Behavioural adaptations and responses to obstetric care among pregnant women during an early stage of the COVID-19 pandemic in Hong Kong: a cross-sectional survey

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ABSTRACT

Introduction: This study evaluated behavioural adaptations and responses to obstetric care among pregnant women during an early stage of the coronavirus disease 2019 (COVID-19) pandemic.

Methods: This cross-sectional survey included pregnant women who received obstetric care from 27 May 2020 to 16 June 2020 in a university-affiliated hospital in Hong Kong. Responses were collected with respect to obstetric appointment scheduling, workplace changes, mask-wearing practices, travel and quarantine experiences, obstetric service adjustments, and visiting arrangements. Regression analysis was used to compare the effects of patient characteristics on their responses.

Results: In total, 1000 surveys were distributed; 733 pregnant women provided complete survey responses. Among obstetric-related appointments in public hospitals, 16% were postponed or cancelled by pregnant women; such changes were most frequent among women beyond 24 weeks of gestation, women who had previous deliveries, and women who had a history of mental illness. The practice of working from home imposed psychological stress and negatively impacted the pregnancy experience in 4.5% of women. Childbirth companionship was regarded as an important service by 88.1% of women; only 4.2% agreed with its suspension. Obstetric service adjustments had the greatest impact on Chinese women and nulliparous women.

Conclusions: The findings provide an overview of how pregnant women adapted during an early stage of the COVID-19 pandemic. Women adjusted obstetric service attendance, began working from home, and wore masks. Women's expectations did not match changes in childbirth companionship and peripartum services. Hospital administrators should consider psychological impacts on pregnant women when implementing service adjustments.

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New knowledge added by this study

- Pregnant women, especially women who had previous deliveries and a history of mental illness, were more likely to postpone or cancel obstetric appointments during an early stage of the coronavirus disease 2019 (COVID-19) pandemic.
- While working from home improved the overall pregnancy experience for most women, it caused psychological stress and had a negative influence in 4.5% of respondents.
- Childbirth companionship was considered important by 88.1% of the respondents; only 4.2% of respondents fully accepted its suspension.

Implications for clinical practice or policy

- Obstetricians and policy makers should be aware of mismatches in the expectations of pregnant women concerning childbirth companionship and peripartum services; infection control should be balanced with peripartum needs.
- Obstetric service adjustments had the greatest impact on Chinese women and nulliparous women.

Introduction

Coronavirus disease 2019 (COVID-19) has had substantial psychosocial impacts worldwide and caused major behavioural changes. In 2020, increased stress and anxiety levels were reported in countries with major disease spread.[1-6] Pregnancy is considered a risk factor for COVID-19 because of relative maternal immunosuppression; there is also a risk of vertical transmission.[7-11] Importantly, behavioural changes have been recognised among pregnant women.[4] The pandemic situation could potentially disrupt obstetric care for pregnant

香港2019冠狀病毒病大流行早期孕婦的行為適應和對產科護理的反應：橫斷面調查

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引言：本研究評估2019冠狀病毒病（COVID-19）大流行早期，孕婦的行為適應和對產科護理的反應。

方法：這項橫斷面調查包括2020年5月27日至2020年6月16日期間在香港一所大學附屬醫院接受產科護理的孕婦。收集了有關產科預約安排、工作場所變化、戴口罩習慣、旅行和檢疫經驗、產科服務調整和探訪安排的回覆。使用迴歸分析比較患者特徵對其反應的影響。

結果：研究共分發1000份調查；733名孕婦提供完整的調查答覆。在公立醫院的產科預約中，16%被孕婦推遲或取消；這種變化在妊娠超過24週的女性、曾經分娩過的女性以及有精神病史的女性中最為常見。在家工作給4.5%受訪女性帶來心理壓力，並對懷孕經歷產生負面影響。88.1%受訪女性認為分娩陪伴是一項重要服務；只有4.2%同意暫停此項服務。產科服務調整對華裔婦女和未生育女性的影響最大。

結論：研究結果概述孕婦如何適應COVID-19大流行的早期階段。婦女調整產科護理預約、開始在家工作並戴上口罩。婦女的期望與分娩陪伴和圍產期服務的變化不符。醫院管理人員在實施服務調整時應考慮對孕婦的心理影響。

women.[8] Thus, it is important to study how the pandemic has affected obstetric care and pregnancy experiences.

Considering the severe adult respiratory syndrome (SARS) outbreaks in 2002 to 2003 in Hong Kong, a serious alert level was announced on 4 January 2020 in response to the emergence of novel coronavirus pneumonia in Wuhan, China.[12,13] This was escalated to an emergency alert level on 25 January 2020. Corresponding policies were imposed in public hospitals with each alert announcement. In obstetric units, husbands and partners were no longer allowed to accompany pregnant women for labour and delivery. No visiting was allowed for mothers or babies staying with their mothers in postnatal wards. All antenatal exercise classes, antenatal seminars, hospital tours, and postnatal classes were suspended. Many workplaces for women and their partners shifted to working from home. These changes were coupled with suspensions of schools and non-urgent community services. The infection continued to spread worldwide; the COVID-19 pandemic was recognised by the World Health Organization on 11 March 2020. On 20 March 2020, the first case of COVID-19 in a pregnant woman was confirmed in Hong Kong. The local government subsequently restricted travel with additional quarantine measures and mandated social distancing in late March 2020.[12] This study was conducted in the middle of 2020 to examine how pregnant women responded to changes in obstetric care and alterations in the workplace during an early stage of the COVID-19 pandemic; it also investigated their adaptations to the practices of mask wearing and social distancing.

Methods

This prospective questionnaire survey was conducted in the obstetric unit of a university-affiliated tertiary public hospital in Hong Kong from 27 May 2020 to 16 June 2020 in English (online supplementary Table 1) and Traditional Chinese (online supplementary Table 2). Pregnant women were invited to participate in an online questionnaire upon admission to obstetric wards or attendance to obstetric clinics; each invitation was provided by a midwife (in an obstetric ward) or a designated research assistant (in an obstetric clinic). Clinic sessions included an antenatal check-up, ultrasound scan, and screenings for gestational diabetes and Group B streptococcus. The survey was administered to all women who could read either Chinese or English. Each woman received an information leaflet containing an introduction of the project, a description of key events related to COVID-19 from January 2020 to March 2020, and a QR code linked to an online survey. The participants could begin the survey by scanning the QR code, selecting the language, and providing their consent.

The survey was developed by the authors and tailored to address issues related to the impacts of COVID-19 on obstetric services. Prior to this study, the survey content was validated by local consultant obstetricians and midwives; it consisted of demographic data collection and questions that involved five domains. These domains were related to obstetric appointment scheduling, workplace changes, mask-wearing practices, travel and quarantine experiences, and adjustments to birth companionship and visiting hours since the first novel coronavirus alerts were announced in January 2020. Concerning obstetric appointment scheduling, participants were asked whether their appointments had been postponed or rescheduled from a public hospital to a private hospital. Concerning workplace changes, participants were asked whether they and/or their partners had begun to work from home; they were then asked to describe the impact of the change on their pregnancy experience. Concerning mask-wearing practices, participants were asked about their pattern and type of mask use. With respect to travel and quarantine, participants were asked whether they had travelled because of COVID-19 risk; they were also asked about their experiences with COVID-19 testing and quarantine. Regarding the importance of birth companionship and visiting hours, as well as the acceptance of service adjustments and relief measures, participants were asked to rate their opinions of these factors using a visual analogue scale of 0 to 100, with 100 as very important or strongly accepted.

Women with gestational age ≤24 weeks were regarded as the early gestational group, while women with gestational age >24 weeks and women in the postnatal period were regarded as the late gestational group. The COVID-19 alert was announced by the Hong Kong government on 4 January 2020, slightly more than 20 weeks prior to the commencement of this study. Women in the early gestational group conceived after the date of COVID-19 alert announcement, while women in the late gestational group were already pregnant on the announcement date. Statistical analysis was performed using SPSS software (Windows version 26.0; IBM Corp, Armonk [NY], United States). The distributions of continuous variables were checked for normality. Analysis of variance and t test assessments were used for normally distributed variables, while the Mann-Whitney *U* test was used for non-normally distributed variables. Categorical variables were evaluated by the Chi squared test or Fisher's exact test. Regression analysis was performed to examine the effects of marital status, ethnic background, parity, and mental illness on the behaviours of pregnant women regarding antenatal appointment rescheduling and their opinions of obstetric service adjustments. A value of P<0.05 was considered significant.

Results

In total, 1000 information leaflets were distributed to 200 women in obstetric wards and 800 women in out-patient clinics. In all, 890 responses were registered online, including 878 women who consented to participate and 12 women who did not consent. Among women who agreed to participate, 145 did not finish the survey; thus, 733 completed responses were available for analysis.

Table 1 shows the basic demographic characteristics of the participants. Women aged 31 to 35 years constituted nearly half (48.8%) of the respondents. The largest gestational age-group was 25 to 30 weeks (24.3%). With the exception of influenza and pertussis vaccination histories, other background characteristics were comparable between early and late gestational groups.

TABLE 1. Participant characteristics*

	All	Early gestation	Late gestation
No. of completed surveys	733	277	456
Gestational age, wk			
<12	18 (2.5%)		
12-18	153 (20.9%)		
19-24	106 (14.5%)		
25-30	178 (24.3%)		
31-36	138 (18.8%)		
>36	113 (15.4%)		
Post-delivery	27 (3.7%)		
Age-group, y			
≤20	5 (0.7%)	2 (0.7%)	3 (0.6%)
21-25	24 (3.3%)	8 (2.9%)	16 (3.5%)
26-30	119 (16.2%)	52 (18.8%)	67 (14.7%)
31-35	358 (48.8%)	124 (44.8%)	234 (51.3%)
36-40	198 (27.0%)	79 (28.5%)	119 (26.1%)
≥41	29 (4.0%)	12 (4.3%)	17 (3.7%)
Marital status			
Married	687 (93.7%)	258 (93.1%)	429 (94.1%)
Single/others	46 (6.3%)	19 (6.9%)	27 (5.9%)
Ethnicity			
Chinese	624 (85.1%)	234 (84.5%)	390 (85.5%)
Caucasian	52 (7.1%)	19 (6.9%)	33 (7.2%)
Asian	47 (6.4%)	20 (7.2%)	27 (5.9%)
Others	10 (1.4%)	4 (1.4%)	6 (1.3%)
Nulliparity	432 (58.9%)	167 (60.3%)	265 (58.1%)
Previous vaginal delivery	219 (29.9%)	83 (30.0%)	136 (29.8%)
Previous CS	97 (13.2%)	35 (12.6%)	62 (13.6%)
Multiple pregnancies	26 (3.5%)	11 (4.0%)	15 (3.3%)
Method of conception			
Spontaneous	635 (86.6%)	243 (87.7%)	392 (86.0%)
ART	98 (13.4%)	34 (12.3%)	64 (14.0%)
Mental illness	44 (6.0%)	15 (5.4%)	29 (6.4%)
Influenza vaccination	78 (10.6%)	9 (3.2%)	69 (15.1%)
Pertussis vaccination	48 (6.5%)	2 (0.7%)	46 (10.1%)

Abbreviations: ART = assisted reproductive technology; CS = caesarean section

* Data are shown as No. (%)

Obstetric appointment scheduling

Among 2583 patient appointments, 417 (16.1%) were postponed or cancelled by pregnant women. Over half (56.1%) of these were rescheduled to a private hospital. The rate of postponement or cancellation was higher for regular antenatal visits (20.3%) and lower for foetal anomaly scans (13.6%) [Table 2]. Multivariate analysis showed that women in the late gestational group (odds ratio [OR]=2.66; 95% confidence interval [CI]=1.68-4.19; P<0.001) and women with mental illness (OR=2.20; 95% CI=1.09-4.43; P=0.03) were more likely to postpone or cancel regular antenatal appointments, while nulliparous women (OR=0.67; 95% CI=0.46-0.99; P=0.04) were less likely to make such changes (Table 3). No significant associations of demographic characteristics with ultrasound and investigation appointments (blood test, screening of Down's syndrome, or Group B streptococcus colonisation) were identified.

TABLE 2. Arrangement of obstetric appointments after COVID-19 alert*

	Participants with appointment	Appointment postponed	Appointment rescheduled in private hospital
Overall patient-appointment episodes	2583	417/2583 (16.1%)	234/417 (56.1%)
Regular antenatal check-up	691	140 (20.3%)	89 (63.6%)
Foetal anomaly scan	632	86 (13.6%)	44 (51.2%)
Other obstetric scans	604	90 (14.9%)	51 (56.7%)
Other obstetric investigations	656	101 (15.4%)	50 (49.5%)

Abbreviation: COVID-19 = coronavirus disease 2019
* Data are shown as No. (%)

TABLE 3. Multivariate analysis of factors affecting the antenatal appointment scheduling pattern

	Postponed			Rescheduled in private hospital		
	OR	95% CI	P value	OR	95% CI	P value
Late gestation	2.66	1.68-4.19	<0.001	0.50	0.19-1.34	0.17
Married	0.85	0.39-1.85	0.68	2.57	0.60-10.91	0.20
Chinese	1.11	0.65-1.91	0.70	2.09	0.77-5.63	0.15
Nulliparity	0.67	0.46-0.99	0.04	1.21	0.59-2.49	0.60
Mental illness	2.20	1.09-4.43	0.03	0.44	0.13-1.45	0.18

Abbreviations: 95% CI = 95% confidence interval; OR = odds ratio

TABLE 4. Work patterns, and effect of work patterns on antenatal appointment attendance*

	Pregnant women (n=733)	Husbands/ partners (n=733)	P value
Not working	191 (26.1%)	57 (7.8%)	
Working in same workplace	256 (34.9%)	476 (64.9%)	
Working from home	286 (39.0%)	200 (27.3%)	
Among the working group	286/542 (52.8%)	200/676 (29.6%)	<0.05
Effect of work from home on antenatal appointment attendance			
No impact	138/286 (48.3%)	101/200 (50.5%)	
Easier	133/286 (46.5%)	87/200 (43.5%)	
More difficult	15/286 (5.2%)	12/200 (6.0%)	

* Data are shown as No. (%)

Working from home

As shown in Table 4, there were 542 (73.9%) working women in this study; more than half of them began working from home after the COVID-19 alert announcement. Compared with their husbands/partners, significantly more women were working from home (29.6% vs 52.8%; P<0.05). Among women working from home, this work pattern facilitated obstetric appointment attendance for 46.5% (133/286) of the women and 43.5% (87/200) of their husbands/partners. There was a tendency for decreased omission of antenatal appointments among women working at home, compared with women working in usual workplaces, although the differences were not statistically significant for any type of appointment (antenatal check-up 6.6% vs 6.7%, P=0.10; anomaly scan 3.7% vs 8.0%, P=0.09; obstetric scan 3.5% vs 6.6%, P=0.22; obstetric investigations 5.1% vs 8.3%, P=0.30).

Overall pregnancy experience

Among the 131 women who reported that both they and their husbands/partners worked from home, 107 (81.7%) reported a better overall pregnancy experience. Among the 224 women who reported that they or their husbands/partners worked from home, 139 (62.1%) felt this work arrangement had made their overall pregnancy experience better while 13 (5.8%) felt this had made their experience worse. A significantly greater proportion of respondents reported a much better overall pregnancy experience when both they and their husbands/partners were working from home than when either they or their husbands/partners were working from home (50.4% vs 31.7%; P=0.001). In contrast, suspension of school and community services had more negative impacts on pregnancy experience (Table 5).

More time to spend at home was selected by 80.1% (197/246) of the respondents as a beneficial effect of working from home on their pregnancy experience (online supplementary Table 3). Among 18 women who had a worse pregnancy experience because of working from home, more psychological stress was chosen by 13 (72.2%) women as one of the underlying reasons. Five (27.8%) women reported greater conflict with their husbands/partners because of working from home (online supplementary Table 4).

Mask-wearing practices

The mean proportion of mask-wearing time was significantly greater in clinical areas (97.2% for hospitals and 97.0% for clinics) than in outdoor areas (89.3%) and at home (4.1%, P<0.05). Over 90% of respondents always wore masks in clinical areas; 63.8% always wore masks outdoors, and 0.8% always wore masks at home. Among all women in the study, surgical masks were most commonly used; N95 masks were used by 55 (7.5%) women in hospitals and 32 (4.4%) women in clinics (online supplementary Table 5).

Travel and quarantine experiences

Since the announcement of the COVID-19 alert, 6.8% (50/733) of respondents had travelled abroad

TABLE 5. Effect of work pattern, school suspension, and community service suspension on overall pregnancy experience*

Postoperative day	Work pattern			School suspension (n=733)	Community service suspension (n=733)
	Both work from home (n=131)	Either one work from home (n=224)	Either one or both work from home (n=355)		
Much better experience	66 (50.4%)†	71 (31.7%)†	137 (38.6%)	64 (8.7%)	25 (3.4%)
Slightly better experience	41 (31.3%)	68 (30.4%)	109 (30.7%)	65 (8.9%)	27 (3.7%)
Similar experience	19 (14.5%)	72 (32.1%)	91 (25.6%)	445 (60.7%)	267 (36.4%)
Slightly worse experience	3 (2.3%)	10 (4.5%)	13 (3.7%)	100 (13.6%)	260 (35.5%)
Much worse experience	2 (1.5%)	3 (1.3%)	5 (1.4%)	59 (8.0%)	154 (21.0%)

* Data are shown as No. (%)
† Chi squared test P=0.001

because of COVID-19 risk in Hong Kong; 13.4% (98/733) of respondents had returned to Hong Kong because of COVID-19 risk abroad. Additionally, 31 (4.2%) women had been quarantined and 26 (3.5%) women had lived with household members during home quarantine. Coronavirus disease 2019 testing had been performed in 3.7% of all respondents. Moderate to marked emotional disturbance related to personal quarantine experience was reported by 64.5% (20/31) of the women (online supplementary Table 6).

Adjustments of birth companionship and visiting hours

Husband/partner companionship during childbirth was regarded as the most important obstetric service, followed by visiting hours for pregnant women and neonates. Childbirth companionship was considered important by 88.1% of the respondents; only 4.2% of the respondents fully accepted its suspension. In contrast, suspension of hospital tours was fully accepted by 27.0% of the respondents (online supplementary Fig). Univariate analysis showed that marital status, ethnicity, parity, and history of mental illness were factors that influenced opinions of obstetric service importance and acceptance of service suspension. Regression analysis showed that being married was strongly associated with greater perceived importance of childbirth companionship (B=10.51; 95% CI=5.77-15.24) and visiting hours for mothers (B=5.14; 95% CI=0.35-9.94). Chinese women had the greatest perceived importance of visiting arrangements for both mothers and babies; they had the least acceptance of suspension of those services. Nulliparity was only factor significantly associated with the perceived importance of antenatal exercise (B=23.41; 95% CI=19.00-27.82), antenatal seminars (B=28.72; 95% CI=24.41-33.03), hospital tours (B=20.03; 95% CI=14.97-25.09), and postnatal breastfeeding classes (B=25.96; 95% CI=21.59-30.33) [Table 6].

Discussion

Summary

To our knowledge, this is the first study of the behavioural adaptations and responses to obstetric care among pregnant women during an early stage of the COVID-19 pandemic in Hong Kong, a city which previously experienced SARS outbreaks in 2002-2003. Approximately 16% of obstetric-related appointments in public hospitals were postponed or cancelled by pregnant women because of COVID-19, but only 56% of these appointments were rescheduled in private hospitals. Women who had previous deliveries and a history of mental illness were more likely adjust their appointments. Working from home during the COVID-19 pandemic improved the overall pregnancy experience in most respondents. However, approximately 5% of women reported negative impacts on their pregnancy experiences, primarily because of psychological stress. Concerning obstetric services, nearly 90% of the women considered childbirth companionship to be important; <5% of the women fully accepted its suspension. More than 80% of the respondents regarded visiting for mothers and newborns as very important aspect of the overall pregnancy experience. Obstetric service adjustments had the greatest impact on Chinese women and nulliparous women.

Antenatal care

Delays in seeking medical attention for acute medical conditions such as cardiac and cerebrovascular events were reported in 2020.[14-16] Importantly, failure to attend scheduled antenatal care can lead to adverse outcomes.[17,18] Women in the late gestational group were already pregnant on the date of the COVID-19 alert announcement; they might have reported more adjustments to obstetric appointments. Additionally, their shifts in obstetric care and avoidance of in-hospital stays in public

TABLE 6. Multivariate analysis of obstetric service importance and acceptance of service suspension*

Postoperative day	Importance			Acceptance		
	B	95% CI	P value	B	95% CI	P value
Childbirth companionship						
Intercept	83.31	77.96-88.66	<0.001	23.79	14.68-32.91	<0.001
Married	10.51	5.77-15.24	<0.001	-5.28	-13.35 to 2.80	0.20
Chinese ethnicity	1.36	-1.86-4.57	0.83	-2.42	-7.90 to 3.06	0.39
Nulliparity	1.84	-0.48-4.15	1.56	-3.65	-7.59 to 0.30	0.07
Mental illness	0.98	-3.84 to 5.80	0.40	-1.77	-9.98 to 6.45	0.67
Visiting hours for mothers						
Intercept	84.23	78.81-89.64	<0.001	28.61	18.46-38.76	<0.001
Married	5.14	0.35-9.94	0.04	-0.90	-9.89 to 8.09	0.84
Chinese ethnicity	6.34	3.08-9.59	<0.001	-7.36	-13.46 to -1.26	0.02
Nulliparity	-0.55	-2.89 to 1.80	0.65	-2.73	-7.13 to 1.66	0.22
Mental illness	1.85	-3.03 to 6.73	0.46	-1.35	-10.49 to 7.80	0.77
Visiting hours for babies						
Intercept	83.69	77.95-89.44	<0.001	26.96	16.27-37.65	<0.001
Married	3.97	-1.12 to 9.06	0.13	0.55	-8.92 to 10.21	0.91
Chinese ethnicity	6.53	3.08-9.99	<0.001	-7.65	-14.07 to -1.22	0.02
Nulliparity	0.32	-2.17 to 2.81	0.80	0.17	-4.46 to 4.80	0.94
Mental illness	4.28	-0.90 to 9.46	0.11	-5.12	-14.75 to 4.52	0.30
Postnatal breastfeeding classes						
Intercept	52.55	42.46-62.64	<0.001	66.11	54.85-77.36	<0.001
Married	2.91	-6.03 to 11.85	0.52	-4.40	-14.36 to 5.57	0.39
Chinese ethnicity	4.29	-1.78 to 10.35	0.17	-7.41	-14.17 to -0.64	0.03
Nulliparity	25.96	21.59-30.33	<0.001	-21.62	-26.49 to -16.73	<0.001
Mental illness	3.64	-5.45 to 12.74	0.43	-4.14	-14.29 to 6.00	0.42
Antenatal exercise						
Intercept	48.59	38.41-58.76	<0.001	67.26	55.92-78.60	<0.001
Married	6.54	-2.48 to 15.55	0.16	1.18	-8.86 to 11.22	0.82
Chinese ethnicity	2.50	-3.62 to 8.61	0.42	-9.39	-16.21 to -2.58	0.007
Nulliparity	23.41	19.00-27.82	<0.001	-19.96	-24.87 to -15.05	<0.001
Mental illness	9.47	0.30-18.64	0.04	-8.61	-18.82 to 1.61	0.10
Antenatal seminars						
Intercept	46.70	36.75-56.66	<0.001	72.28	60.98-83.59	<0.001
Married	3.56	-5.26 to 12.38	0.43	-0.93	-10.94 to 9.09	0.86
Chinese ethnicity	3.10	-2.88 to 9.08	0.31	-11.24	-18.03 to -4.44	0.001
Nulliparity	28.72	24.41-33.03	<0.001	-21.80	-26.69 to -16.90	<0.001
Mental illness	3.69	-5.28 to 12.66	0.42	-7.61	-17.80 to 2.57	0.14
Hospital tours						
Intercept	38.91	27.23-50.59	<0.001	59.43	47.22-71.63	<0.001
Married	0.54	- 9.81 to 10.89	0.92	5.75	-5.06 to 16.56	0.30
Chinese ethnicity	-0.65	-7.67 to 6.37	0.86	0.34	-7.00 to 7.67	0.93
Nulliparity	20.03	14.97-25.09	<0.001	-11.91	-17.19 to -6.62	<0.001
Mental illness	5.09	-5.44 to 15.61	0.34	-4.51	-15.51 to 6.49	0.42

Abbreviation: 95% CI = 95% confidence interval

* References: unmarried, non-Chinese ethnicity, multiparity, no mental illness

hospitals might be reflected by the reduced delivery rate.[19] Because of their previous pregnancy experience, multiparous women might have been more likely to modify antenatal appointments. In contrast, women with mental illness require greater antenatal care and psychosocial support.[20] The establishment of virtual clinics for online assessment without exposing pregnant women to COVID-19 risk in clinical areas offers an important alternative.[21] To establish such clinics, antenatal protocols must be revised to incorporate virtual visits when ultrasounds, physical examinations, and obstetric investigations are unnecessary. Pregnant women would also require stable internet access, as well as foetal doppler and blood pressure monitoring equipment.

Working from home

Prior to and during the survey period, no complete lockdowns were instituted in Hong Kong, although working from home was encouraged. In this study, slightly more than half of working women were working from home after the COVID-19 alert. There is a need to consider safety for women who reported greater conflict with their husband/partner while working from home. Increased domestic violence was observed during the early stages of the COVID-19 pandemic; greater relationship friction and household conflict could be contributing factors.[22] Public policy should be revised to facilitate the identification of women in need of conflict assistance when physical and psychosocial support may be limited because of physical isolation and the suspension of community services.[9,23]

Behavioural adaptations

In this study, >90% of pregnant women reported wearing a mask in clinical areas, although <10% reported wearing an N95 mask in hospitals. Our finding of 90% mask usage in clinical areas was much greater than the 31.8% observed among the general public in Taiwan in 2020.[3] While the high rate of mask use could represent compliance with hospital policies regarding mandatory mask use and heightened awareness of self-protection in pregnant women, the use of N95 masks might also indicate a fear of contacting COVID-19 in public hospitals where confirmed cases were managed. Additionally, >20% of the women either travelled abroad or returned to Hong Kong because of COVID-19 risk. The history of SARS outbreaks in Hong Kong might have led to increased caution from the initial announcement of the COVID-19 alert. Travel during pregnancy and changes in delivery plans are important decisions. In 2020, a study in China showed that women were generally more anxious than men with respect to COVID-19; greater perceived susceptibility and severity of COVID-19 were also associated with greater anxiety.[5] Obstetric decision-making and the implementation of preventive measures have been associated with antenatal anxiety secondary to the COVID-19 pandemic.[3,8] Quarantine can lead to widespread and long-lasting adverse psychological sequelae.[24] In 2020, anxiety levels were significantly higher among people who personally knew at least one person with COVID-19.[1] In our cohort, moderate to marked emotional disturbance was reported by two-thirds of women who had undergone quarantine and one-third of women who had been living with household members during home quarantine. There is a need for supportive counselling to be provided to this susceptible group of women.

Expectations of childbirth companionship and peripartum services

Women's expectations did not match changes in peripartum services and childbirth companionship; these mismatches were greatest in married women. Childbirth companionship provides multiple types of physical and psychological support.[25] Women of Chinese ethnicity exhibited the greatest disagreement with suspension of visiting hours. The principle of "doing the month" in Chinese culture promotes maternal rest with nutritious supplements; thus, visits during the postpartum period are regarded as essential convalescence for mothers and babies.[26] In Hong Kong, a greater proportion of women had a higher Edinburg Postpartum Depression Scale score upon suspension of childbirth companionship and visiting hours after announcement of the COVID-19 alert.[19] In 2020, a similar effect on the Edinburg Postpartum Depression Scale score was observed in a Turkish population.[27] Importantly, the Comprehensive Child Development Service in public obstetric units provides a programme for the identification, follow-up, and counselling of women at risk of postpartum depression; this programme constitutes critical support during stressful periods, such as the COVID-19 pandemic.

Strengths and limitations

Likely because many women of reproductive age living in Hong Kong remember the SARS outbreaks in 2002-2003, a notable strength was that the present study provided a useful assessment of adaptations and responses to a similar disease (COVID-19). Such valuable information can improve the understanding of behaviour among pregnant women in places that encounter further waves of COVID-19 transmission.

The merit of this survey was that the online questionnaire format allowed respondents to complete the questionnaire remotely and at their preferred speed. The responses were automatically captured in a database, which minimised entry

errors and potential transmission of COVID-19. However, this questionnaire format is limited to patients with electronic access and does not permit the involvement of an interviewer to explain the questions. The use of convenience sampling in a single centre might also have introduced bias and limited the generalisability of the findings to the general population.

An additional limitation was that only women who continued antenatal follow-up or delivered in our public hospital were included in the present study. The delivery rate for January to April decreased by 13% in 2020, compared with the same period in 2019, despite a similar number of delivery bookings.[17] This phenomenon was observed across all public hospitals in Hong Kong, indicating that pregnant women might have chosen to deliver in private hospitals instead. There is no standalone maternity hospital in Hong Kong; all maternity units are housed within general hospitals that admit patients with COVID-19. We suspect that this situation might have led some pregnant women to deliver in private hospitals where they perceived the risk of COVID-19 to be lower.

The final limitation was that the survey was conducted during a non-peak period of COVID-19 transmission in 2020. Childbirth companionship was resumed 2 days prior to the survey period; companions were required to complete an assessment of fever, travel, occupational exposure, contact history, and clustering phenomenon. Thus, the practices might have differed and the overall fear of disease might have been less intense, compared with a peak period of COVID-19 transmission. Furthermore, the retrospective nature of this study might have introduced recall bias, which we attempted to minimise by providing a timeline of key events concerning COVID-19 in the information leaflet. However, the initial response of the general public to COVID-19 might have been exaggerated because accurate disease information was limited during the early stages of the pandemic; the performance of a questionnaire study during a non-peak period might have helped to gather less exaggerated data concerning the behaviour of pregnant women. Further prospective longitudinal studies can address how women respond in different phases of the COVID-19 pandemic.

Conclusion

This study demonstrated the adaptations and responses of pregnant women to the COVID-19 pandemic in Hong Kong. The women in this study adjusted their obstetric appointments, began to work from home, and practised protective measures to reduce their risk of disease. While the overall pregnancy experience was mostly improved by working from home, women reported emotional disturbance because of the pandemic. Expectations of obstetric services remained high, particularly for Chinese women and nulliparous women. Obstetricians and policymakers should attempt to balance infection control and the peripartum needs of pregnant women when modifying childbirth companionship policies. Particular attention to nulliparous women is needed because they demonstrated higher levels of disagreement with the suspension of antenatal and postnatal educational programmes.

Author contributions

Concept or design: All authors.
Acquisition of data: All authors.
Analysis or interpretation of data: PW Hui.
Drafting of the manuscript: PW Hui.
Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Ethics approval

The research has been approved by Institutional Review Board of The University of Hong Kong/Hospital Authority West Cluster (Ref UW 20-387).

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