7,8
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	12,13,14,15
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16,17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Association between intimate partner violence and prenatal anxiety and depression in pregnant women: A cross-sectional survey during the COVID-19 epidemic in Shenzhen, China

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-055333.R2
Article Type:	Original research
Date Submitted by the Author:	02-Apr-2022
Complete List of Authors:	Wu, Fei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare; Southern Medical University, Department of Epidemiology, School of Public Health Zhou, Lin; Shenzhen Centre for Disease Control and Prevention, Department of Information Technology Chen , Caiyun; Southern Medical University, Department of Epidemiology, School of Public Health Lin, Wei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Liu, Peiyi; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Huang, Weikang; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Zhong, Chuyan; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University,, Department of Healthcare Zhang, Minyi; Southern Medical University, Department of Epidemiology, School of Public Health LI, Qiushuang; Southern Medical University, Department of Epidemiology, School of Public Health Chen, Qing; Southern Medical University, Department of Epidemiology, School of Public Health Wang, Yue-Yun; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Mental health
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, COVID-19

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3
4 **Association between intimate partner violence and prenatal**
5 **anxiety and depression in pregnant women: A cross-sectional**
6 **survey during the COVID-19 epidemic in Shenzhen, China**
7
8
9
10
11
12
13

14 Fei Wu^{1,3}, Lin Zhou², Caiyun Chen³, Wei Lin¹, Peiyi Liu¹, Weikang Huang¹, Chuyan Zhong¹,

15
16
17 Minyi Zhang³, Qiushuang Li³, Qing Chen^{3*}, Yueyun Wang^{1*}
18
19
20
21

22 ¹Department of Healthcare, Affiliated Shenzhen Maternity and Child Healthcare Hospital,
23
24 Southern Medical University, Shenzhen 518048, Guangdong, China
25
26

27 ²Department of Information Technology, Shenzhen Centre for Disease Control and
28
29 Prevention, Shenzhen 518055, China
30
31

32 ³Department of Epidemiology, School of Public Health, Southern Medical University,
33
34 Guangzhou 510515, Guangdong, China
35
36
37
38
39

40 *Correspondence to:

41
42 Yueyun Wang

43
44 Email: wangyueyun@126.com

45
46
47 Phone: +86-0755-82889999
48
49
50
51

52
53 Qing Chen

54
55 Email: qch.2009@163.com

56
57
58 Phone: +86-20-61648312
59
60

Abstract

Objectives: Intimate partner violence (IPV) against women remains a major global public health problem with harmful consequences for individuals and society. People's lifestyles have been greatly affected by the coronavirus disease 2019 (COVID-19) pandemic. This study investigated the prevalence of and relationship between IPV and anxiety and depression in pregnant Chinese women during the pandemic.

Design: Cross-sectional study.

Setting: This investigation was conducted in Shenzhen City, Guangdong Province, China from September 15 to December 15, 2020.

Participants: A total of 3434 pregnant women were screened with the Abuse Assessment Screen Questionnaire to evaluate IPV and General Anxiety Disorder and Patient Health Questionnaire to evaluate symptoms of anxiety and depression, respectively. Pregnant women with perinatal health records at Shenzhen District Maternity and Child Healthcare Hospitals who consented to participate were enrolled. Women with psychotic disorders such as schizophrenia, mania, or substance dependence and pregnant women who refused to participate were excluded. Data were analysed with the chi-squared test and by logistic regression analysis.

Results: The prevalence of IPV among pregnant women was 2.2%. Mental violence was the most common type of violence (2.2%), followed by physical (0.6%) and sexual (0.7%) violence. The prevalence of anxiety and depression symptoms was 9.8% and 6.9%, respectively. After adjusting for covariates, there was a statistically significant association between IPV and prenatal anxiety (odds ratio OR=4.136, 95% confidence interval CI: 2.436,

1
2
3
4 7.022) and depression (OR=4.136, 95% CI: 2.436, 7.022).
5

6 Conclusions: IPV increased the risk of prenatal anxiety and depression in pregnant women in
7
8 China during the COVID-19 pandemic. Efforts should be made by the government and civil
9
10 society to promote long-lasting antenatal interventions to ensure the safety and protect the
11
12 mental health of pregnant women.
13
14
15

16 17 18 19 **Strengths and limitations of this study** 20

- 21
22 1. This is the first investigation of the relationship between IPV and prenatal anxiety and
23
24 depression in pregnant women during the COVID-19 pandemic in China.
25
- 26
27 2. Causality between these two outcomes was not established.
28
- 29
30 3. IPV was likely under-reported by the study participants.
31
- 32
33 4. Some results should be interpreted with caution because of the small sample size.
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1. Introduction

Intimate partner violence (IPV) against women including physical, mental, and sexual abuse is an important clinical and public health issue^{1,2}. In 2016, the World Health Organization highlighted various forms of interpersonal violence, particularly those occurring in the home and inflicted by intimate partners and other family members and remaining hidden, stigmatized, and largely unrecognized by health and other service providers³. A previous study showed that pregnant women were vulnerable to the initiation or exacerbation of IPV⁴ and were 2.7 to 3.9 times more likely to be victims of physical violence and twice as likely to be subjected to sexual violence compared with non-pregnant women⁵. In China, IPV prevalence in pregnant women has been reported as 18.32% in Wuhan⁶ and 11.3% in Changsha⁷. Prenatal depression and anxiety are common sequelae of IPV^{8,9}.

The coronavirus disease 2019 (COVID-19) outbreak began in December 2019 in Wuhan City, Hubei Province, China¹⁰ and suddenly and radically altered the population's habits and lifestyles, with a drastic reduction in any form of socialization. Physical distancing and self-isolation strongly impacted people's lives¹¹, including those of pregnant women and their partners. Protecting the physical and mental wellbeing of pregnant women is important for a healthy society. However, only one study to date¹² has examined the prevalence of IPV among pregnant women since the start of the COVID-19 pandemic, and there have been no studies investigating the association between IPV and prenatal anxiety and depression in this group.

Shenzhen is one of the most economically developed and populous cities in mainland China whose activities have been severely impacted by the restrictions imposed in response

1
2
3
4 to the pandemic. The present study aimed to establish the prevalence of IPV among pregnant
5
6 women in Shenzhen during the COVID-19 pandemic and the association between IPV and
7
8 prenatal anxiety and depression.
9
10

11 12 13 14 **2. Methods**

15 16 17 **2.1 Research design and study population**

18
19 This cross-sectional survey was conducted from September 15 to December 15, 2020 and
20
21 enrolled women at all stages of pregnancy in Shenzhen City, Guangdong Province, China.
22
23 Shenzhen is an economic centre and the fourth largest city in mainland China in terms of
24
25 economic aggregate; there are fewer migrant workers than other large cities and most of its
26
27 population is urban. The study participants were recruited from 10 representative
28
29 administrative areas of Shenzhen that can provide reference values for areas in other
30
31 countries with similar characteristics. Pregnant women were recruited from maternity and
32
33 child healthcare hospitals in each of the 10 administrative areas using a multi-stage random
34
35 sampling method¹³. Briefly, women at all stages of pregnancy who came to the hospital for
36
37 regular check-ups between September 15 and December 15, 2020 were enrolled. A full
38
39 description of the objectives, contents, procedures, associated benefits, and risks of the
40
41 present study was provided at the beginning of the electronic questionnaire completed by
42
43 participants when they registered for the check-up. Investigators including trained doctors,
44
45 nurses, and medical students provided guidance for filling out the questionnaire. Pregnant
46
47 women with perinatal health records at Shenzhen District Maternity and Child Healthcare
48
49 Hospitals who consented to participate were enrolled. Women with psychotic disorders such
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4 as schizophrenia, mania, or substance dependence and pregnant women who could not
5
6 complete the questionnaire within the allotted time were excluded. The sample size
7
8 calculation formula for cross-sectional studies was used to determine the minimum
9
10 theoretical sample size for this study. The admissible error was 0.15, $\alpha=0.05$, and based on
11
12 previous studies, the expected prevalence was 5%¹⁴; 3416 people were therefore required to
13
14 represent the population of Shenzhen. A total of 3437 women who met the inclusion criteria
15
16 were enrolled; those who completed the questionnaire in less than 100 s were excluded,
17
18 leaving 3434 women in the study from all 10 administrative areas of Shenzhen. Thus, the
19
20 response rate was 99.9% (3434/3437). There were about 160,000 live births in the Maternal
21
22 and Child Health Hospital system of Shenzhen in 2020, which represents our sample size of
23
24 about 2% of the total number of newborns in Shenzhen. The study was approved by the
25
26 Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospitals and was
27
28 conducted in Shenzhen.
29
30
31
32
33
34
35
36
37
38
39

40 **2.2 Measurements**

41 **2.2.1 General characteristics of the study population**

42
43 General information obtained on each participant included age, education level, partner's
44
45 education level, work status after pregnancy, partner's work status, marital status, living
46
47 situation, psychological counselling before pregnancy, vaginal bleeding and pregnancy
48
49 complications, pregnancy intention, intimacy between partners since COVID-19, and
50
51 household income since COVID-19.
52
53
54
55
56
57
58
59
60

2.2.2 Family care

The Family Adaptation Partnership Growth and Resolved (APGAR) index was used for family care assessment¹⁵. The APGAR has five items, each answered on a 3-point Likert scale from “Often” (2 points) to “Rarely” (0 points). The total score was 0–10 points. A high APGAR score (7–10 points) indicated good family functioning; a mid-range score (4–6 points) indicated moderate family dysfunction; and a low score (0–3) indicated severe family dysfunction.

2.2.3 Lifestyle characteristics

Lifestyle characteristics including smoking and drinking by a pregnant woman and her partner, exercise, and sitting time per day were recorded. Smoking was defined as an average of one cigarette a day in recent years. Drinking was defined as consuming alcohol once a week on average. Exercise was defined as having engaged in walking, yoga, or other physical activities more than three times during the past week. The above definitions were in accordance with previous research¹⁶. Sitting time per day was categorized as ≤ 1 , 1 to <3 , 3 to <5 , 5 to <10 , and ≥ 10 h.

2.2.4 Assessment of IPV

The Abuse Assessment Screen Questionnaire was used to assess IPV during pregnancy. This scale is widely used as a tool to screen IPV in pregnant women and has good validity and reliability¹⁷. The scale assesses three aspects of domestic violence—i.e., mental, physical, and sexual—and has eight items. The response to each item was “Yes” or “No.” If the respondent

1
2
3
4 answered “Yes” to one or more of questions 5 to 7, she was identified as a victim of domestic
5
6 violence during pregnancy¹⁸.
7
8
9

10 11 **2.2.5 Assessment tool for prenatal anxiety**

12
13
14 The 7-Item Generalized Anxiety Disorder scale (GAD-7)¹⁹ is used as a screening tool for
15
16 GAD in primary care patients and is easily understood and can be completed quickly. The
17
18 scale has seven items, each scored on a 4-point scale ranging from 0 to 3 for a total score
19
20 between 0 and 21, with a higher score indicating more severe anxiety symptoms. A GAD-7
21
22 score ≥ 7 was the cut-off for prenatal anxiety.
23
24
25
26
27
28
29

30 31 **2.2.6 Assessment tool for prenatal depression**

32
33 Prenatal depression was assessed with the 9-Item Patient Health Questionnaire (PHQ-9),
34
35 which consists of nine questions pertaining to depression symptoms over the prior 2 weeks,
36
37 each with four possible responses: “Not at all,” “Several days,” “More than half of the days,”
38
39 and “Nearly every day,” corresponding to 0, 1, 2, and 3 points, respectively. The total score
40
41 ranges from 0 to 27²⁰. Participants with a score ≥ 10 were considered to have prenatal
42
43 depression.
44
45
46
47
48
49

50 51 **2.3 Statistical analysis**

52
53 Data were kept anonymous and non-identifiable and were analysed using SPSS v25.0 (SPSS
54
55 Inc, Chicago, IL, USA). Some continuous variables such as age and family care (APGAR),
56
57 prenatal anxiety (GAD-7), and prenatal depression (PHQ-9) scores were treated as
58
59
60

1
2
3
4 categorical variables. The chi-squared test, calibration chi-squared test, or Fisher's exact test
5
6 was used to compare baseline characteristics between women who had experienced IPV (IPV
7
8 group) and those who had not (No-IPV group). Multivariate logistic regression with the enter
9
10 method was used to estimate odds ratio (OR) and 95% confidence interval (CI) of
11
12 associations between IPV and prenatal anxiety and depression. A two-tailed test with $P<0.05$
13
14 was considered statistically significant.
15
16
17
18
19
20
21

22 **2.4 Patients or public involvement statement**

23
24 Neither the patients nor the public were involved in the design, conduct, reporting, or
25
26 dissemination of this work.
27
28
29
30
31

32 **3. Results**

33
34 Of 3437 pregnant women without psychotic disorders who completed the electronic
35
36 questionnaire, three were excluded because their completion time was <100 s. Thus, 3434
37
38 participants were ultimately included in the analysis. The mean age of the participants was
39
40 28.97 ± 4.57 years (Table 1). There were significant differences in age, professional
41
42 psychological counselling, family care, pregnancy complications, partner intimacy since
43
44 COVID-19, household income since COVID-19, smoking habits, drinking habits of the
45
46 participant and her partner, exercise, and sitting time per day between the IPV and No-IPV
47
48 groups, whereas no intergroup differences were observed in the participant and her partner's
49
50 education level, work status, and other characteristics. A total of 77 participants (2.2%)
51
52 experienced at least one form of IPV during pregnancy; mental violence was the most
53
54
55
56
57
58
59
60

common (n=57, 1.7%), followed by physical (n=19, 0.6%) and sexual (n=7, 0.7%) violence.

Table 1. General characteristics of the study participants

Variable	No-IPV	IPV	χ^2	<i>P</i> *
Age (years)			17.528	0.002
≤19	28 (0.8)	4 (5.2)		
20–24	507 (15.1)	13 (16.9)		
25–29	1341 (39.9)	30 (39.0)		
30–34	1096 (32.6)	19 (24.7)		
≥35	385 (11.5)	11 (14.3)		
Education level			4.895 ^a	0.418
Master's degree or higher	140 (4.2)	7 (9.1)		
Undergraduate	919 (27.4)	18 (23.4)		
College degree	912 (27.2)	21 (27.3)		
High school degree	699 (20.8)	14 (18.2)		
Junior high school diploma	670 (20.0)	17 (22.1)		
Primary school or lower	17 (0.5)	0 (0.0)		
Partner's education level			6.761 ^a	0.215
Master's degree or higher	202 (6.0)	6 (7.8)		
Undergraduate	998 (29.7)	22 (28.6)		
College degree	844 (25.1)	18 (23.4)		
High school degree	698 (20.8)	13 (16.9)		
Junior high school diploma	600 (17.9)	16 (20.8)		
Primary school or lower	15 (0.4)	2 (2.6)		
Work status after pregnancy			0.007	0.933
Employed	2065 (61.5)	47 (61.0)		
Unemployed	1292 (38.5)	30 (39.0)		
Partner's working status			0.024 ^b	0.876
Employed	3217 (95.8)	73 (94.8)		
Unemployed	140 (4.2)	4 (5.2)		
Marital status			0.440	0.507
Married	3118 (92.9)	70 (90.9)		
Unmarried/divorced/widowed	239 (7.1)	7 (9.1)		
Living situation			3.337	0.189
Couple alone	2263 (67.4)	54 (70.1)		
Living with in-laws	844 (25.1)	14 (18.2)		
Living with parents	250 (7.4)	9 (11.7)		
Professional psychological counselling			17.816	<0.001
Not received	3125 (93.1)	62 (80.5)		
Received	232 (6.9)	15 (19.5)		
Family care			45.788	<0.001

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Good functioning	1992 (59.3)	18 (23.4)		
Moderately dysfunction	872 (26.0)	31 (40.3)		
Severe dysfunction	493 (14.7)	28 (36.4)		
Gestational age			0.944	0.624
First trimester	1122 (33.4)	22 (28.6)		
Second trimester	1122 (33.4)	29 (37.7)		
Third trimester	1113 (33.2)	26 (33.8)		
Vaginal bleeding			2.623	0.105
No	2537 (75.6)	52 (67.5)		
Yes	820 (24.4)	25 (32.5)		
Pregnancy complications			6.730	0.009
No	2601 (77.5)	50 (64.9)		
Yes	756 (22.5)	27 (35.1)		
Pregnancy intention			3.641 ^a	0.144
Planned conception	1796 (53.5)	33 (42.9)		
Unplanned pregnancy	1452 (43.3)	41 (53.2)		
Artificial insemination	109 (3.2)	3 (3.9)		
Intimacy with partner since COVID-19			64.846	<0.001
Essentially unchanged	2554 (76.1)	47 (61.0)		
Strained	65 (1.9)	12 (15.6)		
More intimate	738 (22.0)	18 (23.4)		
Household income since COVID-19			12.921 ^a	0.004
Essentially unchanged	1805 (53.8)	30 (39.0)		
Increased	60 (1.8)	5 (6.5)		
Decreased by 20%–50%	1165 (34.7)	30 (39.0)		
Decrease by \geq 50%	327 (9.7)	12 (15.6)		
Smoking			19.565 ^b	<0.001
No	3302 (98.4)	70 (90.9)		
Yes	55 (1.6)	7 (9.1)		
Partner's smoking habits			1.217	0.270
No	2082 (62.0)	43 (55.8)		
Yes	1275 (38.0)	34 (44.2)		
Drinking			8.892 ^b	0.003
No	3195 (95.2)	67 (87.0)		
Yes	162 (4.8)	10 (13.0)		
Partner's drinking habits			7.672	0.006
No	2441 (72.7)	45 (58.4)		
Yes	916 (27.3)	32 (41.6)		
Exercise			4.327	0.038
No	2412 (71.8)	47 (61.0)		
Yes	945 (28.2)	30 (39.0)		
Sitting time per day, h			14.533	0.006
\leq 1	454 (13.5)	19 (24.7)		
1–3	1069 (31.8)	21 (27.3)		

3-5	829 (24.7)	11 (14.3)
5-10	831 (24.8)	18 (23.4)
≥10	174 (5.2)	8 (10.4)

Data are presented as n (%).

^aFisher's exact test.

^bCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

There were differences in the prevalence of anxiety and depression between IPV and No-IPV groups (Tables 2 and 3). According to GAD-7 scale score, the incidence of mild anxiety symptoms was 15.2% (523/3434), while moderate and severe anxiety symptoms were observed in 2.5% (85/3434) and 1.0% (35/3434) of participants, respectively. Using a cut-off value of 7, the incidence of anxiety symptoms was 9.8% (337/3434). According to PHQ-9 scale score, 22.0% of participants (757/3434) had mild depressive symptoms, 6.1% (210/3434) had moderate depressive symptoms, and 0.8% (28/3434) had severe depressive symptoms. Using a cut-off value of 10, the incidence of depressive symptoms was 6.9% (238/3434). Participants who experienced mental, physical, and sexual violence had higher rates of prenatal anxiety and depression than those who did not report IPV.

Table 2. Prevalence of anxiety among study participants

IPV or IPV subtype	No prenatal anxiety	Prenatal anxiety	χ^2	P^*
Overall IPV			97.172	<0.001
No	3053 (98.6)	304 (90.2)		
Yes	44 (1.4)	33 (9.8)		
Mental violence			83.936	<0.001
No	3066 (99.0)	311 (92.3)		
Yes	31 (1.0)	26 (7.7)		
Physical violence			44.591 ^a	<0.001
No	3089 (99.7)	326 (96.7)		
Yes	8 (0.3)	11 (3.3)		
Sexual violence			13.594 ^a	<0.001

No	3082 (99.5)	329 (97.6)
Yes	15 (0.5)	8 (2.4)
Total	3097 (90.2)	337 (9.8)

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

Table 3. Prevalence of depression among study participants

IPV or IPV subtype	No prenatal depression	Prenatal depression	χ^2	P^*
Overall IPV			64.257	<0.001
No	3142 (98.3)	215 (90.3)		
Yes	54 (1.7)	23 (9.7)		
Mental violence			36.892 ^a	<0.001
No	3155 (98.7)	222 (93.3)		
Yes	41 (1.3)	16 (6.7)		
Physical violence			31.369 ^a	<0.001
No	3185 (99.7)	230 (96.6)		
Yes	11 (0.3)	8 (3.4)		
Sexual violence			23.669 ^a	<0.001
No	3181 (99.5)	230 (96.6)		
Yes	15 (0.5)	8 (3.4)		
Total	3196 (93.1)	238 (6.9)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

After adjusting for potential confounding factors, IPV was significantly associated with prenatal anxiety in the multivariate logistic regression analysis (Table 4). Participants who had experienced IPV were 4.207 times more likely to have experienced prenatal anxiety (OR=4.207, 95% CI: 2.469, 7.166). Mental violence (OR=4.394, 95% CI: 2.444, 8.179) and physical violence (OR=8.869, 95% CI: 3.224, 26.102) were significantly associated with prenatal anxiety; however, there was no association between sexual violence and anxiety.

Table 4. Association between intimate partner violence and prenatal anxiety

Variable	OR (95% CI)	P
IPV ^a	4.207 (2.469, 7.166)	<0.001
Mental violence ^b	4.471 (2.444, 8.179)	<0.001
Physical violence ^b	9.174 (3.224, 26.102)	<0.001
Sexual violence ^b	2.018 (0.733, 5.556)	0.174

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

In the logistic regression analysis, participants who reported IPV were more likely to develop prenatal depression after adjusting for confounding factors (OR=3.864, 95% CI: 2.095, 7.125). Mental violence (OR=3.259, 95% CI: 1.590, 6.678), physical violence (OR=10.176, 95% CI: 3.495, 29.627), and sexual violence (OR=4.121, 95% CI: 1.457, 11.659) were all associated with an increased risk of prenatal depression (Table 5).

Table 5. Association between intimate partner violence and prenatal depression

Variable	OR (95% CI)	P
IPV ^a	3.864 (2.095, 7.125)	<0.001
Mental violence ^b	3.259 (1.590, 6.678)	0.001
Physical violence ^b	10.176 (3.495, 29.627)	<0.001
Sexual violence ^b	4.121 (1.457, 11.659)	0.008

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

4. Discussion

The prevalence of IPV during the COVID-19 pandemic among pregnant women in Shenzhen, China, was 2.2%. This is comparable to the rate reported in a cross-sectional study conducted in London, UK (3%)²¹ but much lower than that reported in Pakistan (35%)²². The disparities in prevalence are likely attributable to cultural, economic, and regional differences. The COVID-19 pandemic has radically changed the lives of individuals. In particular, COVID-19 quarantine made the home a very dangerous place for victims of domestic violence as they were forced to spend more time with their abusive partners and away from people who could validate their experiences and offer help. IPV was also exacerbated by the economic crisis linked to COVID-19 with some pregnant women unable to leave their partners for economic reasons²³, which likely influenced the reported prevalence of IPV. However, there has not been consistent screening for IPV because of limited time and resources, a reluctance to potentially offend pregnant women, insufficient training and reimbursement, and perceived lack of institutional support. It is therefore essential that healthcare professionals address

1
2
3
4 safety and violence faced by their pregnant patients at home. Telehealth provides an
5
6 opportunity for IPV screening and the provision of resources as well as contraceptive and
7
8 mental health counselling²⁴.
9

10
11 Mental violence (1.7%) was the most common form of IPV among the study
12
13 participants, which is consistent with findings from other studies conducted in China⁷,
14
15 Thailand²⁵, and Ethiopia²⁶. We observed similar rates of physical (0.6%) and sexual (0.7%)
16
17 violence, although these were lower than that reported in Ethiopia during the COVID-19
18
19 pandemic¹². The difference may be explained by the Chinese cultural norm of avoiding
20
21 discussions of unpleasant personal circumstances in order to “save face”¹⁶, with the result that
22
23 violence during pregnancy is frequently underreported²⁷. It is worth noting that our results
24
25 may have been biased by the fact that outcomes were assessed by self-report²⁸. Although we
26
27 informed the subjects that the survey was for scientific research purposes only and that they
28
29 were filling out the electronic questionnaire anonymously, it is possible that the subjects
30
31 concealed or avoided fully reporting their experiences of violence. On the other hand, the
32
33 survey results were based on participants’ recall of past events; participants may have
34
35 forgotten about or ignored their experiences of IPV, especially psychological violence such
36
37 as belittling and ridiculing, which may have decreased the reported rate of IPV.
38
39
40
41
42
43
44
45
46
47

48 We observed a significant and positive association between IPV and prenatal anxiety
49
50 and depression during the COVID-19 pandemic. This is consistent with other reports^{6 7 9 29} in
51
52 which IPV was identified as a chronic stressful condition that increased the risk of depression
53
54 and anxiety during pregnancy. We also found that IPV subtypes had different effects on
55
56 prenatal anxiety and depression; for instance, mental violence was associated with an
57
58
59
60

1
2
3
4 increased risk of both conditions. A higher rate of psychological (emotional and verbal) abuse
5
6 was shown to be more closely associated with mental health outcomes than physical
7
8 violence³⁰, possibly because psychological violence directly attacks a person's
9
10 self-perception and can cause post-traumatic stress disorder and anxiety through mechanisms
11
12 such as guilt, self-hatred, and regret³¹. The adverse consequences of physical violence such as
13
14 fractures, lacerations, and head trauma are amplified during pregnancy and increased the risk
15
16 of prenatal anxiety and depression in our cohort. Sexual violence did not appear to be
17
18 associated with prenatal anxiety in our research, which contradicts earlier findings³²; this may
19
20 be due to participants' reluctance to report this form of IPV according to the norms of
21
22 Chinese culture. It is also possible that the positive rate was too low to show an association
23
24 between sexual violence and prenatal anxiety. This warrants closer investigation in future
25
26 studies with a larger sample size.
27
28
29
30
31
32
33
34
35
36
37

38 **Strengths and limitations**

39
40 This study is the first investigation of the relationship between IPV and prenatal anxiety and
41
42 depression in pregnant women during the COVID-19 pandemic in China. The participants
43
44 were representative of the entire population of Shenzhen. However, there were several
45
46 limitations to our study. Firstly, we were unable to establish causality between the two
47
48 outcomes because of the cross-sectional study design. Secondly, symptoms of depression and
49
50 anxiety were evaluated only once and therefore, it was not possible to detect any trends over
51
52 the course of pregnancy. Thirdly, non-pregnant women should have been included as controls
53
54 to obtain a more comprehensive view of the effects of IPV on pregnant women. Finally, we
55
56
57
58
59
60

1
2
3
4 found a low prevalence of IPV, which may lead to false negative results when analysing
5
6 correlations. Future investigations should expand the sample size to confirm the results of this
7
8 study. These issues can be addressed in future studies with a prospective, longitudinal,
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

found a low prevalence of IPV, which may lead to false negative results when analysing correlations. Future investigations should expand the sample size to confirm the results of this study. These issues can be addressed in future studies with a prospective, longitudinal, meditational, and mixed method designs that also examine the mental health consequences of IPV for pregnant women.

Conclusion

Violence against women is a key priority for achieving gender equality around the world. The prevalence of IPV in pregnant women in China cannot be underestimated. Our results suggest that IPV among pregnant women during the COVID-19 pandemic was associated with prenatal anxiety and depression. Prenatal care can identify pregnant women who experience IPV so that they can be connected with services that offer protection. Eliminating violence against pregnant women requires practical and long-term interventions by the government and civil society starting from education within the family.

Acknowledgments

The authors thank the participants for their time and effort. We wish to thank the help given by Charlesworth Author Services in the language revision.

Data Availability Statement

The datasets generated and analysed during the current study are not publicly available due to privacy restrictions but are available from the corresponding author on reasonable request.

Contributors

All authors made substantial contributions to this study. FW, WL, PL, and MZ were responsible for study conception and initiation, design, and supervised implementation. FW, CC, QL, WH, and CZ acquired the data. FW, WL, LZ, YW, and QC interpreted the data and performed statistical analyses. FW drafted the manuscript. All authors contributed to the critical revision of the manuscript and gave final approval for its publication.

Funding

This work was supported by the Shenzhen Science and Technology Innovation Committee (grant no. JCYJ20170307091451207) and China Maternal and Child Health Association (project no. 21). The funder was not involved in any part of the study process, from design to submission of the article for publication.

Competing interests

None declared.

Ethics approval

The Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospital approved this study (authorization no. SFYLS [2020] 032) and granted an amended approval in 2020.

References

1. Goodwin MM, Gazmararian JA, Johnson CH, et al. Pregnancy intendedness and physical abuse around the time of pregnancy: findings from the pregnancy risk assessment monitoring system, 1996-1997. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. *Maternal and child health journal* 2000;4(2):85-92. doi: 10.1023/a:1009566103493 [published Online First: 2000/09/20]
2. Dahlen HG, Munoz AM, Schmied V, et al. The relationship between intimate partner violence reported at the first antenatal booking visit and obstetric and perinatal outcomes in an ethnically diverse group of Australian pregnant women: a population-based study over 10 years. *BMJ open* 2018;8(4):e019566. doi: 10.1136/bmjopen-2017-019566 [published Online First: 2018/04/27]
3. Organisation WH. Global plan of action to strengthen the role of the health system within a national multisectoral response to address interpersonal violence, in particular against women and girls, and against children. *Geneva: WHO Press* 2016
4. Chan KL, Brownridge DA, Fong DY, et al. Violence against pregnant women can increase the risk of child abuse: a longitudinal study. *Child abuse & neglect* 2012;36(4):275-84. doi: 10.1016/j.chiabu.2011.12.003 [published Online First: 2012/05/09]
5. Brownridge DA, Taillieu TL, Tyler KA, et al. Pregnancy and intimate partner violence: risk factors, severity, and health effects. *Violence against women* 2011;17(7):858-81. doi: 10.1177/1077801211412547 [published Online First: 2011/07/22]
6. Yu H, Jiang X, Bao W, et al. Association of intimate partner violence during pregnancy, prenatal depression, and adverse birth outcomes in Wuhan, China. *BMC pregnancy*

- 1
2
3
4 *and childbirth* 2018;18(1):469. doi: 10.1186/s12884-018-2113-6 [published Online
5
6
7 First: 2018/12/05]
8
- 9 7. Zhang Y, Zou S, Cao Y, et al. Relationship between domestic violence and postnatal
10
11 depression among pregnant Chinese women. *International journal of gynaecology*
12
13 *and obstetrics: the official organ of the International Federation of Gynaecology and*
14
15 *Obstetrics* 2012;116(1):26-30. doi: 10.1016/j.ijgo.2011.08.011 [published Online First:
16
17 2011/10/26]
18
19
- 20 8. Connelly CD, Hazen AL, Baker-Ericzén MJ, et al. Is screening for depression in the
21
22 perinatal period enough? The co-occurrence of depression, substance abuse, and
23
24 intimate partner violence in culturally diverse pregnant women. *Journal of women's*
25
26 *health (2002)* 2013;22(10):844-52. doi: 10.1089/jwh.2012.4121 [published Online
27
28 First: 2013/08/13]
29
30
- 31 9. Navarrete L, Nieto L, Lara MA. Intimate partner violence and perinatal depression and
32
33 anxiety: Social support as moderator among Mexican women. *Sexual & reproductive*
34
35 *healthcare : official journal of the Swedish Association of Midwives* 2021;27:100569.
36
37 doi: 10.1016/j.srhc.2020.100569 [published Online First: 2020/11/07]
38
39
- 40 10. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive
41
42 symptoms in pregnant women: a preliminary study. *The journal of maternal-fetal &*
43
44 *neonatal medicine : the official journal of the European Association of Perinatal*
45
46 *Medicine, the Federation of Asia and Oceania Perinatal Societies, the International*
47
48 *Society of Perinatal Obstet* 2020:1-7. doi: 10.1080/14767058.2020.1763946
49
50
51
52
53
54
55
56
57
58 [published Online First: 2020/05/19]
59
60

- 1
2
3
4 11. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during
5
6 COVID-19 lockdown: an Italian survey. *Journal of translational medicine*
7
8 2020;18(1):229. doi: 10.1186/s12967-020-02399-5 [published Online First:
9
10 2020/06/10]
11
12
13
14 12. Teshome A, Gudu W, Bekele D, et al. Intimate partner violence among prenatal care
15
16 attendees amidst the COVID-19 crisis: The incidence in Ethiopia. *International*
17
18 *journal of gynaecology and obstetrics: the official organ of the International*
19
20 *Federation of Gynaecology and Obstetrics* 2021;153(1):45-50. doi:
21
22 10.1002/ijgo.13566 [published Online First: 2020/12/29]
23
24
25
26
27 13. Wu F, Lin W, Liu P, et al. Prevalence and contributory factors of anxiety and depression
28
29 among pregnant women in the post-pandemic era of COVID-19 in Shenzhen, China.
30
31 *Journal of affective disorders* 2021;291:243-51. doi: 10.1016/j.jad.2021.05.014
32
33 [published Online First: 2021/05/30]
34
35
36
37 14. Devries KM, Kishor S, Johnson H, et al. Intimate partner violence during pregnancy:
38
39 analysis of prevalence data from 19 countries. *Reproductive health matters*
40
41 2010;18(36):158-70. doi: 10.1016/s0968-8080(10)36533-5 [published Online First:
42
43 2010/11/30]
44
45
46
47 15. Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family APGAR as a
48
49 test of family function. *The Journal of family practice* 1982;15(2):303-11. [published
50
51 Online First: 1982/08/01]
52
53
54
55 16. Yu Y, Zhu X, Xu H, et al. Prevalence of depression symptoms and its influencing factors
56
57 among pregnant women in late pregnancy in urban areas of Hengyang City, Hunan
58
59
60

- Province, China: a cross-sectional study. *BMJ open* 2020;10(9):e038511. doi: 10.1136/bmjopen-2020-038511 [published Online First: 2020/09/03]
17. Leung WC, Leung TW, Lam YY, et al. The prevalence of domestic violence against pregnant women in a Chinese community. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics* 1999;66(1):23-30. doi: 10.1016/s0020-7292(99)00053-3 [published Online First: 1999/08/24]
18. Zheng B, Zhu X, Hu Z, et al. The prevalence of domestic violence and its association with family factors: a cross-sectional study among pregnant women in urban communities of Hengyang City, China. *BMC public health* 2020;20(1):620. doi: 10.1186/s12889-020-08683-9 [published Online First: 2020/05/07]
19. Tong X, An D, McGonigal A, et al. Validation of the Generalized Anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy research* 2016;120:31-6. doi: 10.1016/j.eplesyres.2015.11.019 [published Online First: 2015/12/29]
20. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *Jama* 1999;282(18):1737-44. doi: 10.1001/jama.282.18.1737 [published Online First: 1999/11/24]
21. Bacchus L, Mezey G, Bewley S. Domestic violence: prevalence in pregnant women and associations with physical and psychological health. *European journal of obstetrics, gynecology, and reproductive biology* 2004;113(1):6-11. doi: 10.1016/s0301-2115(03)00326-9 [published Online First: 2004/03/24]

- 1
2
3
4 22. Habib S, Abbasi N, Khan B, et al. Domestic Violence Among Pregnant Women. *Journal*
5
6
7 *of Ayub Medical College, Abbottabad : JAMC* 2018;30(2):237-40. [published Online
8
9 First: 2018/06/26]
10
11
12 23. Mazza M, Marano G, Lai C, et al. Danger in danger: Interpersonal violence during
13
14 COVID-19 quarantine. *Psychiatry research* 2020;289:113046. doi:
15
16 10.1016/j.psychres.2020.113046 [published Online First: 2020/05/11]
17
18
19 24. Zero O, Geary M. COVID-19 and Intimate Partner Violence: A Call to Action. *Rhode*
20
21 *Island medical journal (2013)* 2020;103(5):57-59. [published Online First: 2020/06/03]
22
23
24 25. Saito A, Creedy D, Cooke M, et al. Effect of intimate partner violence on antenatal
25
26 functional health status of childbearing women in Northeastern Thailand. *Health care*
27
28 *for women international* 2013;34(9):757-74. doi: 10.1080/07399332.2013.794459
29
30 [published Online First: 2013/06/25]
31
32
33
34 26. Fekadu E, Yigzaw G, Gelaye KA, et al. Prevalence of domestic violence and associated
35
36 factors among pregnant women attending antenatal care service at University of
37
38 Gondar Referral Hospital, Northwest Ethiopia. *BMC women's health* 2018;18(1):138.
39
40 doi: 10.1186/s12905-018-0632-y [published Online First: 2018/08/16]
41
42
43
44 27. Oweis A, Gharaibeh M, Alhourani R. Prevalence of violence during pregnancy: findings
45
46 from a Jordanian survey. *Maternal and child health journal* 2010;14(3):437-45. doi:
47
48 10.1007/s10995-009-0465-2 [published Online First: 2009/03/28]
49
50
51
52 28. Perry AR, Fromuth ME. Courtship violence using couple data: characteristics and
53
54 perceptions. *Journal of interpersonal violence* 2005;20(9):1078-95. doi:
55
56 10.1177/0886260505278106 [published Online First: 2005/07/30]
57
58
59
60

- 1
2
3
4 29. Belay S, Astatkie A, Emmelin M, et al. Intimate partner violence and maternal depression
5
6 during pregnancy: A community-based cross-sectional study in Ethiopia. *PloS one*
7
8 2019;14(7):e0220003. doi: 10.1371/journal.pone.0220003 [published Online First:
9
10 2019/08/01]
11
12
13
14 30. Coker AL, Davis KE, Arias I, et al. Physical and mental health effects of intimate partner
15
16 violence for men and women. *American journal of preventive medicine*
17
18 2002;23(4):260-8. doi: 10.1016/s0749-3797(02)00514-7 [published Online First:
19
20 2002/10/31]
21
22
23
24 31. Street AE, Arias I. Psychological abuse and posttraumatic stress disorder in battered
25
26 women: examining the roles of shame and guilt. *Violence and victims*
27
28 2001;16(1):65-78. [published Online First: 2001/04/03]
29
30
31
32 32. Silva RP, Leite FMC. Intimate partner violence during pregnancy: prevalence and
33
34 associated factors. *Revista de saude publica* 2020;54:97. doi:
35
36 10.11606/s1518-8787.2020054002103 [published Online First: 2020/11/05]
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5,6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7,8,9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5,6
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6,7,8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8,9
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	9
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	8,9
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10,11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6,7,8
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	12,13,14,15
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16,17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Association between intimate partner violence and prenatal anxiety and depression in pregnant women: A cross-sectional survey during the COVID-19 epidemic in Shenzhen, China

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-055333.R3
Article Type:	Original research
Date Submitted by the Author:	16-Apr-2022
Complete List of Authors:	Wu, Fei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare; Southern Medical University, Department of Epidemiology, School of Public Health Zhou, Lin; Shenzhen Centre for Disease Control and Prevention, Department of Information Technology Chen , Caiyun; Southern Medical University, Department of Epidemiology, School of Public Health Lin, Wei; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Liu, Peiyi; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Huang, Weikang; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare Zhong, Chuyan; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University,, Department of Healthcare Zhang, Minyi; Southern Medical University, Department of Epidemiology, School of Public Health LI, Qiushuang; Southern Medical University, Department of Epidemiology, School of Public Health Chen, Qing; Southern Medical University, Department of Epidemiology, School of Public Health Wang, Yue-Yun; Affiliated Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University, Department of Healthcare
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Mental health
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, COVID-19

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3
4 **Association between intimate partner violence and prenatal**
5 **anxiety and depression in pregnant women: A cross-sectional**
6 **survey during the COVID-19 epidemic in Shenzhen, China**
7
8
9
10
11
12
13

14 Fei Wu^{1,3}, Lin Zhou², Caiyun Chen³, Wei Lin¹, Peiyi Liu¹, Weikang Huang¹, Chuyan Zhong¹,

15
16
17 Minyi Zhang³, Qiushuang Li³, Qing Chen^{3*}, Yueyun Wang^{1*}
18
19
20
21

22 ¹Department of Healthcare, Affiliated Shenzhen Maternity and Child Healthcare Hospital,
23 Southern Medical University, Shenzhen 518048, Guangdong, China
24
25

26
27 ²Department of Information Technology, Shenzhen Centre for Disease Control and
28 Prevention, Shenzhen 518055, China
29
30

31
32 ³Department of Epidemiology, School of Public Health, Southern Medical University,
33 Guangzhou 510515, Guangdong, China
34
35
36
37
38
39

40 *Correspondence to:

41
42 Yueyun Wang

43
44 Email: wangyueyun@126.com

45
46
47 Phone: +86-0755-82889999
48
49
50
51

52
53 Qing Chen

54
55 Email: qch.2009@163.com

56
57
58 Phone: +86-20-61648312
59
60

Abstract

Objectives: Intimate partner violence (IPV) against women remains a major global public health problem with harmful consequences for individuals and society. People's lifestyles have been greatly affected by the coronavirus disease 2019 (COVID-19) pandemic. This study investigated the prevalence of and relationship between IPV and anxiety and depression in pregnant Chinese women during the pandemic.

Design: Cross-sectional study.

Setting: This investigation was conducted in Shenzhen City, Guangdong Province, China from September 15 to December 15, 2020.

Participants: A total of 3434 pregnant women were screened with the Abuse Assessment Screen Questionnaire to evaluate IPV and General Anxiety Disorder and Patient Health Questionnaire to evaluate symptoms of anxiety and depression, respectively. Pregnant women with perinatal health records at Shenzhen District Maternity and Child Healthcare Hospitals who consented to participate were enrolled. Women with psychotic disorders such as schizophrenia, mania, or substance dependence and pregnant women who refused to participate were excluded. Data were analysed with the chi-squared test and by logistic regression analysis.

Results: The prevalence of IPV among pregnant women was 2.2%. Mental violence was the most common type of violence (2.2%), followed by physical (0.6%) and sexual (0.7%) violence. The prevalence of anxiety and depression symptoms was 9.8% and 6.9%, respectively. After adjusting for covariates, there was a statistically significant association between IPV and prenatal anxiety (odds ratio OR=4.136, 95% confidence interval CI: 2.436,

1
2
3
4 7.022) and depression (OR=4.136, 95% CI: 2.436, 7.022).
5

6 Conclusions: IPV increased the risk of prenatal anxiety and depression in pregnant women in
7
8 China during the COVID-19 pandemic. Efforts should be made by the government and civil
9
10 society to promote long-lasting antenatal interventions to ensure the safety and protect the
11
12 mental health of pregnant women.
13
14
15

16 17 18 19 **Strengths and limitations of this study** 20

- 21
22 1. This is the first investigation of the relationship between IPV and prenatal anxiety and
23
24 depression in pregnant women during the COVID-19 pandemic in China.
25
- 26
27 2. Causality between these two outcomes was not established.
28
- 29
30 3. IPV was likely under-reported by the study participants.
31
- 32
33 4. Some results should be interpreted with caution because of the small sample size.
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1. Introduction

Intimate partner violence (IPV) against women including physical, mental, and sexual abuse is an important clinical and public health issue^{1,2}. In 2016, the World Health Organization highlighted various forms of interpersonal violence, particularly those occurring in the home and inflicted by intimate partners and other family members and remaining hidden, stigmatized, and largely unrecognized by health and other service providers³. A previous study showed that pregnant women were vulnerable to the initiation or exacerbation of IPV⁴ and were 2.7 to 3.9 times more likely to be victims of physical violence and twice as likely to be subjected to sexual violence compared with non-pregnant women⁵. In China, IPV prevalence in pregnant women has been reported as 18.32% in Wuhan⁶ and 11.3% in Changsha⁷. Prenatal depression and anxiety are common sequelae of IPV^{8,9}.

The coronavirus disease 2019 (COVID-19) outbreak began in December 2019 in Wuhan City, Hubei Province, China¹⁰ and suddenly and radically altered the population's habits and lifestyles, with a drastic reduction in any form of socialization. Physical distancing and self-isolation strongly impacted people's lives¹¹, including those of pregnant women and their partners. Protecting the physical and mental wellbeing of pregnant women is important for a healthy society. However, only one study to date¹² has examined the prevalence of IPV among pregnant women since the start of the COVID-19 pandemic, and there have been no studies investigating the association between IPV and prenatal anxiety and depression in this group.

Shenzhen is one of the most economically developed and populous cities in mainland China whose activities have been severely impacted by the restrictions imposed in response

1
2
3
4 to the pandemic. The present study aimed to establish the prevalence of IPV among pregnant
5
6 women in Shenzhen during the COVID-19 pandemic and the association between IPV and
7
8 prenatal anxiety and depression.
9
10

11 12 13 14 **2. Methods**

15 16 17 **2.1 Research design and study population**

18
19 This cross-sectional survey was conducted from September 15 to December 15, 2020 and
20
21 enrolled women at all stages of pregnancy in Shenzhen City, Guangdong Province, China.
22
23 Shenzhen is an economic centre and the fourth largest city in mainland China in terms of
24
25 economic aggregate; there are fewer migrant workers than other large cities and most of its
26
27 population is urban. The study participants were recruited from 10 representative
28
29 administrative areas of Shenzhen that can provide reference values for areas in other
30
31 countries with similar characteristics. Pregnant women were recruited from maternity and
32
33 child healthcare hospitals in each of the 10 administrative areas using a multi-stage random
34
35 sampling method¹³. Briefly, women at all stages of pregnancy who came to the hospital for
36
37 regular check-ups between September 15 and December 15, 2020 were enrolled. A full
38
39 description of the objectives, contents, procedures, associated benefits, and risks of the
40
41 present study was provided at the beginning of the electronic questionnaire completed by
42
43 participants when they registered for the check-up. Investigators including trained doctors,
44
45 nurses, and medical students provided guidance for filling out the questionnaire. Pregnant
46
47 women with perinatal health records at Shenzhen District Maternity and Child Healthcare
48
49 Hospitals who consented to participate were enrolled. Women with psychotic disorders such
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4 as schizophrenia, mania, or substance dependence and pregnant women who could not
5
6 complete the questionnaire within the allotted time were excluded. The sample size
7
8 calculation formula for cross-sectional studies was used to determine the minimum
9
10 theoretical sample size for this study. The admissible error was 0.15, $\alpha=0.05$, and based on
11
12 previous studies, the expected prevalence was 5%¹⁴; 3416 people were therefore required to
13
14 represent the population of Shenzhen. A total of 3437 women who met the inclusion criteria
15
16 were enrolled; those who completed the questionnaire in less than 100 s were excluded,
17
18 leaving 3434 women in the study from all 10 administrative areas of Shenzhen. Thus, the
19
20 response rate was 99.9% (3434/3437). There were about 160,000 live births in the Maternal
21
22 and Child Health Hospital system of Shenzhen in 2020, which represents our sample size of
23
24 about 2% of the total number of newborns in Shenzhen. The study was approved by the
25
26 Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospitals and was
27
28 conducted in Shenzhen.
29
30
31
32
33
34
35
36
37
38
39

40 **2.2 Measurements**

41 **2.2.1 General characteristics of the study population**

42
43 General information obtained on each participant included age, education level, partner's
44
45 education level, work status after pregnancy, partner's work status, marital status, living
46
47 situation, psychological counselling before pregnancy, vaginal bleeding and pregnancy
48
49 complications, pregnancy intention, intimacy between partners since COVID-19, and
50
51 household income since COVID-19.
52
53
54
55
56
57
58
59
60

2.2.2 Family care

The Family Adaptation Partnership Growth and Resolved (APGAR) index was used for family care assessment¹⁵. The APGAR has five items, each answered on a 3-point Likert scale from “Often” (2 points) to “Rarely” (0 points). The total score was 0–10 points. A high APGAR score (7–10 points) indicated good family functioning; a mid-range score (4–6 points) indicated moderate family dysfunction; and a low score (0–3) indicated severe family dysfunction.

2.2.3 Lifestyle characteristics

Lifestyle characteristics including smoking and drinking by a pregnant woman and her partner, exercise, and sitting time per day were recorded. Smoking was defined as an average of one cigarette a day in recent years. Drinking was defined as consuming alcohol once a week on average. Exercise was defined as having engaged in walking, yoga, or other physical activities more than three times during the past week. The above definitions were in accordance with previous research¹⁶. Sitting time per day was categorized as ≤ 1 , 1 to <3 , 3 to <5 , 5 to <10 , and ≥ 10 h.

2.2.4 Assessment of IPV

The Abuse Assessment Screen Questionnaire was used to assess IPV during pregnancy. This scale is widely used as a tool to screen IPV in pregnant women and has good validity and reliability¹⁷. The scale assesses three aspects of domestic violence—i.e., mental, physical, and sexual—and has eight items. The response to each item was “Yes” or “No.” If the respondent

1
2
3
4 answered “Yes” to one or more of questions 5 to 7, she was identified as a victim of domestic
5
6 violence during pregnancy¹⁸.
7
8
9

10 11 12 **2.2.5 Assessment tool for prenatal anxiety**

13
14 The 7-Item Generalized Anxiety Disorder scale (GAD-7)¹⁹ is used as a screening tool for
15
16 GAD in primary care patients and is easily understood and can be completed quickly. The
17
18 scale has seven items, each scored on a 4-point scale ranging from 0 to 3 for a total score
19
20 between 0 and 21, with a higher score indicating more severe anxiety symptoms. A GAD-7
21
22 score ≥ 7 was the cut-off for prenatal anxiety.
23
24
25
26
27
28
29

30 31 32 **2.2.6 Assessment tool for prenatal depression**

33 Prenatal depression was assessed with the 9-Item Patient Health Questionnaire (PHQ-9),
34
35 which consists of nine questions pertaining to depression symptoms over the prior 2 weeks,
36
37 each with four possible responses: “Not at all,” “Several days,” “More than half of the days,”
38
39 and “Nearly every day,” corresponding to 0, 1, 2, and 3 points, respectively. The total score
40
41 ranges from 0 to 27²⁰. Participants with a score ≥ 10 were considered to have prenatal
42
43 depression.
44
45
46
47
48
49

50 51 52 **2.3 Statistical analysis**

53 Data were kept anonymous and non-identifiable and were analysed using SPSS v25.0 (SPSS
54
55 Inc, Chicago, IL, USA). Some continuous variables such as age and family care (APGAR),
56
57 prenatal anxiety (GAD-7), and prenatal depression (PHQ-9) scores were treated as
58
59
60

1
2
3
4 categorical variables. The chi-squared test, calibration chi-squared test, or Fisher's exact test
5
6 was used to compare baseline characteristics between women who had experienced IPV (IPV
7
8 group) and those who had not (No-IPV group). Multivariate logistic regression with the enter
9
10 method was used to estimate odds ratio (OR) and 95% confidence interval (CI) of
11
12 associations between IPV and prenatal anxiety and depression. A two-tailed test with $P<0.05$
13
14 was considered statistically significant.
15
16
17
18
19
20
21

22 **2.4 Patient and public involvement**

23
24 Neither the patients nor the public was involved in the design, conduct, reporting, or
25
26 dissemination of this work. However, women in the recruitment populations have expressed a
27
28 high degree of interest in the issue of mental health.
29
30
31
32
33
34

35 **3. Results**

36
37 Of 3437 pregnant women without psychotic disorders who completed the electronic
38
39 questionnaire, three were excluded because their completion time was <100 s. Thus, 3434
40
41 participants were ultimately included in the analysis. The mean age of the participants was
42
43 28.97 ± 4.57 years (Table 1). There were significant differences in age, professional
44
45 psychological counselling, family care, pregnancy complications, partner intimacy since
46
47 COVID-19, household income since COVID-19, smoking habits, drinking habits of the
48
49 participant and her partner, exercise, and sitting time per day between the IPV and No-IPV
50
51 groups, whereas no intergroup differences were observed in the participant and her partner's
52
53 education level, work status, and other characteristics. A total of 77 participants (2.2%)
54
55
56
57
58
59
60

experienced at least one form of IPV during pregnancy; mental violence was the most common (n=57, 1.7%), followed by physical (n=19, 0.6%) and sexual (n=7, 0.7%) violence.

Table 1. General characteristics of the study participants

Variable	No-IPV	IPV	χ^2	<i>P</i> *
Age (years)			17.528	0.002
≤19	28 (0.8)	4 (5.2)		
20–24	507 (15.1)	13 (16.9)		
25–29	1341 (39.9)	30 (39.0)		
30–34	1096 (32.6)	19 (24.7)		
≥35	385 (11.5)	11 (14.3)		
Education level			4.895 ^a	0.418
Master's degree or higher	140 (4.2)	7 (9.1)		
Undergraduate	919 (27.4)	18 (23.4)		
College degree	912 (27.2)	21 (27.3)		
High school degree	699 (20.8)	14 (18.2)		
Junior high school diploma	670 (20.0)	17 (22.1)		
Primary school or lower	17 (0.5)	0 (0.0)		
Partner's education level			6.761 ^a	0.215
Master's degree or higher	202 (6.0)	6 (7.8)		
Undergraduate	998 (29.7)	22 (28.6)		
College degree	844 (25.1)	18 (23.4)		
High school degree	698 (20.8)	13 (16.9)		
Junior high school diploma	600 (17.9)	16 (20.8)		
Primary school or lower	15 (0.4)	2 (2.6)		
Work status after pregnancy			0.007	0.933
Employed	2065 (61.5)	47 (61.0)		
Unemployed	1292 (38.5)	30 (39.0)		
Partner's working status			0.024 ^b	0.876
Employed	3217 (95.8)	73 (94.8)		
Unemployed	140 (4.2)	4 (5.2)		
Marital status			0.440	0.507
Married	3118 (92.9)	70 (90.9)		
Unmarried/divorced/widowed	239 (7.1)	7 (9.1)		
Living situation			3.337	0.189
Couple alone	2263 (67.4)	54 (70.1)		
Living with in-laws	844 (25.1)	14 (18.2)		
Living with parents	250 (7.4)	9 (11.7)		
Professional psychological counselling			17.816	<0.001
Not received	3125 (93.1)	62 (80.5)		

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Received	232 (6.9)	15 (19.5)		
Family care			45.788	<0.001
Good functioning	1992 (59.3)	18 (23.4)		
Moderately dysfunction	872 (26.0)	31 (40.3)		
Severe dysfunction	493 (14.7)	28 (36.4)		
Gestational age			0.944	0.624
First trimester	1122 (33.4)	22 (28.6)		
Second trimester	1122 (33.4)	29 (37.7)		
Third trimester	1113 (33.2)	26 (33.8)		
Vaginal bleeding			2.623	0.105
No	2537 (75.6)	52 (67.5)		
Yes	820 (24.4)	25 (32.5)		
Pregnancy complications			6.730	0.009
No	2601 (77.5)	50 (64.9)		
Yes	756 (22.5)	27 (35.1)		
Pregnancy intention			3.641 ^a	0.144
Planned conception	1796 (53.5)	33 (42.9)		
Unplanned pregnancy	1452 (43.3)	41 (53.2)		
Artificial insemination	109 (3.2)	3 (3.9)		
Intimacy with partner since COVID-19			64.846	<0.001
Essentially unchanged	2554 (76.1)	47 (61.0)		
Strained	65 (1.9)	12 (15.6)		
More intimate	738 (22.0)	18 (23.4)		
Household income since COVID-19			12.921 ^a	0.004
Essentially unchanged	1805 (53.8)	30 (39.0)		
Increased	60 (1.8)	5 (6.5)		
Decreased by 20%–50%	1165 (34.7)	30 (39.0)		
Decrease by \geq 50%	327 (9.7)	12 (15.6)		
Smoking			19.565 ^b	<0.001
No	3302 (98.4)	70 (90.9)		
Yes	55 (1.6)	7 (9.1)		
Partner's smoking habits			1.217	0.270
No	2082 (62.0)	43 (55.8)		
Yes	1275 (38.0)	34 (44.2)		
Drinking			8.892 ^b	0.003
No	3195 (95.2)	67 (87.0)		
Yes	162 (4.8)	10 (13.0)		
Partner's drinking habits			7.672	0.006
No	2441 (72.7)	45 (58.4)		
Yes	916 (27.3)	32 (41.6)		
Exercise			4.327	0.038
No	2412 (71.8)	47 (61.0)		
Yes	945 (28.2)	30 (39.0)		
Sitting time per day, h			14.533	0.006

≤1	454 (13.5)	19 (24.7)
1–3	1069 (31.8)	21 (27.3)
3–5	829 (24.7)	11 (14.3)
5–10	831 (24.8)	18 (23.4)
≥10	174 (5.2)	8 (10.4)

Data are presented as n (%).

^aFisher's exact test.

^bCalibration chi-squared test.

*Values in bold face are statistically significant at $P < 0.05$.

There were differences in the prevalence of anxiety and depression between IPV and No-IPV groups (Tables 2 and 3). According to GAD-7 scale score, the incidence of mild anxiety symptoms was 15.2% (523/3434), while moderate and severe anxiety symptoms were observed in 2.5% (85/3434) and 1.0% (35/3434) of participants, respectively. Using a cut-off value of 7, the incidence of anxiety symptoms was 9.8% (337/3434). According to PHQ-9 scale score, 22.0% of participants (757/3434) had mild depressive symptoms, 6.1% (210/3434) had moderate depressive symptoms, and 0.8% (28/3434) had severe depressive symptoms. Using a cut-off value of 10, the incidence of depressive symptoms was 6.9% (238/3434). Participants who experienced mental, physical, and sexual violence had higher rates of prenatal anxiety and depression than those who did not report IPV.

Table 2. Prevalence of anxiety among study participants

IPV or IPV subtype	No prenatal anxiety	Prenatal anxiety	χ^2	P^*
Overall IPV			97.172	<0.001
No	3053 (98.6)	304 (90.2)		
Yes	44 (1.4)	33 (9.8)		
Mental violence			83.936	<0.001
No	3066 (99.0)	311 (92.3)		
Yes	31 (1.0)	26 (7.7)		
Physical violence			44.591 ^a	<0.001
No	3089 (99.7)	326 (96.7)		

Yes	8 (0.3)	11 (3.3)		
Sexual violence			13.594 ^a	<0.001
No	3082 (99.5)	329 (97.6)		
Yes	15 (0.5)	8 (2.4)		
Total	3097 (90.2)	337 (9.8)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

Table 3. Prevalence of depression among study participants

IPV or IPV subtype	No prenatal depression	Prenatal depression	χ^2	P^*
Overall IPV			64.257	<0.001
No	3142 (98.3)	215 (90.3)		
Yes	54 (1.7)	23 (9.7)		
Mental violence			36.892 ^a	<0.001
No	3155 (98.7)	222 (93.3)		
Yes	41 (1.3)	16 (6.7)		
Physical violence			31.369 ^a	<0.001
No	3185 (99.7)	230 (96.6)		
Yes	11 (0.3)	8 (3.4)		
Sexual violence			23.669 ^a	<0.001
No	3181 (99.5)	230 (96.6)		
Yes	15 (0.5)	8 (3.4)		
Total	3196 (93.1)	238 (6.9)		

Data are presented as n (%).

^aCalibration chi-squared test.

*Values in bold face are statistically significant at $P<0.05$.

IPV, intimate partner violence.

After adjusting for potential confounding factors, IPV was significantly associated with prenatal anxiety in the multivariate logistic regression analysis (Table 4). Participants who had experienced IPV were 4.207 times more likely to have experienced prenatal anxiety (OR=4.207, 95% CI: 2.469, 7.166). Mental violence (OR=4.394, 95% CI: 2.444, 8.179) and physical violence (OR=8.869, 95% CI: 3.224, 26.102) were significantly associated with

1
2
3
4 prenatal anxiety; however, there was no association between sexual violence and anxiety.
5
6
7
8

9
10 **Table 4.** Association between intimate partner violence and prenatal anxiety

Variable	OR (95% CI)	P
IPV ^a	4.207 (2.469, 7.166)	<0.001
Mental violence ^b	4.471 (2.444, 8.179)	<0.001
Physical violence ^b	9.174 (3.224, 26.102)	<0.001
Sexual violence ^b	2.018 (0.733, 5.556)	0.174

11
12
13
14
15
16
17
18 ^aAdjusted for age, participant and her partner's education level, participant and her partner's
19 work status, marital status, living situation, professional psychological counselling, family
20 care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention,
21 intimacy with partner since COVID-19, household income since COVID-19, participant and
22 her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting
23 time per day, and IPV subtype.

24
25
26 ^bAdjusted for age, participant and her partner's education level, participant and her partner's
27 work status, marital status, living situation, professional psychological counselling, family
28 care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention,
29 intimacy with partner since COVID-19, household income since COVID-19, participant and
30 her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting
31 time per day, and IPV subtype.

32
33 *Values in bold face are statistically significant at $P < 0.05$.

34 CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.
35
36
37
38

39
40 In the logistic regression analysis, participants who reported IPV were more likely to
41 develop prenatal depression after adjusting for confounding factors (OR=3.864, 95% CI:
42 2.095, 7.125). Mental violence (OR=3.259, 95% CI: 1.590, 6.678), physical violence
43
44 (OR=10.176, 95% CI: 3.495, 29.627), and sexual violence (OR=4.121, 95% CI: 1.457,
45
46 11.659) were all associated with an increased risk of prenatal depression (Table 5).
47
48
49
50
51
52
53
54

55
56 **Table 5.** Association between intimate partner violence and prenatal depression

Variable	OR (95% CI)	P
IPV ^a	3.864 (2.095, 7.125)	<0.001
Mental violence ^b	3.259 (1.590, 6.678)	0.001

Physical violence ^b	10.176 (3.495, 29.627)	<0.001
Sexual violence ^b	4.121 (1.457, 11.659)	0.008

^aAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

^bAdjusted for age, participant and her partner's education level, participant and her partner's work status, marital status, living situation, professional psychological counselling, family care, gestational age, vaginal bleeding, pregnancy complications, pregnancy intention, intimacy with partner since COVID-19, household income since COVID-19, participant and her partner's smoking habits, participant and her partner's drinking habits, exercise, sitting time per day, and IPV subtype.

*Values in bold face are statistically significant at $P < 0.05$.

CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

4. Discussion

The prevalence of IPV during the COVID-19 pandemic among pregnant women in Shenzhen, China, was 2.2%. This is comparable to the rate reported in a cross-sectional study conducted in London, UK (3%)²¹ but much lower than that reported in Pakistan (35%)²². The disparities in prevalence are likely attributable to cultural, economic, and regional differences. The COVID-19 pandemic has radically changed the lives of individuals. In particular, COVID-19 quarantine made the home a very dangerous place for victims of domestic violence as they were forced to spend more time with their abusive partners and away from people who could validate their experiences and offer help. IPV was also exacerbated by the economic crisis linked to COVID-19 with some pregnant women unable to leave their partners for economic reasons²³, which likely influenced the reported prevalence of IPV. However, there has not been consistent screening for IPV because of limited time and resources, a reluctance to potentially offend pregnant women, insufficient training and reimbursement, and perceived

1
2
3
4 lack of institutional support. It is therefore essential that healthcare professionals address
5
6 safety and violence faced by their pregnant patients at home. Telehealth provides an
7
8 opportunity for IPV screening and the provision of resources as well as contraceptive and
9
10 mental health counselling²⁴.
11
12

13
14 Mental violence (1.7%) was the most common form of IPV among the study
15
16 participants, which is consistent with findings from other studies conducted in China⁷,
17
18 Thailand²⁵, and Ethiopia²⁶. We observed similar rates of physical (0.6%) and sexual (0.7%)
19
20 violence, although these were lower than that reported in Ethiopia during the COVID-19
21
22 pandemic¹². The difference may be explained by the Chinese cultural norm of avoiding
23
24 discussions of unpleasant personal circumstances in order to “save face”¹⁶, with the result that
25
26 violence during pregnancy is frequently underreported²⁷. It is worth noting that our results
27
28 may have been biased by the fact that outcomes were assessed by self-report²⁸. Although we
29
30 informed the subjects that the survey was for scientific research purposes only and that they
31
32 were filling out the electronic questionnaire anonymously, it is possible that the subjects
33
34 concealed or avoided fully reporting their experiences of violence. On the other hand, the
35
36 survey results were based on participants’ recall of past events; participants may have
37
38 forgotten about or ignored their experiences of IPV, especially psychological violence such
39
40 as belittling and ridiculing, which may have decreased the reported rate of IPV.
41
42
43
44
45
46
47
48
49

50 We observed a significant and positive association between IPV and prenatal anxiety
51
52 and depression during the COVID-19 pandemic. This is consistent with other reports^{6 7 9 29} in
53
54 which IPV was identified as a chronic stressful condition that increased the risk of depression
55
56 and anxiety during pregnancy. We also found that IPV subtypes had different effects on
57
58
59
60

1
2
3
4 prenatal anxiety and depression; for instance, mental violence was associated with an
5
6 increased risk of both conditions. A higher rate of psychological (emotional and verbal) abuse
7
8 was shown to be more closely associated with mental health outcomes than physical
9
10 violence³⁰, possibly because psychological violence directly attacks a person's
11
12 self-perception and can cause post-traumatic stress disorder and anxiety through mechanisms
13
14 such as guilt, self-hatred, and regret³¹. The adverse consequences of physical violence such as
15
16 fractures, lacerations, and head trauma are amplified during pregnancy and increased the risk
17
18 of prenatal anxiety and depression in our cohort. Sexual violence did not appear to be
19
20 associated with prenatal anxiety in our research, which contradicts earlier findings³²; this may
21
22 be due to participants' reluctance to report this form of IPV according to the norms of
23
24 Chinese culture. It is also possible that the positive rate was too low to show an association
25
26 between sexual violence and prenatal anxiety. This warrants closer investigation in future
27
28 studies with a larger sample size.
29
30
31
32
33
34
35
36
37
38
39

40 **Strengths and limitations**

41
42 This study is the first investigation of the relationship between IPV and prenatal anxiety and
43
44 depression in pregnant women during the COVID-19 pandemic in China. The participants
45
46 were representative of the entire population of Shenzhen. However, there were several
47
48 limitations to our study. Firstly, we were unable to establish causality between the two
49
50 outcomes because of the cross-sectional study design. Secondly, symptoms of depression and
51
52 anxiety were evaluated only once and therefore, it was not possible to detect any trends over
53
54 the course of pregnancy. Thirdly, non-pregnant women should have been included as controls
55
56
57
58
59
60

1
2
3
4 to obtain a more comprehensive view of the effects of IPV on pregnant women. Finally, we
5
6 found a low prevalence of IPV, which may lead to false negative results when analysing
7
8 correlations. Future investigations should expand the sample size to confirm the results of this
9
10 study. These issues can be addressed in future studies with a prospective, longitudinal,
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

to obtain a more comprehensive view of the effects of IPV on pregnant women. Finally, we found a low prevalence of IPV, which may lead to false negative results when analysing correlations. Future investigations should expand the sample size to confirm the results of this study. These issues can be addressed in future studies with a prospective, longitudinal, meditational, and mixed method designs that also examine the mental health consequences of IPV for pregnant women.

Conclusion

Violence against women is a key priority for achieving gender equality around the world. The prevalence of IPV in pregnant women in China cannot be underestimated. Our results suggest that IPV among pregnant women during the COVID-19 pandemic was associated with prenatal anxiety and depression. Prenatal care can identify pregnant women who experience IPV so that they can be connected with services that offer protection. Eliminating violence against pregnant women requires practical and long-term interventions by the government and civil society starting from education within the family.

Acknowledgments

The authors thank the participants for their time and effort. We wish to thank the help given by Charlesworth Author Services in the language revision.

Data Availability Statement

The datasets generated and analysed during the current study are not publicly available due to

1
2
3
4 privacy restrictions but are available from the corresponding author on reasonable request.
5
6
7
8

9 **Contributors**

10 All authors made substantial contributions to this study. FW, WL, PL, and MZ were
11 responsible for study conception and initiation, design, and supervised implementation. FW,
12 CC, QL, WH, and CZ acquired the data. FW, WL, LZ, YW, and QC interpreted the data and
13 performed statistical analyses. FW drafted the manuscript. All authors contributed to the
14 critical revision of the manuscript and gave final approval for its publication.
15
16
17
18
19
20
21
22
23
24
25
26

27 **Funding**

28 This work was supported by the Shenzhen Science and Technology Innovation Committee
29 (grant no. JCYJ20170307091451207) and China Maternal and Child Health Association
30 (project no. 21). The funder was not involved in any part of the study process, from design to
31 submission of the article for publication.
32
33
34
35
36
37
38
39
40
41
42

43 **Competing interests**

44 None declared.
45
46
47
48
49

50 **Ethics approval**

51 The Institutional Review Board of Shenzhen Maternity and Child Healthcare Hospital
52 approved this study (authorization no. SFYLS [2020] 032) and granted an amended approval
53 in 2020.
54
55
56
57
58
59
60

References

1. Goodwin MM, Gazmararian JA, Johnson CH, et al. Pregnancy intendedness and physical abuse around the time of pregnancy: findings from the pregnancy risk assessment monitoring system, 1996-1997. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. *Maternal and child health journal* 2000;4(2):85-92. doi: 10.1023/a:1009566103493 [published Online First: 2000/09/20]
2. Dahlen HG, Munoz AM, Schmied V, et al. The relationship between intimate partner violence reported at the first antenatal booking visit and obstetric and perinatal outcomes in an ethnically diverse group of Australian pregnant women: a population-based study over 10 years. *BMJ open* 2018;8(4):e019566. doi: 10.1136/bmjopen-2017-019566 [published Online First: 2018/04/27]
3. Organisation WH. Global plan of action to strengthen the role of the health system within a national multisectoral response to address interpersonal violence, in particular against women and girls, and against children. *Geneva: WHO Press* 2016
4. Chan KL, Brownridge DA, Fong DY, et al. Violence against pregnant women can increase the risk of child abuse: a longitudinal study. *Child abuse & neglect* 2012;36(4):275-84. doi: 10.1016/j.chiabu.2011.12.003 [published Online First: 2012/05/09]
5. Brownridge DA, Taillieu TL, Tyler KA, et al. Pregnancy and intimate partner violence: risk factors, severity, and health effects. *Violence against women* 2011;17(7):858-81. doi: 10.1177/1077801211412547 [published Online First: 2011/07/22]
6. Yu H, Jiang X, Bao W, et al. Association of intimate partner violence during pregnancy, prenatal depression, and adverse birth outcomes in Wuhan, China. *BMC pregnancy*

- 1
2
3
4 *and childbirth* 2018;18(1):469. doi: 10.1186/s12884-018-2113-6 [published Online
5
6
7 First: 2018/12/05]
8
- 9 7. Zhang Y, Zou S, Cao Y, et al. Relationship between domestic violence and postnatal
10
11 depression among pregnant Chinese women. *International journal of gynaecology*
12
13 *and obstetrics: the official organ of the International Federation of Gynaecology and*
14
15 *Obstetrics* 2012;116(1):26-30. doi: 10.1016/j.ijgo.2011.08.011 [published Online First:
16
17 2011/10/26]
18
19
- 20 8. Connelly CD, Hazen AL, Baker-Ericzén MJ, et al. Is screening for depression in the
21
22 perinatal period enough? The co-occurrence of depression, substance abuse, and
23
24 intimate partner violence in culturally diverse pregnant women. *Journal of women's*
25
26 *health (2002)* 2013;22(10):844-52. doi: 10.1089/jwh.2012.4121 [published Online
27
28 First: 2013/08/13]
29
30
- 31 9. Navarrete L, Nieto L, Lara MA. Intimate partner violence and perinatal depression and
32
33 anxiety: Social support as moderator among Mexican women. *Sexual & reproductive*
34
35 *healthcare : official journal of the Swedish Association of Midwives* 2021;27:100569.
36
37 doi: 10.1016/j.srhc.2020.100569 [published Online First: 2020/11/07]
38
39
- 40 10. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive
41
42 symptoms in pregnant women: a preliminary study. *The journal of maternal-fetal &*
43
44 *neonatal medicine : the official journal of the European Association of Perinatal*
45
46 *Medicine, the Federation of Asia and Oceania Perinatal Societies, the International*
47
48 *Society of Perinatal Obstet* 2020:1-7. doi: 10.1080/14767058.2020.1763946
49
50
51
52
53
54
55
56
57
58 [published Online First: 2020/05/19]
59
60

- 1
2
3
4 11. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during
5
6 COVID-19 lockdown: an Italian survey. *Journal of translational medicine*
7
8 2020;18(1):229. doi: 10.1186/s12967-020-02399-5 [published Online First:
9
10 2020/06/10]
11
12
13
14 12. Teshome A, Gudu W, Bekele D, et al. Intimate partner violence among prenatal care
15
16 attendees amidst the COVID-19 crisis: The incidence in Ethiopia. *International*
17
18 *journal of gynaecology and obstetrics: the official organ of the International*
19
20 *Federation of Gynaecology and Obstetrics* 2021;153(1):45-50. doi:
21
22 10.1002/ijgo.13566 [published Online First: 2020/12/29]
23
24
25
26
27 13. Wu F, Lin W, Liu P, et al. Prevalence and contributory factors of anxiety and depression
28
29 among pregnant women in the post-pandemic era of COVID-19 in Shenzhen, China.
30
31 *Journal of affective disorders* 2021;291:243-51. doi: 10.1016/j.jad.2021.05.014
32
33 [published Online First: 2021/05/30]
34
35
36
37 14. Devries KM, Kishor S, Johnson H, et al. Intimate partner violence during pregnancy:
38
39 analysis of prevalence data from 19 countries. *Reproductive health matters*
40
41 2010;18(36):158-70. doi: 10.1016/s0968-8080(10)36533-5 [published Online First:
42
43 2010/11/30]
44
45
46
47 15. Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family APGAR as a
48
49 test of family function. *The Journal of family practice* 1982;15(2):303-11. [published
50
51 Online First: 1982/08/01]
52
53
54
55 16. Yu Y, Zhu X, Xu H, et al. Prevalence of depression symptoms and its influencing factors
56
57 among pregnant women in late pregnancy in urban areas of Hengyang City, Hunan
58
59
60

- Province, China: a cross-sectional study. *BMJ open* 2020;10(9):e038511. doi: 10.1136/bmjopen-2020-038511 [published Online First: 2020/09/03]
17. Leung WC, Leung TW, Lam YY, et al. The prevalence of domestic violence against pregnant women in a Chinese community. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics* 1999;66(1):23-30. doi: 10.1016/s0020-7292(99)00053-3 [published Online First: 1999/08/24]
18. Zheng B, Zhu X, Hu Z, et al. The prevalence of domestic violence and its association with family factors: a cross-sectional study among pregnant women in urban communities of Hengyang City, China. *BMC public health* 2020;20(1):620. doi: 10.1186/s12889-020-08683-9 [published Online First: 2020/05/07]
19. Tong X, An D, McGonigal A, et al. Validation of the Generalized Anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy research* 2016;120:31-6. doi: 10.1016/j.eplesyres.2015.11.019 [published Online First: 2015/12/29]
20. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *Jama* 1999;282(18):1737-44. doi: 10.1001/jama.282.18.1737 [published Online First: 1999/11/24]
21. Bacchus L, Mezey G, Bewley S. Domestic violence: prevalence in pregnant women and associations with physical and psychological health. *European journal of obstetrics, gynecology, and reproductive biology* 2004;113(1):6-11. doi: 10.1016/s0301-2115(03)00326-9 [published Online First: 2004/03/24]

- 1
2
3
4 22. Habib S, Abbasi N, Khan B, et al. Domestic Violence Among Pregnant Women. *Journal*
5
6
7 *of Ayub Medical College, Abbottabad : JAMC* 2018;30(2):237-40. [published Online
8
9 First: 2018/06/26]
10
11
12 23. Mazza M, Marano G, Lai C, et al. Danger in danger: Interpersonal violence during
13
14 COVID-19 quarantine. *Psychiatry research* 2020;289:113046. doi:
15
16 10.1016/j.psychres.2020.113046 [published Online First: 2020/05/11]
17
18
19 24. Zero O, Geary M. COVID-19 and Intimate Partner Violence: A Call to Action. *Rhode*
20
21 *Island medical journal (2013)* 2020;103(5):57-59. [published Online First: 2020/06/03]
22
23
24 25. Saito A, Creedy D, Cooke M, et al. Effect of intimate partner violence on antenatal
25
26 functional health status of childbearing women in Northeastern Thailand. *Health care*
27
28 *for women international* 2013;34(9):757-74. doi: 10.1080/07399332.2013.794459
29
30 [published Online First: 2013/06/25]
31
32
33
34 26. Fekadu E, Yigzaw G, Gelaye KA, et al. Prevalence of domestic violence and associated
35
36 factors among pregnant women attending antenatal care service at University of
37
38 Gondar Referral Hospital, Northwest Ethiopia. *BMC women's health* 2018;18(1):138.
39
40 doi: 10.1186/s12905-018-0632-y [published Online First: 2018/08/16]
41
42
43
44 27. Oweis A, Gharaibeh M, Alhourani R. Prevalence of violence during pregnancy: findings
45
46 from a Jordanian survey. *Maternal and child health journal* 2010;14(3):437-45. doi:
47
48 10.1007/s10995-009-0465-2 [published Online First: 2009/03/28]
49
50
51
52 28. Perry AR, Fromuth ME. Courtship violence using couple data: characteristics and
53
54 perceptions. *Journal of interpersonal violence* 2005;20(9):1078-95. doi:
55
56 10.1177/0886260505278106 [published Online First: 2005/07/30]
57
58
59
60

- 1
2
3
4 29. Belay S, Astatkie A, Emmelin M, et al. Intimate partner violence and maternal depression
5
6 during pregnancy: A community-based cross-sectional study in Ethiopia. *PloS one*
7
8 2019;14(7):e0220003. doi: 10.1371/journal.pone.0220003 [published Online First:
9
10 2019/08/01]
11
12
13
14 30. Coker AL, Davis KE, Arias I, et al. Physical and mental health effects of intimate partner
15
16 violence for men and women. *American journal of preventive medicine*
17
18 2002;23(4):260-8. doi: 10.1016/s0749-3797(02)00514-7 [published Online First:
19
20 2002/10/31]
21
22
23
24 31. Street AE, Arias I. Psychological abuse and posttraumatic stress disorder in battered
25
26 women: examining the roles of shame and guilt. *Violence and victims*
27
28 2001;16(1):65-78. [published Online First: 2001/04/03]
29
30
31
32 32. Silva RP, Leite FMC. Intimate partner violence during pregnancy: prevalence and
33
34 associated factors. *Revista de saude publica* 2020;54:97. doi:
35
36 10.11606/s1518-8787.2020054002103 [published Online First: 2020/11/05]
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5,6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7,8,9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5,6
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6,7,8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8,9
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	9
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	8,9
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10,11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6,7,8
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	12,13,14,15
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16,17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.