

# Contraceptive and reproductive health practices of unmarried women globally, 1999 to 2018

## Systematic review and meta-analysis

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### Abstract

**Background:** Premarital sex practices and contraceptive prevalence rate (CPR) among unmarried women worldwide remain unclear, even though unmarried women tend to have multiple sex partners over time, which makes their sexual behaviors particularly important to the sexual and reproductive health of society more broadly.

**Methods:** We searched the MEDLINE, PubMed, and Google Scholar databases for relevant articles published between January 1, 1999 and December 31, 2018. Data on prevalence of premarital sexual intercourse, use of highly prevalent contraceptive methods, as well as CPR overall and at first sexual intercourse were extracted and estimated using a DerSimonian–Laird random effects model.

**Results:** Of the 3918 articles identified, 37 covering 19 countries were included. The estimated overall prevalence of premarital sexual intercourse was 41.9% (95%CI 34.2–49.6%). Pooled CPR was 57.0% (95%CI 44.3–69.8%) overall and 57.6% (95% CI 39.5–75.6%) at first intercourse. The overall prevalence of condom use was 51.2% (95%CI 42.7–59.7%), followed by oral contraceptives (20.5%, 95%CI 13.7–27.3%), withdrawal (12.7%, 95%CI 9.4–15.9%), and rhythm (12.1%, 95%CI 6.7–17.4%).

**Conclusion:** The findings of this global study indicate worrying trends in unprotected intercourse and contraceptive practices, suggesting the need for greater attention and resources aimed at educating unmarried adolescent women about sexual and reproductive health.

**Systematic review registration number:** CRD42019132736.

**Abbreviations:** AIDS = acquired immune deficiency syndrome, CI = confidence interval, CPR = contraceptive prevalence rate, HIV = human immunodeficiency virus, OCP = oral contraceptive pill, SRH = sexual and reproductive health, STI = sexually transmitted infection.

**Keywords:** unprotected intercourse, contraceptive practices, unmarried women, worldwide, meta-analysis

## 1. Introduction

According to the Global Strategy for Women's, Children's and Adolescents' Health of the United Nations,<sup>[1]</sup> the health of young people, particularly the sexual and reproductive health (SRH) of young unmarried people, has become a global public health concern. As global development continues, the prevalence of

premarital sexual intercourse among young people has risen, exposing adolescents to the challenges of contraceptive practices and unplanned pregnancies.<sup>[2]</sup>

The World Health Organisation (WHO) reported that in developing regions, ~16 million girls aged 15 to 19 years and 2.5 million girls under 16 years gave birth in 2015.<sup>[3]</sup> Simultaneously,

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teenage sexually transmitted infections (STIs) and acquired immune deficiency syndrome (AIDS) have become major health concerns in the world.<sup>[4]</sup> Studies from many parts of the world link these phenomena to limited access to SRH information and inadequate family planning and contraception.<sup>[5]</sup> Poor knowledge of SRH, use of less-effective contraceptive methods, or failure to use any contraception at all contribute to this dangerous reproductive health situation among young people, particularly unmarried individuals. Several countries have implemented strategies to promote contraception and improve SRH among unmarried women, but they have proven ineffective in many regions.<sup>[6]</sup>

Although some studies and systematic reviews have examined sexual intercourse behavior in various countries, a systematic review of contraceptive practices among unmarried women is lacking.<sup>[5,7-9]</sup> Unmarried women are a particularly important population to understand because they may have more partners than older, married women and their sexual and reproductive health practices may be less stable over time.<sup>[10]</sup> In other words, the behaviors of unmarried women may strongly influence the sexual and reproductive health of the larger population and may be more amenable to modification through appropriate public health campaigns and interventions.<sup>[2]</sup> Therefore, we set out to conduct a systematic review and meta-analysis of the prevalence of premarital sexual intercourse, contraceptive prevalence rate (CPR), and rates of use of highly prevalent contraceptive methods. These results may be useful to guide policymakers aiming to improve SRH of unmarried women.

## 2. Methods

This systematic review and meta-analysis were conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The research protocol was registered in the PROSPERO international prospective register of systematic reviews (CRD42019132736).<sup>[11]</sup>

### 2.1. Search strategy

We searched the MEDLINE, PubMed, and Google Scholar databases for articles published between January 1, 1999 and December 31, 2018 that reported contraceptive practices and reproductive health conditions of unmarried women worldwide. This date range was chosen because it was a period of increasing premarital sexual intercourse among young people as a result of growing prosperity and liberalization.<sup>[12]</sup> The following search terms were combined: (contraception OR contraceptive) AND (unmarried OR adolescent OR teenager OR young OR college student) (Box 1). We restricted our searches to literature published in English, and no other restrictions were applied.

### 2.2. Eligibility criteria

For a study to be included in our systematic review and meta-analysis, it had to be a cross-sectional study (descriptive or analytical) focusing on SRH among unmarried women aged 14 to 25 years. If a study reported data on women over a broader age range, data were extracted only for women aged 14 to 25. This age range was chosen because sexual activity often changes rapidly during this age span.<sup>[13]</sup>

Studies were excluded if they reported:

1. data on unmarried women only as a composite outcome, such that their data could not be separated from data on married women or unmarried men;
2. data on a specific population of unmarried women, such as sex workers or women living with cancer, HIV, or disability;
3. data on unmarried women in a clinic or hospital because of unplanned pregnancy or induced abortion; or
4. data for a sample smaller than 100 unmarried women.<sup>[14]</sup>

Exclusion criteria (2), (3), and (4) were imposed to ensure that our study population would reasonably reflect the general population of unmarried women.

In our analysis, we defined unmarried women as those who reported having had a lover or not, no matter how long they were together. We defined married women as those who were cohabiting with a male sexual partner or who had a husband at the time of the interview.<sup>[10]</sup>

### 2.3. Study selection and quality assessment

Two authors (MY Wang and Y Fan) independently screened the titles and abstracts of the search results based on the eligibility criteria. Duplicate references were removed, as were studies that failed to match our review criteria. The remaining studies were then read in full and assessed for quality. The methodological quality of the included studies was assessed independently by two researchers (MY Wang and Y Fan) based on the Cross-Sectional/Prevalence Study Quality Checklists.<sup>[15]</sup> Studies awarded 3 or fewer stars were considered low-quality and excluded from our study. Any discrepancy in the study selection and quality assessment was resolved through discussion with the corresponding authors.

### 2.4. Data extraction

Data from all included studies were extracted and tabulated by two authors (MY Wang and Y Fan). The data included:

1. name of the first study author,
2. year of publication,
3. year of survey,
4. location of study,

#### **Box 1. Keywords used for identification of articles that reported data on contraceptive and reproductive health practices of unmarried women worldwide during 1999 to 2018.**

1. [unmarried OR adolescent OR adolescence OR teenager OR young OR college student OR single person]
2. [contraception OR contraceptive]
3. [#1 AND #2]
4. Filter: published between January 1, 1999 and December 31, 2018

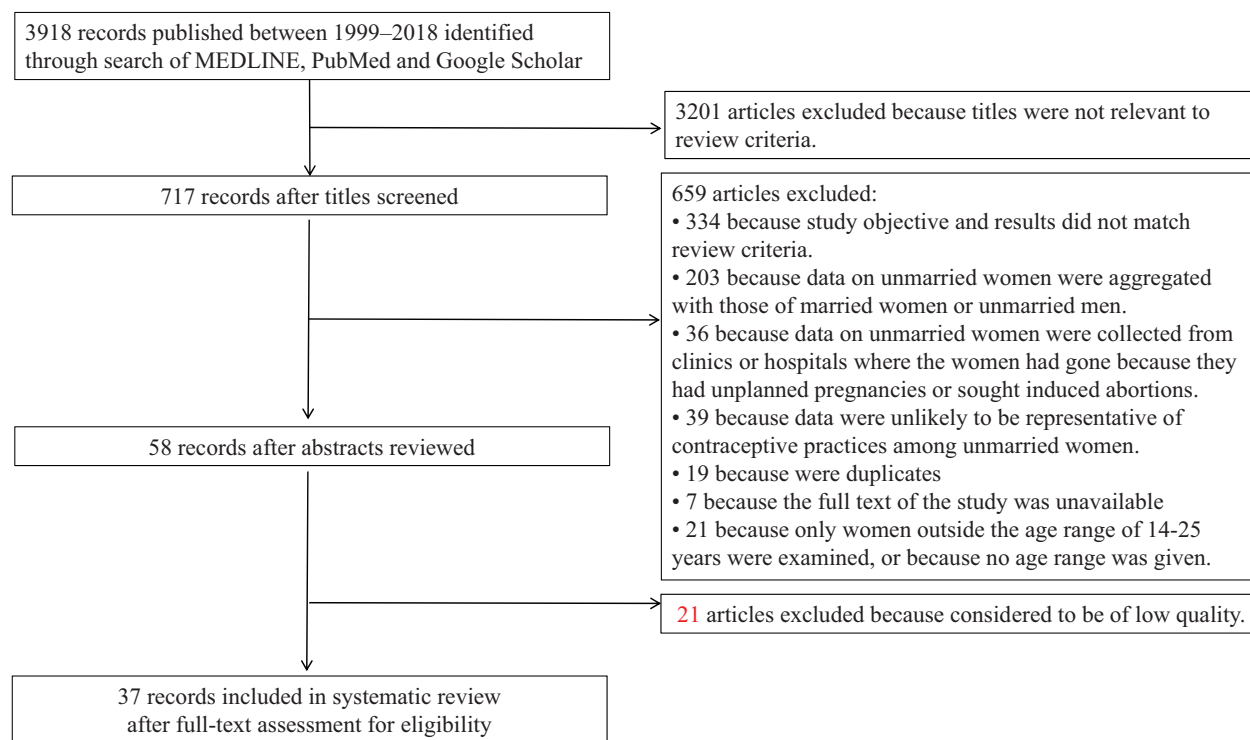


Figure 1. Flowchart summarizing the study selection process.

5. target population,
6. age of participants,
7. sample size,
8. key results,
9. quality assessment,
10. outcome measurements,
11. prevalence of premarital sexual intercourse,
12. CPR,
13. CPR at first sexual intercourse and
14. prevalence of highly prevalent contraceptive methods.

For studies that reported SRH behavior of unmarried women worldwide at different time points, we extracted only baseline data in order to reduce effects of loss to follow-up.

To calculate the prevalence of premarital sexual intercourse, the number of women who were sexually initiated was divided by the total number of unmarried women. To calculate CPR, the number of women using at least one form of effective contraception was divided by the total number of sexually active unmarried women. To calculate the rate of use of each contraceptive method, the number of sexually active women using that particular method was divided by the total number of sexually active unmarried women in the study. We also examined CPR at first intercourse among sexually active unmarried women.

## 2.5. Meta-analysis

Meta-analysis was conducted using Stata 14 (StataCorp, College Station, TX) and a DerSimonian–Laird random-effects model was used because of the expected significant heterogeneity caused by differences in populations, geographic regions, and methods of outcome assessment. The meta-analysis subsequently indicated substantial heterogeneity (see Results), validating our use of

the random-effects model. When appropriate, results were reported together with 95% confidence intervals (CIs).

## 2.6. Heterogeneity

Heterogeneity among studies was assessed using Cochran's  $Q$  test. As recommended by the Cochrane Collaboration, Cochran's  $Q$  test was considered to indicate heterogeneity when  $P < .05$ . To explore the potential causes of heterogeneity, we conducted subgroup analysis stratified by year of survey, study population, geographical region, and outcome measurements. In addition, sensitivity analysis was performed by repeating the meta-analysis after removing each study one by one in order to assess its influence.

## 2.7. Ethical review

The study was approved by the Human Research Ethics Committee of the Hospital.

## 3. Results

The process of selecting articles is shown in Figure 1. We identified 3918 articles through the initial search, from which 19 duplicate references were removed and 3862 references were excluded because they were ineligible or of low quality. In the end, 37 studies published between January 1, 1999 and December 31, 2018 were retained in our analysis (Table 1).<sup>[10,16–51]</sup>

### 3.1. Characteristics of the included studies

All 37 studies were cross-sectional surveys involving a total of 123,254 unmarried females, with sample sizes ranging from a

**Table 1****Relevant studies on contraceptive prevalence rate and use of specific contraceptive methods by unmarried women aged 14 to 25 years around the world.**

Study	Survey year	Country	Population sampled	Age (years)	Sample size	Study quality*	Survey method	Key results
Narring et al, 2000 <sup>[16]</sup>	1996	Switzerland	Undergraduates	16–20	2075	High	Self-completed questionnaire	High premarital intercourse rate
William et al, 2000 <sup>[17]</sup>	1996	Ghana	Urban	15–24	829	High	Face-to-face interview	High premarital intercourse rate low CPR
Donald et al, 2002 <sup>[18]</sup>	2002	Canada	Undergraduates	15–19	922	Medium	Face-to-face interview	High premarital intercourse rate and low CPR
Allen et al, 2003 <sup>[19]</sup>	2001	Thailand	Undergraduates	15–22	832	High	Self-completed questionnaire	Low CPR
Kallipolitis et al, 2003 <sup>[20]</sup>	2000	Greece	Undergraduates	17–25	297	Medium	Self-completed questionnaire and Face-to-face interview	Inadequate knowledge of contraception
Dei et al, 2004 <sup>[21]</sup>	2002	Italy	Junior high/high school students	14–23	104	Medium	Self-completed questionnaire	Complex sexual behavior
Bender et al, 2005 <sup>[22]</sup>	1996	Iceland	General population	17–20	1430	High	Self-completed questionnaire	Low level of contraceptive knowledge
Byamugisha et al, 2006 <sup>[23]</sup>	2005	Uganda	Undergraduates	18–25	379	High	Self-completed questionnaire	Low knowledge of emergency contraception and fertility awareness
Li et al, 2006 <sup>[24]</sup>	2006	China	Undergraduates	16–26	2365	High	Self-completed questionnaire	Low CPR and unreliable contraceptive methods
Matteson et al, 2006 <sup>[25]</sup>	2003	USA	Urban	14–25	424	Medium	Self-completed questionnaire	Low CPR and high unwanted pregnancy rate
Larsson et al, 2007 <sup>[26]</sup>	2003	Sweden	Undergraduates	17–21	331	High	Self-completed questionnaire	High premarital intercourse rate
Maria et al, 2007 <sup>[27]</sup>	2000	Ethiopia	General population	15–24	3988	Medium	Self-completed questionnaire	Low CPR and low level of SRH knowledge
Rocha et al, 2007 <sup>[28]</sup>	2002	Brazil	Urban	15–18	219	Medium	Self-completed questionnaire	Relatively high CPR and low level of contraceptive knowledge
Wang et al, 2007 <sup>[29]</sup>	2002	China	Urban	15–24	503	Medium	Self-completed questionnaire	Low CPR and high unwanted pregnancy rate
Olszewski et al, 2010 <sup>[30]</sup>	2008	Poland	Undergraduates	18–27	1478	High	Self-completed questionnaire	Use of unreliable contraceptives
Tafari et al, 2011 <sup>[31]</sup>	2008	Italy	Junior high/high school students	17–30	760	Medium	Self-completed questionnaire	High premarital intercourse rate
Doku et al, 2012 <sup>[32]</sup>	2008	Ghana	Undergraduates	15–18	644	Medium	Self-completed questionnaire	High rate of premarital sex and risky sexual behaviour
Higgins et al, 2012 <sup>[33]</sup>	2009	USA	General population	18–29	419	High	Face-to-face interview	Urgent need for preventive approach towards reproductive health
Lu et al, 2012 <sup>[34]</sup>	2008	China	Migrants	18–29	831	Medium	Self-completed questionnaire and face-to-face interview	Low SRH knowledge
Desrosiers et al, 2013 <sup>[35]</sup>	2007	USA	Urban	15–19	666	Medium	Face-to-face interview	Delay between first sexual intercourse and contraceptive use
He& Blum, 2013 <sup>[36]</sup>	2006	China	Urban	15–24	263	Medium	Self-completed questionnaire and face-to-face interview	Considerable risk of unintended pregnancy and abortion
Yip et al, 2013 <sup>[37]</sup>	2011	China	Urban	18–27	532	Medium	Self-completed questionnaire and face-to-face interview	Premarital sex more prevalent
Clark et al, 2014 <sup>[38]</sup>	2007	New Zealand	Junior high/high school students	15–18	1015	Medium	Self-completed questionnaire	Access to suitable contraception and education is required
Hood et al, 2014 <sup>[39]</sup>	2003	USA	Urban	15–25	734	High	Face-to-face interview	Urgent need for a preventive approach towards reproductive health
Melaku et al, 2014 <sup>[40]</sup>	2012	Ethiopia	Junior high/high school students	15–21	807	High	Self-completed questionnaire	Relative high premarital intercourse rate but low CPR
Sidze et al, 2014 <sup>[41]</sup>	2011	Senegal	Urban	15–29	237	Medium	Face-to-face interview	Low CPR
Tsitsika et al, 2014 <sup>[42]</sup>	2010	Greece	Junior high/high school students	15–16	568	High	Self-completed questionnaire	Unreliable contraceptive methods

*(continued)*

**Table 1**  
(continued).

Study	Survey year	Country	Population sampled	Age (years)	Sample size	Study quality*	Survey method	Key results
Nyarko, 2015 [43]	2008	Ghana	General population	15–19	941	Medium	Face-to-face interview	Low CPR and low level of contraceptive knowledge
Borges et al, 2016 [44]	2014	Brazil	Junior high/high school students	15–17	74589	Medium	Self-completed questionnaire	Heterogeneity in the prevalence of sexual initiation and CPR
Chimah et al, 2016 [45]	2016	Nigeria	Junior high/high school students	15–19	179	High	Self-completed questionnaire	Low use of contraceptives
Clarke et al, 2016 [46]	2012	USA	Urban	15–19	350	Medium	Self-completed questionnaire	Low SRH knowledge
Long et al, 2016 [47]	2013	China	Undergraduates	15–24	9052	High	Self-completed questionnaire	Low level of contraceptive knowledge and low CPR
Coronado et al, 2017[48]	2014	Spain	Undergraduates	18–24	1423	High	Self-completed questionnaire	High premarital intercourse rate and relative high CPR
Frederiksen et al, 2017[10]	2015	USA	Urban	15–44	6317	Medium	Face-to-face interview	Relatively premarital intercourse rate and high CPR
Hoopes et al, 2018 [49]	2012	USA	General population	15–24	1067	Medium	Self-completed questionnaire	Low SRH knowledge
Mendelsohn et al, 2018 [50]	2015	South Africa	General population	15–19	3613	Medium	Face-to-face interview	Relatively high premarital intercourse rate
Young et al, 2018 [51]	2010	Ireland	Junior high/high school students	15–18	2071	Medium	Self-completed questionnaire	High premarital intercourse rate and relatively high CPR

CPR=contraceptive prevalence rate, SRH=sexual and reproductive health.

\*Based on criteria explained in Section 2.

minimum of 104 in Italy to a maximum of 74,589 in Brazil. The publication years of the 37 surveys were distributed as follows: 6 (16.2%) were published between 1999 and 2004, 8 (21.6%) between 2005 and 2009, 13 (35.1%) between 2010 and 2014, and 10 (27.1%) between 2015 and 2018. Of the 37 studies, 7 (18.9%) were conducted in Asia, 8 (21.6%) in North America, 9 (24.3%) in Africa, 10 (27.0%) in Europe, 2 (5.4%) in South America and 1 (2.8%) in Oceania, covering a total of 19 countries. The studies in 19 articles sampled student populations: 9 (47.4%) in Europe, 3 (15.7%) in Asia, 4 (21.0%) in Africa, 1 (5.3%) each in South America, North America, and Oceania.

### 3.2. Prevalence of premarital sexual intercourse

The highest prevalence of premarital sexual intercourse was reported in Italy (87.6%, 95%CI 85.3–89.9%), and the lowest in China (10.1%, 95%CI 9.5–10.7%) (Fig. 2). Data on prevalence of premarital sexual intercourse were pooled from 25 studies to obtain a pooled prevalence of 41.9% (95%CI 34.2–49.6%; Fig. 2).

### 3.3. CPR overall

Based on data from 23 articles reporting CPR, the rate fluctuated worldwide between 9.3% (95%CI 7.1–11.5%) in Ethiopia to 96.3% (95%CI 91.5–100%) in Greece. CPR for the total sample of 14,222 sexually active unmarried women from 13 countries was 57.0% (95%CI 44.3–69.8%; Fig. 3).

### 3.4. CPR at first sexual intercourse

A total of 8 studies examined CPR among unmarried women at their first sexual intercourse. The pooled CPR at first sexual intercourse was 57.6% (95%CI 39.5–75.6%; Fig. 4).

### 3.5. Prevalence of highly prevalent contraceptive methods

During 1999 to 2018, unmarried women around the world relied predominantly on condoms, oral contraceptive pills (OCPs), rhythm, and withdrawal as their contraceptive methods. Among the 37 studies, 23 reported data on condom use, 23 on OCP use, 15 on withdrawal, and 8 on rhythm (Figs. 5–8). For condom use, the highest rate was reported in Greece (89.0%, 95%CI 84.2–93.8%) and the lowest in Nigeria (2.7%, 95%CI 0–6.4%) (Fig. 5). For OCP use, the highest rate was reported in Iceland (59.5%, 95%CI 56.7–62.3%) and lowest in South Africa (1.9%, 95%CI 1.2–2.6%) (Fig. 6). The highest rates of rhythm and withdrawal were reported in China (24.9%, 95%CI 22.1–27.7%) and Greece (51.9%, 95%CI 39.3–64.5%) (Figs. 7 and 8). Overall prevalence of condom use was 51.2% (95%CI 42.7–59.7%), followed by OCPs (20.5%, 95%CI 13.7–27.3%), withdrawal (12.7%, 95%CI 9.4–15.9%), and rhythm (12.1%, 95%CI 6.7–17.4%).

### 3.6. Heterogeneity analysis

To explain the high heterogeneity among studies, we divided them into subgroups by year of survey, study population, geographical region, and outcome measurements. Homogeneity was not achieved in any of these subgroups. During the subgroup analysis, we found that the pooled prevalence of premarital sex was highest in Europe (59.1%, 95%CI 39.4–78.8%), followed by Oceania (54.6%, 95%CI 51.5–57.7%), North America (40.6%, 95%CI 30.4–50.9%), Africa (35.2%, 95%CI 17.8–52.5%), Asia (24.2%, 95%CI 15.6–32.9%), and South America (22.6%, 95%CI 22.3–22.9%) (Fig. 9). The pooled results may be less reliable for South America and Oceania, since only one study came from each of these regions.



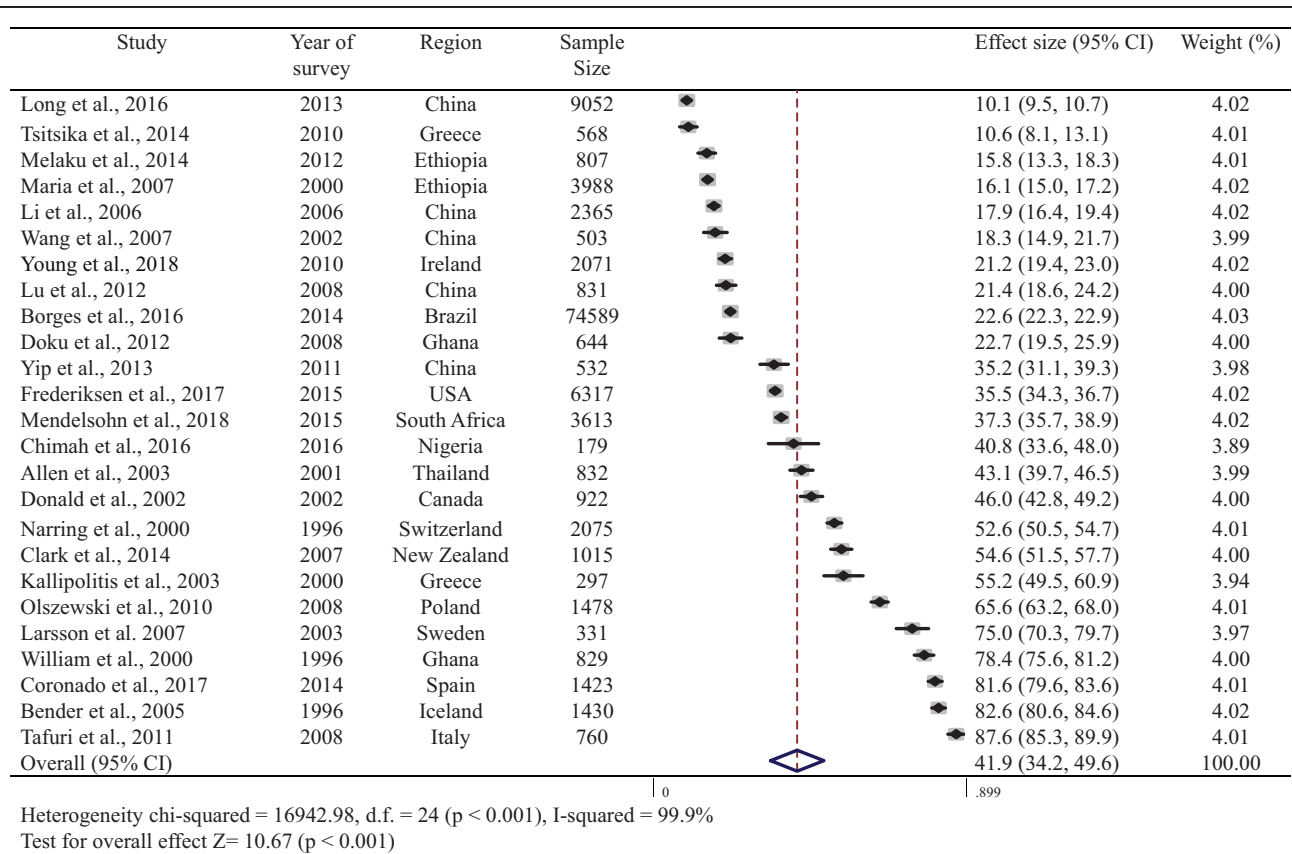


Figure 2. Prevalence of premarital sexual intercourse among unmarried women worldwide.

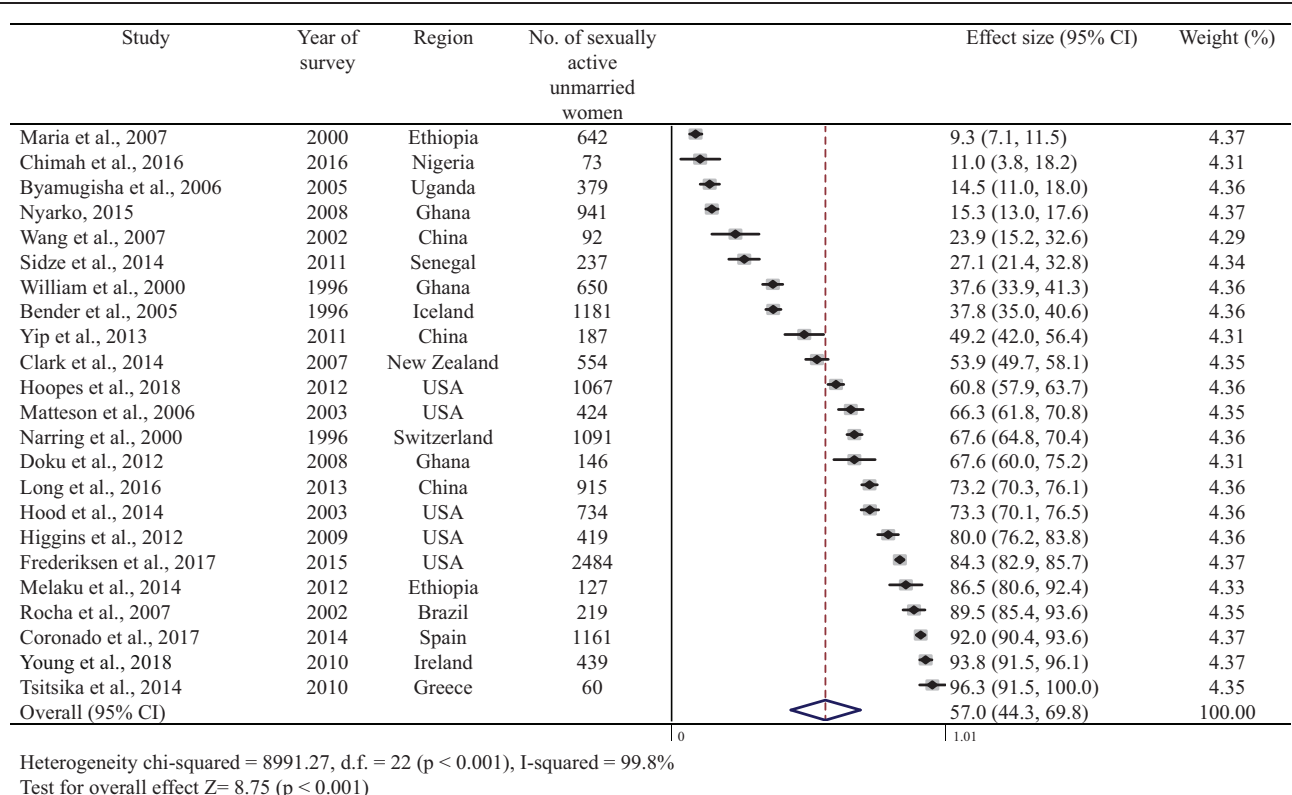


Figure 3. Contraceptive prevalence rate (CPR) among unmarried women worldwide.

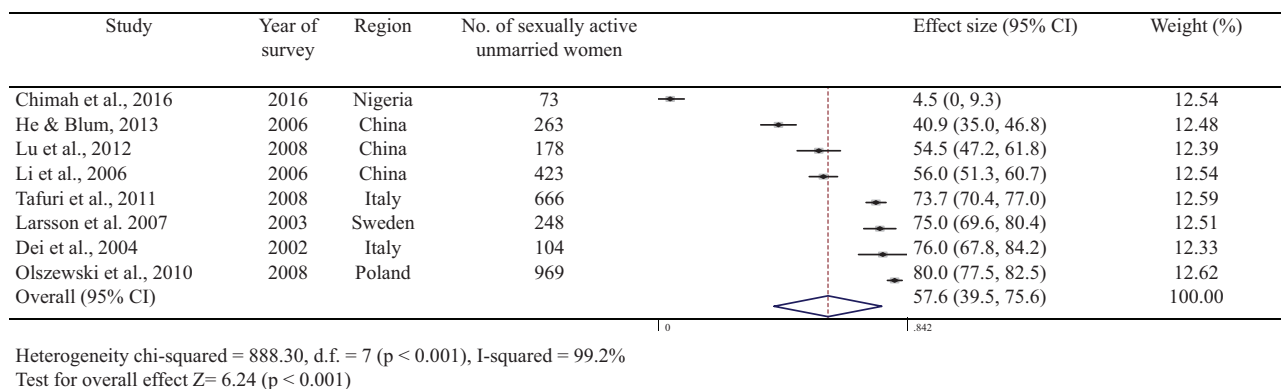


Figure 4. Contraceptive prevalence rate (CPR) at first sexual intercourse among unmarried women worldwide.

### 4. Discussion

#### 4.1. Principal findings

The pooled prevalence of premarital sex among unmarried women worldwide in our meta-analysis was 41.9% (95%CI 34.2–49.6%). Subgroup analysis showed that the incidence of premarital sex was lower among Asian women (24.2%) and African women (35.2%) than among European women (59.1%). At the same time, recent data from the Guttmacher Institute indicate that the unintended pregnancy rate has fallen more in developed regions than in developing ones.<sup>[7]</sup> This may reflect a deficit of SRH policies and curricula in developing areas that are aimed at expanding adolescents’ knowledge about, and full access to, contraceptives—regardless of sex, age, or marital status.

In our study, the overall CPR was 57.0% (95%CI 44.3–69.8%) and the estimated overall CPR at first intercourse was 57.6% (95%CI 39.5–75.6%). Among different contraceptive methods, the most prevalent was condom use, which was 51.2% (95%CI 42.7–59.7%) in unmarried women. Since condoms are

not only an effective contraceptive, but they can also prevent STIs and AIDS, they should be the most recommended method to young women who wish to use contraception. In addition, we noted that a percentage of young unmarried females still rely on the less effective contraceptive methods of withdrawal (12.7%, 95%CI 9.4–15.9%) and rhythm (12.1%, 95%CI 6.7–17.4%). Even in Europe and North America, the proportions of unmarried women using withdrawal were 15.3% and 8.7%, respectively, and the proportions using rhythm were 23.1% and 0.6%. These data may help explain the increasing number of unmarried women experiencing an unplanned pregnancy.<sup>[7]</sup> This suggests that supranational as well as national solutions are needed to advance effective contraceptive practices among unmarried women.

#### 4.2. Strengths and weaknesses of the study

Since unmarried women tend to have multiple sex partners over time, their sexual behaviors are particularly important to the

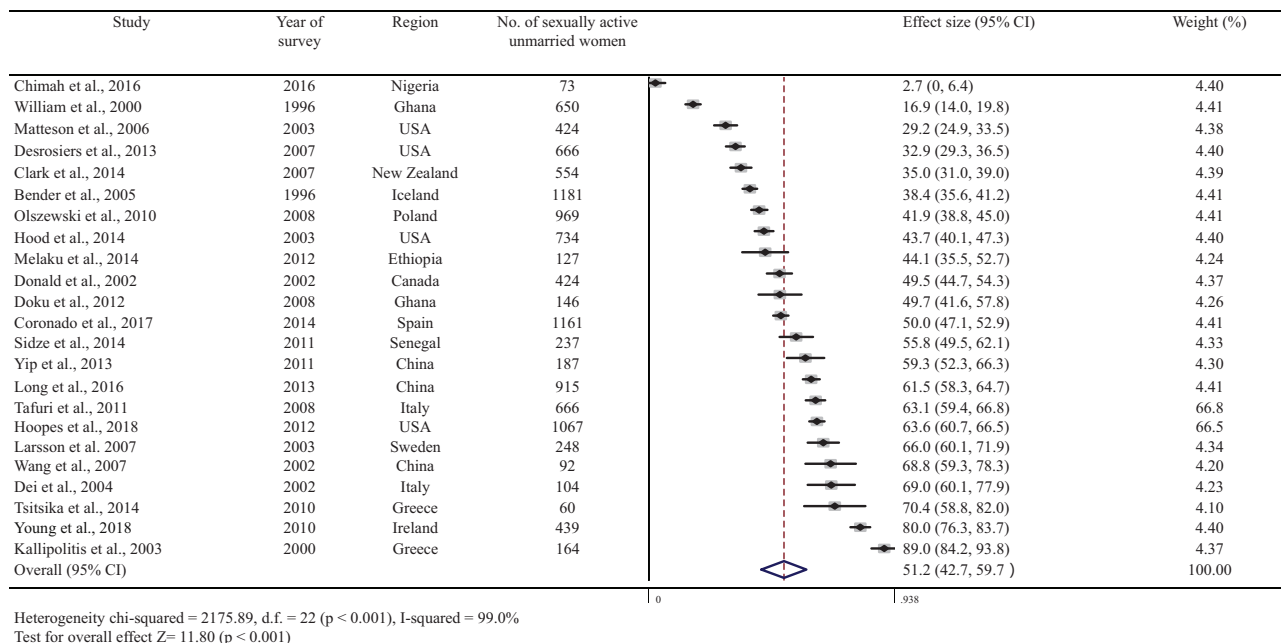


Figure 5. Studies on condom use by sexually active unmarried women worldwide.

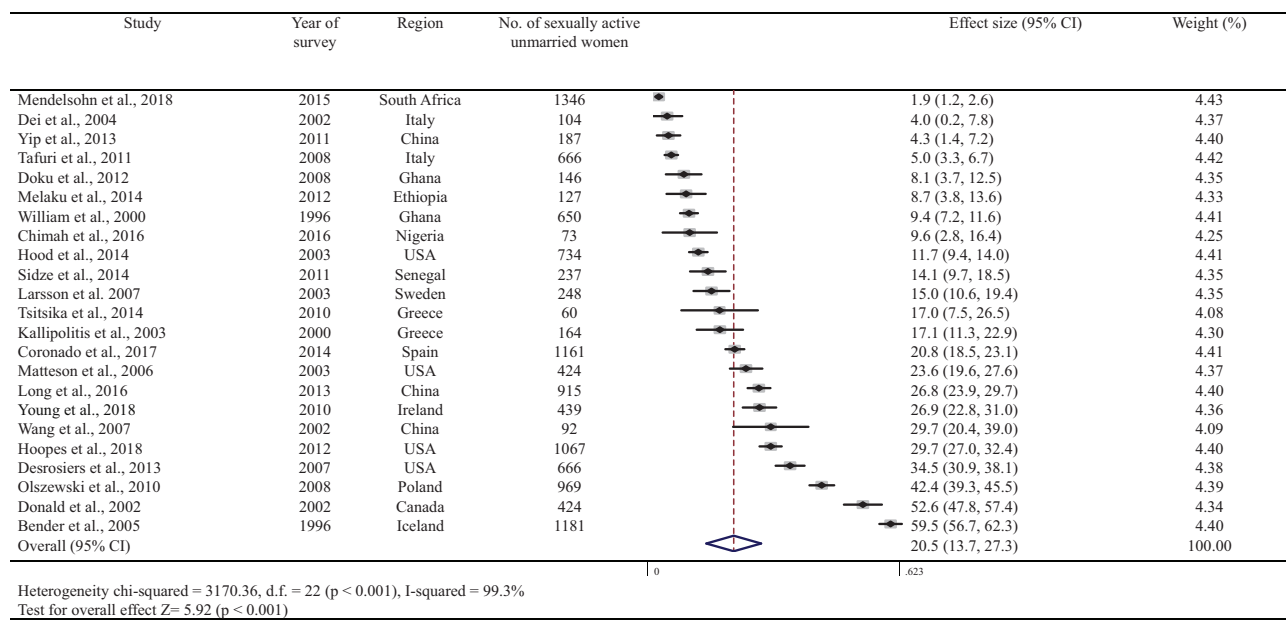


Figure 6. Studies on oral contraceptive pill use by sexually active unmarried women worldwide.

sexual and reproductive health of society more broadly. To the best of our knowledge, this is the first meta-analysis of contraceptive and reproductive health practices of unmarried women globally. The wide range in CPR reflects the heterogeneity in sexual and reproductive health practices around the world and therefore supports the need for analysis such as ours to guide appropriate interventions.

This meta-analysis has several limitations. First, although the final set of studies came from various geographical areas, numerous countries were not represented, especially those from Eastern Europe (including Russia), North Africa, the Middle East, and most of Latin America. Other populous countries such as Indonesia and Pakistan were also not included. This increases the risk that our sample is not representative of unmarried women around the globe. Second, we observed significant heterogeneity in our meta-analysis, which we could not fully control through subgroup analysis. The heterogeneity may have several explanations: Some surveys were conducted by face-to-face interviews

while others involved self-completed questionnaires without expert intermediaries. It is possible that many participants, especially those taking self-completed questionnaires, may not have been able or willing to respond to all questions accurately. Regardless of the survey method, responses may not always have been truthful, especially because premarital sexual behavior remains a highly sensitive topic in many cultures. As a result, unmarried women in certain countries may be less likely to admit a history of sexual intercourse. Although we restricted our data to women aged 14 to 25 years, socioeconomic situation and cultural standing may vary substantially even within this range, perhaps contributing to the heterogeneity in our analysis.

#### 4.3. Strengths and weaknesses of this study in relation to other studies

A previous systematic review of 21 studies in 12 low- and middle-income countries suggested that single adolescents receive

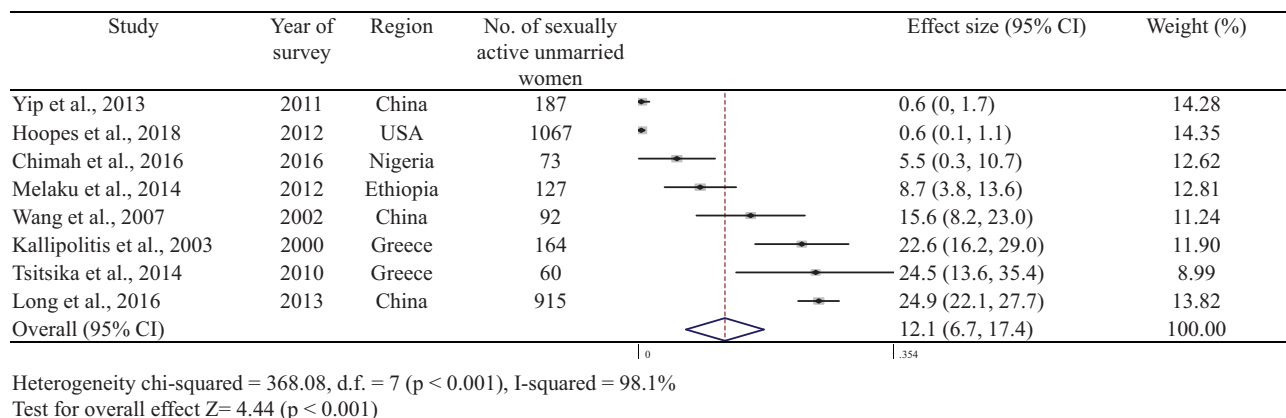


Figure 7. Studies on use of rhythm by sexually active unmarried women worldwide.



Study	Year of survey	Region	No. of sexually active unmarried women	Effect size (95% CI)	Weight (%)
Yip et al., 2013	2011	China	187	1.6 (0, 3.4)	7.55
Chimah et al., 2016	2016	Nigeria	73	2.7 (0, 6.4)	7.03
Desrosiers et al., 2013	2007	USA	666	2.9 (1.6, 4.2)	7.63
Larsson et al. 2007	2003	Sweden	248	3.0 (0.9, 5.1)	7.48
Tafari et al., 2011	2008	Italy	666	5.7 (3.9, 7.5)	7.55
Donald et al., 2002	2002	Canada	424	7.5 (5.0, 10.0)	7.39
Bender et al., 2005	1996	Iceland	1181	9.1 (7.5, 10.7)	7.58
Olszewski et al., 2010	2008	Poland	969	10.9 (8.9, 12.9)	7.51
Melaku et al., 2014	2012	Ethiopia	127	12.6 (6.8, 18.4)	6.24
Young et al., 2018	2010	Ireland	439	14.6 (11.3, 17.9)	7.16
Hoopes et al., 2018	2012	USA	1067	15.9 (13.7, 18.1)	7.46
Dei et al., 2004	2002	Italy	104	17.0 (9.8, 24.2)	5.63
Kallipolitis et al., 2003	2000	Greece	164	34.1 (26.8, 41.4)	5.61
Wang et al., 2007	2002	China	92	35.9 (26.1, 45.7)	4.58
Tsitsika et al., 2014	2010	Greece	60	51.9 (39.3, 64.5)	3.60
Overall (95% CI)				12.7 (9.4, 15.9)	100.00

Heterogeneity chi-squared = 346.84, d.f. = 14 (p < 0.001), I-squared = 96.0%  
 Test for overall effect Z= 7.54 (p < 0.001)

Figure 8. Studies on use of withdrawal by sexually active unmarried women worldwide.

Study	Year of survey	Sample Size	Effect size (95% CI)	Weight (%)
<b>Africa</b>				
Melaku et al., 2014	2012	807	15.8 (13.3, 18.3)	4.01
Maria et al., 2007	2000	3988	16.1 (15.0, 17.2)	4.02
Doku et al., 2012	2008	644	22.7 (19.5, 25.9)	4.00
Mendelsohn et al., 2018	2015	3613	37.3 (35.7, 38.9)	4.02
Chimah et al., 2016	2016	179	40.8 (33.6, 48.0)	3.89
William et al., 2000	1996	829	78.4 (75.6, 81.2)	4.00
Subtotal (I-squared = 99.7%, P < 0.001)			35.2 (17.8, 52.5)	23.94
<b>Europe</b>				
Tsitsika et al., 2014	2010	568	10.6 (8.1, 13.1)	4.01
Young et al., 2018	2010	2071	21.2 (19.4, 23.0)	4.02
Narring et al., 2000	1996	2075	52.6 (50.5, 54.7)	4.01
Kallipolitis et al., 2003	2000	297	55.2 (49.5, 60.9)	3.94
Olszewski et al., 2010	2008	1478	65.6 (63.2, 68.0)	4.01
Larsson et al. 2007	2003	331	75.0 (70.3, 79.7)	3.97
Coronado et al., 2017	2014	1423	81.6 (79.6, 83.6)	4.01
Bender et al., 2005	1996	1430	82.6 (80.6, 84.6)	4.02
Tafari et al., 2011	2008	760	87.6 (85.3, 89.9)	4.01
Subtotal (I-squared = 99.8%, P < 0.001)			59.1 (39.4, 78.8)	36.00
<b>North America</b>				
Frederiksen et al., 2017	2015	6317	35.5 (34.3, 36.7)	4.02
Donald et al., 2002	2002	922	46.0 (42.8, 49.2)	4.00
Subtotal (I-squared = 97.2%, P < 0.001)			40.6 (30.4, 50.9)	8.02
<b>South America</b>				
Borges et al., 2016	2014	74589	22.6 (22.3, 22.9)	4.03
Subtotal (I-squared = .%, P -)			22.6 (22.3, 22.9)	4.03
<b>Asia</b>				
Long et al., 2016	2013	9052	10.1 (9.5, 10.7)	4.02
Li et al., 2006	2006	2365	17.9 (16.4, 19.4)	4.02
Wang et al., 2007	2002	503	18.3 (14.9, 21.7)	3.99
Lu et al., 2012	2008	831	21.4 (18.6, 24.2)	4.00
Yip et al., 2013	2011	532	35.2 (31.1, 39.3)	3.98
Allen et al., 2003	2001	832	43.1 (39.7, 46.5)	3.99
Subtotal (I-squared = 99.2%, P < 0.001)			24.2 (15.6, 32.9)	24.02
<b>Oceania</b>				
Clark et al., 2014	2007	1015	54.6 (51.5, 57.7)	4.00
Subtotal (I-squared = .%, P -)			54.6 (51.5, 57.7)	4.00
Overall (95% CI)			41.9 (34.2, 49.6)	100.00

Figure 9. Estimated prevalence of premarital sexual intercourse among women from Africa, Europe, North America, South America, Asia and Oceania (25 studies), 1999 to 2018.

inadequate information about sexuality or SRH, which prevents them from adopting safer pregnancy prevention strategies and other good reproductive health practices.<sup>[5]</sup> Another systematic review of 15 studies covering 9 African countries showed high prevalence of premarital sexual intercourse and low contraceptive use among young girls and women aged 10 to 24 years.<sup>[7]</sup> These results from low- and middle-income countries are similar to ours, suggesting that our results from 37 studies in 19 countries in Africa, Asia, Europe, North America, South America, and Oceania may provide reliable insights into SRH practices among unmarried women. Our analysis also extends the literature by providing global insights into rates of use of specific contraceptive methods. All these findings call for greater attention and investment in appropriate SRH education for unmarried adolescents.

#### 4.4. Meaning of the study

Despite its limitations, our study is the first meta-analysis of CPR and the rates of use of highly prevalent contraceptive methods among unmarried women globally. The findings from this global study help us understand the contraceptive practices, and by extension the reproductive health practices, of unmarried women worldwide over the past 20 years. Our study found persistent use of ineffective contraceptive methods or no contraception at all, as well as a relatively high prevalence of premarital sex, at least in some regions. These findings highlight the need for government and civil society to step up efforts to sensitize unmarried women and their partners to SRH and help them improve their SRH behaviors.

#### 4.5. Unanswered questions and future research

This study raises at least three questions. First, we were unable to separate data on unmarried adolescents from those on unmarried young women, and studies suggest a global increase in premarital sex and unwanted pregnancy among adolescents in recent years.<sup>[3]</sup> Further work should focus on premarital sexual intercourse and contraceptive practices among unmarried adolescent women. Second, further work should examine SRH practices and contraceptive use among unmarried women in regions where such research is sorely lacking, that is, Eastern Europe, North Africa, the Middle East, and most of Latin America. Third, studies of particularly large countries, such as USA and China, may uncover geographical variations in contraceptive practices that are important for guiding interventions and policy.

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