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Original Paper

Contraceptive Use Measured in a National Population–Based Approach: Cross-Sectional Study of Administrative Versus Survey Data

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Abstract

Background: Prescribed contraception is used worldwide by over 400 million women of reproductive age. Monitoring contraceptive use is a major public health issue that usually relies on population-based surveys. However, these surveys are conducted on average every 6 years and do not allow close follow-up of contraceptive use. Moreover, their sample size is often too limited for the study of specific population subgroups such as people with low income. Health administrative data could be an innovative and less costly source to study contraceptive use.

Objective: We aimed to explore the potential of health administrative data to study prescribed contraceptive use and compare these data with observations based on survey data.

Methods: We selected all women aged 15–49 years, covered by French health insurance and living in France, in the health administrative database, which covers 98% of the resident population (n=14,788,124), and in the last French population-based representative survey, the Health Barometer Survey, conducted in 2016 (n=4285). In health administrative data, contraceptive use was recorded with detailed information on the product delivered, whereas in the survey, it was self-declared by the women. In both sources, the prevalence of contraceptive use was estimated globally for all prescribed contraceptives and by type of contraceptive: oral contraceptives, intrauterine devices (IUDs), and implants. Prevalences were analyzed by age.

Results: There were more low-income women in health administrative data than in the population-based survey (1,576,066/14,770,256, 11% vs 188/4285, 7%, respectively; $P < .001$). In health administrative data, 47.6% (7034,710/14,770,256; 95% CI 47.6%–47.7%) of women aged 15–49 years used a prescribed contraceptive versus 50.5% (2297/4285; 95% CI 49.1%–52.0%) in the population-based survey. Considering prevalences by the type of contraceptive in health administrative data versus survey data, they were 26.9% (95% CI 26.9%–26.9%) versus 27.7% (95% CI 26.4%–29.0%) for oral contraceptives, 17.7% (95% CI 17.7%–17.8%) versus 19.6% (95% CI 18.5%–20.8%) for IUDs, and 3% (95% CI 3.0%–3.0%) versus 3.2% (95% CI 2.7%–3.7%) for implants. In both sources, the same overall tendency in prevalence was observed for these 3 contraceptives. Implants remained little used at all ages, oral contraceptives were highly used among young women, whereas IUD use was low among young women.

Conclusions: Compared with survey data, health administrative data exhibited the same overall tendencies for oral contraceptives, IUDs, and implants. One of the main strengths of health administrative data is the high quality of information on contraceptive use and the large number of observations, allowing studies of subgroups of population. Health administrative data therefore appear

as a promising new source to monitor contraception in a population-based approach. They could open new perspectives for research and be a valuable new asset to guide public policies on reproductive and sexual health.

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KEYWORDS

contraception; administrative data; health data; implant; oral contraceptives; intrauterine device; IUD; contraceptive prevalence; contraceptive; birth control; monitoring; public health issue; population-based survey; prevalence

Introduction

Prescribed contraception is used worldwide by more than 400 million women of reproductive age [1]. It must be monitored closely to implement public health policy or decisions and ensure rapid response to societal, media, and medical events. For example, after the media scare regarding increased cardiovascular risks for women using third- or fourth-generation pills, a large number of women abruptly stopped using these pills [2-5]. More recently, with the COVID-19 pandemic, the disruption of some supply chains threatened the availability of these contraceptives [6] and a possible increased risk of thromboembolism when contracting COVID-19 while using hormonal contraceptives was investigated [7,8]. Contraceptive use also needs to be monitored to study its long-term effects, particularly in view of recent studies looking into an association between hormonal contraceptive use and a wide range of indicators such as ectopic pregnancy, pancreatic cancer, and depression [9-11].

Contraceptive use is monitored worldwide by the United Nations Population Division, whose findings are regularly published in World Contraceptive Use [1]. These statistics are based on national population-based surveys including the Demographic and Health Surveys [12] and the Fertility and Family Surveys [13]. However, such surveys are time-consuming and costly, resulting in 2 major limitations. First, they are conducted only about every 6 years and so do not allow close follow-up of contraceptive use over time [14,15]. Second, their sample size is restricted by the cost of the survey, which leads to serious limitations of statistical power when aiming to explore specific subgroups (such as low-income people who are often hard to reach in population-based surveys) or lesser-used contraceptives (such as implants). It would therefore be useful to examine new sources to monitor contraceptive use in a national population-based approach.

Health administrative data could provide an innovative and low-cost source to monitor the use of prescribed contraceptives. Theoretically, these data could provide comprehensive, time-continuous information on prescribed contraception in very large samples that include all the resident population covered by health insurance [16]. Considering the limitations of population-based surveys, health administrative data could be a very powerful alternative to monitor contraceptive use, even if neither source can be considered as a gold standard.

We aimed to explore the potential of health administrative data to study prescribed contraceptive use and compare these data with observations based on surveys.

Methods

Administrative and Survey Sources

The French health administrative database records data from the national health insurance system, which covers health care based on reimbursements determined at the national level. It includes 98% of the resident population, whether of French nationality or not. These data have been presented in detail elsewhere [16,17]. They provide information on all health care reimbursements including medicines, medical devices, medical procedures, laboratory tests, and hospital admissions. Dates of prescription and delivery are recorded as well as some information on the patient: age, sex, and place of residence. Persons with low income are identified through their registration (yes or no) with specific health care insurance for low-income people. This specific insurance is granted to persons below the poverty line, that is, with an income less than 50% of the median income.

The last French population-based survey on contraceptive use, the Health Barometer Survey, was conducted in 2016 [18,19]. Through a 2-level survey (household and then individual), a representative sample was recruited, including 15,216 people aged 15-75 years living in metropolitan France and speaking French. Data were collected through phone interviews based on a 37-minute questionnaire on sexual health.

Study Population

The population studied comprised all women aged between 15 and 49 years in 2016, covered by French health insurance, and living in mainland France, based on both French health insurance data ($n=14,788,124$) and survey data ($n=4285$).

Outcome

Contraceptive use was defined as the use (yes or no) of a prescribed contraceptive by the woman. Three types of contraceptives were considered: oral contraceptives, intrauterine devices (IUDs), and implants.

In the French health administrative database, prescribed contraceptives are recorded automatically at purchase at the pharmacy, which directly transfers data to the national system with detailed information on the product ([Multimedia Appendix 1](#)). The very few contraceptives delivered through community structures are not recorded in the database. Data include only reimbursed contraceptives (oral contraceptives, except third- and fourth-generation pills that are not reimbursed in France; IUDs; and implants). We studied the population that was using contraception on December 31, 2016. Women were considered to be using contraception if their last prescribed contraceptive purchased had a recommended duration of use still ongoing at

that date. For example, if the last prescribed contraceptive was an implant, and it was bought less than 3 years previously (the recommended duration of use), it was considered as still ongoing on December 31, 2016.

In the French survey, contraceptive use was measured based on response to the following question: “Currently, do you, or your partner, use a method to avoid pregnancy, including natural methods, and if so, which one?” Sixteen different methods were listed: pill, IUD, implant, diaphragm, patch, ring, male condom, female condom, withdrawal, avoidance of intercourse on the days most at risk of pregnancy, spermicides (creams, ovules, and sponges), hormonal injection, morning-after pill, abstinence, tubal ligation, and vasectomy. These methods were collected whether prescribed and reimbursed (such as the IUD or the implant), prescribed and not reimbursed (such as the patch or the ring), or nonprescribed (such as the withdrawal or natural methods). If the method was “the pill,” no information was collected on the generation of the pill. This category therefore included both first- and second-generation pills (reimbursed in France) and third- and fourth-generation pills (not reimbursed). In this study, only contraceptive methods included in the French health administrative database were considered, and the type of contraceptive used was coded as a 3-group variable: oral contraceptive (pill), IUD, or implant. Contraceptive use was collected for all women regardless of their relationship status, taking into consideration the possibility that they used contraception outside of marriage or partnerships. To avoid unnecessary questions, it was presumed that women who were not likely to become pregnant did not use contraception (pregnant women, women who did not have sexual intercourse, and those who had sexual intercourse only with women). These women were directly recoded as not using any contraception.

Statistical Analysis

In the French health administrative data and in the population-based survey, the prevalence of contraceptive use was calculated among all women aged 15-49 years (including unmarried women, women who were not in a relationship, pregnant women, women who did not have sexual intercourse, and those who had sexual intercourse only with women). The prevalence was estimated for all prescribed contraceptives and by type of contraceptive (oral contraceptive, IUD, and implant). The 2 sources were not comparable regarding the measurement of oral contraceptive use, as French health administrative data included only first- and second-generation pills, whereas the population-based survey included indiscriminately first-, second-, third-, and fourth-generation pills. To obtain comparable estimates in both sources, the prevalence of oral contraceptive use in health administrative data was adjusted by a factor of $1.2195 = (1 + 0.18 / 0.82)$, as third- and fourth-generation pills account for 18% (519,548/2,906,112)

of estrogen-progestin pill sales in France (see [Multimedia Appendix 2](#) for details). In the survey, all estimates were weighted in order to take into account the 2-level design of the study and correction for undercoverage. We carried out analyses using SAS (version 9.4; SAS Institute).

Ethical Considerations

The French health administrative database is accessible through the French *Système National des Données de Santé* (SNDS; National Decree 2016-316, October 13, 2016). French law allows the use of personal data from the SNDS for health research without requiring the express or written consent of individual subjects (deliberation 2016-263, July 21, 2016). Participants did not receive any compensation. The French National Consultative Ethics Committee analyzed ethical issues of big data and approved the use of personal data without requiring the individual’s consent, considering that their use for public health research corresponds to an ethical principle of solidarity and fraternity (committee opinion 130). All SNDS data are pseudonymized. Two authors (JC and ELR) took SNDS training courses and obtained permission to access data remotely for the duration of the present project under the legal responsibility of Institut National d’Etudes Démographiques, which has permanent access to the SNDS (National Decree 2016-1871, December 26, 2016). This research was approved by the Institut National d’Etudes Démographiques Data Protection Officer (reference 2019-DPD-0013). The last French population-based survey on contraceptive use, the Health Barometer Survey, was approved by the National Data Protection Authority (reference 915589).

Results

In health administrative data, women were almost evenly distributed across age groups ([Table 1](#)). In comparison, in the survey data, younger women (<25 years) were underrepresented, and older women (≥40 years) were overrepresented. In health administrative data, 11% (1,576,066/14,770,256) were women with low income, whereas this proportion was 7% (188/4285) in the survey ($P<.001$).

Among women aged 15-49 years, the prevalence of prescribed contraception was 47.6% (95% CI 47.6%-47.7%) in health administrative data versus 50.5% (95% CI 49.1%-52.0%) in survey data ([Table 2](#)). More specifically, the prevalence of oral contraceptive use was 26.9% (95% CI 26.9%-26.9%) in health administrative data versus 27.7% (95% CI 26.4%-29.0%) in survey data. The prevalence of IUD use was 17.7% (95% CI 17.7%-17.8%) in health administrative data versus 19.6% (95% CI 18.5%-20.8%) in survey data. Finally, the prevalence of implants was 3% in both health administrative data and survey data (95% CI 3.0%-3.0% and 2.7%-3.7%, respectively).

Table 1. Characteristics of populations selected in health administrative data and population-based survey data for women aged 15-49 years in France 2016, cross-sectional study.

	Health administrative data (n=14,770,256), n (%)	Survey data ^a (n=4285), n (%)	P value ^b
Age (years)			.04
15-19	1,943,189 (13.2)	352 (12.1)	
20-24	1,923,509 (13)	488 (12.9)	
25-29	2,093,726 (14.2)	588 (14.7)	
30-34	2,173,256 (14.7)	647 (14.2)	
35-39	2,185,765 (14.8)	694 (14.3)	
40-44	2,196,345 (14.9)	741 (16.4)	
45-49	2,254,465 (15.3)	775 (15.4)	
Economic status^c			<.001
Low-income women	1,576,066 (10.7)	188 (6.7)	
Non-low-income women	13,194,190 (89.3)	4097 (93.3)	

^aWeighted percentage.

^bChi-square test comparing distributions between health administrative data and weighted survey data.

^cEconomic status was identified through registration (yes or no) with specific health care insurance for low-income people. This specific insurance is granted to persons below the poverty line, that is, with an income less than 50% of the median income.

Table 2. Use of prescribed contraceptive by method in health administrative data and survey data for women aged 15-49 years in France 2016, cross-sectional study.

	Health administrative data (n=14,770,256), prevalence (%; 95% CI)	Survey data ^a (n=4285), prevalence (%; 95% CI)	P value ^b
All contraceptives ^c	47.6 (47.6-47.7)	50.5 (49.1-52.0)	<.001
Implants, IUDs^d, and oral contraceptives			<.001
Implants	3.0 (3.0-3.0)	3.2 (2.7-3.7)	
IUDs	17.7 (17.7-17.8)	19.6 (18.5-20.8)	
Oral contraceptives	26.9 (26.9-26.9)	27.7 (26.4-29.0)	

^aWeighted percentage.

^bChi-square test.

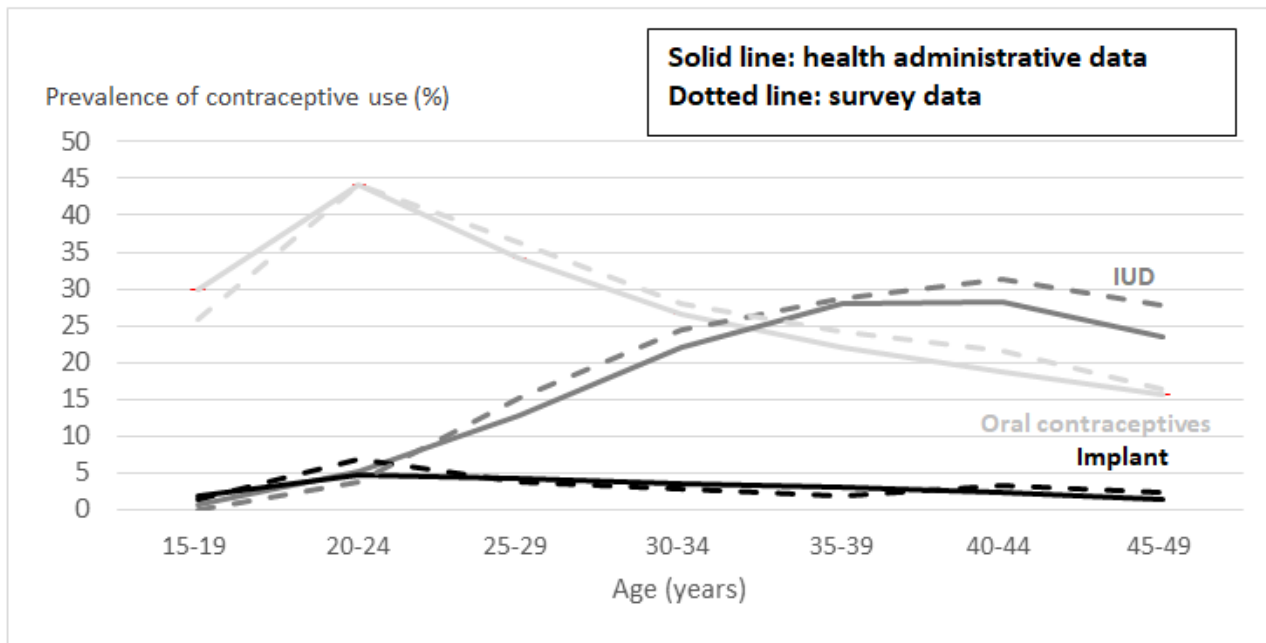
^cAll contraceptives include implants, IUDs, and oral contraceptives.

^dIUD: intrauterine device.

The prevalence of use of the 3 types of contraceptives is detailed by age group in [Figure 1](#) (also see [Multimedia Appendix 3](#) for detailed statistics of this figure). The curves from the health administrative data (solid lines) and the survey data (dotted lines) followed a similar overall pattern and were very close for all 3 types of contraceptives. Implants were little used at all ages, with a peak around 5% (health administrative data: 89,210/1,923,509 and survey data: 29/488) among women aged 20-24 years. Oral contraceptives were widely used by young women, with a peak around 42% (health administrative data: 849,867/1,923,509 and survey data: 244/488) at age 20-24 years.

Their prevalence then decreased to around 16% (health administrative data: 354,633/2,254,464 and survey data: 139/775) among women aged 45-49 years. On the contrary, IUD use was low among young women, being used by only around 7% (health administrative data: 99,244/2,254,464 and survey data: 16/488) of women aged 20-24 years. It increased with age to around 30% (health administrative data: 1,232,328/2,382,109 and survey data: 458/1435) in women aged 35-44 years and then showed a decrease to around 25% (health administrative data: 528,837/2,254,464 and survey data: 222/775).

Figure 1. Use of prescribed contraceptive by method according to age, health administrative data and survey data for women aged 15-49 years in France 2016, cross-sectional study. IUD: intrauterine device.



Discussion

Principal Findings and Comparison With Prior Work

Using health administrative data, the prevalence of contraceptive use was estimated by type of contraceptive. In both health administrative and survey data, the same overall tendency in prevalence was observed across age groups for oral contraceptives, IUDs, and implants. Following a PubMed search and to the best of our knowledge, this study is the first to compare contraceptive use through both health administrative data and survey data. However, some authors have previously used health administrative data to estimate contraceptive use in Denmark, Finland, Iceland, Norway, Sweden, and the United Kingdom [20-26]. In all these countries, as in this French study, results were consistent: oral contraceptives were the most widely used method, followed by IUDs, whereas implants remained little used.

French health administrative data have already been highlighted as a new tool that provides high-quality data for pharmacoepidemiological study [17,27]. As shown in a paper comparing Nordic countries using their national health administrative data [24], these data can be particularly relevant for comparisons between countries. They can also be a valuable source for time-analysis studies. Health administrative data may be more homogeneous than data originating from different surveys. Moreover, they are statistically very powerful because of the large population from which they are drawn, allowing exploration of topics that are usually difficult to approach in surveys with limited sample size. For example, health administrative data would allow analysis of less-used contraceptives (such as implants) or could assess the impact of local policies on regional populations. Finally, health administrative data have already shown their value in guiding public health decisions, for example, in England, where they are used to support sexual health strategy [28].

Limitations

One of the main strengths of health administrative data is the high quality of information on contraceptive use [16]. In this study, to allow comparisons, we limited the analysis to the 3 large classes of contraceptives that were measured in the survey: implants, IUDs, and oral contraceptives. Health administrative data would allow analysis of more detailed information, for example, the type of hormones used in the contraceptive. However, a limitation is that non-reimbursed medical contraception is not included in the health administrative database, so it is not possible to take condoms into account even though they are widely used, especially among young women [2]. In addition, nonmedical contraception, such as natural methods and the withdrawal method, is not included in the health administrative data. Depending on the study objective, these limitations may be insignificant or prohibitive and must be anticipated when considering the use of health administrative data to monitor contraceptive use. Another major strength of the French health administrative database is that it covers about 98% of the resident population [16], yielding a very large sample for analysis. With such data, the 95% CI is very narrow (with possibly the same value for the 2 limits of the interval when displayed with only 1 decimal), and statistical tests can be significant with a negligible gap between proportions. Thus, statistical differences should not be overinterpreted, and the gap between values should also always be considered.

With such a large sample, health administrative data allow low-income populations to be fully taken into account in research. Low-income populations are hard to reach in population-based surveys because they are known to respond less to surveys [29]. They may therefore be too few in number for statistical analysis in surveys. Moreover, considering their low participation rate, there is probably a selection bias in the recruitment of low-income populations. On the contrary, health administrative data offer a source that is nearly exhaustive and

free of selection bias. The very large number of low-income women (1.6 million women aged 15-49 years) allowed accurate analysis of their contraceptive use by distinguishing the different types of contraceptives (oral contraceptives, IUDs, and implants).

In France, low-income persons benefit from 100% health coverage at no personal cost. In the health administrative health database, people with low income can be effectively identified through this special health coverage. This is a very strong advantage of French health administrative data compared with other national health databases such as the UK health care database, where disadvantage is not measured as an individual characteristic but only through a deprivation index [30,31].

A limitation of the French health administrative data is that it does not include non-reimbursed prescribed contraception, that

is, third- and fourth-generation pills, patches, and vaginal rings. Patches and vaginal rings are rarely used in France (<1%) [18]. Third- and fourth-generation pills are more often used, so in this study, we adjusted oral contraceptive use to include these pills. Moreover, it cannot be ruled out that some contraceptives were purchased but never used or that a few women stopped using the contraceptive before the end of its recommended duration.

Conclusions

In France, as in other countries, health administrative data are a promising new source for population-based monitoring of contraceptive use. They could open new perspectives for research and be a valuable asset to guide public policies on reproductive and sexual health.

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Data Availability

The data sets generated and analyzed during this study are not publicly available for reasons of confidentiality but are available from the Health Data Hub repository on reasonable request. The data sets of the Health Barometer Survey analyzed during this study are available from author DR on reasonable request.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Codes of prescribed contraceptives in the French health administrative database.

[\[DOCX File , 39 KB-Multimedia Appendix 1\]](#)

Multimedia Appendix 2

Estimation of contraceptive use prevalence in health administrative data.

[\[DOCX File , 15 KB-Multimedia Appendix 2\]](#)

Multimedia Appendix 3

Prescribed contraceptive use by type of contraceptive and age group in health administrative data and population-based survey data, women aged 15-49 years in France 2016 cross-sectional study.

[\[DOCX File , 22 KB-Multimedia Appendix 3\]](#)

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Abbreviations

IUD: intrauterine device

SNDS: Système National des Données de Santé

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Multimedia Appendix 1

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
G02BA03	3400927419478	JAYDESS 13,5 MG DISP INTRA UTERIN 1	3 years
	3400930094754	KYLEENA 19,5 MG DISP INTRA UTERIN 1	5 years
	3400933929282	MIRENA 52 MG DISP INTRA UTERIN 1	5 years
G03AA05	3400930677667	MILLI ANOVLAR CPR 21	1 month
	3400930677438	MILLI ANOVLAR CPR 63	3 months
	3400931853596	TRENTOVLANE CPR 21	1 month
	3400931853657	TRENTOVLANE CPR 63	3 months
	3400932549139	TRIELLA CPR 21	1 month
	3400932549368	TRIELLA CPR 63	3 months
G03AA06	3400930996195	STEDIRIL 0,5 MG/0,05 MG CPR 21	1 month
	3400930996256	STEDIRIL 0,5 MG/0,05 MG CPR 63	3 months
G03AA07	3400931840640	ADEPAL CPR 21	1 month
	3400931840879	ADEPAL CPR 63	3 months
	3400930149164	ASTERLUNA 100 MCG/20 MCG CPR 21	1 month
	3400930149171	ASTERLUNA 100 MCG/20 MCG CPR 63	3 months
	3400930149140	ASTERLUNA CONTINU 100 MCG/20 MCG CPR 0	1 month
	3400930149157	ASTERLUNA CONTINU 100 MCG/20 MCG CPR 84	3 months
	3400926921200	EFFILEVO 100 MCG/20 MCG CPR 21	1 month
	3400926921378	EFFILEVO 100 MCG/20 MCG CPR 63	3 months
	3400926921439	EFFILEVO CONTINU 100/20 MCG CPR 28	1 month
	3400926921668	EFFILEVO CONTINU 100/20 MCG CPR 84	3 months
	3400922408378	ETHINYL/LEVON.TVC 30/150 MCG CPR 21	1 month
	3400922408439	ETHINYL/LEVON.TVC 30/150 MCG CPR 63	3 months

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
3400938479263		LEELOO 0,1 MG/0,02 MG CPR 21	1 month
3400938479324		LEELOO 0,1 MG/0,02 MG CPR 63	3 months
3400930066690		LEELOO CONTINU 100/20 MCG CPR 28	1 month
3400930066713		LEELOO CONTINU 100/20 MCG CPR 84	3 months
3400928023308		LEVONOR/ETHINYL BGA 0.15/0,03 MG CPR 21	1 month
3400928023476		LEVONOR/ETHINYL BGA 0.15/0,03 MG CPR 63	3 months
3400930017531		LEVONOR/ETHINYL BGA 100/20 MICROG CPR 21	1 month
3400930017548		LEVONOR/ETHINYL BGA 100/20 MICROG CPR 63	3 months
3400930066737		LEVONOR/ETHINYL BGACONT 100/20 MCG CP 84	3 months
3400930033326		LEVONOR/ETHINYL CRT 100/20 MICROG CPR 63	3 months
3400927982552		LEVONOR/ETHINYL EG 0.15/0,03 MG CPR 21	1 month
3400927982613		LEVONOR/ETHINYL EG 0.15/0,03 MG CPR 63	3 months
3400927838392		LEVONOR/ETHINYL EG 100/20 MICROG CPR 21	1 month
3400927838453		LEVONOR/ETHINYL EG 100/20 MICROG CPR 63	3 months
3400927983733		LEVONOR/ETHINYL MYP 0.15/0,03 MG CPR 21	1 month
3400927983962		LEVONOR/ETHINYL MYP 0.15/0,03 MG CPR 63	3 months
3400928023186		LEVONOR/ETHINYL SDZ 0.15/0,03 MG CPR 21	1 month
3400928023247		LEVONOR/ETHINYL SDZ 0.15/0,03 MG CPR 63	3 months
3400927714283		LEVONOR/ETHINYL SDZ 100/20 MICROG CPR 21	1 month
3400927714344		LEVONOR/ETHINYL SDZ 100/20 MICROG CPR 63	3 months
3400927999291		LEVONOR/ETHINYL ZEN 0.15/0,03 MG CPR 21	1 month
3400927999352		LEVONOR/ETHINYL ZEN 0.15/0,03 MG CPR 63	3 months
3400927731723		LEVONOR/ETHINYL ZEN 100/20 MICROG CPR 21	1 month
3400927731891		LEVONOR/ETHINYL ZEN 100/20 MICROG CPR 63	3 months
3400930140567		LOLISTREL CONTINU 100/20 MCG CPR 28	1 month

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
	3400930140574	LOLISTREL CONTINU 100/20 MCG CPR 84	3 months
	3400927838163	LOLISTREL GE 100MCG/20 MCG CPR 21	1 month
	3400927838224	LOLISTREL GE 100MCG/20 MCG CPR 63	3 months
	3400922033396	LOVAPHARM 30/150 MCG CPR 21	1 month
	3400922033457	LOVAPHARM 30/150 MCG CPR 63	3 months
	3400939102344	LOVAVULO 20 MICROG/100 MICROG CPR PELL 21	1 month
	3400939108087	LOVAVULO 20 MICROG/100 MICROG CPR PELL 63	3 months
	3400935673169	LUDEAL CPR 21	1 month
	3400935673220	LUDEAL CPR 63	3 months
	3400927982323	MILEVONI 0.15/0,03 MG CPR 21	1 month
	3400927982491	MILEVONI 0.15/0,03 MG CPR 63	3 months
	3400927892332	MILEVONI 100/20 MICROG CPR 21	1 month
	3400927892561	MILEVONI 100/20 MICROG CPR 63	3 months
	3400931823902	MINIDRIL 0,15/0,03 MG CPR 21	1 month
	3400931824091	MINIDRIL 0,15/0,03 MG CPR 63	3 months
	3400926752514	OPTIDRIL 30/150 MCG CPR 28	1 month
	3400926752682	OPTIDRIL 30/150 MCG CPR 84	3 months
	3400922178967	OPTILOVA 20/100 MCG CPR 28	1 month
	3400922179049	OPTILOVA 20/100 MCG CPR 84	3 months
	3400939181066	PACILIA CPR 21	1 month
	3400939181127	PACILIA CPR 63	3 months
	3400949113361	QIADE GE 150/30 MCG CPR 21	1 month
	3400949113422	QIADE GE 150/30 MCG CPR 63	3 months
G03AA09	3400939720579	DESOBEL 150 MCG/20 MCG G _i CPR 21	1 month

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
	3400939720630	DESOBEL 150 MCG/20 MCG G _i CPR 63	3 months
	3400939721231	DESOBEL 150 MCG/30 MCG G _i CPR 21	1 month
	3400939721460	DESOBEL 150 MCG/30 MCG G _i CPR 63	3 months
	3400935866219	DESOGESTREL/ETHINYLESTRADIOL BIOGARAN 150/20 CPR 21	1 month
	3400935866387	DESOGESTREL/ETHINYLESTRADIOL BIOGARAN 150/20 CPR 63	3 months
	3400935866448	DESOGESTREL/ETHINYLESTRADIOL BIOGARAN 150/30 CPR 21	1 month
	3400935866509	DESOGESTREL/ETHINYLESTRADIOL BIOGARAN 150/30 CPR 63	3 months
	3400939720869	DESOGESTREL/ETHINYLESTRADIOL ELKA 150 MCG/20 MCG CPR 21	1 month
	3400939720920	DESOGESTREL/ETHINYLESTRADIOL ELKA 150 MCG/20 MCG CPR 63	3 months
	3400939721989	DESOGESTREL/ETHINYLESTRADIOL ELKA 150 MCG/30 MCG CPR 21	1 month
	3400939722061	DESOGESTREL/ETHINYLESTRADIOL ELKA 150 MCG/30 MCG CPR 63	3 months
	3400935037183	DESOGESTREL/ETHINYLESTRADIOL QUILL 150 MCG/20 MCG CPR 21	1 month
	3400935037244	DESOGESTREL/ETHINYLESTRADIOL QUILL 150 MCG/20 MCG CPR 63	3 months
	3400935037763	DESOGESTREL/ETHINYLESTRADIOL QUILL 150 MCG/30 MCG CPR 21	1 month
	3400935037824	DESOGESTREL/ETHINYLESTRADIOL QUILL 150 MCG/30 MCG CPR 63	3 months
	3400933853839	VARNOLINE CONTINU CPR 28	1 month
	3400933854089	VARNOLINE CONTINU CPR 84	3 months
G03AA10	3400937596138	CARLIN 75 MCG/20 MCG G _i CPR 21	1 month
	3400937596367	CARLIN 75 MCG/20 MCG G _i CPR 63	3 months
	3400937595476	CARLIN 75 MCG/30 MCG G _i CPR 21	1 month
	3400937595537	CARLIN 75 MCG/30 MCG G _i CPR 63	3 months
	3400937596428	EFEZIAL 75 MCG/20 MCG G _i CPR 21	1 month
	3400937596596	EFEZIAL 75 MCG/20 MCG G _i CPR 63	3 months
	3400937596886	EFEZIAL 75 MCG/30 MCG G _i CPR 21	1 month

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
3400937596947		EFEZIAL 75 MCG/30 MCG G _i CPR 63	3 months
3400937734417		GESTODENE/ETHINYLESTRADIOL ARROW 75 MCG/20 MCG CPR 21	1 month
3400937734585		GESTODENE/ETHINYLESTRADIOL ARROW 75 MCG/20 MCG CPR 63	3 months
3400937737029		GESTODENE/ETHINYLESTRADIOL ARROW 75 MCG/30 MCG CPR 21	1 month
3400937737197		GESTODENE/ETHINYLESTRADIOL ARROW 75 MCG/30 MCG CPR 63	3 months
3400937464383		GESTODENE/ETHINYLESTRADIOL BIOGARAN 75 MCG/20 MCG CPR 21	1 month
3400937464444		GESTODENE/ETHINYLESTRADIOL BIOGARAN 75 MCG/20 MCG CPR 63	3 months
3400937464505		GESTODENE/ETHINYLESTRADIOL BIOGARAN 75 MCG/30 MCG CPR 21	1 month
3400937464673		GESTODENE/ETHINYLESTRADIOL BIOGARAN 75 MCG/30 MCG CPR 63	3 months
3400937935500		GESTODENE/ETHINYLESTRADIOL RANBAXY 75 MCG/20 MCG CPR 63	3 months
3400937935159		GESTODENE/ETHINYLESTRADIOL RANBAXY 75 MCG/30 MCG CPR 63	3 months
3400937734646		GESTODENE/ETHINYLESTRADIOL RATIOPHARM 75 MCG/20 MCG CPR 21	1 month
3400937734707		GESTODENE/ETHINYLESTRADIOL RATIOPHARM 75 MCG/20 MCG CPR 63	3 months
3400937736886		GESTODENE/ETHINYLESTRADIOL RATIOPHARM 75 MCG/30 MCG CPR 21	1 month
3400937736947		GESTODENE/ETHINYLESTRADIOL RATIOPHARM 75 MCG/30 MCG CPR 63	3 months
3400937596657		GESTODENE/ETHINYLESTRADIOL SANDOZ 75 MCG/20 MCG CPR 21	1 month
3400937596718		GESTODENE/ETHINYLESTRADIOL SANDOZ 75 MCG/20 MCG CPR 63	3 months
3400937597029		GESTODENE/ETHINYLESTRADIOL SANDOZ 75 MCG/30 MCG CPR 21	1 month
3400937597197		GESTODENE/ETHINYLESTRADIOL SANDOZ 75 MCG/30 MCG CPR 63	3 months
3400938072464		GESTODENE/ETHINYLESTRADIOL TEVA 75 MCG/20 MCG CPR 21	1 month
3400938072525		GESTODENE/ETHINYLESTRADIOL TEVA 75 MCG/20 MCG CPR 63	3 months
3400938072006		GESTODENE/ETHINYLESTRADIOL TEVA 75 MCG/30 MCG CPR 21	1 month
3400938072174		GESTODENE/ETHINYLESTRADIOL TEVA 75 MCG/30 MCG CPR 63	3 months
3400937736657		GESTODENE/ETHINYLESTRADIOL WINTHROP 75 MCG/20 MCG CPR 21	1 month
3400937736718		GESTODENE/ETHINYLESTRADIOL WINTHROP 75 MCG/20 MCG CPR 63	3 months

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
	3400937737258	GESTODENE/ETHINYLESTRADIOL WINTHROP 75 MCG/30 MCG CPR 21	1 month
	3400937737319	GESTODENE/ETHINYLESTRADIOL WINTHROP 75 MCG/30 MCG CPR 63	3 months
G03AB03	3400937700009	AMARANCE CPR 63	3 months
	3400935884138	DAILY CPR 21	1 month
	3400935884367	DAILY CPR 63	3 months
	3400938999754	EVANECIA CPR 21	1 month
	3400938999815	EVANECIA CPR 63	3 months
	3400930081051	TRINORDIOL CPR 21	1 month
	3400930081068	TRINORDIOL CPR 63	3 months
	3400932807093	TRINORDIOL CPR SUREMBALLE 21	1 month
	3400932807154	TRINORDIOL CPR SUREMBALLE 63	3 months
G03AB04	3400932026326	MINIPHASE (ACETATE DE NORETHISTERONE, ETHINYLESTRA	1 month
	3400932026494	MINIPHASE (ACETATE DE NORETHISTERONE, ETHINYLESTRA	1 month
G03AC03	3400932200672	MICROVAL 0,03 MG CPR 28	1 month
	3400932200733	MICROVAL 0,03 MG CPR 84	3 months
G03AC08	3400935154439	NEXPLANON 68 MG IMPLANT 1	3 years
G03AC09	3400922474144	ANTIGONE 75 MCG CPR 28	1 month
	3400922474373	ANTIGONE 75 MCG CPR 84	3 months
	3400941918308	CLAREAL 75 MCG CPR 28	1 month
	3400941918476	CLAREAL 75 MCG CPR 84	3 months
	3400926736484	DESOGESTREL BGA 75 MCG CPR 28	1 month
	3400926736545	DESOGESTREL BGA 75 MCG CPR 84	3 months

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
	3400930093535	DESOGESTREL CRT 75 MCG CPR 84	3 months
	3400926954666	DESOGESTREL EG 75 MCG CPR 28	1 month
	3400926954727	DESOGESTREL EG 75 MCG CPR 84	3 months
	3400941918018	DESOGESTREL MITHRA 75 MCG CPR 28	1 month
	3400941918186	DESOGESTREL MITHRA 75 MCG CPR 84	3 months
	3400930145463	DESOGESTREL MYLAN PHARMA 75 MCG CPR 0	1 month
	3400930145470	DESOGESTREL MYLAN PHARMA 75 MCG CPR 84	3 months
	3400930055595	DESOGESTREL SDZ 75 MCG CPR 28	1 month
	3400930055601	DESOGESTREL SDZ 75 MCG CPR 84	3 months
	3400941912443	DESOGESTREL ZEN 75 MCG CPR 28	1 month
	3400941912672	DESOGESTREL ZEN 75 MCG CPR 84	3 months
	3400926808037	DESOPOP 75 MCG CPR 28	1 month
	3400926808266	DESOPOP 75 MCG CPR 84	3 months
	3400921661477	ELFASLETTE MYL 75 MCG CPR 28	1 month
	3400921661538	ELFASLETTE MYL 75 MCG CPR 84	3 months
	3400927421600	LACTINETTE 75 MCG CPR 28	1 month
	3400927421778	LACTINETTE 75 MCG CPR 84	3 months
	3400927406812	OPTIMIZETTE 75 MCG CPR 28	1 month
	3400927406980	OPTIMIZETTE 75 MCG CPR 84	3 months
G03DA02	3400933930004	GESTORAL 10 MG (ACETATE DE MEDROXYPROGESTERONE) 1	1/2 month
	3400933930233	PROVERA 10 MG CPR SEC 14	1/2 month
G03DB01	3400932192946	DUPHASTON 10 MG CPR 10	1/2 month
G03DB03	3400931308614	COLPRONE 5 MG CPR 20	1/2 month

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
G03DB04	3400936557246	LUTENYL 3,75 MG CPR 14	1/2 month
	3400932661121	LUTENYL 5 MG CPR 10	1/2 month
	3400938691870	NOMEGESTROL ARW 5 MG CPR 10	1/2 month
	3400938173451	NOMEGESTROL BGA 5 MG CPR 10	1/2 month
	3400938172799	NOMEGESTROL EG 5 MG CPR 10	1/2 month
	3400936453708	NOMEGESTROL MYL 5 MG CPR 10	1/2 month
	3400938323917	NOMEGESTROL RTP 5 MG CPR 10	1/2 month
	3400939016207	NOMEGESTROL SDZ 5 MG CPR 10	1/2 month
	3400938280241	NOMEGESTROL TVC 5 MG CPR 10	1/2 month
3400938692532	NOMEGESTROL ZEN 5 MG CPR 10	1/2 month	
G03DB05	3400931789451	LUTIONEX 0,5 MG CPR 30	1 month
G03DB06	3400936647466	CHLORMADINONE MYL 10 MG CPR 12	1/2 month
	3400936327986	CHLORMADINONE MYL 5 MG CPR 10	1/2 month
	3400937352161	CHLORMADINONE MYLAN GENERIQUES 10 MG CPR 12	1/2 month
	3400937352222	CHLORMADINONE MYLAN GENERIQUES 5 MG 1 BOITE DE 10,	1/2 month
	3400936328587	CHLORMADINONE QUALIMED 5 MG CPR 10	1/2 month
	3400936526600	CHLORMADINONE SANDOZ 2 MG CPR 10	1/2 month
	3400936647527	CHLORMADINONE SDZ 10 MG CPR 12	1/2 month
	3400936560147	CHLORMADINONE SDZ 5 MG CPR 10	1/2 month
	3400936647237	CHLORMADINONE THERAMEX 10 MG CPR 12	1/2 month
	3400936667747	CHLORMADINONE THERAMEX 5 MG CPR 10	1/2 month
	3400936561847	CHLORMADINONE TVC 10 MG CPR 12	1/2 month
	3400936526020	CHLORMADINONE TVC 2 MG CPR 10	1/2 month

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
	3400936526310	CHLORMADINONE TVC 5 MG CPR 10	1/2 month
	3400933943301	LUTERAN 10 MG CPR 12	1/2 month
	3400930633144	LUTERAN 2 MG (ACETATE DE CHLORMADINONE) 1 BOITE DE	1/2 month
	3400930633205	LUTERAN 5 MG CPR 10	1/2 month
G03DB07	3400932491544	SURGESTONE 0,125 MG CPR 10	1/2 month
	3400932491834	SURGESTONE 0,25 MG CPR 10	1/2 month
	3400933133146	SURGESTONE 0,5 MG CPR 10	1/2 month
	3400933642860	SURGESTONE 0,5 MG CPR 12	1/2 month
N/A ^b	1120717	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, 7 MED, NT 380, SHORT OU STANDARD	10 years
	1103848	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, 7 MED, TT 380	10 years
	1128370	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, 7 MED, UT N 380 STANDARD	10 years
	1122283	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, 7 MED, UT S 380 SHORT	10 years
	1158536	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, AU CUIVRE	10 years
	6172819	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, AU CUIVRE.,HRA PHARMA	10 years
	6186566	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, AU CUIVRE.,LABO 7 MED	10 years
	6186572	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, AU CUIVRE.,LABO GYNEAS	10 years
	6184840	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, AU CUIVRE.,LABORATOIRE CCD	10 years
	1135890	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, CONTREL, GYNEFIX	10 years
	1173062	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, JANSSEN-CILAG, GYNE T 200	10 years
	1187615	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, JANSSEN-CILAG, GYNE T 380	10 years
	1171407	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MONA LISA NV, MONA LISA CU375 SL RO	10 years
	1121125	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MONA LISA NV, MONA LISA CU375-RO	10 years
	1106752	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MONA LISA NV, MONA LISA CUT-380A	10 years
	1132519	OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MONA LISA NV, MONA LISA NT CU380	10 years

ATC code^a	Contraceptive code	Label Name	Recommended duration of use
1101938		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MULTILAN, CU 375 SL	10 years
1152960		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, MULTILAN, CU 375 STANDARD	10 years
1134760		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, PRODIMED, GYNELLE 375	10 years
1132531		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, SCHERING SA, NOVA T	10 years
1146770		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, SCHERING SA, NOVA T 380	10 years
1125749		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, THERAMEX, SERTALIA	10 years
1120717		OBJET CONTRACEPTIF, STERILET AVEC INSERTEUR, 7 MED, NT 380, SHORT OU STANDARD	10 years

^a Codes of the Anatomical Therapeutic Chemical (ATC) classification system.

^b Not applicable: ATC not applicable because copper IUDs are categorized as medical devices, not as drugs.

Multimedia Appendix 2

In French health administrative data, prevalence is estimated taking into account non-reimbursed contraceptives and people who had no health care during the study period.

1) Non-reimbursed contraceptives: third and fourth-generation combined oral contraceptives

Third and fourth-generation combined oral contraceptives (COC) are not reimbursed in France and so are not included in French health administrative data. To compare administrative data with the most recent survey data, the prevalence estimated in health administrative data must be corrected in order to take into account third and fourth-generation COC. A correction factor was estimated based on another administrative database, a French pharmaceutical sales database (IQVIA Pharmatrend Micro). The IQVIA database exhaustively records all sales of reimbursed and non-reimbursed medicines in a sample of 11,400 drugstores nationwide, randomly selected after stratification on turnover, type of sales, location and catchment area. Between 1 January, 2016 and 31 December, 2016, the database recorded the sales of 42,123,458 units of COC (first, second, third and fourth-generation), a total which included 34,592,723 units of first and second-generation COC and 7,530,735 units of third and fourth-generation COC. Third and fourth-generation COC accounted for only 18% of all sales of these contraceptives, whereas first and second-generation COC accounted for 82%. The prevalence of all COC can be estimated as:

$$\begin{aligned} \text{Prevalence of COC} &= \text{Prevalence of first and second-generation COC} \times (1+0.18/0.82) \\ &= \text{Prevalence of first and second-generation COC} \times 1.2195 \end{aligned}$$

2) People who had no health care during the study period

The French health database includes information on reimbursed health care consumption. Thus, only people who had reimbursed health care during the study period can be observed. The prevalence estimated in the health administrative data has to be corrected in order to take into account people who received no reimbursed health care during the study period. A correction factor was estimated based on the referential table of the health insurance, that references all persons affiliated to the main French

health insurance schemes, even those who have not received health care. This table showed that 96.949385% of women aged 15-49 years had received reimbursed health care.

Thus, prevalence can be estimated as:

Prevalence for all women = Prevalence for women who had received reimbursed health care during
the study period \times 0.96949385

Multimedia Appendix 3

Women aged 15-19 years			
	Health administrative data	Survey data	P value^c
	(n=1,943,189)	(n=352)	
	% (95% CI)^a	%^b (95% CI)	
Implant	1.9 (1.9-1.9)	1.5 (0.5-2.5)	=.04
IUD	0.6 (0.6-0.6)	0.00 (0.00-0.00)	
Oral contraceptives	29.8 (29.8-29.9)	25.9 (22.2-29.6)	
Not using contraception	32.3 (32.3-32.4)	27.4 (23.6-31.1)	
Women aged 20-24 years			
	Health administrative data	Survey data	P value^c
	(n=1,923,509)	(n=488)	
	% (95% CI)^a	%^b (95% CI)	
Implant	4.6 (4.6-4.7)	6.9 (4.9-9.0)	=.03
IUD	5.2 (5.1-5.2)	3.8 (2.2-5.3)	
Oral contraceptives	44.2 (44.1-44.3)	44.3 (40.2-48.3)	
Not using contraception	54.0 (53.9-54.1)	55.0 (50.9-59.0)	

Women aged 25-29 years			
	Health administrative data	Survey data	<i>P</i> value^c
	(n=2,093,726)	(n=588)	
	% (95% CI)^a	%^b (95% CI)	
Implant	4.2 (4.1-4.2)	3.8 (2.3-5.3)	=.12
IUD	12.9 (12.9-13.0)	15.1 (12.4-17.8)	
Oral contraceptives	34.1 (34.0-34.2)	36.3 (32.6-40.0)	
Not using contraception	51.2 (51.1-51.2)	55.2(51.4-59.0)	
Women aged 30-34 years			
	Health administrative data	Survey data	<i>P</i> value^c
	(n=2,173,256)	(n=647)	
	% (95% CI)^a	%^b (95% CI)	
Implant	3.6 (3.6-3.6)	2.9 (1.6-4.2)	=.24
IUD	22.1 (22.0-22.1)	24.4 (21.0-27.7)	
Oral contraceptives	26.6 (26.5-26.6)	28.0 (24.5-31.5)	
Not using contraception	52.2 (52.2-52.3)	55.3 (51.4-59.1)	
Women aged 35-39 years			
	Health administrative data	Survey data	<i>P</i> value^c
	(n=2,185,765)	(n=694)	
	% (95% CI)^a	%^b (95% CI)	
Implant	3.1 (3.1-3.2)	2.0 (0.9-3.0)	=.19
IUD	28.1 (28.0-28.1)	28.7 (25.2-32.2)	
Oral contraceptives	22.0 (21.9-22.0)	24.2 (20.8-27.5)	
Not using contraception	53.2 (53.1-53.3)	54.8 (51.0-58.7)	

Women aged 40-44 years			
	Health administrative data	Survey data	<i>P</i> value^c
	(n=2,196,344)	(n=741)	
	% (95% CI)^a	%^b (95% CI)	
Implant	2.4 (2.3-2.4)	3.2 (2.0-4.5)	=.003
IUD	28.2 (28.1-28.2)	31.2 (27.9-34.6)	
Oral contraceptives	18.8 (18.8-18.9)	21.5 (18.6-24.5)	
Not using contraception	49.3 (49.3-49.4)	56.0 (52.4-59.6)	

Women aged 45-49 years			
	Health administrative data	Survey data	<i>P</i> value^c
	(n=2,254,464)	(n=775)	
	% (95% CI)^a	%^b (95% CI)	
Implant	1.5 (1.5-1.5)	2.5 (1.3-3.6)	=.003
IUD	23.5 (23.4-23.5)	27.7 (24.3-31.0)	
Oral contraceptives	15.7 (15.7-15.8)	16.4 (13.7-19.2)	
Not using contraception	40.7 (40.6-40.7)	46.6 (42.8-50.3)	

^aCI Confidence interval

^b Weighted percentage

^c The values given are *P* values of the χ^2 test, except for women aged 15-19 years where numbers were too small for use of this test. For this age group we used Fisher's exact test.