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Characteristics and contraceptive practices among Chinese women seeking abortion: a multicentre, descriptive study from 2019 to 2021

Pengcheng Tu,[1] Denghui Hu ,[1,2] Shangchun Wu,[1] Jianan Li,[1] Xiaomei Jiang,[1] Kaiyan Pei,[1,2] Wei-Hong Zhang [3]

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For numbered affiliations see end of article.

Correspondence to
Professor Kaiyan Pei, Social Medicine Center, National Research Institute for Family Planning, Beijing, China; psmile1971@163.com and Wei-Hong Zhang, International Center for Reproductive Health, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium; weihong.zhang@ugent.be

PT and DH contributed equally.

PT and DH are joint first authors.

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ABSTRACT

Introduction Despite the widespread provision of free contraceptives and post-abortion care (PAC) services, China grapples with a high rate of unintended pregnancies and subsequent abortions. We aimed to study the evolving characteristics of women seeking abortion and their contraceptive practices before and after abortions, to shed light on the optimisation of Chinese PAC services.

Methods This study utilised data from an abortion cohort between 2019 and 2021. We studied their demographic features, contraception and abortion histories, reasons and choices using chi-square or linear-by-linear tests. We also explored the potential impact of receiving services at PAC facilities on post-abortion contraception use and repeat abortions using logistic regression models.

Results Among the 9005 participants, 43.4% experienced repeat abortion, without a discernible trend over the 3 years. Noteworthy increases were observed in the percentages of college students (from 1.7% to 6.6%, p<0.01) and middle-aged women (from 23.2% to 26.8%, p<0.01) seeking abortions. Surgical abortion was chosen by nearly 90% of participants with a continuously increasing trend (p_{trend}<0.01). Nearly half of the participants experienced unintended pregnancies due to non-use of contraception. Of the remainder, the majority preferred less or the least effective methods both before and after abortion. Women residing in moderate-gross domestic product (GDP) regions faced a higher risk of repeat abortions (OR 1.33, 95% CI 1.16 to 1.54). Despite this, high-quality PAC services may encourage the use of reliable contraceptive methods, with 86.8% of women changing from least effective or no methods to (most) effective methods post-abortion, and prevent repeat abortions (OR 0.65, 95% CI 0.56 to 0.75).

Conclusions Increased proportions of college students and middle-aged multiparous women seeking abortions were observed, together with inappropriate preferences for less effective contraception and increasing choice of surgical abortions. Future research should extend the focus to cover the entire abortion period, advocate the rational selection of contraceptive methods, and emphasise the specified PAC services tailored to different socioeconomic groups.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ China has modified its population policy and implemented a series of government-funded services aimed at facilitating accessible contraception to reduce unintended pregnancies and induced abortion rates, particularly repeat abortions. Despite these efforts, annual induced abortion procedures still exceed 9 million in China, with 50% of women experiencing abortion more than once, with evolving characteristics.

WHAT THIS STUDY ADDS

⇒ We observed rising proportions among young college students and middle-aged parous women seeking abortions, with increasing choice of surgical over medical abortions. While most women tend to choose less effective or the least effective contraceptive methods both before and after abortion, the provision of high-quality PAC services can encourage the use of more effective contraceptive methods post-abortion and prevent repeat abortions.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These findings indicate that China's efforts to diminish economic barriers to accessible contraception have been effective. Future studies should prioritise health education on contraception to promote correct choice and adherence, with a particular focus on often overlooked demographics such as students and women with childbirth experiences, while considering their socioeconomic status. In the light of these results, we advocate for the relevant authorities to consider incorporating comprehensive sexual health education, beyond simply the provision of free contraceptive agents, into fundamental public health services in China.

INTRODUCTION

Induced abortion (IA) procedures involve two main methods - medical or surgical - for terminating an unintended pregnancy.[1] Globally, estimates from 2015 to 2019 indicated there were 64 unintended pregnancies per 1000 women aged 15–49 years, and 61% of these ended in abortion, resulting in a global abortion rate of 39 abortions per 1000 women.[2] According to the 2021 Health Statistics Yearbook of China, there were approximately 9.50 million IAs, with an abortion rate of 124 per 1000 women aged 15–49 years.[3] These data highlight a potential public health issue that warrants further attention.

Historically, China's stringent population policy, notably the one-child policy, was a significant factor contributing to the high abortion rate.[4 5] According to the one-child policy, most families were only allowed to bear one offspring, leading to IAs for additional pregnancies. Recent adjustments have been made in response to an ageing population, including the implementation of the universal two-child policy in 2016 and the three-child policy implemented in 2021. However, these changes have not resulted in the anticipated decline in reported abortions.[6 7] Therefore, the current leading factor behind China's high abortion rate is likely the high unintended pregnancy rate, often stemming from limited access to contraception or improper contraceptive use.[8 9]

The factors influencing contraceptive access may vary depending on the geographical location, cultural context and socioeconomic status of the individual.[10] Recognising this diversity, Chinese authorities have integrated contraception into the fundamental public health service. This involves providing basic contraceptive agents and surgical procedures (hospitals and healthcare centres only) free of charge in hospitals, communities and schools. Additionally, the China Maternal and Child Health Association is implementing a project to provide government-funded post-abortion care (PAC) services, involving over 900 hospitals in 2022, to promote couples' contraceptive behaviours through counselling, education and one-to-one guidance.[11] However, the effectiveness of these initiatives in improving contraceptive practices and preventing unintended pregnancies and subsequent abortions has yet to be thoroughly validated.

Currently, in addition, the practice of abortion in China is regulated differently than in countries such as the UK, France, and the Netherlands where abortion at home is legal. In China, medical abortions within 7 weeks need to be carried out in outpatient clinics, while medical abortions after 7 weeks and all surgical abortions require hospitalisation. Although both methods are considered safe and effective and are equally available throughout the first and second trimesters,[1] these differences may still lead to varying preferences in choosing abortion methods. Previous studies have found that both practitioners and clients were more likely to provide/choose a medical method where medical abortion at home is legally permitted.[12–14] During the COVID-19 pandemic, the 'contactless' provision of the mifepristone-misoprostol medication abortion care strategy was extensively validated as safe and effective and was popular.[15] However, the preferences for provision/choice of abortion methods in China are still unknown.

Meanwhile, the preferences for methods of contraception and abortion are intricately linked to individual factors such as knowledge, attitudes, occupation, childbirth experience, frequency of sexual activity, and more.[16] To the best of our knowledge, no study has explored contraceptive behaviours, repeat abortions, and their associations with individual characteristics among Chinese women presenting for abortion post the implementation of these policies. Based on the above, our study aimed to elucidate the evolving characteristics and contraceptive practice of Chinese women while assessing the factors influencing contraceptive choices and repeat abortions following these adjustments in policy and services.

METHOD

Setting

The survey served as the baseline for a prospective, multicentre, abortion cohort study in eight provinces/municipalities in China. The primary objective of this cohort was to assess the impact of prior experiences of IAs on female fertility complications and future pregnancy outcomes. Data were collected from May 2019 to December 2021, and the study was registered on ClinicalTrials.gov (Identifier: NCT04183829). This study was approved by the Ethics Review Committee of the National Research Institute for Family Planning (No. 2018-I2M-1–004). All participants provided written informed consent before their inclusion. This study adhered to the Strengthening the Reporting of

Observational Studies in Epidemiology (STROBE) reporting statement.[17]

Patient and public involvement

Given the study's initiation in 2019 and its execution during the COVID-19 pandemic, there was no direct involvement of patients and the public in the design, conducting and reporting of the study.

Procedures

At each research centre, women seeking IA procedures and meeting our inclusion criteria were invited to join our cohort (online supplemental figure S1). Following a thorough explanation, written informed consents were obtained to confirm their willingness to participate. On each enrolment, trained nurses administered a self-designed questionnaire to pregnant women. This questionnaire comprehensively collected detailed demographic information, previous IA history, reasons for the current unintended pregnancy, and previous contraceptive practices.

After the abortion procedure was completed, the participants underwent another questionnaire session, conducted through face-to-face interviews with the same nurse. [NB. Medication abortion at home is currently not supported in China, necessitating hospital follow-up for those choosing medication abortions.] During this session, participants reported their post-abortion contraceptive choices. Researchers refrained from intervening in any aspect of the participant's IA decision-making, the procedure itself or their choice of PAC services.

Measures

To assess the socioeconomic status of participants' places of residence, we classified cities based on the 2021 Gross Domestic Product (GDP) Rankings of Major Cities in China.[18] The top 30 cities were categorised as high-GDP, cities ranked 31–90 as medium-GDP, and those beyond 90 as low-GDP areas. We identified whether the research centre provided PAC services and whether it was an exemplary unit, following the list of executing units for the China PAC project[19] released by the China Women's Development Foundation (online supplemental table S1). The Foundation has been entrusted by the authorities with conducting regular evaluations of PAC service units. Adhering to the Chinese Post-Abortion Family Planning Service Guidelines, these evaluations considered the perspectives of institutional capacity, service delivery and service efficacy. Institutions meeting the requirements for both institutional and service delivery aspects, achieving a service coverage rate of at least 90%, a follow-up rate exceeding 80%, and utilising adaptation-effective contraceptives with a minimum rate of 60% were recognised as exemplary units.

We categorised participants based on their IA experiences. Those without a history of IA were labelled as having their first abortion, while those with a history of IA were categorised as having undergone repeat abortions. Reasons for the current unintended pregnancy were distinguished between non-use of contraception and contraceptive failure. For women experiencing contraceptive failure, we further identified the most commonly used methods based on effectiveness, classifying them into four types: most effective methods, effective methods, less effective methods, and the least effective methods. This classification included intrauterine devices (IUDs), contraceptive implants, combination contraceptive injections (CCIs, monthly injectable), combination oral contraceptive (COC) pills, condoms, external contraceptive (EC, including patch, gel, etc.), withdrawal (coitus interruptus, CI), fertility awareness-based (FAB) methods and emergency contraceptive pills (ECPs). Post-abortion contraceptive choices were determined based on participants' reported use or intention to use contraception during the follow-up after the procedure.

Statistical analysis

The database was established using Microsoft Excel 2019 (Microsoft Corporation, Redmond, WA, USA); statistical analysis was carried out with RStudio Version 1.1.383 (RStudio, PBC; 1999 Free Software Foundation, Boston, MA, USA). Continuous and categorical variables were presented as means (SDs) and frequencies (percentages). Linear-by-linear association (Mantel–Haenszel $\chi 2$) tests were applied to compare the demographic trends of participants from 2019 to 2021, while chi-square tests were applied to compare the differences between groups. Post hoc analyses were conducted to analyse the differences between statistically significant groups. Multivariable binary logistic regression models were employed to estimate the odds ratio (OR) and 95% confidence interval (95% CI) for the associations of the relative factors with abortion more than once and contraceptive practice. Two-sided $p<0.05$ was used to test statistical significance.

RESULTS

Study sample and demographics

We recruited a total of 9005 pregnant women seeking abortions between 2019 and 2021 as outlined in table 1. On average, participants were 31.3±5.1 years old, ranging from 18 to 49 years, with a notable proportion (39.0%, n=3512) having attained an undergraduate education or higher. Approximately 70.9% (n=6382) were married. Throughout the 2019–2021 period, there was an upward trend among students ($p<0.01$). A significant proportion (43.8%, n=3943) reported a monthly household income of less than 5000 Chinese Yuan (approximately US$700). The majority of participants (91.1%, n=8205) had either no children or only one child in online supplemental table S2. Few participants were regular smokers and/

Table 1 Demographic characteristics of study participants between 2019 and 2021.

Characteristic	2019 (N=1883) (n (%))	2020 (N=4006) (n (%))	2021 (N=3116) (n (%))	Total (N=9005) (n (%))	P value
Region					<0.01
High-GDP area	768 (40.8)	957 (23.9)	1053 (33.8)	2778 (30.8)	
Median-GDP area	521 (27.7)	1887 (47.1)	459 (14.7)	2867 (31.8)	
Low-GDP area	594 (31.5)	1162 (29.0)	1604 (51.5)	3360 (37.3)	
Age, years					<0.01
Mean (SD)	31.4 (4.38)	31.5 (5.01)	30.9 (5.57)	31.3 (5.10)	
≤24	73 (3.9)	332 (8.3)	444 (14.2)	849 (9.4)	
25–29	614 (32.6)	1109 (27.7)	825 (26.5)	2548 (28.3)	
30–34	760 (40.4)	1502 (37.5)	1012 (32.5)	3274 (36.4)	
≥35	436 (23.2)	1063 (26.5)	835 (26.8)	2334 (25.9)	
Marital status					<0.01
Unmarried	594 (31.5)	1034 (25.8)	868 (27.9)	2496 (27.7)	
Married	1258 (66.8)	2915 (72.8)	2209 (70.9)	6382 (70.9)	
Divorced or widowed	31 (1.6)	57 (1.4)	39 (1.3)	127 (1.4)	
Educational level					<0.01
Middle school or below	235 (12.5)	421 (10.5)	331 (10.6)	987 (11.0)	
High school	424 (22.5)	728 (18.2)	537 (17.2)	1689 (18.8)	
Vocational college	627 (33.3)	1261 (31.5)	929 (29.8)	2817 (31.3)	
Undergraduate or above	597 (31.7)	1596 (39.8)	1319 (42.3)	3512 (39.0)	
Occupation					<0.01
Farmers/homemakers	182 (9.7)	482 (12.0)	348 (11.2)	1012 (11.2)	
Labourers	163 (8.7)	201 (5.0)	197 (6.3)	561 (6.2)	
Clerks	919 (48.8)	2016 (50.3)	1466 (47.0)	4401 (48.9)	
Businesswomen	349 (18.5)	679 (16.9)	567 (18.2)	1595 (17.7)	
Students	32 (1.7)	119 (3.0)	205 (6.6)	356 (4.0)	
Freelancers	238 (12.6)	509 (12.7)	333 (10.7)	1080 (12.0)	
Household income group, CNY					<0.01
<5000	845 (44.9)	1959 (48.9)	1139 (36.6)	3943 (43.8)	
5000–9999	724 (38.4)	1362 (34.0)	1060 (34.0)	3146 (34.9)	
10 000–15 000	187 (9.9)	440 (11.0)	607 (19.5)	1234 (13.7)	
>15 000	127 (6.7)	245 (6.1)	310 (9.9)	682 (7.6)	
Frequency of smoking, times					0.048
No smoking	1814 (96.3)	3895 (97.2)	3046 (97.8)	8755 (97.2)	
1–4 per month	40 (2.1)	59 (1.5)	42 (1.3)	141 (1.6)	
>4 per month	29 (1.5)	52 (1.3)	28 (0.9)	109 (1.2)	
Frequency of drinking, times					<0.01
No drinking	1746 (92.7)	3806 (95.0)	2979 (95.6)	8531 (94.7)	
1–3 per month	94 (5.0)	134 (3.4)	102 (3.3)	330 (3.7)	
>3 per month	43 (2.3)	66 (1.6)	35 (1.1)	144 (1.6)	
Frequency of sexual activities, times					<0.01
<1 per week	786 (41.7)	2312 (57.7)	1316 (42.2)	4414 (49.0)	
2–4 per week	1096 (58.2)	1678 (41.9)	1788 (57.4)	4562 (50.7)	
≥5 per week	1 (0.1)	16 (0.4)	12 (0.4)	29 (0.3)	

P values were determined by chi-square tests.
CNY, Chinese Yuan; GDP, gross domestic product; SD, standard deviation.

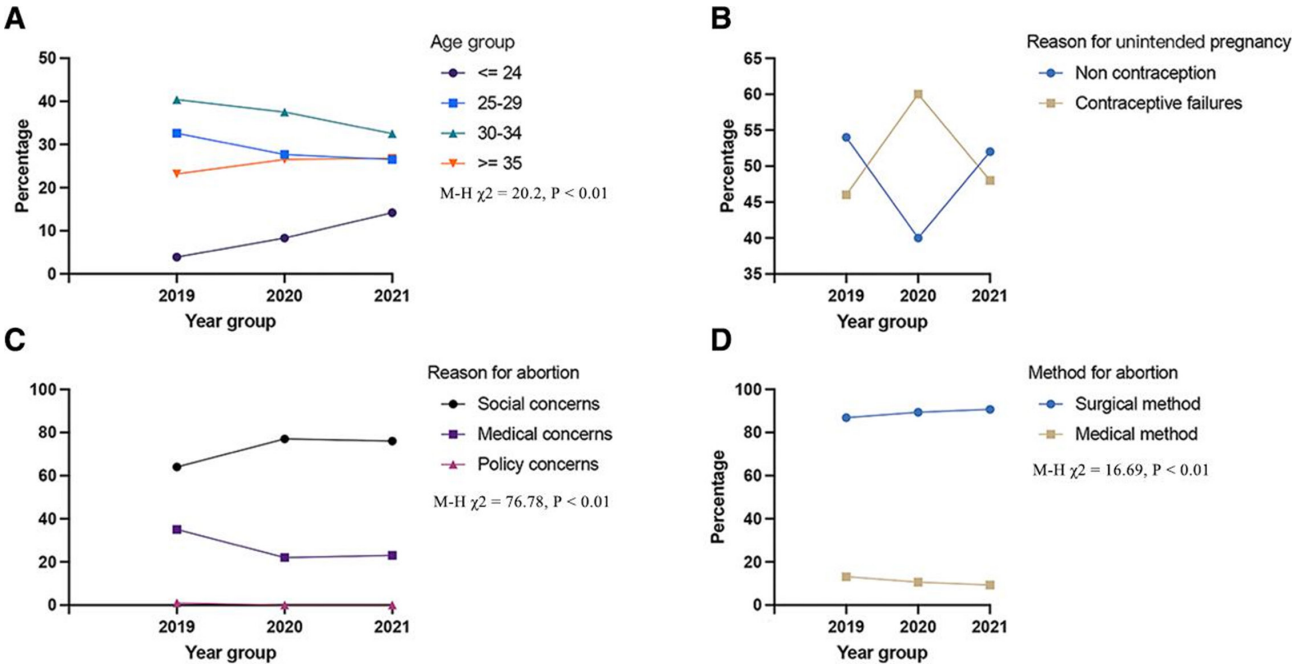


Figure 1 Proportion of women seeking abortions by (a) age group, (b) reason for unintended pregnancy, (c) reason for abortion and (d) method for abortion between 2019 and 2021. Note: P values were determined by linear-by-linear tests.

or drinkers, constituting less than 5% (n=150 and n=474, respectively).

Characteristics of abortions

As illustrated in figure 1 and online supplemental table S2, there was a noteworthy increase in the proportions of participants seeking abortions under the age of 25 years and over 35 years, rising from 3.9% (n=73) and 23.2% (n=436) in 2019 to 14.2% (n=444) and 26.8% (n=835) in 2021. The reasons for unintended pregnancies did not show a discernible trend, with non-use of contraception and contraceptive failure consistently sharing equal prominence. The primary motivations of participants seeking IAs changed during the study period. Those motivated by social concerns notably increased (from 63.7% (n=1199) to 76.3% (n=2376)), while those driven by medical considerations decreased (35.4% (n=667) to 23.4% (n=729)). The choices of surgical abortion demonstrated an upward trend year by year (M-H $\chi 2=16.69$, $p_{trend}<0.01$), with proportions of 86.9% (n=1637), 89.4% (n=3580) and 90.7% (n=2826) in 2019, 2020 and 2021, respectively.

Repeat abortion

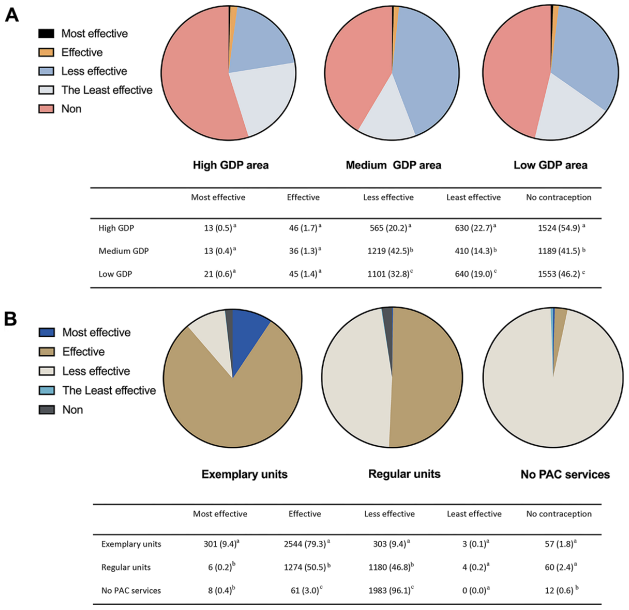
The rate of repeat abortion remained consistently stable at 42.5% in 2019, 44.0% in 2020 and 43.2% in 2021, contributing to an overall rate of 43.4% (online supplemental table S3). Participants residing in medium-GDP areas (47.2%, n=1354) exhibited a higher proportion of repeat abortions, while individuals with higher education levels had a lower proportion. Married (46.9%) and divorced/widowed (74.0%) women exhibited a significantly higher repeat abortion rate compared with unmarried women (32.9%, p<0.05), with an even higher proportion among those who had experienced childbirth (p<0.05).

As shown in online supplemental table S4, the logistic regression for repeat abortions revealed that participants residing in medium-GDP areas faced a higher risk compared with those in high-GDP areas (OR 1.33, 95% CI 1.16 to 1.54). Participants residing in low-GDP regions showed no significant difference in repeat abortion compared with those in high-GDP regions. Advanced age and having children were both associated with higher proportions of repeat abortion, with single participants exhibiting a lower risk compared with their married counterparts (OR 0.87, 95% CI 0.76 to 0.99). The results further indicated that the higher the educational level, the lower the likelihood of repeat abortions (OR 0.79, 0.60, 0.35, 95% CI 0.67 to 0.94, 0.51 to 0.70, 0.30 to 0.41, respectively). However, there was no significant association between repeat abortions and monthly household income.

Remarkably, the availability of PAC services seemed to be associated with lower proportions of repeat abortions (OR 0.65, 95% CI 0.56 to 0.75). However, a significant association was only observed in hospitals categorised as exemplary units. In addition, participants who experienced unintended pregnancies due to contraceptive failure were at a higher risk (OR 1.20, 95% CI 1.09 to 1.31).

Contraceptive practices

Before abortion, 47.4% (n=4266) of participants did not use any contraception (figure 2). Among the



	Most effective	Effective	Less effective	Least effective	No contraception
High GDP	13 (0.5)[a]	46 (1.7)[a]	565 (20.2)[a]	630 (22.7)[a]	1524 (54.9)[a]
Medium GDP	13 (0.4)[a]	36 (1.3)[a]	1219 (42.5)[b]	410 (14.3)[b]	1189 (41.5)[b]
Low GDP	21 (0.6)[a]	45 (1.4)[a]	1101 (32.8)[c]	640 (19.0)[c]	1553 (46.2)[c]

	Most effective	Effective	Less effective	Least effective	No contraception
Exemplary units	301 (9.4)[a]	2544 (79.3)[a]	303 (9.4)[a]	3 (0.1)[a]	57 (1.8)[a]
Regular units	6 (0.2)[b]	1274 (50.5)[b]	1180 (46.8)[b]	4 (0.2)[a]	60 (2.4)[a]
No PAC services	8 (0.4)[b]	61 (3.0)[c]	1983 (96.1)[c]	0 (0.0)[a]	12 (0.6)[b]

Figure 2 Use of contraception of differing effectiveness (a) before abortion by gross domestic product (GDP) levels of residents and (b) post-abortion by post-abortion care (PAC) service groups. Note: Bonferroni's Z was calculated for post hoc analysis. The same superscript letter on the same column of data indicates no significance (p>0.05).

remaining women, 3.7% (n=174) had used effective methods (i.e., 47 women had used IUDs, 8 CCIs and 119 COC pills) (table 2 and online supplemental table S5). The consistent use of these effective contraceptive methods before abortion did not show significant differences among women in different residential areas (figure 2). Regarding the less effective methods, condom use was significantly higher among participants in low- and medium-GDP areas than in high-GDP areas. Conversely, the least effective contraceptive methods (including CI, FAB and ECP) were significantly more prevalent in the high-GDP area than in the other two categories.

After the abortion, participants showed significant differences in contraceptive choices based on the PAC service groups. Among women undergoing abortions at PAC exemplary units, 88.7% (n=2845) chose the most effective or effective contraceptive methods such as IUDs, contraceptive implants, COC, etc. In contrast, in regular PAC units or units not providing PAC services, the proportions were only 50.7% (n=1280) and 3.4% (n=69), respectively (figure 2). In regular PAC units, the adoption rate of effective contraceptive measures reached 50.5%, although 46.8% of women still opted for less effective methods. In hospitals without PAC services, 96.1% of women seeking abortion chose less effective methods, primarily relying on condoms. In addition, as shown in online supplemental table S6, PAC services can facilitate participants' change from the least effective or no methods before abortion to the most effective or efficient methods after abortion compared with no PAC units (86.8%, 51.1%

Table 2 Specific contraceptive methods for women before and after abortion by region and post-abortion care services.

Parameter	IUDs (n (%))	Contraceptive implants (n (%))	CCI (n (%))	COC pills (n (%))	Condom (n (%))	EC (n (%))	FAB (n (%))	CI (n (%))
Prior to abortion								
Total	47 (0.5)	0 (0.0)	8 (0.1)	119 (1.3)	2868 (31.8)	17 (0.2)	811 (9.0)	446 (5.0)
High-GDP area	13 (0.5)	0 (0.0)	2 (0.1)	44 (1.6)	554 (19.9)	11 (0.4)	331 (11.9)	189 (6.8)
Medium-GDP area	13 (0.4)	0 (0.0)	1 (<0.1)	35 (1.2)	1217 (42.4)	2 (0.1)	193 (6.7)	111 (3.9)
Low-GDP area	21 (0.6)	0 (0.0)	5 (0.1)	40 (1.2)	1097 (32.7)	4 (0.1)	287 (8.6)	146 (4.3)
Post-abortion								
Total	314 (4.0)	1 (<0.1)	0 (0.0)	3879 (49.8)	3463 (44.4)	3 (< 0.1)	4 (0.1)	3 (<0.1)
Exemplary PAC	300 (9.4)	1 (<0.1)	0 (0.0)	2544 (79.3)	301 (9.4)	2 (0.1)	2 (0.1)	1 (<0.1)
Regular PAC	6 (0.2)	0 (0.0)	0 (0.0)	1274 (50.5)	1179 (46.7)	1 (< 0.1)	2 (0.1)	2 (0.1)
No PAC	8 (0.4)	0 (0.0)	0 (0.0)	61 (3.0)	1983 (96.1)	0 (0.0)	0 (0.0)	0 (0.0)

CCI, combination contraceptive injection; CI, coitus interruptus; COC, combination oral contraceptive; EC, external contraceptive (EC, including patch, gel, etc.); FAB, fertility awareness-based; GDP, gross domestic product; IUD, intrauterine device; PAC, post-abortion care.

and 2.78% in exemplary, regular and no PAC units, respectively).

Regardless of the effectiveness of contraception, several factors are associated with women's consistent use of contraception (online supplemental table S7). These factors include having higher education levels and drinking 1–3 times per month. Conversely, participants with middle-income earning levels, residing in high-GDP areas and having more frequent sexual activity were negatively associated with consistent use of contraception.

DISCUSSION

This study sheds light on shifts in the demographic profile of Chinese women seeking abortions in response to changes in population policy and the introduction of PAC services. While these alterations have contributed to a subtle decline in the rate of repeat abortion compared with our previous study (43.4% vs 51.54%),[6] a noteworthy increase in the risk of unintended pregnancies and abortions among young college students and middle-aged women with children has been identified. An increasing preference for surgical over medical abortion in Chinese women seeking abortions was also observed. Furthermore, despite the widespread provision of free contraceptives in China, a considerable number of women still experience unintended pregnancies due to the non-use of contraceptives. Among women engaging in contraceptive behaviour, a significant proportion still opt for less effective or the least effective contraceptive methods. Even after undergoing abortion, the adoption rate of highly effective contraceptives remains low. This underscores the need for heightened awareness and adoption of appropriate contraceptive practices among women of reproductive age. It emphasises the ongoing necessity for the sustained implementation of high-quality PAC services to address these challenges effectively.

We observed a significant increase in the proportion of students and women under 25 years of age seeking abortions. A nationwide survey spanning 25 years in China has also identified a similar trend, indicating a rebound in adolescent marriage and childbearing since 2015.[20] One potential explanation for this trend could be the influence of the marriage market, where an increasing number of men in China may be choosing younger partners due to a rising male-to-female ratio. Another contributing factor might be that unmarried adolescents are engaging in more sexual activity without using reliable contraception.[21 22] The neglect of sexual and reproductive health among adolescents in China is evident, given the lack of comprehensive sex education in schools and the failure of healthcare providers to offer the necessary support and non-judgmental services to this age group.

The results also show an increase in the proportion of women aged over 35 years and women having one child seeking abortion. Previous studies have highlighted a consistent delay in the average age of first marriage in China and a gradual rise in the rate of lifetime childlessness among women, attaining a 10% increase in 2020.[23 24] Moreover, reported declines in fertility rates among Chinese women, together with a 37% prevalence of second-child fertility intentions according to a systematic review,[25] may contribute to the increased abortion rate for middle-aged women and those who have had children. Therefore, we need to pay more attention to the integrated sexual and reproductive healthcare of these vulnerable groups in the future and implement a more comprehensive and accessible service system to promote the healthy development of young students and middle-aged multiparous women.

We observed a notable trend of increasing rates of surgical abortions, exceeding 90% of abortions using this method during 2019–2021. In China, all IA procedures are performed by trained doctors in qualified hospitals adhering to the abortion procedure guidelines. Without contraindications, both medical and surgical methods are available for early abortion. However, the two methods were not equally recommended in clinics, which is often based on the experiences of doctors or peers. In this context, surgical procedures, particularly analgesia-induced abortions, are frequently recommended for their expediency and efficiency.

Previous studies have found that the privacy of medication abortion, especially when administered at home, significantly encourages its choice.[1] Similarly, during the COVID-19 pandemic, the fact that medication abortion at home does not require a trip to the hospital and avoids many attendant risks also leads to its preference in some regions.[26] However, home abortions are not permitted in China, and medication abortion requires more than one follow-up visit to the hospital. In addition, due to the lack of assessment tools for applicability and outcome prediction of medical abortion, a certain number of women require additional uterine evacuation procedures. These factors have significantly impacted the popularity of medication abortion in China. Despite the challenges, medication abortion, if chosen correctly, can avoid damage from intrauterine procedures and contribute to more privacy, secrecy and comfort for women undergoing abortions.[26] Therefore, we recommend further research and development of outcome prediction models for medication abortions. This would promote evidence-based clinical decision-making rather than relying solely on experiential approaches.

In this study, approximately 43.4% of participants underwent repeat abortions. Although this prevalence is significantly lower than the 65.2% reported in 2013,[27] it remains notably higher than that among abortion seekers in some other countries or regions, such as Sweden (25.8%),[28] southwestern Ontario (23.1%)[29] and India (24.2%).[30] While we found that

women receiving high-quality PAC services had a lower risk, specifically those served in PAC exemplary units, women living in medium-GDP areas still faced a higher risk of repeat abortion. This is consistent with our results on contraceptive use, whereby a smaller proportion of people residing in medium-GDP areas consistently use the most effective contraception. This may be because women in middle-GDP areas are more likely to be served in regular PAC units but are similarly under greater pressure to bear and raise children compared with those in high-GDP areas. Therefore, we suggest that future PAC services also need to be adjusted to take into account the characteristics of people of different socioeconomic statuses.

Our study revealed a significantly high proportion of women experiencing unintended pregnancies due to the non-use of contraceptives or using the least effective contraceptives. A study on sexual behaviour among Chinese university students reported similar findings, with 41.87% of participants not consistently using contraceptives during sexual activities, and 40.96% having previously used ineffective methods.[31] We also found that the higher the frequency of sexual activity, the lower the proportion of consistent contraception. Meanwhile, women residing in high-GDP areas exhibited less adherence to contraception. Despite the considerable efforts to address economic and geographic barriers to contraceptive access in China, there is still a need for further educational initiatives to enhance public awareness of contraception.

While our study emphasised the significant impact of high-quality PAC services on improving post-abortion contraception, there was still limited adoption of the most effective or effective contraceptive methods among post-abortion women. Additionally, the high rate of repeat abortions from contraceptive failures, usually from condom use, still underscores the effectiveness of services. A significant factor contributing to this situation may be the lack of male involvement in contraceptive education or PAC services. In China, contraception is typically discussed among women, and women almost exclusively bear the responsibility for contraceptive failure. Consequently, male awareness of and involvement in contraception is relatively low. However, in reality, the initiative for the most popular contraceptive method, condoms, lies largely in the hands of men. Therefore, exploring ways to enhance male involvement in contraception and family planning responsibility is worth further investigation for improved PAC services.

This study represents the first comprehensive survey in China analysing IAs and contraceptive practices following the implementation of the universal two-child policy since 1 January 2016. It is a noteworthy multicentre collaborative study, with participation from more than ten maternal and child health hospitals across eight provinces in China. This is also the first large-scale study to explore changes in the abortion population, abortion methods, contraceptive choices, and influencing factors in China, which may provide valuable insights for the future development of women's sexual and reproductive health services in the country.

However, there are several limitations that require acknowledgement. First, the characteristics of sexual partners were not documented, preventing us from reporting factors from the perspective of partners. Although information on the contraceptives used before abortions was collected, the specific contraceptives leading to failure remained unidentified. Due to the definition of post-abortion contraception being based on having adopted or planning to adopt a contraceptive method, our calculated post-abortion contraceptive rate is likely inflated. This is because contraceptives are provided free of charge in China. Every woman undergoing abortion has access to free contraceptives, primarily condoms unless she chooses a more effective method or refuses. Finally, since this study was conducted during the COVID-19 pandemic, there may be some bias in the study population we included. As any abortion procedure in China requires follow-up visits to the hospital, the restricted mobility within urban areas at that time may have prevented some women residing far from towns from accessing services and, consequently, they were not invited to participate in our study.

CONCLUSIONS

This study revealed evolving characteristics and contraceptive behaviours of Chinese women seeking abortions after new population policies and the implementation of PAC services. It highlighted heightened risks of seeking abortions among certain demographic groups, including college students, middle-aged women, and those with prior childbirth experiences. Contrary to trends in other countries, surgical abortion is increasingly being chosen over medical abortion, which requires consideration regarding enabling home medical abortion in China. Finally, although the study suggests that high-quality PAC services may promote post-abortion contraception and prevent repeat abortions, the high selection of less effective contraception is a concern and underscores the need for further promotion of comprehensive and tailored strategies for contraception guidance.

Author affiliations
[1]Social Medicine Center, National Research Institute for Family Planning, Beijing, China
[2]Graduate School, Peking Union Medical College & Chinese Academy of Medical Science, Beijing, China
[3]International Center for Reproductive Health, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium

X Denghui Hu @Dennis_hu_

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Contributors PT and DH contributed equally to this work and are joint first authors. PT, DH and KP formulated the research question. PT, SW, JL, XJ and KP collected the data and collated the database, with assistance from WZ. PT, JL and DH verified the data. JL and DH contributed to the statistical analysis. DH and PT drafted the manuscript. KP and WZ contributed to the critical revision of the manuscript for important intellectual content. KP obtained funding for the study and is responsible for the overall content as the guarantor. All authors reviewed and approved the final manuscript.

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ORCID iDs
Denghui Hu http://orcid.org/0000-0002-1908-9637
Wei-Hong Zhang http://orcid.org/0000-0003-0380-770X

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