DANISH MEDICAL JOURNAL

Original Article

Dan Med J 2021;68(6):A08200599

Hormonal contraceptive use in Denmark 2010-2019

Sigrid I. P. Kristensen[1, 2] & Øjvind Lidegaard[1, 2]

1) Department of Gynaecology, Copenhagen University Hospital – Rigshospitalet, 2) Department of Clinical Medicine, University of Copenhagen, Denmark

Dan Med J 2021;68(6):A08200599

ABSTRACT

INTRODUCTION: Hormonal contraception (HC) celebrates its 60th anniversary this year. Thanks to thousands of scientific studies on these products, we now have solid knowledge about the short- and long-term effects and also the adverse effects of different contraceptive types. The aim of this study was to analyse trends in the use of different types of HC through the latest decade in different age groups of Danish women and to study reasons for any changes.

METHODS: Individual-level HC sale statistics were provided from the National Registry of Medicinal Products. All statistics were stated as defined daily doses per 1,000 women per day. Absolute numbers and distributions among users were calculated.

RESULTS: The overall use of HC was stable in women from 15 to 25 years, decreased among women aged 25-34 years and increased among women aged 35 years or more. On average, an increase from 35% to 39% was recorded. Across all age groups, the use of second-generation combined oral contraceptives (COC) has almost completely replaced the use of third- and fourth-generation pills, and from the age of 20 years of age, the use of COC has decreased contrasting a steep increase in use of the hormone-intrauterine device (IUD). The magnitude of this shift increased with increasing age.

CONCLUSIONS: Whereas the overall use of hormonal contraception has increased over the latest decade from 35% to 39% among all women aged 15-49 years, hormone-IUDs have increasingly replaced COCs so that they are now dominating among women aged 30 years or more. These changes are expected to have decreased venous thrombosis and menorrhagic complaints in young women substantially.

FUNDING: Expenses were covered by Department of Gynaecology, Rigshospitalet.

TRIAL REGISTRATION: The Danish Data Protection Agency (R. no. 2015-41-4481).

The rate of unwanted and terminated pregnancies is quite low in Denmark, which may be due to the relatively high contraceptive use among Danish women [1]. This year, we celebrate the 60th anniversary of hormonal contraception (HC). Several new products have subsequently been developed and the use of specific types of HC has changed accordingly [2].

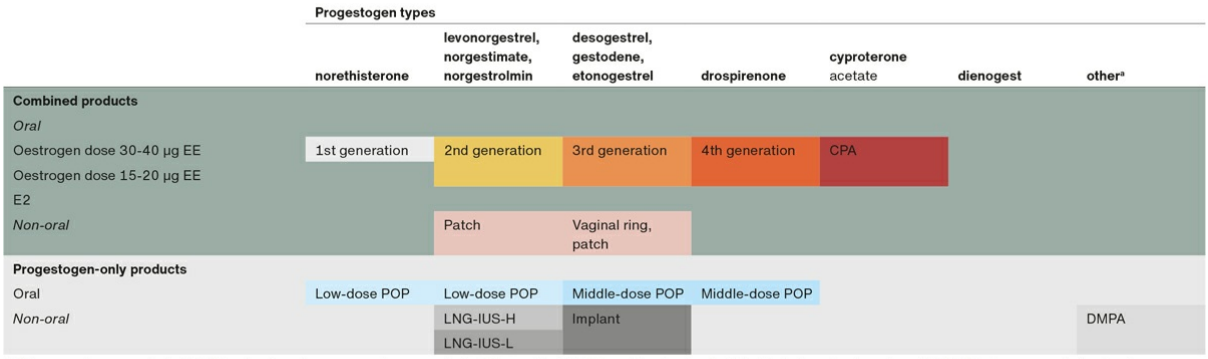
No reports examining changes in the use of different types of hormonal contraception in Danish women have been published since Wilson's 2012 study [2]. With new research assessing updated adverse effects of hormonal contraception such as an increased risk of breast cancer [3] and depression [4], further changes might have occurred. These changes may have affected different age groups differently [5].

The aim of this study was to assess developments in the use of different types of hormonal contraception among Danish women aged 15-49 years over the past decade and to discuss possible reasons for any changes.

METHODS

The data used in this study were obtained from the Danish National Registry of Medicinal Products (prescription registry), which records all prescriptions redeemed by Danish citizens. We included data on all types of HC among Danish women aged 15-49 years from 1 January 2010 to 31 December 2019 expressed as defined daily doses (DDD) per 1,000 women per day. **Figure 1** provides an overview over the nine different types of HC that were available during the study period and which were assessed in this study. The data were grouped by year for all women and into five-year age groups.

FIGURE 1 Available hormonal contraception in Denmark, 2010-2020.



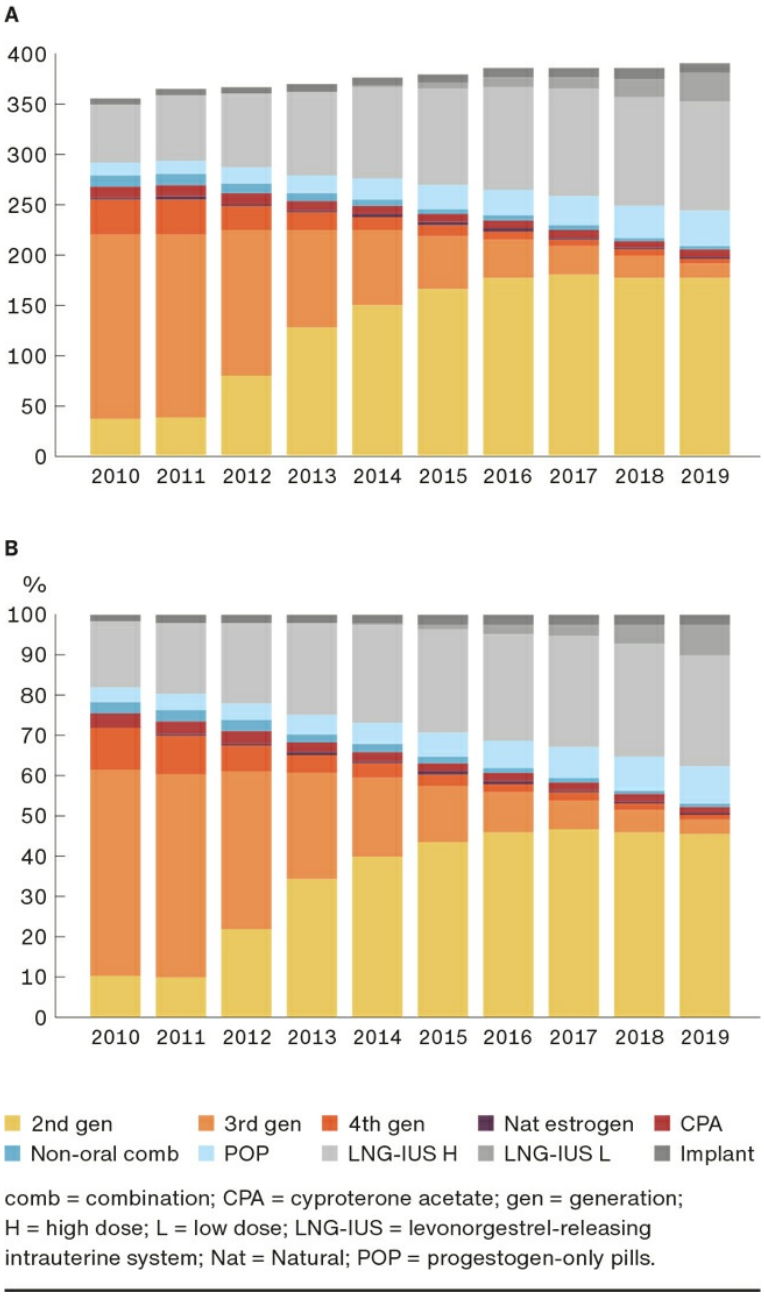
CPA = cyproterone acetate; DMPA = depot medroxyprogesterone acetate; E2 = oestradiol; EE = ethinyloestradiol; H = high dose; L = low dose; LNG-IUS = levonorgestrel-releasing intrauterine system; POP = progestogen-only pills.
a) Includes natural oestrogen combined with nomegestrol acetate.

Trial registration: This study was approved by the Danish Data Protection Agency (R.no. 2015-41-4481).

RESULTS

Figure 2 shows an increase in the overall use of hormonal contraception from 356 to 391 DDD per 1,000 women per day over the ten-year study period. Furthermore, the use of combined oral contraceptives (COC) decreased from 255 DDD per 1,000 women per day in 2010 to 197 DDD per 1,000 per day in 2019, contrasting an increase in the use of levonorgestrel-releasing intrauterine system (LNG-IUS), in this article coined hormone-intrauterine device (IUD). Among users of COC, second-generation COC with levonorgestrel or norgestimate have increased their share at the expense of third- and fourth-generation COC. Relatively few and progressively fewer women over time have used COC with natural oestrogen, with cyproterone acetate, and non-oral combined products like transdermal patches and the vaginal ring.

FIGURE 2 Absolute (**A**) and relative (**B**) defined daily doses per 1,000 per day of ten different hormonal contraceptive types from 2010-2019 in women aged 15-49 years.



comb = combination; CPA = cyproterone acetate; gen = generation; H = high dose; L = low dose; LNG-IUS = levonorgestrel-releasing intrauterine system; Nat = Natural; POP = progestogen-only pills.

The relative distribution among users (Figure 2B) demonstrates that the share of COC decreased from 72% in 2010 to 50% in 2019, covering an increase in use of second-generation COC from 37 to 178 DDD/1,000/day, and a decrease in use of third- and fourth-generation COC from 219 to 19 DDD/1,000/day over the same period.

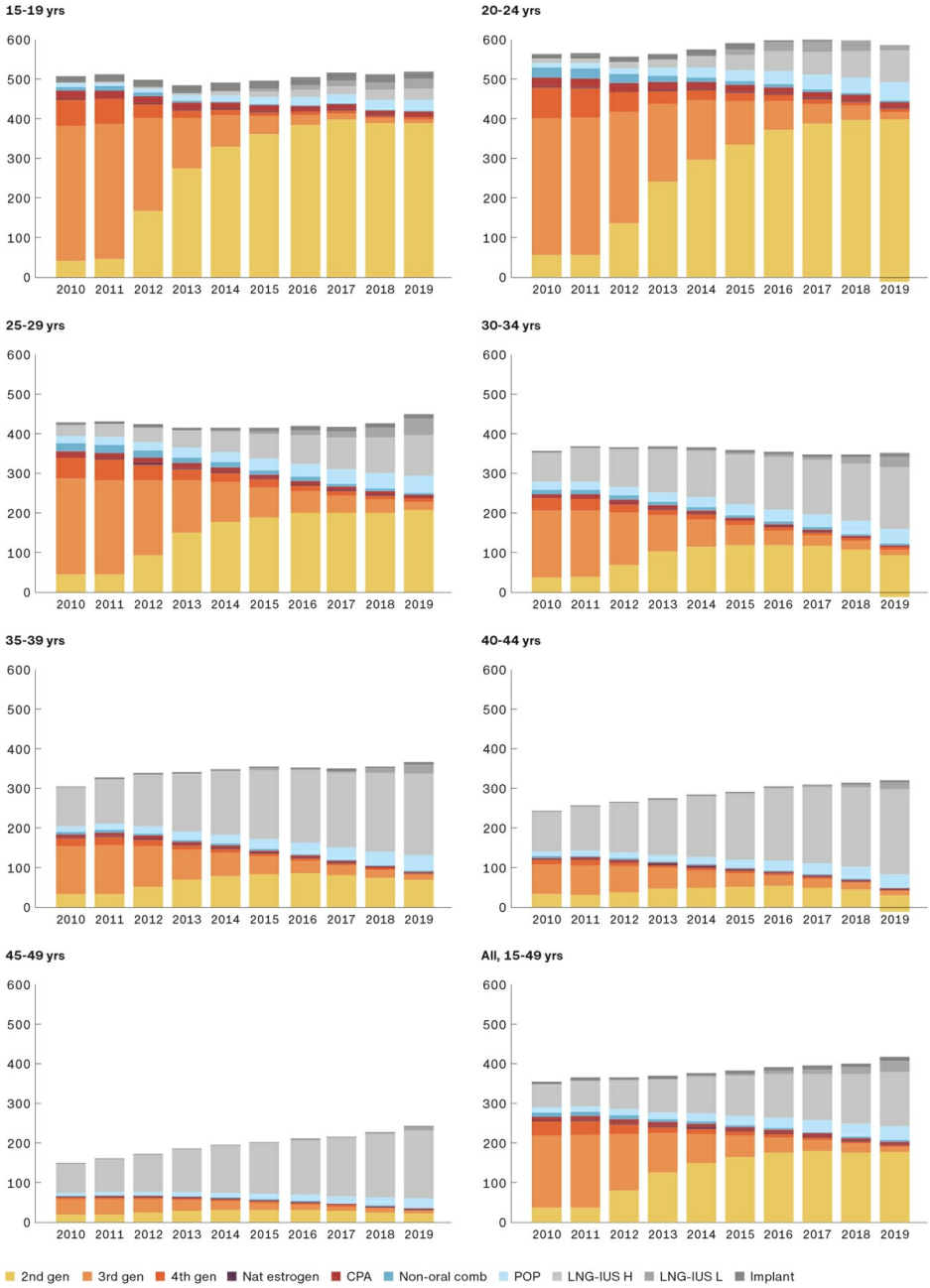
Progestogen-only pills increased in use from 13 to 36 DDD/1,000/day in the same period, reflecting an increasing share among users from 4% to around 9%.

Implant usage increased slightly from seven to ten DDD/1,000/day, which is a relative increase among users from 2% to 3%.

Hormone-IUD use rose from 58 DDD/1,000/day in 2010 to 137 DDD/1,000/day in 2019, corresponding to an increase from 16% to 35%. In 2014, low-dose hormone-IUD appeared on the market, and in 2019 they accounted for 21% of all sold hormone-IUDs.

After age stratification (**Figure 3**), the shift from COC to hormone-IUD over the past decade was more pronounced with increasing age. The shift from third- and fourth-generation COC to second-generation pills was more rapid and more pronounced among young women (**Supplementary Figure 1 https://ugeskriftet.dk/files/a08200599_-_supplementary.pdf**).

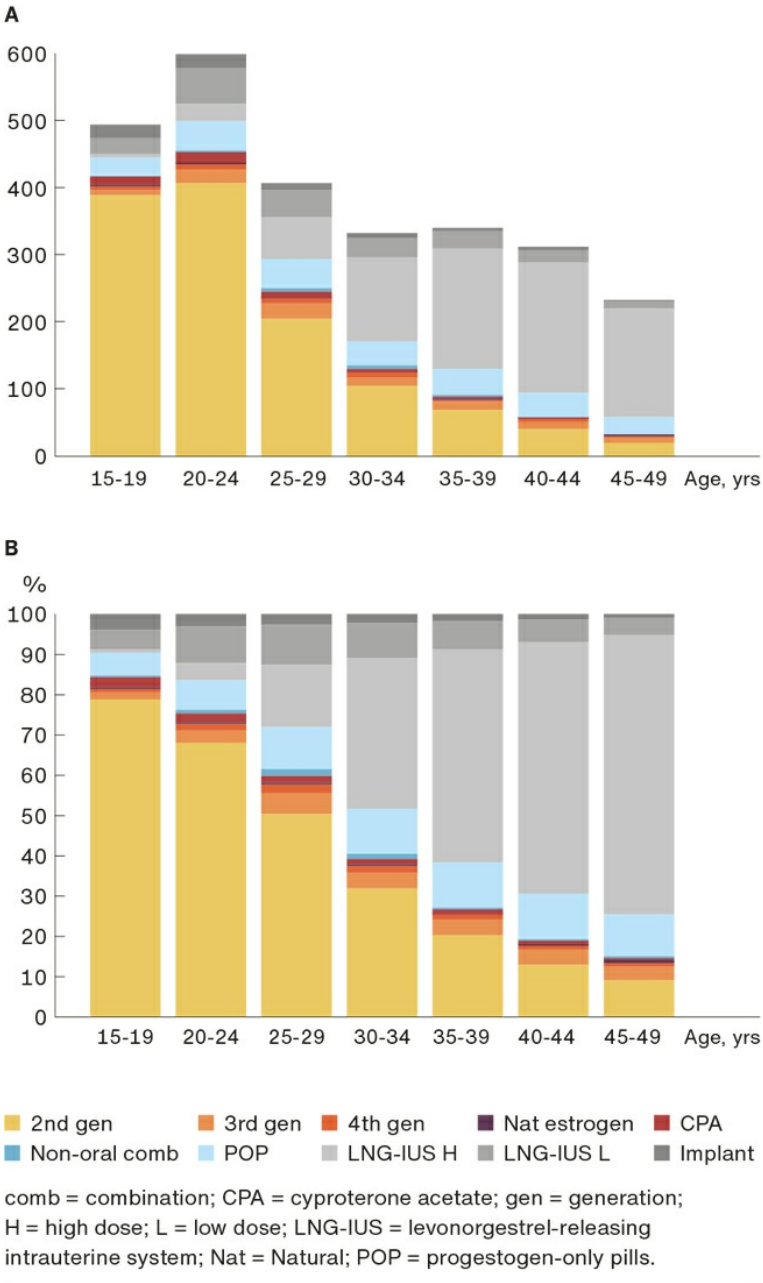
FIGURE 3 Defined daily doses per 1,000 women per day of nine different hormonal contraceptive types from 2010-2019 in women at different ages.



comb = combination; CPA = cyproterone acetate; gen = generation; H = high dose; L = low dose; LNG-IUS = levonorgestrel-releasing intrauterine system; Nat = Natural; POP = progestogen-only pills.

Today (2019), half of all women between 15 and 19 years use some kind of hormonal contraception, peaking in the 20-24-year age group with 60%, 40% in women aged 25-29 years, and thereafter remaining relatively stable around 31-34% until 45 years, ending at 23% in women aged 45-49 years oof age (**Figure 4**).

FIGURE 4 Defined daily doses per 1,000 women per day of ten different hormonal contraceptive types in 2019, by age (**A**) and distribution among users (**B**).



comb = combination; CPA = cyproterone acetate; gen = generation; H = high dose; L = low dose; LNG-IUS = levonorgestrel-releasing intrauterine system; Nat = Natural; POP = progestogen-only pills.

In women aged 15-29 years, COC dominates, whereas hormone-IUD dominates in women aged 30-49 years (Figure 4B). Among users of HC, the share of COC decreased successively with increasing age: 85%, 76%, 61%, 41%, 27% and 19%, ending at 15% in women aged 45-49 years. Besides the decreasing share of COC and the increasing share of hormone-IUD with increasing age, the use of progestogen-only pills increased, and implants decreased their share among users of HC by age. Exact figures are available in **Supplementary Table 1**

(https://ugeskriftet.dk/files/a08200599_-_supplementary.pdf).

DISCUSSION

Use of HC among Danish women aged 15-49 years has risen over the past decade, primarily because of an increased use of hormone-IUD and progestogen-only pills, particularly in women above 35 years of age. Use of third- and fourth-generation COCs has almost ceased, contrasting a substantial increase in the use of second-generation COCs. In 2019, the use of hormone-IUD dominated among women older than 30 years of age, whereas younger women continued to primarily use COCs.

These rather dramatic changes over a decade make good clinical sense and are in line with our national guidelines [6] and with international recommendations. The steep increase in hormone-IUD use among women above 30 years of age not only removes the thrombotic risks implied by COC but also offers important non-contraceptive benefits to women in this age group in terms of less menorrhagic complaints [7]. Similarly, the change from third- and fourth- to second-generation COC has halved the risk of a first venous thrombosis for a substantial part of young women [8].

Together these changes are expected to have prevented in the order of 300 first venous thromboses annually among young Danish women. Concern about long-term breast cancer risk may have contributed to the decreasing use of COC among women of all ages [3], and psychological complications including the increased risk depression may further have influenced the receding use of COC, especially among young women [4].

This trend is similar to trends observed in the other Scandinavian countries [9] and in France [10]. However, user profiles differ with respect to many other countries. In China, long-acting reversible contraceptive hormone-IUD has been dominating in recent decades, and few Chinese women use COC [11]. Conversely, in most Latin American countries, short-acting methods are dominating [12]. These differences may be due to different advertising promotions, different cultures, differences in recommendations and different economic capabilities.

In women under 30 years of age, the most common contraceptive method remains COC. This is most likely because of ease of use, accessibility, doctor's recommendations and lack of invasiveness [5]. Danish doctors have only recently started to recommend the use of the hormone-IUD in younger women, which may possibly explain why so few young women used this method in the beginning of the decade and why the use in young women has increased since 2010. This shift in recommendation reflects its high efficacy, important non-contraceptive benefits and the fact that hormone-IUD does not demand daily active adherence, which may be challenging for some young women [5]. Unfortunately, hormone-IUDs do not remove the increased risk of depression among young women as compared to the use of combined oral contraceptives [13]. These results were based on the use of high-dose hormone-IUD. One might hope for less mood influences with the new low-dose hormone-IUD.

The progestogen-only pill is another contraceptive option with fewer thrombotic side effects than COCs. The increased use of these pills has likely occurred because they are a good alternative to women who are reluctant to use an invasive method such as hormone-IUD and who are also concerned about the thrombotic risks associated with COCs.

In summary, Danish women have shifted from traditional COCs towards the highly effective hormone-IUD and progestogen-only pills. This trend is most obvious among older women. Although we suspect that the shift is owed to greater awareness of side effects and changed recommendations based on emerging research, further study of the underlying causes of this shift may potentially shape the future of the conversation about contraception between doctor and patient in all age groups.

CONCLUSIONS

Our study has shown that the use of hormonal contraception among Danish women aged 15-49 years has changed considerably since 2010. The use of COCs has decreased across all age groups with a larger decrease with increasing age. Second-generation COCs have largely replaced use of third- and fourth-generation COCs. Further, women are shifting towards use of the progestogen-only pill and the LNG-IUS method, which was the dominant contraceptive form used in women above 30 years of age in 2019. Both methods present fewer serious side effects than COCs and the shift towards a greater use of these two methods suggests that women are aiming to use safer and more effective contraceptive forms.

Correspondence *Øjvind Lidegaard*. E-mail: Oejvind.Lidegaard@regionh.dk

Accepted 3 May 2021

Conflicts of interest none. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

Cite this as Dan Med J 2021;68(6):A08200599

REFERENCES

1. Hognert H, Skjeldestad FE, Gemzell-Danielsson K et al. High birth rates despite easy access to contraception and abortion: a cross-sectional study. Acta Obstet Gynecol Scand 2017;96:1414-22.
2. Wilson NM, Laursen M, Lidegaard Ø. Oral contraception in Denmark 1998-2010. Acta Obstet Gynecol Scand 2012;91:810-15.
3. Mørch LS, Skovlund CW, Hannaford PC et al. Contemporary hormonal contraception and the risk of breast cancer. N Engl J Med 2017;377:2228-39.
4. Skovlund CW, Mørch LS, Kessing LV et al. Association of hormonal contraception with depression. JAMA Psychiatry 2016;73:1154-62.
5. Pritt NM, Norris AH, Berlan ED. Barriers and facilitators to adolescents' use of long-acting reversible contraceptives. J Pediat Adolesc Gynecol 2017;30:18-22.
6. Danish Society of Obstetrics and Gynaecology. Hormonel kontraception og tromboembolisk sygdom. https://static1.squarespace.com/static/5467abcce4b056d72594db79/t/5f037b87cbe58661457eddcf/1594063758357/HormonelKontraceptionTrombose.pdf (17 May 2021).
7. Meaidi A, Skals RK, Gerds TA et al. Decline in Danish use of oral tranexamic acid with increasing use of the levonorgestrel-releasing intrauterine system: a nationwide drug utilization study. Contraception 2020;101:321-6.
8. Lidegaard Ø, Nielsen LH, Skovlund CW et al. Risk of venous thromboembolism from use of oral contraceptives containing different progestogens and oestrogen doses: Danish cohort study, 2001-9. BMJ 2011;343:d6423.
9. Lindh I, Skjeldestad FE, Gemzell-Danielsson K et al. Contraceptive use in the Nordic countries. Acta Obstet Gynecol Scand 2017;96:19-28.
10. Vigoureux S, Le Guen M. Current knowledge on contraceptive knowledge in France: CNGOF Contraception Guidelines. Gynecol Obstet Fertil Senol 2018;46:777-85.
11. Wang C. Trends in contraceptive use and determinants of choice in China: 1980-2010. Contraception 2011;85:570-9.
12. Ponce de Leon RG, Ewerling F, Serruya SJ et al. Contraceptive use in Latin America and the Caribbean with a focus on long-acting reversible contraceptives: prevalence and inequalities in 23 countries. Lancet Global Health 2019;7:e227-e235.
13. Bchtawi AK, Issa BSM, Jørgensen EF et al. Hormonel kontraception, depression og selvmord. Ugeskr Læger 2020;182:V12190713.