Preplanned Studies

The Distribution of Pregnant Women with Different Pregnancy Risks — 4 Cities, China, 2019

Yanhui Liu[1]; Rong Luo[1]; Aiqun Huang[1,#]

Summary

What is already known on this topic?

Based on different pregnancy risk levels, the implementation of the "Five-Color Management" for pregnant women can prevent adverse pregnancy outcomes and ensure the safety of mothers and infants.

What is added by this report?

The proportions of being multipara and of advanced maternal age in the 4 cities (Beijing, Chengdu, Shenzhen, and Wuhan) were 47.4% and 13.3%, respectively. The proportions of "Yellow and above" pregnancy risk ranged from 54.5% to 65.0% and ranged from 7.4% to 16.3% for "Orange and above" pregnancy risk. Among women with "Orange and above" pregnancy risk, most of them gave birth in public tertiary institutions (71.8%–79.4%).

What are the implications for public health practice?

The implementation of the "Five-Color Management" for pregnant women with different pregnancy risks should be strengthened, especially those with "Orange and red" pregnancy risk who should be hospitalized for delivery in tertiary medical institutions if they have conditions.

In October 2015, China's One-Child Policy was replaced by a universal Two-Child Policy; following the policy change, multiparous births exceeded primiparous births nationwide (*1*). From July 2016 to December 2017, the monthly mean percentage of being multipara and being of advanced maternal age (aged 35 years and over) increased by 9.1% and 5.8%, respectively, and this increase was also seen in at-risk pregnant women (*2*). The comprehensive high-risk score method for pregnant women was used to screen pregnancy risks, but the screening results were untargeted and disorganized (*3*). In order to prevent adverse pregnancy outcomes and ensure the safety of mothers and infants, the National Health Commission (NHC) of China in 2017 proposed implementing the "Five-Color Management" for women during

pregnancy and 42-days postpartum based on different pregnancy risk levels (*4*). Compared with the traditional comprehensive high-risk score method, the "Five-Color Management" for pregnant women is to screen, assess, classify, and manage pregnancy risks from a thematic perspective (*5*). We conducted this study based on surveillance projects from 4 cities (Beijing, Chengdu, Shenzhen, and Wuhan) in China from 2014 to 2019. This study aims to analyze the implementation of the "Five-Color Management" in 2019 in the 4 cities. The results showed that the proportions of "Yellow and above" pregnancy risk ranged from 54.5% to 65.0% and ranged from 7.4% to 16.3% for "Orange and above" pregnancy risk. Among women with "Orange and above" pregnancy risk, most of them gave birth in public tertiary institutions (71.8%–79.4%).

The data were collected from the surveillance project that was founded by the China-World Health Organization Biennial Collaborative Projects entitled "Surveillance of high-risk maternal health services and management" (2018–2019). The surveillance project was implemented by the National Center for Women and Children's Health of China CDC, and its details were described in our previous publications (*6–7*). Briefly, three cities including Chengdu, Wuhan, and Shenzhen were selected for the surveillance from the western, central, and eastern regions of China, respectively. These cities were selected based on their geographical location, and the existing city-wide unified reporting system for maternal and child health (MCH) covering the whole city. Furthermore, these criteria were used to select two districts (Haidian District and Chaoyang District) in Beijing to represent the northern region of China. The surveillance covered all medical institutions providing childbirth services in the 4 cities, including general hospitals, maternal and children's healthcare hospitals, specialized hospitals, community health centers/township hospitals, and private hospitals. In 2019, a total of 325 medical institutions were covered in the surveillance.

According to national regulations, the "Five-Color

Management" requires that pregnant women be classified into five colors levels — green, yellow, orange, red, and purple — according to their basic conditions and pregnancy complications (4–5). "Green" indicates normal pregnancy; "Yellow" indicates general risk and that pregnancy complications are mild and stable; "Orange" indicates medium risk and that pregnancy complications pose a threat to mother and infant safety; "Red" indicates high risk and that pregnant women suffer from serious pregnancy complications, continued pregnancy may endanger the life of mother and infant; and "Purple" indicates that the pregnant women have infectious diseases such as viral hepatitis, syphilis, HIV/AIDS, tuberculosis, serious infectious pneumonia, or a specific viral infection (H1N7, Zika, etc.). Except for the combination of "Purple" and other color levels, pregnant women will be managed according to their "color level" with the highest pregnancy risks. "Yellow and above" was classified as high-risk pregnancy, and "Orange or above" was classified as key groups of high-risk pregnancy. In the 4 cities, the MCH information system covered the whole city, and individual antenatal care and delivery information for all pregnant women were recorded in the system. Due to the adjustment of the MCH information system, the analysis of the "Five-Color Management" only covered pregnant

women from July 1 to December 31, 2019 in Wuhan, while in the other 3 cities included all pregnant women during 2019.

Among 625,305 pregnant women in the 4 cities, the proportions of being multipara and of advanced maternal age were 47.4% and 13.3%, respectively. The proportion of being of advanced maternal age in multipara (21.8%) was higher than that in primipara (5.7%). (Table 1)

In the 4 cities, the proportion of "Yellow" pregnancy risk was between 48.1% and 62.1%, and the proportion of "Orange" and "Red" pregnancy risk was the highest in Beijing (14.5%) and the lowest in Wuhan (6.3%). The proportion of "Yellow and above" pregnancy risk (high-risk pregnancy) ranged from 54.5% to 71.4%, and "Orange and above" pregnancy risk (the key groups of high-risk pregnancy) ranged from 7.4% to 16.3%. (Table 2)

In the 4 cities, the proportion of pregnant women giving birth in public tertiary institutions was between 65.9% to 76.9%, and the proportion giving birth in public secondary institutions or other institutions were between 11.2% to 18.6%. More than 82.0% of pregnant women with "Yellow" risk gave birth in public secondary or above institutions, and 71.8% to 79.4% of pregnant women with "Orange and above" risk gave birth in public tertiary institutions. However,

TABLE 1. The number and proportions of multipara and advanced maternal age in 4 cities in China, 2019.

Cities	Pregnant women (N)	Primipara (N/%)	Multipara (N/%)	Advanced maternal age		
				Total (N/%)	Primipara (N/%)	Multipara (N/%)
Beijing	84,403	54,774 (64.9)	29,629 (35.1)	17,317 (20.5)	6,306 (11.5)	11,011 (37.2)
Chengdu	214,554	115,744 (53.9)	98,810 (46.1)	19,998 (9.3)	4,285 (3.7)	15,713 (15.9)
Shenzhen	208,167	90,713 (43.6)	117,454 (56.4)	31,744 (15.2)	5,060 (5.6)	26,684 (22.7)
Wuhan	118,181	67,408 (57.0)	50,773 (43.0)	14,284 (12.1)	2,970 (4.4)	11,314 (22.3)
Total	625,305	328,639 (52.6)	296,666 (47.4)	83,343 (13.3)	18,621 (5.7)	64,722 (21.8)

TABLE 2. The distribution of different pregnancy risks according to color levels in 4 cities in China, 2019.

Cities	Different pregnancy risks[*] (N/%)					Yellow and above (N/%)	Orange and above (N/%)
	Green	Yellow	Orange	Red	Purple		
Beijing	28,935 (34.3)	42,801 (50.7)	11,165 (13.2)	1,078 (1.3)	1,761 (2.1)	55,468 (65.7)	13,729 (16.3)
Chengdu	74,972 (34.9)	123,301 (57.6)	15,171 (7.0)	384 (0.2)	2,372 (1.1)	139,582 (65.1)	17,671 (8.2)
Shenzhen	59,574 (28.6)	129,170 (62.1)	17,923 (8.6)	1,142 (0.5)	1,597 (0.8)	148,593 (71.4)	20,449 (9.8)
Wuhan[†]	28,068 (45.5)	29,679 (48.1)	3,548 (5.8)	300 (0.5)	811 (1.3)	33,616 (54.5)	4,537 (7.4)

* "Green" indicates normal pregnancy. "Yellow" indicates general risk and that pregnancy complications are mild and stable. "Orange" indicates medium risk and that pregnancy complications pose a threat to mother and infant's safety. "Red" indicates high risk and that pregnant women suffer from serious pregnancy complications, continued pregnancy may endanger the life of mother and infant. "Purple" indicates that the pregnant women had an infectious disease such as viral hepatitis, syphilis, HIV infection and AIDS, tuberculosis, serious infectious pneumonia, or a specific viral infection (H1N7, Zika, etc.).
† The analysis of the "Five-Color Management" in Wuhan only included pregnant women from July 1 to December 31, 2019.

more than 20% of pregnant women that had "Orange and above" risk gave birth in public secondary and below institutions. (Table 3)

DISCUSSION

The surveillance project carried out in 4 relatively developed cities of China in 2019 showed that the proportions of pregnant women with "Yellow and above" risk and "Orange and above" risk were higher and that most of them received the "Five-Color Management" based on different pregnancy risks. However, some pregnant women with higher risk still gave birth in lower-level institutions. Therefore, the implementation of the "Five-Color Management" for pregnant women with different risks should be further strengthened, especially for those with "Orange" and "Red" risk who should be hospitalized for delivery in tertiary medical institutions if they have conditions.

The literature showed that multipara and advanced maternal age were associated with increased pregnancy complications, in turn leading to maternal and fetal morbidity and mortality (8–9). In this study, the proportions of being multipara and of advanced maternal age in the 4 cities were 47.4% and 13.3%, respectively, which were basically consistent with the national levels in 2019 (49.9% and 15.8%, respectively) (10). Therefore, more attention should be paid to the "Five-Color Management" for pregnant

women to improve the health of pregnant women that were multipara or of advanced maternal age and reduce maternal and perinatal mortality.

The NHC requires secondary and above medical institutions to assess and classify pregnancy risks for all pregnant women, and tertiary medical institutions to assess pregnancy suitability for "Red" pregnancy risk. "Yellow" pregnancy risk women are recommended to hospitalization for delivery in secondary or above institutions; "Orange and above" pregnancy risk should be hospitalized for delivery in tertiary institutions if they have conditions; "Purple" pregnancy risk should be managed according to the regulations on the prevention and treatment of infectious diseases (4–5). The pilot results showed that the "Five-Color Management" for pregnant women was effective in women accessing emergency obstetric care, especially for receipt of appropriate care once a medical institution is reached (11–12).

Our findings suggested the proportions of pregnant women with "Yellow and above" and "Orange and above" risk in our sample were higher than that in Guangdong Province in 2018 (42.2% and 6.9%, respectively) (12). Most pregnant women with different risk levels were hospitalized for delivery in appropriate level institutions, but there were still some pregnant women with higher risk levels that gave birth in lower-level institutions. In order to stabilize and reduce the pregnancy risk, antenatal care, follow-up management, and timely treatment of pregnancy

TABLE 3. The distribution of delivery with different pregnancy risks in 4 cities in China, 2019.

Cities	Institutions[*]	Different pregnancy risks (N/%)			Total (N/%)
		Green	Yellow	Orange and above	
Beijing	Public tertiary	21,232 (73.4)	24,520 (58.7)	9,862 (71.8)	55,614 (65.9)
	Public secondary	3,554 (12.3)	10,048 (24.1)	2,114 (15.4)	15,716 (18.6)
	Others	4,149 (14.3)	7,171 (17.2)	1,753 (12.8)	13,073 (15.5)
Chengdu	Public tertiary	55,969 (74.7)	85,152 (69.8)	13,937 (78.9)	155,058 (72.3)
	Public secondary	9,314 (12.4)	16,939 (13.9)	1,639 (9.3)	27,892 (13.0)
	Others	9,689 (12.9)	19,820 (16.3)	2,095 (11.9)	31,604 (14.7)
Shenzhen	Public tertiary	43,226 (72.1)	92,332 (72.1)	15,936 (79.4)	151,494 (72.8)
	Public secondary	8,512 (14.2)	16,702 (13.0)	2,048 (10.2)	27,262 (13.1)
	Others	8,206 (13.7)	19,110 (14.9)	2,095 (10.4)	29,411 (14.1)
Wuhan[†]	Public tertiary	21,297 (75.9)	22,707 (78.1)	3,415 (75.3)	47,419 (76.9)
	Public secondary	3,783 (13.5)	3,128 (10.8)	435 (9.6)	7,346 (11.9)
	Others	2,988 (10.6)	3,244 (11.2)	687 (15.1)	6,919 (11.2)

[*] Medical institutions providing childbirth services were divided into public tertiary, public secondary, and other institutions. Other institutions were all health facilities providing childbirth services except public tertiary and public secondary including public primary hospitals, private midwifery hospitals, etc.
[†] The analysis of the "Five-Color Management" in Wuhan only included pregnant women from July 1 to December 31, 2019.

complications should be strengthened. Therefore, medical institutions providing childbirth services should strengthen the implementation of the "Five-Color Management" for pregnant women, especially for pregnant women with "Orange" and "Red" risk levels who should be transferred to tertiary institutions for antenatal care and delivery.

This study were subject to certain limitations. First, the surveillance data were collected in 4 cities with an existing city-wide unified reporting system for MCH, so the results might not fully be representative of the regional and national levels. Second, there is no comparison between the results of the "Five-Color" classification and pregnancy outcomes. In the future, more studies should be taken to fix this issue that may have further value for antenatal care and hospital delivery.

Corresponding author: Aiqun Huang, aqhuang@chinawch.org.cn.

1 National Center for Women and Children's Health, Chinese Center for Disease Control and Prevention. Beijing, China.

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