

Abstract

Hormonal IUD is the major hormonal contraceptive method used among women aged 40-49 years: data from the 2015-16 Tromsø Study, Norway

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Objective: This study aims to investigate hormonal contraceptive (HC) use and user characteristics in women aged 40-49 years in Norway, as little is known on use of HCs in this age segment.

Material and methods: This prevalence study included 2296 women aged 40-49 years who participated in the 2015-16 Tromsø Study, which collected self-reported sociodemographic information and data from a wide range of validated health questionnaires. The participants had been sexually active the last 12 months prior enrollment, were not pregnant, not trying to conceive, and had no prior fertility problems. We categorized use of HC into three groups; no HC use, hormonal IUD use and other HC use. Explanatory variables included demographic, educational, economic and general health variables. All analyses were performed in SPSS with chi-square test and logistic regression at significance level $p < 0.05$.

Results: Nearly 50% of the study sample reported HC use with hormonal IUD use as the major method (39.5%/40-44 years; 43.4%/45-49 years old women). There were no differences in HC use by partner status, educational level, or BMI. Though statistically significant, we found only minor differences in HC use by occupational status, gross household income, and general health status, with higher proportions of women with no paid work, the lowest income, and poor health status reporting no HC use.

Conclusion: The high HC use and the minor differences found across demographic and socioeconomic parameters indicate that HC use, and hormonal IUD use in particular, is widely used among middle-aged women living in the city of Tromsø.

Key words: Hormonal contraceptives, combined oral contraceptives, progestogen-only pills, implants, hormonal intrauterine device, hormonal patch, hormonal injection, premenopausal women

Abbreviations:

BMI	Body mass index
CI	Confidence interval
HCs	Hormonal contraceptives
IUD	Intrauterine device

Introduction

Women aged 40-49 years make up 13% of Norway's female population (1). Most women in this age group are married or cohabiting (2). The proportion of sexually active women tends to decrease with increasing age, but a significant proportion of women over the age of 40 years remains sexually active. From 2010 to 2012, nearly two-thirds of British women aged 45-54 years reported that they had vaginal intercourse at least once in the previous month (3). A good sex life can contribute to successful aging (4). Although fecundity decreases with age, middle-aged women still need effective contraception to prevent unplanned pregnancies. Moreover, middle-aged women are more likely to experience spontaneous abortion and pregnancies with chromosomal abnormalities (5, 6), as well as obstetric complications like gestational diabetes, hypertension, placenta previa, cesarean delivery, perinatal death, and maternal death (5-10).

Hormonal contraceptives (HCs) also have other implications in women approaching menopause. Premenopausal symptoms like bleeding disorders (menorrhagia, menometrorrhagia) and/or vasomotor symptoms (hot flashes, night sweats, etc.) are often treated with HCs (6). Indeed, whereas most women who use combined oral contraceptives have regular menstruations with reduced bleeding, users of hormonal intrauterine devices (IUDs) may experience an 80-100% reduction in blood loss during menstruation (11, 12). This makes the hormonal IUD a more effective treatment of heavy bleeding disorders than other medical treatments (tranexamic acid, mefenamic acid, combined oral contraceptives or gestagen preparations alone) (11, 12). In a patient series of pre-perimenopausal women with vasomotor symptoms, 90% of those who used oral contraceptives experienced an improvement in their symptoms, compared to 40% of those who did not use oral contraceptives (13). Premenopausal women suffering from climacteric symptoms can be treated with estrogen preparations. However, prolonged estrogen stimulation of the endometrium increases the risk of endometrial hyperplasia (14). Gestagens are important to counteract this effect of estrogen (14, 15).

Middle-aged women may have co-morbidities that contraindicate HC use. The use of combined oral contraceptives is contraindicated in a number of cases, such as in women with a history of previous breast cancer or thromboembolic disease, hypertension, obesity, smokers over 35 years of age, women with migraines, and in women with multiple risk factors for cardiovascular disease; in these cases gestagen preparations alone may be indicated.

HC use tends to decrease with increasing age. The proportion of users of combined preparations has been falling over the past decades, while the proportion of users of hormonal IUDs and implants is increasing in Norway (16), the Nordic countries (17), the United Kingdom (18), and Australia (19). There are a few studies on patterns of HC use among women aged 40 years or older (16-19), furthermore there is very little literature on the characteristics of middle-aged women by contraceptive method. Therefore, we aimed to investigate HC use and user characteristics in women aged 40-49 years in Norway.

Material and methods

The Tromsø Study (20, 21) is a large, population-based survey of residents residing in the municipality of Tromsø, Norway. The study began in 1974, and since then seven surveys have been organized. At each survey, self-reported sociodemographic information and data from a wide range of validated health questionnaires was collected, as well as clinical data from physical examinations and biological materials. The present analysis includes female participants from the seventh survey of the Tromsø Study (Tromsø7, conducted in 2015-16). Of the 5155 invited women aged 40-49 years, 3378 women participated (response rate 65%). We excluded women with invalid questionnaires, women who were pregnant or trying to conceive, women with primary or secondary infertility, those with amenorrhea ≥ 12 months who did not use HC, and those who reported that they had not been sexually active in the last 12 months. After exclusions (Table 1), the final analytical sample consisted of 2296 women (68% of those with valid questionnaires; 44% of all invited women).

Women reported their use of five different HC methods in the study questionnaires: combined oral contraceptives, progestogen-only pills, contraceptive patch, implant/injection (depot medroxyprogesterone acetate), and hormonal IUD/vaginal ring. As vaginal ring use in this age group has been reported to be low (0.3-0.6% in women aged 40-44 years (16, 22) and 0.2% in those aged 45-49 years (22)), we will refer to hormonal IUD/vaginal ring as hormonal IUD use. We then categorized HC use as no HC use, other HC methods, and hormonal IUD use. No HC use included all non-hormonal contraceptive methods, including female/male sterilization, copper IUD, condoms, withdrawal, calendar methods, and non-use.

User characteristics included age (40-44, 45-49 years), partner status (living or not living with a spouse), highest completed educational level (primary, vocational/ upper secondary, college/university <4 years, college/university \geq 4 years), occupational status (full-time, part-time, no paid work), gross household income (\leq 45 000 USD, >45 000 and <75 000 USD, >75 000 and <100 000 USD, \geq 100 000 USD), parity (0, 1, \geq 2), body mass index (BMI, 17.0-24.9, 25.0-29.9, 30.0-34.9, \geq 35 kg/m²), and general health status (poor, not poor/not good, good, very good). Women with missing information on educational level (n=15), gross household income (n=50), BMI (n=5), and general health status (n=15) were recorded as having the lowest category, and six responses of “very poor health” were recoded as “poor health”.

All analyses were performed in SPSS with chi-square test and logistic regression (method enter). The significance level was set at $p < 0.05$.

The Regional Committee for Medical and Health Research Ethics North (case no. 393704), The Norwegian Centre for Research Data (project no. 227146), and the Data and Publications Committee for the Tromsø Study (case id. DPU 46/21) reviewed the protocol before study start. All participants gave written informed consent at start of the Tromsø-7 survey.

Results

We observed no difference in partner status, occupational status, gross household income, parity, BMI, or general health status by age (40-44 and 45-49 years). The proportion of women who had completed \geq 4 years of college/university was higher among women aged 40-44 years (49.4%) than those 45-49 years (43.2%). Nearly 50% of the study sample reported HC use. Hormonal IUD use was higher in women aged 45-49 years (43.4%) than 40-44 years (39.5%) (Table 2). The proportion of women who reported other HC use was higher among women aged 40-44 years (64.4%) relative women aged 45-49 years (Table 2).

There was no significant difference across the three categories of HC use by partner status, educational level, or BMI (Table 3). A larger proportion of women who reported no HC use also reported no paid work (13.6%) when compared with the other categories of HC use. This was reflected in the proportion of women with a gross household income >100 000 USD, which was higher among women who reported hormonal IUD use (41.6%) compared with the other categories of HC use (Table 3).

HC use was also related to parity (Table 3). The proportion of women who had no children or one child was higher among women who reported other HC use (32.6%) compared with those who reported hormonal IUD use (13.1%) and no HC use (22.5%). Women with hormonal IUD use more often had two or more children (86.9%) compared to those with no HC use (77.5%) and other HC use (67.5%) (Table 3). Women with no HC use reported poorer general health (7.6%) than those in the other categories of HC use (Table 3).

Relative to women who reported no HC use, the odds of other HC use was lower for women aged 45-49 years and women with no paid work, when compared with women aged 40-44 years and those with full-time work (Table 4). None of the other factors we examined could explain the observed variations in other HC use relative no HC use. Women not living with a spouse, women with no paid work, and women with the highest educational level relative the other educational categories, were less likely to report hormonal IUD use than no HC use at all (Table 4). The odds of hormonal IUD use increased significantly from the lowest to the highest category of the variables gross household income and parity, with no HC use set as the reference (Table 4).

Discussion

Nearly half of sexually active fecund women aged 40-49 years reported using HCs in 2015. Hormonal IUD use dominated in both of our age groups, with the highest prevalence observed among women aged 45-49 years. While there was no significant difference between HC use by partner status, educational level, or BMI, we found minor, statistically significant differences by occupational status, gross household income, and general health status.

In prevalence studies of contraceptive use, it is common to exclude women who have not been sexually active in the last 3 (16) or last 12 (18) months before study start, women who are infertile, pregnant, trying to conceive, and women who experienced amenorrhea for ≥ 12 months and did not use HC (16, 20). However, there is great variation in the inclusion and/or exclusion criteria applied in previous studies of contraceptive prevalence, thus a direct comparison with our results could be misleading.

In a Norwegian study comprising sexually active women who were not trying to get pregnant, 34% of women aged 40-44 years used HC in 2005 (16). Hormonal IUD use (22%)

dominated, followed by combined oral contraceptives (7%), contraceptive patch (0.7%), and vaginal ring (2%). Use of progestogen-only pills and implants (2%) was low (16). In an Australian study with almost the same exclusion criteria as the present study, 37% of women aged 40-45 years used HC/copper IUDs in 2018 (19). The prevalence of hormonal/copper IUD/implant use (22%) was lower than in our study, whereas other HC use was higher (15%) (19). Similar findings were reported in a study from the United Kingdom, where overall HC use among non-pregnant, sexually active women aged 35-44 years in 2010-2012 was 36%, (15% hormonal/copper IUD/implant use and 21% other HC use) (18). A study with similar inclusion criteria to ours reported the prevalence of HC use among German and British women aged 40-44 years in the in the early 1990s as 29% and 12%, respectively (20).

A non-selective, Nordic registry-based study on HCs sold at pharmacies reported an estimated HC use of 24%, 29%, and 31%, respectively, for Norwegian, Swedish, and Danish women aged 40-44 years, and 16%, 21%, and 19% for women aged 45-49 years in 2015 (24). Hormonal IUD use dominated in both age groups in all countries (21). Even after adjusting for differences in denominators (Table 1), our estimate hormonal IUD use in Tromsø7 remained higher, while the prevalence of other HC use was lower than in the aforementioned Nordic study (24).

After adjustment for differences in denominators, our study found a lower prevalence of other HC use, in particular combined oral contraceptives and progestogen-only pills, and fewer differences for injection and implants in both age groups, compared to the previous publication from Norway, Sweden, and Denmark (24). The other HC use reported in the Norwegian component of that 2015 study (24) is in line with a 2005 publication from Norway, indicating that the differences in the use of other HC methods observed in the present study may be real (16).

Middle-aged women generally choose to adopt contraceptive method that they have used previously. An Australian cohort study started in 1996 and including the birth cohort 1973-1978, surveyed the study sample at 3-year intervals from the age of 18-23 to 40-45 years, ending in 2018 (19). This study underlined that women using long-acting reversible contraception at age 40-45 years more often continued these methods (71%) than shifted to non-use or short-acting methods (29%) (19). As most middle-aged women have finished childbearing, our results could be partly explained by these women's desire for a more permanent, long-acting contraceptive method like hormonal IUD.

IUD use tends to increase with increasing age (16-19). The prevalence of hormonal IUD use among women aged 40-49 years was substantially higher in our study than has been reported elsewhere (16-19, 24). We have no good explanation for this finding. There is no national nor local (Tromsø city) reimbursement strategy to motivate for increased use of HC in this age segment. We found no difference in HC use by educational level, nor did we find any difference in educational level between women included in and excluded from our analyses. However, Tromsø7 participants do have a higher educational level than the general population of Troms County and of Norway (26). Thus, it is possible that Tromsø7 participants have more knowledge of the benefits of hormonal IUD use in terms of effectiveness, costs, and safety when compared to combined preparations. Furthermore, higher educational level may also contribute to use of hormonal IUDs in the prevention or treatment of bleeding disorders and endometrial hyperplasia. We do not think that previous positive research findings on the prevention and treatment of endometrial hyperplasia with hormonal IUDs from the University Hospital of North Norway in Tromsø over the past decades have contributed to increased IUD use, as this research in particular relates to women closer to menopause (15, 27).

In line with other studies, we found that middle-aged women using hormonal IUDs often had two or more children, whereas women using other HC methods more often had lower parity (23, 25).

There are few data on the characteristics of women aged 40-49 years who use contraceptives. Through a literature search, we found several publications focusing on demographic factors and contraceptives from developing countries, but due to cultural and socioeconomic differences, we find comparison across these studies to be invalid.

We found no differences across categories of HC use by partner status, educational level, or BMI, and minor differences across occupational status, gross household income, and general health status, despite statistical differences. We interpreted the high prevalence of HC use in this age group as an indication that HCs are generally well accepted across a wide range of user characteristics. In addition, the small difference in lower proportions of women with poor general health status among women using HCs relative non-users, may indicate that practitioners select the “right” women for use of HCs given that poor health status is associated with diseases that are contraindicated for use of HCs. This study provides no data on contraindications nor

specialty of provider. In Norway, general practitioners and medical doctors under specialization are the main providers of HC (22, 28, 29).

The strength of this study is the high response rate and that the Tromsø Study includes all the eligibility criteria necessary to select respondents for contraceptive prevalence studies. The weaknesses of the study are that we lack data on non-use, coitus-dependent methods, copper IUDs, sterilization, and hysterectomy, which could provide a complete presentation of available methods. However, these limitations do not hinder us from studying HC use and user characteristics. By adding questions on the variables mentioned in the limitations section to future Tromsø surveys, the Tromsø Study could become an excellent platform to study contraceptive use in women of older reproductive age for a wide range of health outcomes. Such studies are long awaited (30).

Conclusion

Nearly 50% of the study sample reported HC use. There were no significant differences in partner status, educational level, or BMI between women reporting no HC use, other HC use, or hormonal IUD use. From these findings, in addition to minor differences by occupational status, gross household income, and general health status, we conclude that HC use is widely used among middle-aged women. The fact that hormonal IUD use was more common in our population than elsewhere may indicate that Tromsø women and their physicians have a high awareness of the positive health effects of this method relative other HC methods when approaching menopause.

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Author contributions: FES designed the study, cleaned and analyzed the data. MB/FES interpreted the results. MB evaluated the literature and was the main author. Both authors agreed upon the final manuscript for submission.

Tweetable abstract

The prevalence of hormonal contraceptive use, particularly hormonal IUD use, was high in women aged 40-49 years. The high prevalence of hormonal IUD use may indicate that women and their physicians have an enlarged focus on and awareness of the positive health effects of hormonal IUD use relative other hormonal methods when approaching menopause.

Conflicts of interest: None

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Table 1 Selection of the study population by age and totally

	Age				In total	
	40-44 years		45-49 years		40-49 years	
	n	N	n	N	n	N
Invited to the 2015-16 Tromsø Study		2572		2623	5195	
Reason for exclusion						
Study related						
Non-responders	894		923		1817	
Invalid questionnaire	1		4		5	
Eligibility criteria						
Pregnant	13		2		15	
Trying to conceive	3		1		4	
Primary infertility	81		54		135	
Secondary infertility	144		103		247	
Amenorrhea \geq 12 months, no use of HCs	40		162		202	
Not sexually active in the last 12 months	199		275		474	
Excluded	1375		1524		2899	
Included		1197		1099		2296
Included (%)		46.5		41.9		44.2

HCs, hormonal contraceptives

Table 2 Characteristics of the study sample by age, Tromsø7 2015-2016

		Age (years)		
		40-44	45-49	
		N=1197	N=1099	
		%	%	P-value
Partner status	Living with a spouse	81.1	81.2	=0.98
	Not living with a spouse	19.9	19.8	
Educational level	Primary	8.3	8.9	<0.01
	Vocational/upper secondary	20.1	26.1	
	College/university <4 years	22.2	21.7	
	College/university ≥4 years	49.4	43.2	
Occupational status	Full-time	79.5	77.6	=0.01
	Part-time	10.9	11.1	
	No paid work	9.6	11.3	
Gross household income (USD)	≤45 000	13.5	12.3	=0.47
	>45 000 and <75 000	23.8	22.6	
	>75 000 and <100 000	26.8	29.6	
	>100 000	35.9	35.6	
Parity	0	8.4	6.4	=0.21
	1	12.3	11.4	
	≥2	79.3	82.3	
Body mass index kg/m²	17.0-24.9	46.1	44.1	=0.65
	25.0-29.9	34.3	34.5	
	30.0-34.9	14.1	14.9	
	≥35	5.5	6.5	
General health status	Poor	6.7	5.1	=0.34
	Not poor/not good	18.8	19.2	
	Good	53.6	53.0	
	Very good	20.9	22.7	
Hormonal contraceptive use	None	51.7	51.3	
	Combined oral contraceptives	3.8	1.6	
	Progestogen-only pills	3.4	2.5	
	Contraceptive patch	0.2	0.3	
	Implant/injection	1.3	0.9	
	Hormonal IUD/vaginal ring	39.5	43.4	

Table 3 Characteristics of the study sample by hormonal contraceptive use (%)

		HC use			P-value
		No HC use ¹	Other HC use ²	Hormonal IUD use ³	
		N=1183	N=163	N=950	
		%	%	%	
Age (years)	40-44	52.3	64.4	49.8	<0.01
	45-49	47.7	35.6	50.2	
Partner status	Living with a spouse	53.6	44.2	53.2	=0.20
	Not living with a spouse	27.6	31.9	28.7	
Educational level	Primary	9.6	6.1	7.8	=0.36
	Vocational/upper secondary	22.5	27.6	22.8	
	College/university <4 years	21.1	19.6	23.5	
	College/university ≥4 years	46.8	46.6	45.9	
Occupational status	Full-time	75.0	82.2	82.5	<0.01
	Part-time	11.4	11.0	10.4	
	No paid work	13.6	6.7	7.1	
Gross household income (USD)	≤45 000	15.6	12.3	9.6	<0.01
	>45 000 and <75 000	24.2	27.6	21.3	
	>75 000 and <100 000	28.8	26.4	27.6	
	>100 000	31.4	33.7	41.6	
Parity	0	9.4	16.0	3.6	<0.01
	1	13.1	16.6	9.5	
	≥2	77.5	67.5	86.9	
Body mass index (kg/m²)	17.0-24.9	44.9	52.1	44.3	=0.33
	25.0-29.9	34.7	33.1	34.1	
	30.0-34.9	14.1	12.3	15.4	
	≥35	6.3	2.5	6.2	
General health status	Poor	7.6	4.9	4.0	<0.05
	Not poor/not good	19.4	18.4	18.6	
	Good	52.5	52.8	54.5	
	Very good	20.5	23.9	22.8	

¹Includes all non-hormonal contraceptive methods, including female/male sterilization, copper IUD, condoms, withdrawal, calendar methods, and non-use. ²Includes combined oral contraceptives, progestogen-only pills, contraceptive patch, implant/injection (depot medroxyprogesterone acetate). ³Includes hormonal IUD and vaginal ring.

Table 4 The adjusted odds ratio (aOR) for other hormonal contraceptive (HC) use and hormonal IUD use versus no HC use

	Other HC use ¹ versus no HC use ²		Hormonal IUD use ³ versus no HC use ²	
	aOR	(95% CI)	aOR	(95% CI)
Age (years)			NS	
40-44	1.0		1.0	
45-49	0.6	(0.5-0.9)	1.06	(0.9-1.3)
Partner status	NS			
Living with a spouse	1.0		1.0	
Not living with a spouse	0.7	(0.5-1.04)	0.76	(0.6-0.9)
Educational level	NS		NS	
Primary	1.02	(0.5-2.2)	1.04	(0.7-1.5)
Vocational/upper	1.7	(1.01-2.8)	1.08	(0.8-1.4)
College/university <4	1.0		1.0	
College/university ≥4	0.95	(0.6-1.5)	0.8	(0.6-1.01)
Occupational status	NS			
Full-time	1.0		1.0	
Part-time	0.99	(0.6-1.7)	0.9	(0.7-1.2)
No paid work	0.49	(0.2-0.99)	0.58	(0.4-0.8)
Gross household income	NS			
≤45 000	0.6	(0.3-1.2)	0.5	(0.4-0.8)
>45 000 and <75 000	1.03	(0.6-1.7)	0.8	(0.6-1.1)
>75 000 and <100 000	1.0		1.0	
>100 000	1.3	(0.8-2.1)	1.5	(1.2-1.8)
Parity	NS			
0	1.3	(0.7-2.3)	0.53	(0.3-0.8)
1	1.0		1.0	
≥2	0.7	(0.4-1.1)	1.46	(1.1-2.0)
Body mass index (kg/m²)	NS		NS	
17.0-24.9	1.0	1.0	1.0	
25.0-29.9	0.8	(0.6-1.2)	1.03	(0.8-1.3)
30.0-34.9	0.8	(0.4-1.3)	1.15	(0.9-1.5)
≥35	0.4	(1.1-1.03)	1.13	(0.8-1.7)
General health	NS		NS	
Poor	0.9	(0.4-2.0)	0.70	(0.5-1.1)
Not poor/not good	1.1	(0.7-1.6)	1.1	(0.8-1.4)
Good	1.0		1.0	
Very good	1.02	(0.7-1.5)	1.03	(0.8-1.3)

CI confidence interval, NS Not significant. ¹Includes combined oral contraceptives, progestogen-only pills, contraceptive patch, implant/injection (depot medroxyprogesterone acetate). ²Includes all non-hormonal contraceptive methods, including female/male sterilization, copper IUD, condoms, withdrawal, calendar methods, and non-use. ³Includes hormonal IUD and vaginal ring.