ISSN 2664-8059 (Print) & ISSN 2706-767X (Online)
South Asian Research Journal of Nursing and Healthcare
Abbreviated Key Title: South Asian Res J Nurs Health Care

| Volume-7 | Issue-6 | Nov-Dec- 2025 | **DOI: https://doi.org/10.36346/sarjnhc.2025.v07i06.004**

Original Research Article

Rural and Urban Differences in the Usage of Intra-Uterine Devices and Expectations of Family Planning Services among Married Women in Hubei Province, China

Joseph Lasong[1*], Yula Salifu[1], Kai Zhao[2]

[1]Department of Population and Reproductive Health, School of Public Health, University for Development Studies, Tamale, Ghana
[2]Institute of Reproductive Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, 430030, China

***Corresponding Author:** Joseph Lasong
Department of Population and Reproductive Health, School of Public Health, University for Development Studies, Tamale, Ghana

Article History
Received: 28.07.2024
Accepted: 06.09.2024
Published: 26.12.2025

Abstract: Long-acting reversible contraceptive usage is low globally, given its highly effective nature. There is scant literature on the use of intra-uterine device (IUD) across both rural and urban residencies. This study examined the usage of IUD and the expectations of married Chinese women on family planning (FP) services in rural and urban areas. A community-based study was conducted in Hubei Province, China, via cluster sampling method between 2014 and 2016. A total of 6356 married women (18-49years) present in rural and urban residencies were sampled. Multiple logistic regression was performed using IBM-SPSS (v22.0) to identify determinants of IUD usage at $p \leq 0.05$. IUD usage was 53.7% in urban and 57.2% in rural areas. Most women hoped for a regular reproductive health examination to be provided. IUD usage among rural residents was negatively associated with age, educational level, parity and spouse contraceptive usage, but positively associated with knowledge of vasectomy as contraceptive, discussing contraceptive with spouse and men's involvement in FP services. IUD usage among urban residents was negatively associated with age, having one child, spousal contraceptive usage and participation in FP services education, but positively associated with educational level, having no child, knowledge of vasectomy as contraceptive and discussion on contraception. There is a need to improve the dissemination of family planning methods and education to the clients and spouses in both rural and urban areas to meet universal healthcare coverage goals.

Keywords: Family Planning, Reproductive Health, Intra-uterine Device, Rural, Urban, China.

INTRODUCTION

Family planning (FP) services usage is an excellent method to practice spacing and control the number of children among reproductive segment of populations. There has been tremendous progress in quality and effectiveness of family planning services in recent times (DeMaria *et al.,* 2019; Wulifan *et al.,* 2015). Family planning services usage significantly reduces the rate of abortions and its overall complications (Adisah-Atta & Dim, 2019; Atake & Gnakou Ali, 2019). Most of the contraceptive methods are effective in preventing pregnancies and its associated health risks. Also, contraceptive methods reduce maternal and infant deaths, and limit countless sexually transmitted infections. This indirectly contributes to improving the economic status of individuals and enhances quality education, decreasing teenage pregnancies, unintended births, decelerating population growth for enhanced social development (Austad *et al.,* 2018; Bhandari *et al.,* 2019). Regrettably, there have been high rates of unintended pregnancies associated with non-contraceptive usage among young Chinese women of reproductive age across major cities in China (Shu *et al.,* 2016). Although, contraceptive usage had increased globally from 54.8% in 1990 to 63.3% in 2010, and 15.4% to 12.3% unmet need for family planning within the same period, there still remain women who have an unmet need for contraceptives (Wani *et al.* 2019; Starbird *et al.,*

2016). Recently, a projected 225 million women of reproductive age who reported desiring to control childbirths were found not using any contraceptive methods (Yu *et al.,* 2016; Zeng *et al.,* 2015).

The Chinese population in 2015, contributed roughly one-fifth of the global population and would remain the most populated country by 2050 (Zeng *et al.,* 2013; Wang *et al.,* 2015). Socio-demographic factors such as marital status, gender, ethnicity, age, residence, educational level, healthcare accessibility, occupation, religious and cultural barriers were found to be concomitant with reproductive and sexual healthcare particularly contraceptives usage (Johnson-Mallard *et al.,* 2017; Gong *et al.,* 2015; Cleland & Machiyama, 2015). Moreover, the rate of recurrent induced abortions due to unintended pregnancies is also high in China, with nearly half of the women seeking abortion with a history of one previous induced abortion (Li *et al.,* 2013; Luo *et al.,* 2018). Short-term FP methods are less effective and have a higher risk of contraceptive failure as compared to long-acting reversible contraceptive (LARC) methods such as intra-uterine devices (IUDs) and implants (Kortsmit *et al.,* 2019; Credé *et al.,* 2012). For instance, unintended pregnancy usually occurs due to contraceptive failure (33.1%), incorrect use of contraceptives or lack of condoms (28.6%) and use of the rhythm method (21.9%). Previous literatures confirmed that IUDs are the commonly known forms of female contraceptives in China (Wang *et al.,* 2016). Classified in the group of LARCs, IUDs are more than 99% effective, convenient to use, easily reversible, and offer 3-10 years of protection against pregnancy (Joshi *et al.,* 2015). They either do not contain hormones or contain only progestin, making them attractive for use (Joshi *et al.,* 2015).

IUDs are user-independent and exhibit higher compliance than short-acting methods (Anguzu *et al.,* 2014; Chacko *et al.,* 2016). A study by Trussell (2004) reported that, LARCs are more cost-effective than short-acting reversible methods over a three-year period. The American College of Obstetricians have also certified LARC as an effective contraceptive method in reducing risk of unintended pregnancy and abortion (Thompson *et al.,* 2011). Preceding evidence has also revealed that use of LARCs during the post-abortion period reduces repeat abortion rates (Thompson *et al.,* 2011). In October 2015, China implemented a major reform in its family planning policy, permitting almost all families to have an additional child (Jiang *et al.,* 2016). So far, this policy was overwhelmingly embraced and supported by the citizenry (Jiang *et al.,* 2017). This policy equally requires tested and effective family planning services including use of contraceptives use to ensure its holistic implementation.

In accordance with prior study results (Wang *et al.,* 2016), which found that most respondents were familiar with IUD across rural and urban areas; however, knowledge of IUDs in these two settings may not be translated to effective usage. It is, therefore, essential to examine the profile of IUD usage among married Chinese women in rural and urban areas. Also, we sought to evaluate the expectations of the married Chinese women from family planning service providers in these two settings. This will provide an evidence-based family planning counseling practices for enhanced policy implementation.

MATERIALS AND METHODS

Study Design, Population, Sample Size and Sampling Technique

This paper was extracted from a large population-based cross-sectional study on contraceptive usage and family planning expectations among married couples in the Hubei Province by the Tongji Medical College, Huazhong University of Science and Technology, Wuhan. The study area covers approximately 102 counties. Hubei province is found in the central part of China with 38 districts and covers an area of about 185,900 kilometers square with a projected population of about 57.99 million as at 2013. Approximately, 45.49% of inhabitants live in rural areas. Correspondingly, 45,958 registered households are women and men with a sex ratio of male: female 103:83 and family size of 3 persons/household (sampling fraction 0.822%) as at 2013 (China City Statistics Yearbook, 2013). Wuhan is the capital city of Hubei province with an overall population of approximately 10.607 million people. Most residents in Hubei province are the Han ethnic group (95.6%) and 4.4% ethnic minorities. Conversely, 11.4% of Hubei population are migrants.

The survey employed a community-based cross-sectional study using multistage random and snowball sampling to obtain study samples between 1st January, 2014 and 30th November, 2016 in Hubei Province. Relying on review of literature and expert responses, the Hubei province was selected because it is estimated to have a larger population-based, thus reflecting greater numbers of reproductive-aged women within the Yangtze River Basin area. Primarily, counties/districts, cities, towns and communities were differentiated into urban and rural areas. With support from family planning committees and district health technical professionals, all recognized areas were covered. The key characteristic of area distinction was based on economic growth corresponding to the National Bureau of Statistics database (China City Statistics Yearbook, 2013). Also, the primary characteristics were further defined according to population size and density, and number of communities, districts/counties, cities and towns. The study used the convenience sampling method to select 23 counties/districts from the province. Further, a convenient sampling method was used to select 4 districts/counties within each city, and 4 townships within each district/county was further sampled conveniently for a total of 798 residential areas, segregated into rural and urban localities. The study was then conducted with between 40 and 70 residents conveniently sampled from each community or village. WeChat (Shenzhen Tencent Computer System Co., Ltd, Shenzhen, China) a

Chinese online platform was used in addition to paper questions. This online system was used because majority of the Chinese population use it, as it is user friendly. Those who could read, write, understand, interpret and self-administer the questionnaires were sent the online survey form on WeChat to fill and return them to project enumerators. Those who were not able to read, write, understand, interpret and self-administer the survey questions, a hard copy questionnaire was provided and respondents were assisted by enumerators to fill the questions. Responses of respondents were read back to them after the survey for them to confirm their answers and needed amendments were made. Concurrently, the instant message WeChat software was used to show pop-up invitations in other areas within the enumeration catchment space to recruit random residents to participate in the same online survey used in other communities. All surveys were circulated, and gathered relevant information face-to-face at the community level using a semi-structured questionnaire. The questions were constructed based on demographic health survey (DHS) data, previous local studies (Measure, 2011; CFDCAWH, 2011) and consensus of experts on population and reproductive health from the Huanzhou University of Science and Technology. This study was approved by the ethics committee on research of the Huanzhou University of Science and Technology, and informed consent was obtained from each participant prior to completing the survey. The preface of the survey or questionnaire explained the purpose of the study, and all data were collected without recording any identifying data except for sex, i.e. male or female. Pretesting of the survey questions was conducted in three cities of the Hubei province to assess the validity of the questions and needed amendments were made. A total of 17,555 respondents were interviewed. Out of which 11,199 men were excluded from the analyses. A sample of 6356 non-pregnant married Chinese women aged between 18-49 years, resident in urban and rural areas were further filtered for analyses (Figure 1). The eligible population were selected using age (18–49-year-olds), a member of household and married with a sexual partner, length of stay in the community (for at least 6 months) as the core criteria. The questionnaires were structured into 4 sections: (a) socio-demographic characteristics, (b) family planning status, (c) determinants of female contraceptive use and respondents' opinion about male involvement in family planning (FP), (d) expectations and unmet needs of populations and barriers to contraceptive usage. Ten district health workers, 7 peer educators, and 13 trained young researchers recruited from the Institute of Reproductive Health, Huazhong University of Science and Technology were recruited and trained to help in the data collection with quality control overseen by two professors specialized in public health. The interview process lasted 20-45 minutes. Figure 1 depicts a schematic presentation of data from initial recruitment to those finally used in the analyses.

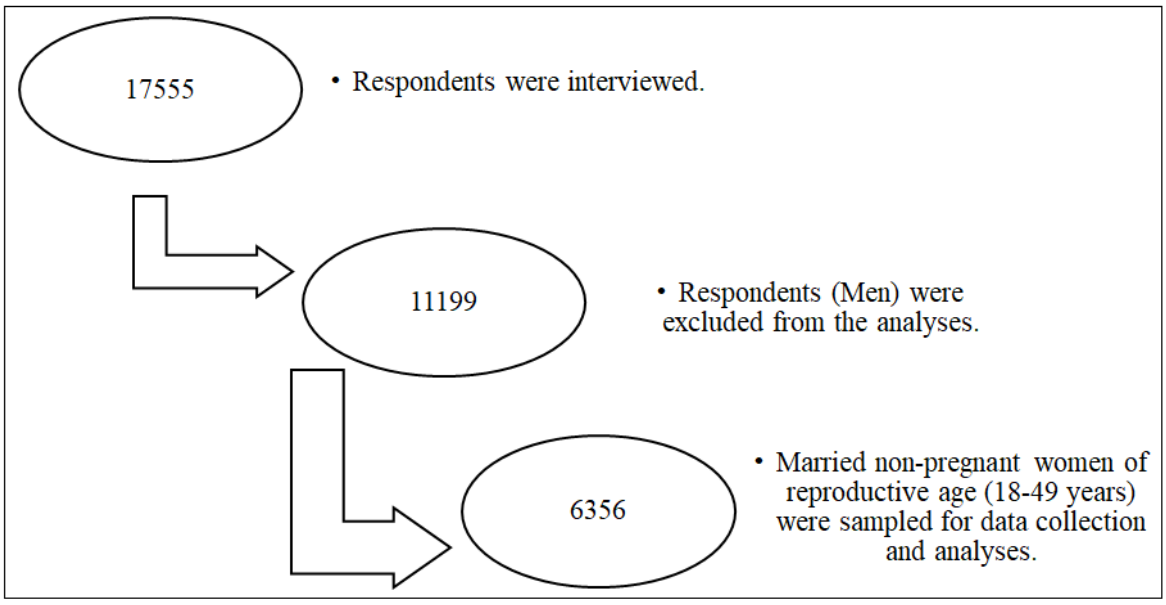

Figure 1: A schema of data from initial recruitment to those finally used in the analyses

Study Variables

The response variable is a dichotomous variable Intrauterine Device (IUD) use, where a married non-pregnant woman who is currently using IUD was coded as 1 and 0 for use or non-use respectively. LARC methods refer to safe, effective, reversible, and legal methods to prevent pregnancy such as the use of implants and IUDs. The present study focused mainly on IUD usage because most of the LARCs used in China are IUDs. The explanatory (independent) variables were selected considering the association reported in literature (Anguzu *et al.,* 2014; Chacko *et al.,* 2016). Respondent's characteristics such as ethnicity, permanent residency, age, educational level and occupation that offered regular income, number of living children, patronage of FP services and education, discussion of contraception with spouse, spouse ever used contraception, experienced contraceptive failure and perception on men's involvement in FP were key measurable variables employed in the study.

Expectations of Populations and Unmet Needs

Respondents were offered the opportunity to comments on men's involvement in family planning services. Respondents were asked to provide the kind of services related to education they wish family planning department should provide. Also, the type of reproductive health and family planning services they desire the family planning unit to give. They were also required to disclose the most convenient way they would like to access contraceptive services. Lastly, respondents were requested to report the best characteristics of *'good contraception'*.

Ethics

All participants were educated on the purpose of the study, advantages, and potential discomforts in accepting to participate in the study. Further, a written informed consent was signed. Respondents' confidentiality and privacy were assured. In the study the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (Institute of Reproductive Health/Center for Reproduction Health, Tongji Medical College of the Huazhong University of Science and Technology) and with the Helsinki Declaration of 1975, as revised in 1983.

Statistics

All descriptive variables were compared using cross-tabulation, univariate and bivariate statistical analyses. Logistic regression model was also performed to assess key associated socio-demographic variables and family planning related factors that affect the use of IUD among rural and urban married Chinese women of reproductive age. Percentage distribution and the relationship between the dependent and the independent variables were analyzed using Person's Chi square test. Variables that significantly affected IUD usage at the Chi square test level were further analyzed at the multivariate logistic regression model to reduce confounding factors. The SPSS software version 22.0 was used for all data analyses. A p-value ≤ 0.05 (2-sided) was considered significant in all analyses.

RESULTS

Background Characteristics and Associated Factors of Current IUD Usage.

The socio-demographic characteristics of 6356 Chinese non-pregnant married women of reproductive age (18-49 years) living in urban and rural areas shows that; 53.7% and 57.2% of the respondents were current users of IUD while; about 96% of the women were Han Chinese within 25 - 34 years in rural and 35 - 44 years (Table 1). More than 50% of the respondents reported that their spouse ever used contraceptive, participating in FP, discussed contraception with spouse, and supports men involvement in FP. IUD usage was significantly associated with all demographic and basic reproductive health characteristics of rural and urban dwellers except ethnicity (p=0.412) and knowledge of pills as contraceptive (p=0.123) among rural residents. Ethnicity (p=0.073) and perception of men's involvement in FP (p=0.062) was not significantly associated with the usage of IUD among urban residents (Table 1).

Table 1: Demographic and basic reproductive health characteristics on current IUD use among married women by residence

Characteristics	Rural (Current IUD Use)			Urban (Current IUD Use)		
	Yes	No	p-value†	Yes	No	p-value†
	n (%)	n (%)		n (%)	n (%)	
Age						
Less than 25	190 (41.2)	271 (58.8)	*0.001	58 (37.2)	98 (62.8)	*0.001
25 to 34	819 (57.0)	619(43.0)		624 (50.6)	608 (49.4)	
35 to 44	793 (58.6)	560 (41.4)		834 (65.8)	434 (34.2)	
45 to 49	93 (33.8)	182 (66.2)		102 (59.0)	71 (41.0)	
Ethnic group						
Han	1824 (53.9)	1562 (46.1)	0.412	1557 (56.9)	1180(43.1)	0.073
Others	71 (50.4)	70 (49.6)		61 (66.3)	31 (33.7)	
Level of education						
Primary/no formal education	110 (40.7)	160 (59.3)	*0.001	41 (52.6)	37 (47.4)	*0.001
Secondary school	1093 (54.4)	918 (45.6)		370 (59.4)	253 (40.6)	
High school	557 (56.4)	431 (43.6)		658 (62.7)	392 (37.3)	
College/university/above	135 (52.3)	123 (47.7)		549 (50.9)	529 (49.1)	
Number of living children						
Nil	43 (17.1)	208 (82.9)	*0.001	21 (10.3)	183 (89.7)	*0.001
One	1549 (66.9)	765 (33.1)		1474 (63.3)	854 (36.7)	
Two	290 (32.4)	606 (67.6)		113 (40.5)	166 (59.5)	
Three or more	13 (19.7)	53 (80.3)		10 (55.6)	8 (44.4)	
Spouse ever used contraceptive						
Yes	1027 (51.1)	981 (48.9)	*0.001	926 (51.1)	888 (48.9)	*0.001
No	868 (57.1)	651 (42.9)		692 (68.2)	323 (31.8)	

Characteristics	Rural (Current IUD Use)			Urban (Current IUD Use)		
	Yes	No	p-value†	Yes	No	p-value†
	n (%)	n (%)		n (%)	n (%)	
Experienced contraceptive failure						
Yes	442 (54.4)	371 (45.6)		422 (58.5)	299 (41.5)	
No	1425 (55.6)	1139 (44.4)	*0.001	1172 (58.0)	848 (42.0)	*0.001
Never used contraceptives	28 (18.7)	122 (81.3)		24 (27.3)	64 (72.7)	
Knowledge of vasectomy as contraceptives						
Yes	1762 (54.8)	1451 (45.2)	*0.001	1525 (59.3)	1047(40.7)	*0.001
No	133 (42.4)	181 (57.6)		93 (36.2)	164 (63.8)	
Knowledge of condom as contraceptives						
Yes	1845 (54.4)	1548 (45.6)	*0.001	1589(57.7)	1163(42.3)	*0.001
No	50 (37.3)	84 (62.7)		29 (37.7)	48(62.3)	
Knowledge of withdrawal as contraceptives						
Yes	1516 (54.4)	1271 (45.6)		1406(57.6)	1033(42.3)	0.223
No	379 (51.2)	361 (48.8)	0.123	212 (54.4)	178 (45.6)	
Taken FP Services education						
Yes	1554 (54.6)	1292 (45.4)	*0.033	1286 (59.6)	872 (40.4)	*0.001
No	341 (50.1)	340 (49.9)		332 (49.5)	339 (50.5)	
Discussion on contraception with spouse						
Yes	1636 (55.4)	1317 (44.6)		1390 (59.0)	967 (41.0)	
No	228 (48.3)	244 (51.7)	*0.001	206 (54.5)	172 (45.5)	*0.001
Never considered contraceptive	31 (30.4)	71 (69.6)		22 (23.4)	72 (76.6)	
Perception on men's involvement in FP						
Yes	1805 (54.4)	1512 (45.6)	*0.001	1540 (57.6)	1133 (42.4)	0.062
No	90 (42.9)	120 (57.1)		78 (50.0)	78 (50.0)	

*FP=Family Planning, N refers to population sample; % refers to percentage; †Chi-square test was used. * p-value p ≤ 0.05.*

Condom were the most widely used contraceptives in both areas with a distribution of 58.1% in urban and 50.2% rural areas. Coitus interruptus especially in urban areas (8.0%) though not well known was applied to a better extent than vasectomy (Figure 2).

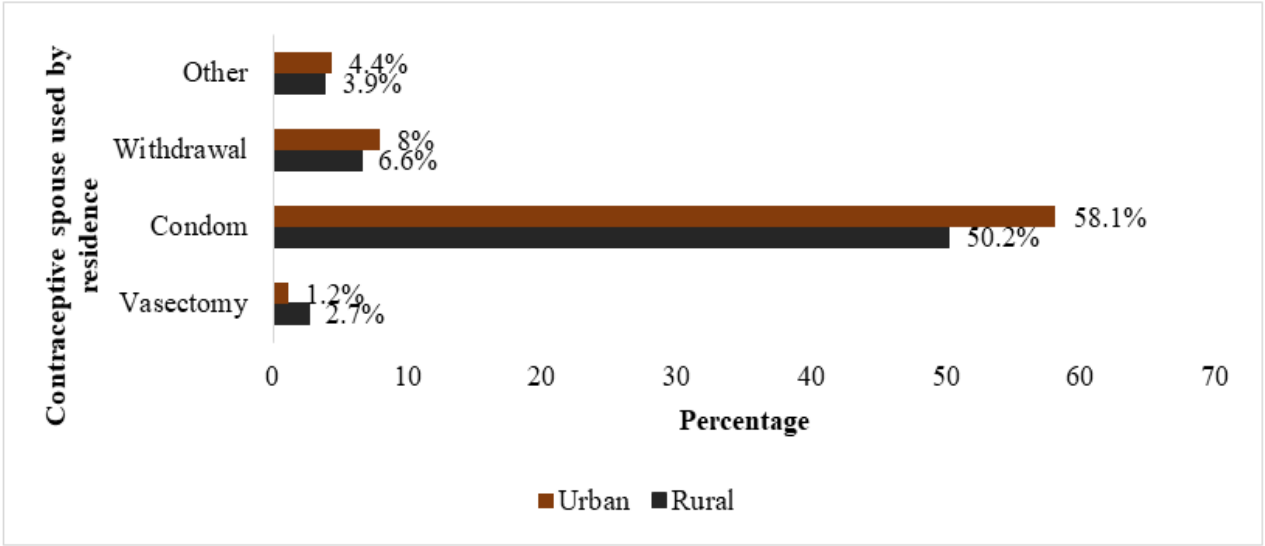

Figure 2: Percentage distribution of respondents on contraceptives spouse (husband/partner) used by residence

About 71.5% and 66.4% of respondents in rural and urban areas proposed key areas of family planning they expect to be educated about as prenatal and postnatal care respectively. Knowledge on contraceptive method, knowledge on reproductive health, knowledge on STD prevention were suggested as preferred topics for relevant sensitization (Table 2).

Table 2: Knowledge and education that females suggest the FP department to provide by place of residence

Knowledge and education females wish to be provided	Rural	Urban	p-value†
	Yes, N (%)	Yes, N (%)	
Prenatal and postnatal education	2522 (71.5)	1879 (66.4)	*0.002
Knowledge on contraception method	2406 (68.2)	1955 (69.1)	*0.019
Knowledge on reproductive health	2421 (68.6)	2043 (72.2)	*0.005
Knowledge on STD prevention	2196 (62.3)	1775 (62.7)	0.469
Knowledge on right parenting	1549 (43.9)	1227 (43.4)	0.667
Others	72 (2.0)	71 (2.5)	0.561
*N refers to total number of respondents; % refers to percentage; †Chi-square test was used. * p-value p ≤ 0.05.*			

Table 3 shows the RH and FP services that the respondents would prefer the FP department to provide. The analyses showed that 67.1% in rural and 63.6% in urban wished they would be provided with free premarital health examination, p=0.019. Most of the respondents (74.8% in rural and 78.2% in urban) hoped for a regular RH examination to be provided, p=0.001.

Table 3: Ideal family planning services expected by respondents from the FP department

Ideal family planning service	Rural	Urban	p-value†
	Yes, N (%)	Yes, N (%)	
Free premarital health examination	2367 (67.1)	1799 (63.6)	*0.019
Regular RH examination	2637 (74.8)	2211 (78.2)	*0.001
Guidance of healthy pregnancy and health baby	1843 (52.3)	1434 (50.7)	0.339
Free access and availability of contraceptives	2021 (57.3)	1542 (54.5)	*0.022
Provide free technical services of contraception	1852 (52.5)	1424 (50.3)	0.609
Others	83 (2.4)	78 (2.8)	0.821
*N refers to total number of respondents; % refers to percentage; †Chi-square test was used. * p-value p ≤ 0.05.*			

The main ways in which respondents expressed to get their contraceptive medicine by place of residence is to get them in FP health units freely. Buying contraceptive medicines from pharmacies, supermarkets or shops as an option was listed by 16.7% rural and 28.0% urban residents (Table 4).

Table 4: Preferred medium for accessing contraceptives by respondents

Preferred access	Rural	Urban	p-value†
	Yes, N (%)	Yes, N (%)	
FP Staff send them to your home	1449 (41.1)	910 (32.2)	*0.025
Get them in FP health units freely	1611 (45.7)	1511 (53.4)	*0.001
Buy them in vending machine	168 (4.8)	150 (5.3)	*0.037
Buy them in pharmacies, supermarkets, or shops	588 (16.7)	792 (28.0)	*0.001
Others	64 (1.8)	59 (2.1)	0.591
*N refers to total number of respondents; % refers to percentage; †Chi-square test was used. *p-value p ≤ 0.05.*			

Determinants of current IUD usage

Determinants of IUD usage among respondents from rural areas were age (25 to 34 years: AOR=0.44, 95% CI: 0.32-0.60, p=0.001; 35 to 44 years: AOR=0.37, 95% CI: 0.28-0.51, p=0.001), educational level (secondary school: AOR=0.63, 95% CI: 0.47-0.85, p=0.003; high school: AOR=0.65, 95% CI: 0.48-0.90, p=0.001), number of children (one child: AOR=0.19, 95% CI: 0.16-0.23, p=0.001), spouse contraceptive usage (AOR=0.55, 95% CI: 0.46-0.64, p=0.001), knowledge of vasectomy as contraceptive (AOR=1.50, 95% CI: 1.12-2.01, p=0.007), discussing contraceptive with spouse (AOR=1.26, 95% CI: 1.00-1.60, p=0.049), and men's involvement in FP service (AOR=1.42, 95% CI: 1.00-2.02, p=0.050; Table 5). While age (35-44 years: AOR=0.67, 95% CI: 0.47-0.96, p=0.030), educational level (college/university/above: AOR=2.14-95% CI: 1.22, 3.77, p=0.008), number of children (no child: AOR=2.16, 95% CI: 1.24-3.75, p=0.006; one child: AOR=0.26, 95% CI: 0.20-0.35, p=0.001), spouse contraceptive usage (AOR=0.40, 95% CI: 0.33-0.49, p=0.001), participation in family planning services education (AOR=0.73, 95% CI: 0.59-0.89, p=0.002), knowledge of vasectomy as contraceptive (AOR=1.90, 95% CI: 1.36-2.66, p=0.001), and discussion on contraception (AOR=1.29, 95% CI: 1.00-1.67, p=0.050) with spouse were determinants of IUD usage among respondent's resident in urban areas (Table 5).

Table 5: Determinants of current IUD usage using multivariable logistic regression by residence

Characteristics	Rural (IUD Use)		Urban (IUD Use)	
	AOR (95% CI)	p-value	AOR (95% CI)	p-value
Age				
Less than 25	0.78 (0.55, 1.12)	0.195	1.5 (0.9, 2.5)	0.112
25 to 34	0.44 (0.32, 0.6)	*0.001	1.07 (0.75, 1.54)	0.690
35 to 44	0.37 (0.28, 0.51)	*0.001	0.67 (0.47, 0.96)	*0.030
45 to 49	Reference		Reference	
Level of education				
Secondary school	0.63 (0.47, 0.85)	*0.003	1.21 (0.68, 2.13)	0.502
High school	0.65 (0.48, 0.9)	*0.009	1.33 (0.76, 2.33)	0.325
College/university/above	0.97 (0.65, 1.44)	0.875	2.14 (1.22, 3.77)	*0.008
Primary/no formal education	Reference		Reference	
Number of living children				
Nil	1.14 (0.77, 1.68)	0.512	2.16 (1.24, 3.75)	*0.006
One	0.19 (0.16, 0.23)	*0.001	0.26 (0.20, 0.35)	*0.001
Two or more	Reference		Reference	
Spouse ever used contraceptive				
No	0.55 (0.46, 0.64)	*0.001	0.4 (0.33, 0.49)	*0.001
Yes	Reference		Reference	
Experienced contraceptive failure				
No	0.95 (0.8, 1.13)	0.521	1.06 (0.88, 1.29)	0.543
Yes	Reference		Reference	
Knowledge of vasectomy as contraceptives				
No	1.5 (1.12, 2.01)	*0.007	1.90 (1.36, 2.66)	*0.001
Yes	Reference		Reference	
Knowledge of condom as contraceptives				
No	1.6 (1, 2.52)	0.068	0.95 (0.50, 1.81)	0.873
Yes	Reference		Reference	
Taken FP Services education				
No	1 (0.82, 1.23)	0.941	0.73 (0.59, 0.89)	*0.002
Yes	Reference		Reference	
Discussion on contraception with spouse				
No	1.26 (1, 1.6)	*0.049	1.29 (1.00, 1.67)	*0.050
Yes	Reference		Reference	
Perception on men's involvement in FP				
No	1.42 (1, 2.02)	*0.050	†	†
Yes	Reference			

*†Not included at multivariate level because of non-significance at bivariate level. AOR refers to adjusted odd ratio; CI refers confidence interval and *refers to p-value ≤ 0.05.*

DISCUSSION

This study examined the use of IUD and expectations of non-pregnant married Chinese women on FPs in rural and urban Hubei Province, China and this is the very first time such a comparative study is been done among residents in rural and urban China on IUD usage and expectations of Chinese women in family planning service providers. The findings revealed that, age, level of education, number of living children, perception of men involvement in FP service, use of contraception by spouse, discussion of contraception use with spouse and participation in FP services education were associated with contraception use particularly IUD use either positively or negatively depending on the place of residence (urban or rural). Conversely, ethnicity had no correlation with contraception use in both areas.

In our study, most of the respondents in both areas were not familiar with male contraceptives except male condom which is easy to use and accessible. Again, vasectomy was only known to a limited number of the population. The irreversible nature of vasectomy could have led to its low utilization and made the method less patronized (Jiang & Liu, 2016). This contradicts a previous report in China that, there is a preference for long-term and permanent methods of contraception among Chinese (Tran *et al.,* 2011; Wang, 2012). China is a developed country and has sophisticated health facilities and resources, therefore availability and access to advanced contraceptives is easy (Wang, 2012). Unfortunately, due to cultural conservativeness, most Chinese couples seldom seek information on contraception (Wang *et al.,* 2015).

Most researchers have reported that, contraceptive use increases with young age (15-39 years) and decreases with old age (40-49 years) (Asiimwe *et al.,* 2014; Belohlav & Karra, 2013). It is believed that, most old-aged women in their menopausal stage mostly due to decreased sexual activity are less likely to use contraceptive (Belohlav & Karra, 2013). Our study revealed that, in rural areas, women between 25 to 44 years were negatively associated with IUD use compared to those in urban areas. This could be because, women in rural areas marry at fairly young age compared to their counterparts in urban areas (Jiang & Liu, 2016). China's family planning policy is aimed mainly at married women, and it emphasizes long-term or permanent methods of contraception (Jiang & Liu, 2016). According to earlier reports, long-acting contraceptives and sterilization have received stiff resistance in rural areas. This may have had an impact on adoption of IUDs (Jiang & Liu, 2016). However, the temporal methods of contraception are not largely used especially among youth, making premarital sex more common and an alarmingly high abortion rate among China's young women (Zheng *et al.,* 2018).

In rural areas, women who had acquired secondary and/or high school education were less likely to use IUDs unlike in urban areas where those with college/university education were more likely to use IUDs. Education empowers women to make informed decisions on childbearing and the efficacy of different contraception methods (Belohlav & Karra, 2013). Several countries advocate for women's education to promote economic growth, foster reasonable family sizes, improve child health and women's sexual reproductive health particularly with use of modern contraceptives (Belohlav & Karra, 2013). Studies have also indicated that, education usually improves knowledge and attitude of women towards modern contraceptive use (Zheng *et al.,* 2018). Previous studies have reported that, women with higher education are more likely to use contraceptive methods than women with no education (Belohlav & Karra, 2013). And in our study, those with college/university education were more likely to use IUDs compared to those with secondary/high school education. Sex education is a new concept in China, and it was probably introduced more intensively in higher institutions making the level of awareness limited to the adolescent Chinese especially regarding contraceptives (Liu *et al.,* 2019). Moreover, with a lot of sexual revolution in China, premarital sex is no longer a taboo and more young people are choosing to co-habit with their partners before marriage and not use contraceptives but opt for abortion (Liu *et al.,* 2019). Additionally, our study revealed that, women with one child (rural areas) and those with no or one child (urban areas) were less likely to use IUDs. This might be due to the introduction of the two-child policy in China which has dictated a lot of decision making among spouses or women to get additional children. Similar to other studies, increased parity was highly associated with contraceptive use compared to women who had no children (Belohlav & Karra, 2013).

Moreover, the present study also revealed that, discussion of contraception use with spouse was negatively correlated with IUD use among women. If both partners had the same perception about a form of contraceptive, it was easier for them to agree to use or not to use it. In our study, the results reveal that, most respondents had a negative perception about the long-term effect of IUDs on the health and fertility of women (Table 6). Majority of participants in both regions thought that, IUD later affects physical labor, had negative side effects and complications, insertion of an IUD was a painful procedure, that the reversal of fertility after removal of IUD was difficult and that the presence of IUD inside the uterus affects sexual life (Sittig *et al.,* 2020). This coincides with findings from Nanjing which highlighted various reasons for the reluctance to use of IUD. Most of the perceptions revolved around false beliefs about the real advantages and drawbacks of IUD (Wang *et al.,* 2019).

Usage of contraceptive by spouse was negatively associated with women using IUD. Most male contraceptives are safe and less invasive, so if a male partner opts to use one of those, then it is likely that, the woman will not use IUD. Our study revealed that, most women expected a mutual sharing of responsibilities for FP and that men should be involved in family planning as FP policy requires men's participation. In most countries including China, FP responsibility is left solely to the woman (Wang, 2012). Additionally, knowledge of vasectomy and condom as a form of contraceptive was positively correlated to the use of IUD as contraceptive. Family planning service education showed a very high likelihood of using IUD. If both partners are educated on family planning, then it is likely that there will be a positive understanding and subsequent patronage of IUD. Education provides information that will eventually influence decision making, behavior, and outcome of any intervention. If family planning education is given to women appropriately, it plays a major role in contraceptive choice and use (Qiao, 2015). Studies have revealed that, women who visit health facilities and are sensitized on family planning methods are more likely to use contraceptive methods than women without relevant and appropriate information. However, it was interesting to note that, in urban areas, those who had patronized FP education services were less likely to use IUDs. Evidence from previous studies has shown that, higher exposure to mass media increases contraceptive use among women and thus, contradicting results of our study (Pazol *et al.,* 2018). In some cases, awareness and knowledge of contraceptives does not always automatically translate to usage (Belohlav & Karra, 2013), as some would focus on the disadvantages of contraceptive use than on their advantages leading to non-compliance or non-adherence. There exists several myths and misinformation surrounding the use of IUDs (Luo *et al.,* 2018).

Limitations

The study was done on only non-pregnant married women, but their partners' perspectives were not considered. Therefore, further studies could increase the number of provinces and explore the husband/partner's perspectives on IUD use. Data collection was done only in Hubei province without taking into consideration the other provinces, due to financial constraints. Therefore, this may limit the generality of the findings to the entire nation of the People's Republic of China. The cross-sectional nature of the data limits drawing generalized casual inferences. We studied only married women by residence; therefore, future studies may explore unmarried women of reproductive age by residence and identify predictive factors of IUD usage in Hubei province, China. Data on LARC use was also self-reported; hence, the probabilities of reporting bias should not be overlooked while interpreting the results. Finally, to collect more reliable and complete evidence, we recommend that both quantitative and qualitative methods should be adopted in future studies.

CONCLUSIONS

As much as IUD was the most common form of contraceptive known among our study population, almost half of the study population were not using it. Determinants of IUD usage in rural area were age (25-44 years), level of education, number of children, usage of contraceptives by spouse, discussing contraceptive with spouse and men's involvement in FP services. Key Determinants of IUD usage in urban areas were age (35-44 years), having no or one alive child, usage of contraceptive by spouse, and participating in family planning services education. We recommend increased education on reproductive health and family planning in schools in both rural and urban areas, especially from senior high school levels across all regions, which may improve their reproductive health in the future. There is a need to improve dissemination of family planning methods and education to the clients to improve population health and meet universal healthcare coverage targets.

Conflict of Interest: The authors have declared no conflict of interests.

ACKNOWLEDGEMENTS

We acknowledge the contribution of Dr. Kojo Ahiakpa, Ms. Essence Tshuma and Mr. Torjim Salifu in proofreading this manuscript. We are grateful to the enumerators and respondents of the study.

REFERENCES

- DeMaria, A. L., Sundstrom, B., Faria, A. A., Moxley Saxon, G., & Ramos-Ortiz, J. (2019). Using the theory of planned behavior and self-identity to explore women's decision-making and intention to switch from combined oral contraceptive pill (COC) to long-acting reversible contraceptive (LARC). *BMC Women's Health*, 19, 1-10.
- Wulifan, J. K., Brenner, S., Jahn, A., & De Allegri, M. (2015). A scoping review on determinants of unmet need for family planning among women of reproductive age in low- and middle-income countries. *BMC women's health*, *16*, 1-15.
- Adisah-Atta, I., & Dim, E. E. (2019). Justification of abortion in West Africa and interplay of sociodemographic predictors: A comparative study of Ghana and Nigeria. *SAGE Open*, *9*(1), 2158244019834368.
- Atake, E. H., & Gnakou Ali, P. (2019). Women's empowerment and fertility preferences in high fertility countries in Sub-Saharan Africa. *BMC women's health*, *19*, 1-14.
- Austad, K., Shah, P., & Rohloff, P. (2018). Correlates of long-acting reversible contraception uptake among rural women in Guatemala. *Plos one*, *13*(6), e0199536.
- Bhandari, R., Pokhrel, K. N., Gabrielle, N., & Amatya, A. (2019). Long-acting reversible contraception use and associated factors among married women of reproductive age in Nepal. *PloS one*, 14(3), e0214590.
- Shu, C., Fu, A., Lu, J., Yin, M., Chen, Y., Qin, T., ... & Yin, P. (2016). Association between age at first sexual intercourse and knowledge, attitudes and practices regarding reproductive health and unplanned pregnancy: a cross-sectional study. *Public health*, 135, 104-113.
- Starbird, E., Norton, M., & Marcus, R. (2016). Investing in family planning: key to achieving the sustainable development goals. *Global health: science and practice*, *4*(2), 191-210.
- Wani, R. T., Rashid, I., Nabi, S. S., & Dar, H. (2019). Knowledge, attitude, and practice of family planning services among healthcare workers in Kashmir–A cross-sectional study. *Journal of family medicine and primary care*, *8*(4), 1319-1325.
- Yu, C., Wu, J., Li, Y., Zhou, Y., Zhao, R., Ji, H., ... & Tong, Q. (2016). The Other Side: How does Informed Choice Affect Induced Abortions among Reproductive-Age Immigrant Women in China—A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, *13*(10), 1038.
- Zeng, J., Zou, G., Song, X., & Ling, L. (2015). Contraceptive practices and induced abortions status among internal migrant women in Guangzhou, China: a cross-sectional study. *BMC Public Health*, *15*, 1-10.
- Zeng, Y., Gu, B., & Liang, J. (2013). China's fertility policy adjustment and China's development. Beijing: *Social Scientific Academic Press*.

- Wang, Z., Yang, M., Zhang, J., & Chang, J. (2016). Ending an era of population control in China: was the one-child policy ever needed? *American Journal of Economics and Sociology*, *75*(4), 929-979.
- Johnson-Mallard, V., Kostas-Polston, E. A., Woods, N. F., Simmonds, K. E., Alexander, I. M., & Taylor, D. (2017). Unintended pregnancy: a framework for prevention and options for midlife women in the US. *Women's midlife health*, *3*, 1-15.
- Gong, Y., Yin, X., Wang, Y., Li, Y., Qin, G., Liu, L., ... & Lu, Z. (2014). Social determinants of community health services utilization among the users in China: a 4-year cross-sectional study. *PloS one*, *9*(5), e98095.
- Cleland, J., & Machiyama, K. (2015, January). Unmet need for family planning: past achievements and remaining challenges. In *Seminars in reproductive medicine* (Vol. 33, No. 01, pp. 011-016). Thieme Medical Publishers.
- Li, J., Temmerman, M., Chen, Q., Xu, J., Hu, L., & Zhang, W. H. (2013). A review of contraceptive practices among married and unmarried women in China from 1982 to 2010. *The European Journal of Contraception & Reproductive Health Care*, *18*(3), 148-158.
- Luo, Z., Gao, L., Anguzu, R., & Zhao, J. (2018). Long-acting reversible contraceptive use in the post-abortion period among women seeking abortion in mainland China: intentions and barriers. *Reproductive health*, *15*, 1-9.
- Kortsmit, K., Williams, L., Pazol, K., Smith, R. A., Whiteman, M., Barfield, W., ... & Warner, L. (2019). Condom use with long-acting reversible contraception vs non–long-acting reversible contraception hormonal methods among postpartum adolescents. *JAMA pediatrics*, *173*(7), 663-670.
- Credé, S., Hoke, T., Constant, D., Green, M. S., Moodley, J., & Harries, J. (2012). Factors impacting knowledge and use of long acting and permanent contraceptive methods by postpartum HIV positive and negative women in Cape Town, South Africa: a cross-sectional study. *BMC public health*, *12*, 1-9.
- Joshi, R., Khadilkar, S., & Patel, M. (2015). Global trends in use of long-acting reversible and permanent methods of contraception: seeking a balance. *International Journal of Gynecology & Obstetrics*, *131*, S60-S63.
- Anguzu, R., Tweheyo, R., Sekandi, J. N., Zalwango, V., Muhumuza, C., Tusiime, S., & Serwadda, D. (2014). Knowledge and attitudes towards use of long-acting reversible contraceptives among women of reproductive age in Lubaga division, Kampala district, Uganda. *BMC research notes*, *7*, 1-9.
- Chacko, M. R., Wiemann, C. M., Buzi, R. S., Kozinetz, C. A., Peskin, M., & Smith, P. B. (2016). Choice of postpartum contraception: factors predisposing pregnant adolescents to choose less effective methods over long-acting reversible contraception. *Journal of Adolescent Health*, *58*(6), 628-635.
- Trussell, J. (2004). Contraceptive failure in the United States. *Contraception*, *70*(2), 89-96.
- Thompson, K. M., Speidel, J. J., Saporta, V., Waxman, N. J., & Harper, C. C. (2011). Contraceptive policies affect post-abortion provision of long-acting reversible contraception. *Contraception*, *83*(1), 41-47.
- Jiang, Q., Li, Y., & Sánchez-Barricarte, J. J. (2016). Fertility intention, son preference, and second childbirth: survey findings from Shaanxi Province of China. *Social indicators research*, *125*, 935-953.
- Jiang, Q., Yu, Q., Yang, S., & Sánchez-Barricarte, J. J. (2017). Changes in sex ratio at birth in China: a decomposition by birth order. *Journal of biosocial science*, *49*(6), 826-841.
- China News. (2013). China City Statistics Yearbook 2013. *China Statistics Press, Beijing*.
- MEASURE, D. (2011). Questionnaires: Household, Woman's, and Man's; Demographic Health Survey Methodology. *Calverton, NY: USAID*.
- CFDCAWH. O. (2011). Effectiveness of Family Planning Methods; http://www.cdc.gov/reproductivehealth/UnintendedPregnancy/PDF/Contraceptive_methods_508.pdf. 2011.
- Jiang, Q., & Liu, Y. (2016). Low fertility and concurrent birth control policy in China. *The History of the Family*, *21*(4), 551-577.
- Wang, C. (2012). Trends in contraceptive use and determinants of choice in China: 1980–2010. *Contraception*, *85*(6), 570-579.
- Tran, N., Stapleton, J., Zhang, Y., Harlow, S., Yang, H., & Moyer, C. A. (2011). Contraceptive practices of women visiting a gynecology clinic in Beijing, China. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, *112*(1), 64.
- Wang, H., Long, L., Cai, H., Wu, Y., Xu, J., Shu, C., ... & Yin, P. (2015). Contraception and unintended pregnancy among unmarried female university students: a cross-sectional study from China. *PloS one*, *10*(6), e0130212.
- Asiimwe, J. B., Ndugga, P., Mushomi, J., & Manyenye Ntozi, J. P. (2014). Factors associated with modern contraceptive use among young and older women in Uganda; a comparative analysis. *BMC public health*, *14*, 1-11.
- Belohlav, K., & Karra, M. (2013). Household decision-making and contraceptive use in Zambia. *Population Reference Bureau*. Washington, DC.
- Zheng, Z., Gu, B., & Gietel-Basten, S. (2018). Fertility preferences in China. Family Demography Asia. *Edward Elgar Publishing. 2018*.
- Liu, J., Wu, S., Xu, J., Temmerman, M., Zhang, W. H., & INPAC Group. (2019). Is repeat abortion a public health problem among Chinese adolescents? A cross-sectional survey in 30 provinces. *International journal of environmental research and public health*, *16*(5), 794.

- Sittig, K. R., Weisman, C. S., Lehman, E., & Chuang, C. H. (2020). What women want: factors impacting contraceptive satisfaction in privately insured women. *Women's Health Issues*, *30*(2), 93-97.
- Wang, Z., Lou, C., Jin, L., Miao, M., Tu, X., Liang, H., ... & Yuan, W. (2019). Attitudes and practices related to intrauterine devices for nulliparous women among Chinese health care providers. *Reproductive health*, *16*, 1-8.
- Qiao, X. (2015). The choice of coming fertility policy through the effect of the new policy. *Chinese Journal of Population Science*, *2*, 26-33.
- Wang, C. (2012). Trends in contraceptive use and determinants of choice in China: 1980–2010. *Contraception*, *85*(6), 570-579.
- Luo, Z., Gao, L., Anguzu, R., & Zhao, J. (2018). Long-acting reversible contraceptive use in the post-abortion period among women seeking abortion in mainland China: intentions and barriers. *Reproductive health*, *15*, 1-9.
- Pazol, K., Zapata, L. B., Dehlendorf, C., Malcolm, N. M., Rosmarin, R. B., & Frederiksen, B. N. (2018). Impact of contraceptive education on knowledge and decision making: an updated systematic review. *American journal of preventive medicine*, *55*(5), 703-715.