

Review Article

Worldwide use of intrauterine contraception: a review☆☆

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Abstract

**Background:** Globally, 14.3% of women of reproductive age use intrauterine contraception (IUC), but the distribution of IUC users is strikingly nonuniform. In some countries, the percentage of women using IUC is <2%, whereas in other countries, it is >40%. Reasons for this large variation are not well documented. The aims of this review are to describe the worldwide variation in IUC utilization and to explore factors that impact utilization rates among women of reproductive age in different continents and countries.

**Study Design:** Published literature from 1982 to 2012 was reviewed, using Medline and Embase, to identify publications reporting diverse practices of IUC provision, including variation in the types of IUC available. Local experts who are active members of international advisory groups or congresses were also consulted to document variations in practice regulations, published guidelines and cost of IUC in different countries.

**Results:** Multiple factors appear to contribute to global variability in IUC use, including government policy on family planning, the types of health care providers (HCPs) who are authorized to place and remove IUC, the medicolegal environment, the availability of practical training for HCPs, cost differences and the geographical spread of clinics providing IUC services.

**Conclusions:** Our review shows that the use of IUC is influenced more by factors such as geographic differences, government policy and the HCP's educational level than by medical eligibility criteria. These factors can be influenced through education of HCPs and greater understanding among policy makers of the effectiveness and cost-effectiveness of IUC methods.

**Implications:** Globally, 14.3% of women of reproductive age use IUC, but the percentage of women using IUC is in some countries <2%, whereas in other countries, it is >40%. This paper reviews the reasons for this diverse and highlights possible starting points to improve the inclusion of IUC in contraceptive counseling.

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**Keywords:** Health care professional; Intrauterine contraception; Intrauterine device; Utilization; Variability

1. Introduction

Globally, 14.3% of women aged 15–49 years who are married or in union use intrauterine contraception (IUC) [1]. However, among women who use contraception, the percentage that use IUC varies greatly between continents/regions; from 1.8% in Oceania to 27.0% in Asia (Fig. 1) [1]. The distribution of IUC users is also geographically skewed: more than 80% of the world's IUC users live in Asia, with almost two-thirds (64%) of them living in China (Fig. 2) [1].

International experts in contraception have been suggesting that increasing the very low update rate of long-acting reversible contraception (LARC) may reduce the rate of unintended pregnancy [2]. This fact is also supported by an

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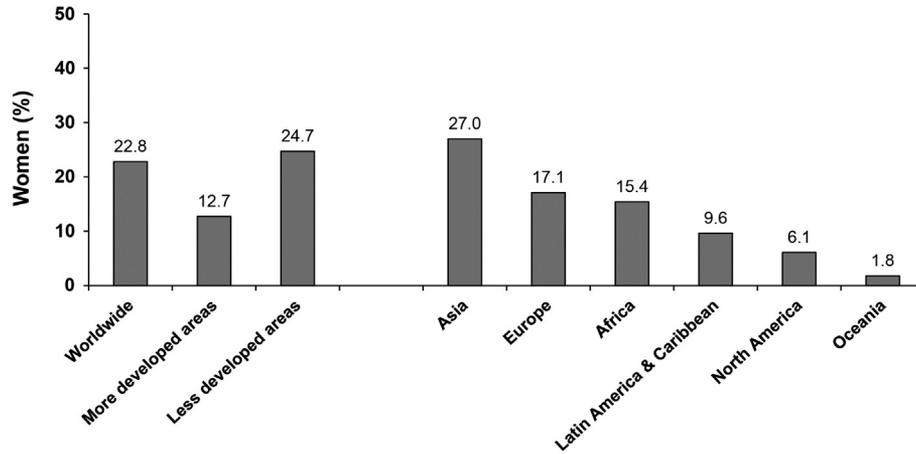


Fig. 1. Percentage of contraceptors (the subset of women who are using any form of contraception) aged 15–49 years, married or in union, who use IUC [1].

actual published study comparing different long-acting reversible contraceptives with other commonly prescribed contraceptive methods. The authors could show that the LARCs were superior to the other methods [3]. Although the evidence would suggest that these methods can be offered to most women of reproductive age, regardless of parity, in some countries only a small percentage of contraceptive users take up this method [4]. In this article, we aimed to explore the worldwide diversity of practice with regard to IUC, and the underlying factors that might explain the differences were noted. We aimed to use both the published literature and sought first-hand experience about local practices from experts across the globe.

## 2. Methods

We undertook a review of published literature using EMBASE, PubMed and Medline between 1982 and 2012 to explore IUC practices in various countries using the search terms “intrauterine contraception,” “IUD” “practices,” and “training.” We also drew on a pool of experts from across the globe to explore disparities that existed but that were not necessarily documented in published studies, especially variations in national guidelines, differences in placement recommendations and nation-specific differences in the costs of various types of IUC and the reimbursement systems in place. We consulted with clinicians in different countries and cross-checked information about prices and country-specific guidance from a number of sources including key professional organizations and national pharmaceutical databases.

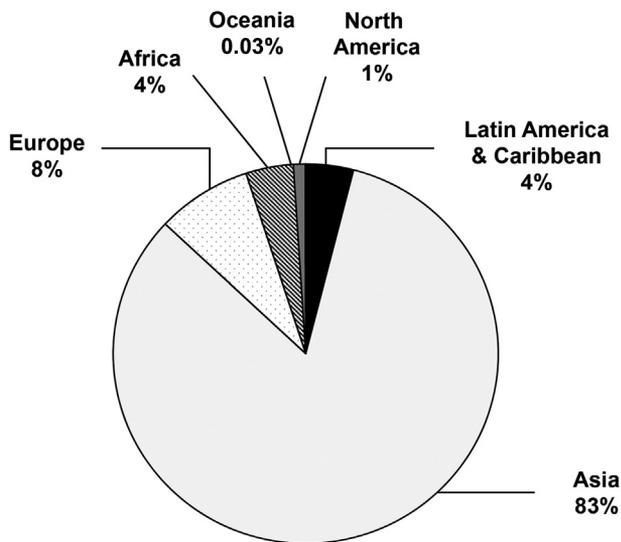


Fig. 2. Worldwide distribution of IUC users. Eighty-three percent of the world’s IUC users are in Asia. The remaining 8%, 4%, 4%, 1% and 0.03% are in Europe, Latin America/Caribbean, Africa, North America and Oceania, respectively. Data have been calculated from United Nations 2011 data tables based on data from surveys of women aged 15–49 years who are married or in union [1].

## 3. Results

### 3.1. Geographical variability in the prevalence of IUC use

Only 62.7% of women worldwide use any form of contraception, although the use of contraception is more prevalent in more developed areas (72.4% of women) than in less developed areas (61.2% of women) (Table 1) [1]. Globally, 14.3% of women and 22.8% of women using contraception use IUC (Table 1; Fig. 1). However, the use of IUC is more prevalent in the less developed areas of the world (15.1% of women; 24.7% of contraception users) than in the more developed areas (9.2% of women; 12.7% of contraception users) (Fig. 1; Table 1) [1].

#### 3.1.1. Variation between continents

The highest rate of IUC use is in Asia (17.9% and 27.0% of women and contraception users, respectively), followed by Europe (12.4%; 17.1%), Africa (4.4%; 15.4%), Latin America/Caribbean (7.0%; 9.6%), North America (4.8%; 6.1%) and Oceania (1.1%; 1.8%) (Table 1; Fig. 1) [1].

Table 1  
United Nations data on worldwide contraceptive use, 2011 [1]

Geographical area	Women aged 15–49 y married or in union (%)		
	Using any method of contraception	Using any modern method of contraception	Using IUC methods
Worldwide	62.7	56.1	14.3
More developed areas	72.4	61.3	9.2
Less developed areas	61.2	55.2	15.1
Africa (overall)	28.6	22.4	4.4
Sub-Saharan Africa	21.8	15.7	0.5
Northern Africa, excluding Sudan	60.5	54.0	22.3
Eastern Africa	28.4	22.9	0.5
Middle Africa	18.6	6.6	0.2
Northern Africa	50.4	44.8	18.1
Southern Africa	58.4	58.1	1.1
Western Africa	14.4	8.7	0.7
Asia (overall)	66.2	60.2	17.9
Central Asia	56.8	51.5	41.5
Eastern Asia	82.8	81.3	37.8
Southern Asia	53.9	45.8	2.0
South-Eastern Asia	62.2	54.7	9.9
Western Asia	55.1	35.8	14.2
Europe (overall)	72.6	58.7	12.4
Eastern Europe	74.9	54.3	16.3
Northern Europe	80.1	77.2	11.9
Southern Europe	63.8	46.3	5.7
Western Europe	71.9	68.6	11.4
Latin America and Caribbean (overall)	72.9	67.0	7.0
Caribbean	61.6	57.0	11.3
Central America	68.2	63.0	9.6
South America	76.1	69.6	5.5
North America (overall)	78.1	72.9	4.8
Canada	74.0	72.0	1.0
United States	78.6	73.0	5.3
Oceania (overall)	59.8	56.7	1.1
Australia/New Zealand	71.6	71.1	1.3
Melanesia/Micronesia/Polynesia	36.7	28.6	0.7

### 3.1.2. Variation within continents

In addition to the variation in IUC use that exists between continents, wide variations exist within some continents.

**3.1.2.1. Asia.** Within Asia, there is an extremely wide regional variation in the proportion of women using IUC (Table 1) [1]. Looking at individual Asian countries, in China, the Democratic Peoples' Republic of Korea and Vietnam, 41%–44% of women use IUC, compared with some other countries in the region that have IUC utilization rates of less than 2% [1]. In addition, data from Chinese national surveys conducted by the National Population and Family Planning Committee have shown that in married women aged 15–49 years, there has been an increase in IUC use from 42.1% in 1988 to 48.0% in 2006 [5].

**3.1.2.2. Europe.** The proportion of women using IUC in Europe also shows tremendous variation by region (Table 1)

and country. The highest rates of IUC use are in Estonia (35.9% of women), and the rates range between 16% and 28% in countries such as France, Slovenia, Latvia and the Scandinavian countries. In contrast, less than 8% of women use IUC in Ireland, Germany and Romania [1]. In addition, in a survey of randomly selected women aged 18–49 years from five European countries (approximately 200 women per country), the reported prevalence of IUC use was 19.0% in Sweden, 13.4% in France, 10.3% in the UK, 5.0% in Germany and 3.5% in Romania [6].

**3.1.2.3. Africa.** There is a clear dichotomization within Africa regarding IUC use: the proportions of women using IUC are very low (<2%) in the sub-Saharan, Eastern, Middle, Southern and Western regions, whereas they are high in Northern Africa (18.1% of women, or 22.3% if Sudan is excluded) (Table 1), with “hot spots” for IUC use in Tunisia and Egypt (27.8% and 36.1% of women, respectively) [1].

**3.1.2.4. North America.** The use of IUC has increased over recent years in North America, with ~5% of women (5.3% in the US, 1.0% in Canada) now using these methods [1]. Data from the 2006–2010 National Survey of Family Growth show that, among contraceptors (rather than all women) aged 15–44 years, 7.7% used IUC [7]. In addition, rates of IUC use in the US are influenced by ethnicity. For example, Hispanic women are more likely to use IUC than Caucasian women [8].

**3.1.2.5. Other.** The percentages of women in Latin America who use IUC vary regionally (9.6% in Central America; 5.5% in South America). In the Caribbean, 11.3% of women use IUC. By contrast, less than 2% of women in Oceania use IUC methods (Table 1) [1].

### 3.2. Types of IUC used in different countries: disparity in the variety of devices available and their costs to women

Although the use of IUC has been documented in almost all countries around the world [1], a comprehensive summary of the types of intrauterine devices (IUDs) used in each country is not available. In the 1960s and 1970s, inert IUDs were widely available, but issues concerning infection with the Dalkon Shield caused it to be removed from the market in 1975. Since then, most other inert devices have gradually been replaced by other types of devices, typically those containing copper [9,10]. Most countries have at least one T-framed copper device, but some countries produce and/or dispense up to 15 different varieties of copper IUD; some of these are available only in the country in which they are manufactured, whereas others are exported, imported or reimported and renamed (Table 2). In addition to copper IUC, hormonal IUC has been introduced. The levonorgestrel-intrauterine system (LNG-IUS), Mirena<sup>®</sup>, was first marketed in Finland in 1990 and is now available in over 120 countries throughout the

Table 2  
Devices and costs worldwide

Country	Devices available for use	Cost of the device	Cost of the placement procedure	Who pays?/Reimbursement
Europe				
France	Mirena®	125.37 EUR	38.40 EUR	<ul style="list-style-type: none"> <li>• Placement is reimbursed up to 65% by public insurance and 35% by private insurance; approximately 90% of the French population receives complementary private insurance</li> </ul>
	Gynelle 375 Mona Lisa Cu375 Mona Lisa Cu 375 SL Mona Lisa CuT 380A QL Mona Lisa NT Cu380 Multiload Cu375 Multiload 375 SL NT 380 standard NT 380 short TT380 UT 380 standard UT 380 short	30.50 EUR	38.40 EUR	<ul style="list-style-type: none"> <li>• Placement is reimbursed up to 65% by public insurance and 35% by private insurance; approximately 90% of the French population receives complementary private insurance</li> <li>• For women &lt;18 years of age, IUD cost and the placement procedure can be free in family planning clinics</li> </ul>
Germany	Mirena®	195 EUR	155–255 EUR	<ul style="list-style-type: none"> <li>• Fully reimbursed by public and private insurances for treatment of heavy menstrual bleeding and for contraception in women with certain illnesses that contraindicate use of pills</li> <li>• Partially or fully reimbursed by public insurance for contraception in women &lt;20 y of age (the percentage reimbursement depends on the woman's age)</li> <li>• Contraception is never covered by private insurance</li> <li>• Fully reimbursed by public insurance for women &lt;20 y of age</li> <li>• No reimbursement by public or private insurers for women ≥20 y of age</li> </ul>
	Flexi-T300 Flexi-T + 380 Multiload Cu375 Multi-safe 375 short stem T-safe 380A GyneFix®	15–30 EUR (GyneFix® 120 EUR)	155–210 EUR	
The Netherlands	Mirena®	~150 EUR	GP: 60 EUR Gynecologist: 95 EUR	<ul style="list-style-type: none"> <li>• The consultation/placement is totally reimbursed by the woman's health care insurance if she has an upgraded insurance, which is common in the Netherlands.</li> </ul>
	Flexi-T 300 Flexi-T plus 300 T-Safe Cu Multiload Cu375 GyneFix®	32–69 EUR	GP 60 EUR Gynecologist: 95 EUR	<ul style="list-style-type: none"> <li>• Hospital costs vary from hospital to hospital in the Netherlands according to the agreement with the insurance companies, but are between 155 and 330 EUR, so placement in total costs between 250 and 425 EUR <i>including</i> the device itself.</li> </ul>
		108 EUR	GP 60 EUR Gynecologist:95 EUR	

Table 2 (continued)

Country	Devices available for use	Cost of the device	Cost of the placement procedure	Who pays?/Reimbursement
Sweden	Mirena®	1000 SEK (119 EUR)	Placement service is free of charge to women when used for contraception (however, women pay for the device itself)	<ul style="list-style-type: none"> <li>• Mirena® is subsidized in some regions for younger women (the threshold for “younger” may be 20, 23 or 25 y depending on the region). For example, in Stockholm, women &lt;23 y of age pay 6 EUR for Mirena®</li> <li>• Mirena® placement is free of charge to women when it is for contraceptive purposes (the government reimburses the provider). However, women pay 20–30 EUR when Mirena® is placed for therapeutic (noncontraceptive) purposes</li> </ul>
	Nova T (380) Flexi-T 300 Flexi-T plus 300	100–200 SEK (12–24 EUR)	Placement service is free of charge	<ul style="list-style-type: none"> <li>• Provided free of charge to women in most (but not all) regions of Sweden (providers are reimbursed by the regional health services)</li> <li>• In regions where devices are not provided free of charge, women pay between 100 and 200 SEK (12–24 EUR)</li> <li>• Placement is performed free of charge to women (providers are reimbursed by the government)</li> </ul>
UK	Mirena®	Provided to women free of charge by the National Health Service	Placement is free of charge to women on the National Health Service	<ul style="list-style-type: none"> <li>• Mirena® and copper IUD are provided and placed free of charge to women (the provider is reimbursed by the National Health Service)</li> <li>• Private cost of copper devices: 8.52–26.64 GBP (9.97–31.37 EUR)</li> <li>• Private cost of Mirena®: 88 GBP (103 EUR)</li> <li>• Private placement fee for copper devices or Mirena®: 150–500 GBP (176–585 EUR)</li> </ul>
	Cu-safe T300	Provided to women free of charge by the National Health Service	Placement is free of charge to women on the National Health Service	
	Flexi-T300			
	Flexi-T + 380			
	Load 375			
	Mini TT 380			
	Multiloader Cu375			
	Multi-safe 375			
	Multi-safe 375 short stem			
	Neo-safe T30			
Nova-T 380				
T-safe 380A				
TT380 slimline				
UT380 short				
UT380 standard				
GyneFix®	Provided to women free of charge by National Health Service			
North America USA	Mirena®	Up to 875 USD (up to 673 EUR)	Up to 300 USD (up to 231 EUR)	<ul style="list-style-type: none"> <li>• Depending on a woman’s insurance, she may pay nothing or up to 875 USD for Mirena® or ParaGard®</li> <li>• Some insurance plans cover the cost (or a proportion of the cost) of both the device and its placement. Other plans may cover only the device or only the placement and vice versa.</li> <li>• Government-funded insurances vary considerably depending on the state the woman lives in</li> <li>• The new affordable care act in the US aims to provide contraception to all women at no cost to themselves; however, it is not yet clear who will cover these costs.</li> </ul>
	ParaGard®	Up to 875 USD (up to 673 EUR)	Up to 300 USD (up to 231 EUR)	
Canada	Mirena®	Up to 500 CAD (up to 378 EUR)	Placement service is free of charge	<ul style="list-style-type: none"> <li>• Some publicly funded clinics will provide IUC at no cost to the woman.</li> <li>• Some public and private insurance plans will cover IUC.</li> <li>• Insurance-plan coverage varies between provinces but usually covers 80%–100% of women.</li> <li>• If women are not covered by insurance, IUC will be entirely their expense.</li> </ul>
	Copper IUDs	Up to 150 CAD (up to 113 EUR)	Placement service is free of charge	

Latin America	Argentina	Mirena®	220 USD (169 EUR)	400–1000 USD (308–770 EUR)	<ul style="list-style-type: none"> <li>• Placement is available in private offices only.</li> <li>• Women pay for Mirena® and its placement themselves.</li> <li>• Women pay either the entire cost of the device and placement themselves (if they do not have insurance that covers this form of contraception) or the cost is partially reimbursed by the insurance company.</li> <li>• In publicly funded clinics the cost of copper IUDs and their placement is free to women</li> <li>• Women pay either the entire cost of Mirena® and its placement themselves (if they do not have insurance that covers Mirena®) or the cost is partially reimbursed by the insurance company.</li> <li>• Insurance covers Mirena® for contraception and treatment of heavy menstrual bleeding.</li> <li>• Women pay either the entire cost of the device and its placement themselves (if they do not have insurance that covers this form of contraception) or the cost is partially reimbursed by the insurance company.</li> <li>• Women pay for Mirena® and its placement themselves</li> <li>• Insurance covers Mirena® strictly for treatment of heavy menstrual bleeding, not for contraception.</li> <li>• Women in private office must pay for the device and its placement.</li> <li>• Copper IUDs and their placement are fully reimbursed by some insurances.</li> <li>• Women without insurance that covers copper IUDs pay the full cost of the device and its placement themselves.</li> <li>• In public clinics and hospitals, cost is covered by the government, so it is free for women.</li> </ul>
		Copper T380 Copper T375	10 USD (domestic manufacturing) (8 EUR)	Private office: 150–300 USD (115–231 EUR) Insurance plan: 60–90 USD (46–69 EUR)	
Brazil		Mirena®	300 USD (231 EUR)	Private office: 500 USD (385 EUR) Insurance plan: 50 USD (38 EUR)	<ul style="list-style-type: none"> <li>• In private office, women must pay for Mirena® and for placement.</li> <li>• Insurance companies do not cover the cost for contraception or treatment of heavy menstrual bleeding.</li> <li>• In some publicly funded clinics, Mirena® is provided to women free of charge (the cost is reimbursed by the government).</li> <li>• In private office, women must pay for copper IUDs and for placement.</li> <li>• Insurance companies do not cover the cost of copper IUDs.</li> <li>• Women are provided with copper IUDs free of charge in public clinics (providers are reimbursed by the government).</li> </ul>
		Copper T380 Copper T375	20 USD (15 EUR)	Private office: 500 USD (385 EUR) Insurance plan: 50 USD (38 EUR)	
Colombia		Mirena®	240–350 USD (185–269 EUR)	Private office: 190 USD (146 EUR) (Mirena is not provided by publicly funded clinics.)	<ul style="list-style-type: none"> <li>• All copper and stainless steel IUDs are provided free of charge to women (providers are reimbursed by the government).</li> <li>• Mirena® is subsidized, i.e., the women and the government share the cost.</li> <li>• Some hospital and sexual health clinics do not charge for fitting or only charge Medicare rebate, and others charge a flat fee of 100–175 AUD (81–141 EUR). Other practices may charge beyond this. This is the placement fee only, not the consultation fee.</li> <li>• Insurance plans cover the cost of the placement procedure, but not the cost of the device.</li> </ul>
		Copper T380	3–10 USD (2–8 EUR)	Private office: 100 USD (77 EUR) (cost of placement and device)	
Mexico		Mirena®	150 USD (115 EUR)	Insurance plan: 20–80 USD (15–62 EUR) Private office: 150 USD (115 EUR)	<ul style="list-style-type: none"> <li>• Purchased online/private script: 250–400+ AUD (202–323+ EUR)</li> </ul>
		Copper T380 Copper T375	7 USD (5 EUR)	Private office: 150 USD (115 EUR) Insurance plan: placement is not covered Public clinic: free of charge to women	
Asia-Pacific	China	Stainless steel rings Copper devices	Free of charge to women	Free of charge to women	
	Australia	Mirena®	Public script: up to 35.40 AUD (28.55 EUR)	0–200+ AUD(0–161+ EUR)	

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Table 2 (continued)

Country	Devices available for use	Cost of the device	Cost of the placement procedure	Who pays?/Reimbursement
	Copper IUD	110–140 AUD (89–113 EUR)	0–200 + AUD(0–161 + EUR)	<ul style="list-style-type: none"> <li>• Copper IUDs are not subsidized.</li> <li>• Some hospital and sexual health clinics do not charge for placement or only charge Medicare rebate, and others a flat fee of between 100 and 175 AUD (81–141 EUR). Other practices may charge beyond this. This is the fitting fee only, not the consultation fee.</li> </ul>
New Zealand	Mirena®	350–400 AUD (282–323 EUR)	28–600 AUD (23–484 EUR)	<ul style="list-style-type: none"> <li>• Mirena® is not subsidized, and women must pay 350–400 AUD (282–323 EUR) for the device.</li> <li>• However, Mirena® is free of charge to women when it is for the treatment of heavy menstrual bleeding.</li> <li>• Insurance plans cover the cost of the placement procedure, but not the cost of IUC.</li> </ul>
	Copper IUD	0 AUD	28 AUD (23 EUR)	<ul style="list-style-type: none"> <li>• Copper IUDs are free to women, the retail cost of 39.50 AUD (32 EUR) is fully funded.</li> </ul>

Currency conversions to Euros correct as of March 25, 2013.

world, although in many countries, access is limited by the cost [11,12].

Differences in the range of IUC options available may affect access for numerous reasons. However, the most obvious factor that influences access is cost [13,14].

Depending on the country, the cost of IUC and its placement might be charged to the health care system, insurance companies, nonprofit organizations or to women themselves. Medical insurance plans vary in the types of device covered and whether or not the cost of placement is included. Furthermore, in low-resource settings, where foreign aid is received for family planning, the methods of contraception provided may reflect donor preferences or may limit the contraceptive options available [15]. Obtaining information on both the cost of manufacturing and the costs to consumers is difficult, but costs are clearly not uniform around the world. In the UK, T-framed, U-framed and frameless copper devices and the LNG-IUS are available to women free of charge through the National Health Service; however, there is, of course, a cost to the health care system (Table 2).

In the US, the available IUC options include one 10-year T-shaped copper device (ParaGard®) and two LNG-IUSs (Mirena® and Skyla®). Depending on a woman's insurance plan, she could pay nothing or up to \$875 for any of the devices and up to \$300 for the placement of the device. Currently, women who have government-funded insurance in the US have variable access to IUC depending on the state in which they live. In 2014, the Patient Protection and Affordable Care Act in the US (commonly known as "ObamaCare") will come into effect. Although it is unclear how this act will impact the cost of IUC, the intention is for all women to have access to contraception at no cost to women themselves. However, there is considerable debate over who would be responsible for covering this financial burden and not all contraceptive methods have to be covered in any given State's plan.

In China, stainless steel rings (Fig. 3) continue to be placed despite the government's commitment to discontinue this option and switch to the use of more effective devices containing copper (Fig. 3) [16,17]. Whatever device a region chooses is provided free of charge to the women there. However, because stainless steel rings are less expensive for the family planning clinics to buy, for many years, these rings were the devices that were provided, despite their higher expulsion and failure rates [16].

In some countries, one IUC device may be provided or subsidized, whereas other devices are not. In Mexico and in most parts of Sweden, copper IUDs are provided to women free of charge, whereas women must pay for the LNG-IUS themselves if it is the method they desire. In New Zealand, the copper IUD is subsidized and is used more widely than the LNG-IUS [18]. Conversely, the LNG-IUS is subsidized in Australia under the Pharmaceutical Benefits scheme [19], and greater utilization is noted compared with copper IUDs [20].

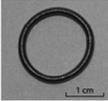
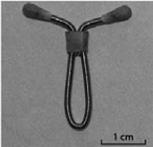
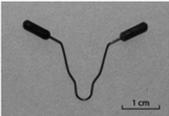
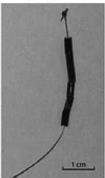
Stainless steel rings (SSRs)		
Stainless steel ring	<ul style="list-style-type: none"> <li>• Can be used permanently without need for periodic replacement</li> <li>• Commonly used in China</li> </ul>	
Double ring	<ul style="list-style-type: none"> <li>• A modified version of the SSR</li> <li>• Consists of a double-helical SSR</li> </ul>	
Combined stainless steel and copper devices		
Uterine-shaped IUD	<ul style="list-style-type: none"> <li>• Consists of a stainless steel coiled wire framework in the shape of the uterine cavity with copper inside the coiled wire</li> </ul>	
Gamma Cu 380 IUD	<ul style="list-style-type: none"> <li>• Comprises a gamma-shaped stainless steel wire frame with copper wire in the middle layer</li> <li>• Two silicone elastomer beads containing indomethacin are welded to both ends of the horizontal arms and a silicone elastomer ring is placed in the middle of the device</li> <li>• Release of indomethacin reduces menstrual bleeding</li> </ul>	
Framed copper devices		
AiMu MCu	<ul style="list-style-type: none"> <li>• Consists of a support made of titanium-nickel alloy with a spring-like action in the middle of the support that allows the device to conform to the shape of the uterine cavity</li> <li>• When placed, the grains on the ends of the support create a zone of high copper density close to the tubal ostia, preventing sperm entry</li> <li>• This new device is increasingly being used in China</li> </ul>	
Flexi T Cu	<ul style="list-style-type: none"> <li>• Similar to Western Copper T IUDs with a copper-bearing shaft</li> </ul>	
Frameless copper device		
GyneFix®	<ul style="list-style-type: none"> <li>• Consists of six 5 mm copper sleeves threaded onto a monofilament polypropylene thread</li> <li>• At the proximal end of the thread, there is a knot that is anchored into the myometrium of the uterine fundus, thus securing the device in the uterine cavity</li> </ul>	

Fig. 3. IUDs (including those available only in China) [48].

### 3.3. Practitioner variation

#### 3.3.1. Types of health care providers authorized to provide IUC services

Through practitioners working in different countries, we obtained information about both the types of health care providers (HCPs) that provide IUC and the settings in which this provision occurs. One of the key variations is whether countries train and permit placement by nurses and/or

midwives (Table 3). In Germany, IUC services are provided only by obstetrician-gynecologists. In the neighboring Netherlands, IUC services are provided by a wider range of HCPs, including family practice physicians and general practitioners. In Sweden, midwives provide most contraceptive services.

Differences in the types of HCP that are authorized to provide IUC services have a marked influence on IUC uptake rates. This is particularly evident in countries with

Table 3  
HCPs for IUC by country

Country	Provider			Location			
	Obstetrician/ Gynecologist	Family practice physician or general practitioner	Nurse, midwife or other provider	Provider's office	Sexual health, contraception or youth clinic	Abortion clinic	Hospital-based community clinic
Europe							
Germany	✓			✓			
UK	✓	✓			✓	✓	✓
France	✓	✓	✓	✓	✓	✓	✓
The Netherlands	✓	✓		✓		✓	✓
Sweden	✓		✓	✓	✓	✓	✓
North America							
USA	✓	✓	✓	✓	✓	✓	✓
Canada	✓	✓		✓	✓	✓	✓
Latin America							
Mexico	✓	✓		✓	✓	✓	✓
Costa Rica	✓	✓	✓	✓			✓
Colombia	✓	✓	✓	✓	✓	✓	✓
Argentina	✓	✓		✓	✓		✓
Brazil	✓	✓	✓		✓		✓
Asia/Asia-Pacific							
China	✓			✓		✓	✓
India	✓		✓	✓	✓	✓	✓
Australia	✓	✓		✓	✓	✓	✓

geographically isolated rural populations who are unable to travel to clinics offering IUC services. For example, in Turkey, initial attempts to extend access to IUC in rural areas via physician-run mobile clinics were less successful than anticipated owing to difficulties in providing adequate postplacement follow-up care [4]. Initial research undertaken to assess whether IUC placements and removals could be performed safely by local midwives who could provide both immediate and follow-up care at a location accessible to women living in rural villages [21]. The study demonstrated that nurses were at least as careful as physicians in performing IUC placements and, based on these findings, the Turkish Government authorized midwives to provide IUC services. A similar approach has been studied in Sudan in the late 90s when midwives undertook a 3-week training course for the insertion of IUDs. The rate of incorrect insertions was evaluated in 520 patients, and just 6 (1.2%) IUDs were found to have been incorrectly placed [22]. This contributed to a steady and sustained increase in IUC use over the following decade [4]. In contrast, one study has shown a higher failure rate when IUC was inserted by nurses compared to physicians. This fact was discussed as the result of an insufficient training in nurses [23].

The provision of IUC services in Egypt used to be the sole prerogative of obstetrician-gynecologists. However, since the mid-1980s, a steady increase in IUC use has been achieved, in part by allowing general practitioners to place and remove devices, with careful attention given to the training and certification of these providers [4]. In addition, since the mid-1990s, nurses have been trained and provided with incentives to place IUC [24].

### 3.3.2. Availability of practical training

An important factor-limiting access to IUC is the availability of providers who have the skills, time and support to train other HCPs. In the UK, a shortage of trainers has led to waiting lists for training program opportunities and hence a delay in physicians gaining the Letter of Competence in Intrauterine Techniques qualification [25].

### 3.4. Locations at which IUC services are accessed

The locations at which women can access IUC services also vary between countries (Table 3). For example, in Germany, IUC services are provided only in obstetrician-gynecologists' offices. However, in many other countries, IUC services can be accessed at a choice of locations, including HCPs' offices, sexual health clinics, contraception or youth clinics, abortion clinics and hospital-based community clinics.

### 3.5. The medicolegal environment

The medicolegal environment can impact IUC provision, and fear of liability has frequently been cited by US-based physicians as a barrier to more liberal prescribing of these methods [26–28]. This may include fear of liability for uterine perforation and, in particular, the fear that if the woman at any point experiences pelvic inflammatory disease or infertility, she may blame it on the LNG-IUS/copper IUD and the provider who placed it. In a survey of Fellows of the American College of Obstetricians and Gynecologists (ACOG) conducted in 2002, a significant correlation ( $p < .001$ ) was found between physicians' fear of litigation and a lower number of IUC placements performed the previous year [29]. However, outside the

US, fear of litigation is much less of a barrier to HCPs offering IUC services.

### 3.6. Factors at the HCP level

HCPs' attitudes have a strong influence on rates of IUC use. The likelihood that an HCP will prescribe IUC depends on many factors, including the providers' knowledge base, and whether they have received appropriate training on placement/removal techniques and patient counseling [30]. Several misperceptions remain among HCPs regarding the efficacy and safety of IUC and the types of women for whom it is unsuitable [30–34].

The degree to which these misperceptions curtail IUC use in individual countries may depend on the persistence of these misperceptions and the success that educational programs have had in dispelling them. Family planning experts in the US for example are actively addressing the misperceptions among women and HCPs regarding the safety of IUC and the unsuitability of these methods for certain groups of women (e.g., nulliparous women and adolescents) [30,35].

### 3.7. Factors at the end-user level: religious and cultural influences

Cultural and religious influences in different countries create environments that are more or less favorable to IUC use. For example, in Muslim countries, bleeding disturbances associated with IUC interfere with women's religious and social activities [36]. In contrast, in Mexico, IUC is widely used, in part because Mexican women appreciate the confidentiality that this type of contraception offers [4].

### 3.8. Variation in local guidelines and package inserts

International guidelines, in the form of the World Health Organization (WHO) Medical Eligibility Criteria (MEC) [37], exist to guide contraceptive practice throughout the world. Individual countries also produce their own guidelines such as US Center for Disease Control and Prevention MEC [38], the UK MEC [39] and Australian guidelines [40], which are broadly based on the WHO recommendations. All of these have relaxed recommendations regarding IUC use in nulliparous women and adolescents and after first- or second-trimester abortions. However, some national guidelines have been slow to acknowledge the evidence supporting use of IUC in nulliparous women; for example, the German guidelines continue to regard IUC as a second choice for nulliparous women [41], whereas no such restrictions are mentioned in the Australian product information [42].

There are also variations between countries in the package inserts for different intrauterine contraceptives. For example, in the US, although the package insert for the copper IUD (ParaGard®) was revised significantly in 2005 (the restrictive "recommended patient profile" was removed entirely), the current package insert for the LNG-IUS (Mirena®) does

not support use in nulliparous women; the insert recommends use in "women who have had at least one child" [43].

There are between-country divergences in preplacement screening practices that are not always evidence based but are driven by local recommendations. One example of such a divergence is the use of preplacement screening for sexually transmitted infections (STIs). In the US, the ACOG guidelines state that for a woman at high risk of STIs (e.g., aged  $\leq 25$  years or with multiple sexual partners), it is reasonable to screen for STIs and then place the IUC on the same day (and subsequently treat the infection if the results are positive) or alternatively wait until the test results are available before placing IUC [44]. In the UK, National Institute for Health and Clinical Excellence guidance recommends that women "at risk of STIs" should be tested for chlamydia and gonorrhea (if the woman lives in an area where gonorrhea is prevalent) before placement of IUC and, if STI screening is not possible, antibiotic prophylaxis should be given before IUC placement [2].

Guidelines regarding cervical cancer screening requirements before IUC placement also vary between countries. For example, in Germany, a Pap smear within 6 months of placement is mandatory [41], whereas in the UK, preplacement Pap smears are not mandated [2]. Taking the Pap smear before IUD placement is not really based on evidence-based facts [44]. These examples should give an impression how national guidelines as well as country-specific labeling are likely to contribute to diversity of practice.

### 3.9. Limitations

Unfortunately, we could not explore all barriers and country-specific reasons, as there are very complicated and sometimes not well-documented factors related to political, religious or other beliefs.

## 4. Conclusions

There is considerable variation between continents and countries in the rates of IUC use and the types of device that are used. Multiple factors contribute to this variability, including government policy, funding for contraception, types of HCP involved in IUC placement and types of clinics that provide IUC services. In addition, the geographic distribution of clinics providing IUC services (e.g., lack of access in rural areas), differences in how IUC services are funded and misperceptions regarding the unsuitability of IUC for certain groups of women appear to have a substantial impact on IUC use. The religious and sociocultural sensitivities in different countries also create environments that are more or less favorable to IUC use.

Our review shows that in practice the use of IUC is influenced more by factors including geographic differences, government policy and the HCP's educational level than by medical eligibility criteria. In order to increase the use of IUC methods, which are both highly effective and highly cost-

effective, a program of HCP education and health policy changes will need to occur in those countries where low rates of IUC uptake are documented. The US and the UK have already recognized a need to increase IUC use and have developed national evidence-based guidelines [2,44]. An upward trend in IUC use has been documented in these countries in the past few years [45,46]. Globally, a compelling reason for governments and health care systems to reduce the diversity in access to IUC is to make them aware that IUC is among the most cost-effective methods available [12,47].

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## References

- [1] United Nations. World contraceptive use 2011. 2011. Available at: <http://www.un.org/esa/population/publications/contraceptive2011/contraceptive2011.htm>. Accessed February 8, 2013.
- [2] National Collaborating Centre for Women's and Children's Health, National Institute for Health and Clinical Excellence. Long-acting reversible contraception: The effective and appropriate use of long-acting reversible contraception. 2005.
- [3] Winner B, Peipert JF, Zhao Q, et al. Effectiveness of long-acting reversible contraception. *N Engl J Med* 2012;366:1998–2007.
- [4] d'Arcangues C. Worldwide use of intrauterine devices for contraception. *Contraception* 2007;75:S2–S7.
- [5] Zheng X, Tan L, Ren Q, et al. Trends in contraceptive patterns and behaviors during a period of fertility transition in China: 1988–2006. *Contraception* 2012;86:204–13.
- [6] de Irala J, Osorio A, Carlos S, Lopez-del Burgo C. Choice of birth control methods among European women and the role of partners and providers. *Contraception* 2011;84:558–64.
- [7] Finer LB, Jerman J, Kavanaugh ML. Changes in use of long-acting contraceptive methods in the United States, 2007–2009. *Fertil Steril* 2012;98:893–7.
- [8] Mosher WD, Jones J. Use of contraception in the United States: 1982–2008. *Vital Health Stat* 2010;23:1–4.
- [9] Cates Jr W, Ory HW, Rochat RW, Tyler Jr CW. The intrauterine device and deaths from spontaneous abortion. *N Engl J Med* 1976;295:1155–9.
- [10] Dafni L, Tamir A, Spenser T, Spenser S. Long term use of inert intrauterine contraceptive devices in 94 women in Israel. *Br J Gen Pract* 1992;42:423–5.
- [11] Bastianelli C, Farris M, Benagiano G. Use of the levonorgestrel-releasing intrauterine system, quality of life and sexuality. Experience in an Italian family planning center. *Contraception* 2011;84:402–8.
- [12] Trussell J, Lalla AM, Doan QV, Reyes E, Pinto L, Gricar J. Cost effectiveness of contraceptives in the United States. *Contraception* 2009;79:5–4.
- [13] Pace LE, Dusetzina SB, Fendrick AM, Keating NL, Dalton VK. The impact of out-of-pocket costs on the use of intrauterine contraception among women with employer-sponsored insurance. *Med Care* 2013; 51:959–63.
- [14] Garipey AM, Simon EJ, Patel DA, Creinin MD, Schwarz EB. The impact of out-of-pocket expense on IUD utilization among women with private insurance. *Contraception* 2011;84:e39–42.
- [15] The ESHRE Capri Workshop Group. Intrauterine devices and intrauterine systems. *Hum Reprod Update* 2008;14:197–208.
- [16] MacDonald TL, Gerscovich EO, McGahan JP, Fogata M. The Chinese ring: a contraceptive intrauterine device. *J Ultrasound Med* 2006;25: 273–5.
- [17] Bilian X. Chinese experience with intrauterine devices. *Contraception* 2007;75:S31–4.
- [18] Rose SB, Wei Z, Cooper AJ, Lawton BA. Peri-abortion contraceptive choices of migrant Chinese women: a retrospective review of medical records. *PLoS One* 2012;7:e40103.
- [19] Australian Government Department for Health and Aging. Pharmaceutical Benefits Scheme (PBS). 2013. Available at: <http://www.pbs.gov.au/medicine/item/8633J>. Accessed February 20, 2013.
- [20] Harvey C, Bateson D, Black K. A prospective study of outpatient Intrauterine device insertion in women with and without a history of a previous vaginal delivery. *Aust N Z J Obstet Gynaecol* 2011;51:474.
- [21] Eren N, Ramos R, Gray RH. Physicians vs. auxiliary nurse-midwives as providers of IUD services: a study in Turkey and the Philippines. *Stud Fam Plann* 1983;14:43–7.
- [22] Aziz FA, Osman AA. Safety of intrauterine device insertion by trained nurse-midwives in the Sudan. *Adv Contracept* 1999;15:9–4.
- [23] Lassner KJ, Chen CH, Kropsch LA, Oberle MW, Lopes IM, Morris L. Comparative study of safety and efficacy of IUD insertions by physicians and nursing personnel in Brazil. *Bull Pan Am Health Organ* 1995;29:206–15.
- [24] The Population Council. IUD use dynamics in Egypt: Asia & Near East Operations Research and Technical Assistance Project. 1985. Available at: [http://www.popcouncil.org/pdfs/frontiers/OR\\_TA/Asia/egypt\\_IUD.pdf](http://www.popcouncil.org/pdfs/frontiers/OR_TA/Asia/egypt_IUD.pdf). Accessed October 2012.
- [25] Lee DJ. Training to fit intrauterine devices/intrauterine systems for general practitioners: is there an alternative method of service delivery? *J Fam Plann Reprod Health Care* 2007;33:205–7.
- [26] MacIsaac L, Espey E. Intrauterine contraception: the pendulum swings back. *Obstet Gynecol Clin N Am* 2007;34:91–111, ix.
- [27] Association of Reproductive Health Professionals. New developments in intrauterine contraception: use of intrauterine contraception in the United States. 2004. Available at: <http://www.arhp.org/Publications-and-Resources/Clinical-Proceedings/CP-Archives>. Accessed November 1, 2011.
- [28] Farr G. The IUD: will its future always be crippled by its past? *Family Plan World* 1993;3:5, 26.
- [29] Stanwood NL, Garrett JM, Konrad TR. Obstetrician-gynecologists and the intrauterine device: a survey of attitudes and practice. *Obstet Gynecol* 2002;99:275–80.
- [30] Black K, Lotke P, Buhling KJ, Zite NB. A review of barriers and myths preventing the more widespread use of intrauterine contraception in nulliparous women. *Eur J Contracept Reprod Health Care* 2012;17: 340–50.
- [31] Black KI, Lotke P, Lira J, Peers T, Zite NB. Global survey of healthcare practitioners' beliefs and practices around intrauterine contraceptive method use in nulliparous women. *Contraception* 2013;88(5):650–6.
- [32] Harper CC, Blum M, de Bocanegra HT, et al. Challenges in translating evidence to practice: the provision of intrauterine contraception. *Obstet Gynecol* 2008;111:1359–69.
- [33] Tyler CP, Whiteman MK, Zapata LB, Curtis KM, Hillis SD, Marchbanks PA. Health care provider attitudes and practices related to intrauterine devices for nulliparous women. *Obstet Gynecol* 2012;119:762–71.
- [34] Madden T, Allsworth JE, Hladky KJ, Secura GM, Peipert JF. Intrauterine contraception in Saint Louis: a survey of obstetrician and gynecologists' knowledge and attitudes. *Contraception* 2010;81: 112–6.
- [35] Lyus R, Lohr P, Prager S. Use of the Mirena LNG-IUS and Paragard CuT380A intrauterine devices in nulliparous women. *Contraception* 2010;81:367–71.
- [36] Salem RM, Setty V, Williamson RT, Schwandt H. When contraceptives change monthly bleeding. *Popul Rep J* 2006;1, 3–1,19.
- [37] World Health Organization. Medical eligibility criteria for contraceptive use: fourth edition. 2010. Available at: [http://whqlibdoc.who.int/publications/2010/9789241563888\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241563888_eng.pdf). Accessed May 23, 2013.

- [38] Centers for Disease Control and Prevention. MMWR early release: U.S. medical eligibility criteria for contraceptive use. 59. 2010. Available at: <http://www.cdc.gov/mmwr/pdf/rr/tr59e0528.pdf>. Accessed May 23, 2013.
- [39] Faculty of the Royal College of Obstetricians and Gynaecologists. UK medical eligibility for contraceptive use. 2009. Available at: <http://www.fsrh.org/pdfs/UKMEC2009.pdf>. Accessed January 21, 2013.
- [40] Family Planning New South Wales. Family Planning New South Wales. Family Planning Queensland Family Planning Victoria, Contraception: an Australian clinical practice handbook. 3rd edn. Queensland: 2012.
- [41] Gemeinsamen Bundesausschusses. Richtlinie des Gemeinsamen Bundesausschusses zur Empfängnisregelung und zum Schwangerschaftsabbruch. Bundesanzeiger Nr. 60a. 1985. Available at: <http://www.g-ba.de/informationen/richtlinien/9/>.
- [42] Bayer HealthCare Pharmaceuticals Inc. Mirena® Australian Prescribing Information. 2013. Available at: <http://www.bayerresources.com.au/resources/uploads/PI/file9399.pdf>.
- [43] Bayer HealthCare Pharmaceuticals Inc. Mirena® (levonorgestrel-releasing intrauterine system) Prescribing Information. 2009. Available at: [http://www.berlex.com/html/products/pi/Mirena\\_PI.pdf](http://www.berlex.com/html/products/pi/Mirena_PI.pdf). Accessed May 23, 2013.
- [44] ACOG Committee on Practice Bulletins—Gynecology. ACOG Practice Bulletin No. 121: Long-acting reversible contraception: implants and intrauterine devices. *Obstet Gynecol* 2011;118:184–96.
- [45] Hubacher D, Finer LB, Espey E. Renewed interest in intrauterine contraception in the United States: evidence and explanation. *Contraception* 2011;83:291–4.
- [46] National Institute for Health and Clinical Excellence. NICE Implementation uptake report: Long-acting reversible contraception (LARC). 2010. Available at: <http://www.nice.org.uk/media/67F/C5/UptakeReportCG30LARC.pdf>. Accessed October 2012.
- [47] Mavranzouli I, LARC Guideline Development Group. The cost-effectiveness of long-acting reversible contraceptive methods in the UK: analysis based on a decision-analytic model developed for a National Institute for Health and Clinical Excellence (NICE) clinical practice guideline. *Hum Reprod* 2008;23:1338–45.
- [48] Cheung VY. Sonographic appearances of Chinese intrauterine devices. *J Ultrasound Med* 2010;29:1093–101.