

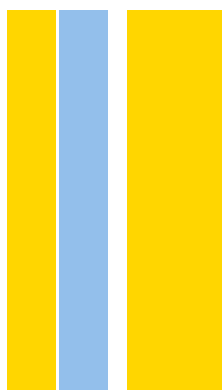
MASTER OF PUBLIC HEALTH

Is women's socioeconomic status associated with the use and method of contraceptives, in Portugal?

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*To Teresa Leño,
without whom this thesis would not have been possible;*

*To Robyn, Micaela, and Nora,
without whom MPH academic year would not have been possible;*

*To my family and friends,
without whom nothing would have ever been possible.*

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Abstract:

Introduction:

Access to safe, effective contraception is important to each woman individually, and to the population's health and well-being. Reducing unintended pregnancies protects women and babies against its risks, such as worsening of women's previous pathologies, impact on women's life plans, and difficulties in the dyad mother-baby. Policies related to contraceptive access vary widely across countries and, in Portugal, access to family planning aims to be universal and free. Still, the use of contraceptives and method of choice is probably influenced by many social and economic factors.

Objectives:

This study aimed to understand if the socioeconomic status of Portuguese women is associated with the use of contraceptives and the method. We further aimed to understand if access to healthcare would partially or entirely explain the eventual socioeconomic patterning.

Materials and Methods:

This cross-sectional study analyzed data from 572 27-years-old women from the 2017 Epiteen cohort survey. We regressed the use and method of contraceptive (including hormonal contraception and copper intrauterine device) against monthly income, education level, and the number of medical appointments in the past twelve months.

Results:

Women who earned lower incomes were less likely to use any contraceptives [OR 0.179, (95%CI 0.064-0.501) for income of less than 500 euros] and, particularly, less likely to use the vaginal ring or contraceptive patch [OR 0.276 (95%CI 0.103-0.743) for income of less than 500 euros, OR 0.553 (95%CI 0.313-0.978) for income between 501 and 1000 euros], compared to women with a monthly income over 1000 euros. Education level and the number of medical appointments in the last 12 months before the survey did not show an association with the use and method of contraception.

Conclusion:

Contraception has had a remarkable impact on the life of women and society, reducing the risk of unintended pregnancies. Public policies facilitating access to contraceptives are fundamental for maximizing the potential of contraception. Portuguese policies aim to provide universal access to family planning, but this study suggests that, in Portugal, there is a socioeconomic pattern in the use of contraception and in the method of choice.

List of abbreviations and acronyms

CI – Confidence Interval

DMPA – Depot medroxyprogesterone acetate

IUD – Intrauterine device

LARC – Long-acting reversible contraception

OBGYN - Obstetrics and Gynecology

OR – Odds Ratio

PhD – Doctor of Philosophy

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Introduction and context

Contraception is essential for the avoidance of unintended pregnancies, which are associated with several negative outcomes. There are several types of contraceptives, with different mechanisms of action, efficacy, effectiveness, and compliance by its users. These topics will be developed in this section, together with a contextualization of the factors related to the use of contraception. The research question and our goals and objectives will be presented at the end of this section.

Planning pregnancies and the burden of unintended pregnancies:

It is estimated that, globally, there are 120 million unintended pregnancies per year, corresponding to 48% of all pregnancies.¹ Unintended pregnancies are pregnancies that are either not desired, unplanned, or mistimed at the time of conception.²

Unintended pregnancies, or pregnancies that women are ambivalent about, have been associated with low-birth-weight babies.^{3,4} Unintended pregnancies are more likely with short intervals between two subsequent pregnancies.⁵ Spacing pregnancies in an adequate way is clinically important, as short intervals (and, to a lower degree, very long intervals) between pregnancies have been associated with increased adverse events.^{6,7} Short interpregnancy intervals (typically considered as less than 6 or 18 months) have been associated with an increased risk of 20% of pre-term birth, of 39-86% of low birth weight, and of 18-33% of small for gestational age babies, and two to three-fold higher risk of uterine rupture if vaginal birth is attempted after a cesarean section.⁶ Some hypotheses to this phenomenon can be the depletion of nutrients such as iron and folic acid after one pregnancy that the woman could not replace at the time of the subsequent pregnancy, but also changes in the vaginal microbiota during pregnancy.⁶ However, some studies also suggest that part of the burden of adverse outcomes relies on confounding factors, such as differences in age and disadvantages in socioeconomic status in women who more often have short pregnancy intervals.⁶

Other benefits of planning pregnancies include higher chances of women attaining higher levels of education.⁷ Women who have children early in their life are less likely to obtain a college degree than those who have children later in life or do not have children at all.⁸ Also, several studies have reported in mothers tend to receive lower

wages than comparable childless women.^{9,10} A more contemporary meta-analysis on this motherhood wage penalty¹⁰ found an average wage gap of 3.6-3.8% between mothers and childless women, but with differences between countries: when adjusting for other explanatory variables, the residual wage gap is smaller in Nordic countries, where public policies actively support mother's integration into the workforce, but also in Southern Europe (Greece, Italy, Portugal and Spain), probably due to low female employment level, and therefore a selective allocation to work. In a population-based study from Denmark¹¹, in the year where their first child was born there was an estimated loss of income of 37% to 65% for college women and from 40% to 53% for non-college women compared to two years before the birth; women who had their first child before 25 years of age had a lower lifetime income, while women who had their first child later than age 31 had higher lifetime labor income, whether they had college education or not, and slightly higher lifetime labor income than childless women.

Several studies have shown an association between unintended pregnancies and a higher risk of perinatal depression,¹²⁻¹⁴ up to 2.72 times the risk of perinatal depression if the woman felt negative feelings towards her unplanned pregnancy.¹² Unintended pregnancies have also been linked by several studies with higher chances of future child mistreatment and abuse^{15,16}: child maltreatment has been described to include an acute and chronic mismatch between the child's needs and reality and the parents' (and larger family and community's) capacities to deal with those needs, and unintended pregnancy implies – at least initially – such a mismatch. Reducing unintended pregnancies also seems to have good impacts on relationships, as these are associated with higher levels of conflict and worse levels of satisfaction in relationships.⁷

Finally, about 61% of unintended pregnancies end in abortion.¹ There are wide variations between countries, even within the same region, both in unintended pregnancies and abortion rates.¹⁷ Worldwide, almost 45% of abortions worldwide are done with unsafe methods or without the necessary support from healthcare professionals; 97% of them occur in developing countries.¹⁸ A study on the causes of

worldwide maternal mortality between 2003 and 2009 concluded that abortion was the cause of 7.9% of these maternal deaths – 193 000 deaths in the 6 years of the study. Besides being a public health and a human rights issue, the World Health Organization stated that countries could have great monetary gains by providing wide access to modern contraception and quality induced abortion.¹⁸

Contraceptives and their role in the prevention of unplanned pregnancies:

Family planning, according to the World Health Organization, allows people to attain their desired number of children, if any, and to determine the spacing of their pregnancies.¹⁹ It can be achieved by the use of contraceptives or, in another perspective, with infertility treatments.¹⁹ Contraception allows women and families to avoid pregnancies, either to plan or space births or to abstain completely from childbearing, and the widespread access to hormonal contraceptives (in the early times, exclusively to the pill) seems to have an important impact on the reduction of the gender gap in pay in the late half of the 20th century.²⁰

Characteristics of several contraceptive methods available: adapted from^{21–23}

Contraceptives are divided into two broad categories: reversible (which can be stopped when a pregnancy is desired) and permanent (which, in general, cannot be undone).

Typical use refers to the failure rate when contraceptives are used in real-life settings by the average person, who might use methods incorrectly or non-consistently.

Reversible methods of contraception

- Long-acting Reversible Contraceptives

These contraceptive methods allow the prevention of pregnancy through multiple years and include intrauterine devices (IUD), both the hormonal IUD and the copper IUD, and the subcutaneous implant.

The hormonal IUD contains a progestin component and is effective for three to five years; it is estimated that the percentage of women experiencing an unintended

pregnancy within the first year of use is 0.2%, with typical and perfect use. The copper IUD, which is a non-hormonal form of contraception, is effective for up to 10 years of use; it can cause heavier menstruations and dysmenorrhea; it is estimated that the percentage of women experiencing an unintended pregnancy within the first year of use is 0.8% with typical use and 0.6% with perfect use. Both the hormonal and copper IUD can also be recommended to teenagers and women who have never been pregnant, and are not associated with higher rates of pelvic inflammatory disease or post-use infertility; they are inserted in a medical office, but, typically, without the need for anesthesia.

The subcutaneous implant also contains a progestin component, and is inserted under the skin on the inside of the upper arm, providing three years of contraception; insertion and removal are typically done with local anesthesia; it is the most effective form of contraceptive available, with only 0.05% of women experiencing an unintended pregnancy within the first year of use (both with typical or perfect use); however, its most common side effect is irregular, unpredictable vaginal bleeding.

- Short-acting reversible contraceptives

These contraceptive methods include the pill (both the contraceptive oral combination pills and the progestin-only contraceptive pills), the transdermal contraceptive patch, the vaginal ring, and the depot medroxyprogesterone acetate (DMPA) shot.

The combined oral contraceptives have both an estrogen and a progestin component, and are commonly known as “the pill”. Typically, a woman takes a daily pill for 21 days and then stops for seven days (or takes placebo pills for seven days). This contraceptive is the most common method of hormonal contraception. The progestin-only oral contraceptives are sometimes known as the “mini-pill” or “breastfeeding pill”, only contain a progestin component and, and are thus especially useful for women who should not be taking estrogens, such as smoking women over 35 years old and, as the name suggests, lactating women; it has the same efficacy as the combination pill, but it is important to take the pill at the same time every day. The percentage of women with an unintended pregnancy within the first year of use of any type of contraceptive pill is 9% with typical use, and 0.3% with perfect use.

The transdermal contraceptive patch has both an estrogen and a progestin component. It should be placed on clean, dry skin located on the buttocks, upper outer arm, or lower abdomen, and replaced weekly for three weeks (the fourth week is patch-free). The percentage of women experiencing an unintended pregnancy is the same as with the pill.

The contraceptive vaginal ring also has both an estrogen and a progestin component. The ring is placed into the vagina by the woman and left in place for three weeks; the fourth week is ring-free. Most women and their partners are unaware of the presence of the ring, but it can be taken out of the vagina for up to three hours, if desired, without altering its efficacy. The percentage of unintended pregnancy is the same as with the contraceptives above mentioned. The DMPA shot contains a progestin component and consists of an injectable given every 12 weeks in a health facility. Some of the concerns involved with it are the potential loss of bone mineral density, and a slower return to fertility after stopping this method. The percentage of women experiencing an unintended pregnancy within the first year of use is 6% with typical use and 0.2% with perfect use.

Besides contraception, hormonal contraceptives also have non-contraceptive health benefits, such as the reduction of certain types of cancer, such as ovarian, endometrial, and colorectal cancer²⁴ (counterbalanced by a small increase in breast cancer risk²⁵), reduction of menstrual pain²⁶ and heavy menstrual bleeding.²⁷

- Barrier methods

Barrier methods work by providing a physical barrier between the sperm and the egg. These methods include condoms (masculine and feminine condoms), diaphragms, sponges, and cervical caps - each of them should be correctly placed before or at each intercourse and, thus, have typically higher failure rates compared to the previous methods. The most known (and currently used of these methods) is the male condom. The male condom (as the female condom) has the advantage of offering protection against several sexually transmitted infections. The male condom has a typical failure rate of unintended pregnancy of 18% with typical use and 2% with perfect use.

- Fertility awareness methods

Sometimes known as natural rhythms methods, these methods include those based on monitoring the menstrual cycle or indirect signs of fertility such as cervical mucus or basal body temperature, and then avoiding sexual intercourse or only using contraceptives on days deemed as fertile (days where pregnancy is more likely). It is estimated that, with perfect use, the percentage of women having an unintended pregnancy in the first year of use varies between 0.4% and 5%; with real-life, usual use, the failure rate is around 24%.

- Other

Other methods include lactational amenorrhea and withdrawal methods, which are less effective to protect against unexpected pregnancies. The first is a form of natural birth control for breastfeeding new mothers. It is highly effective when its criteria are met: the woman has had a baby in less than 6 months; the woman has not resumed menstruation; the woman breastfeeds exclusively (or almost exclusively), with less than 6 months between each breastfeeding session. Withdrawal consists of pulling the penis out of the partner's vagina before ejaculation. It is estimated that this method has a failure rate of unexpected pregnancy within a year of between 4% to 22%. Abstinence may also be considered a contraceptive method and requires refraining from all forms of sexual activity and genital contact to prevent pregnancy. Emergency contraception ought not to be a regular contraceptive method. It is a method used after having unprotected intercourse (whether because the person does not use contraception, or because there was a failure detected on the regular method). Emergency contraception includes emergency contraceptive pills and the copper IUD. Depending on the specific emergency contraception chosen, it can be used up to 5 days after the unprotected sex, but are more effective the sooner they are taken.

Permanent methods of contraception

- Female and male sterilization

These methods include female tubal ligation, occlusion, or removal, as well as male vasectomy. These methods provide prevention of pregnancy for the rest of life but are generally irreversible.

Female sterilization has an estimated percentage of women experiencing an unintended pregnancy within the first year of use of 0.5% with both a typical and perfect use, and male vasectomy has a rate of 0.15% with typical use and 0.10% with perfect use.

Not surprisingly, one study in 36 low and middle-income countries showed that more than half of women undergoing an unintended pregnancy were not using contraception; smaller percentages were using fertility awareness methods such as the calendar method, and short-acting contraceptives; the authors conclude that long-acting contraceptives would have prevented the great majority of these unintended pregnancies.²⁸

Compliance with contraception influences the risk of unintended pregnancy and depends on different factors.²⁹ One of them is the method of contraception: the use of the pill has been associated with higher levels of noncompliance compared with the contraceptive patch [Odds ratio (OR) 2.53 (95%CI 2.13-3.02)] and with the vaginal ring [OR 4.18 (95% CI 3.68-4.73)].²⁹ The Cochrane review on the effectiveness of the pill, the vaginal ring, and the contraceptive patch, albeit limited by data quality, found no differences between these contraceptive methods, but suggested a higher compliance in the patch group, as well as fewer adverse events in vaginal ring users than pill users.³⁰ Low levels of information of the user concerning the method and its instructions were also associated with higher probabilities of non-compliance.²⁹

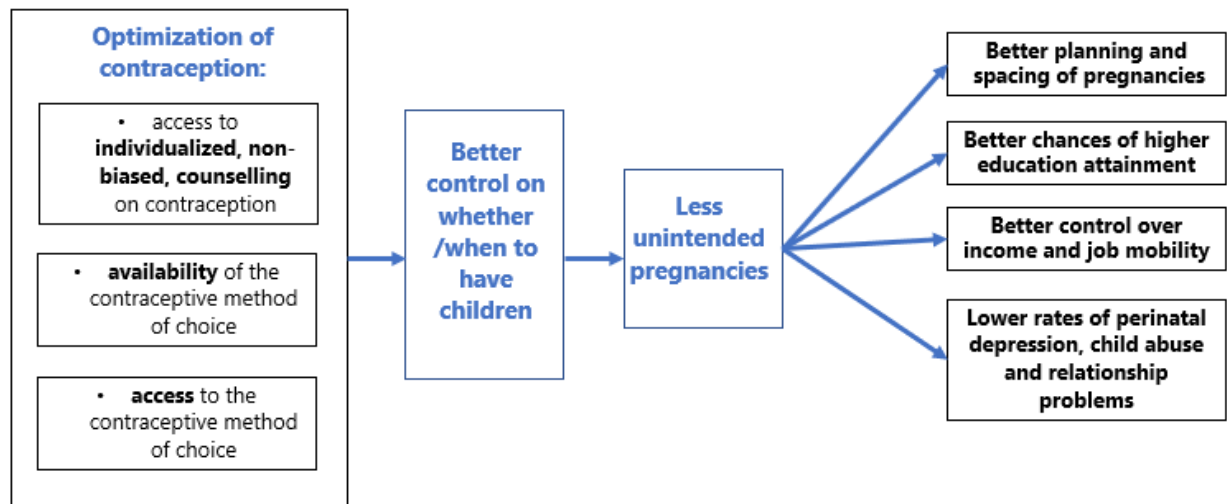


Figure 1: Effect of contraception on unintended pregnancies

Factors associated with the use of contraceptives:

The use of hormonal contraceptives and the method of choice depend on many factors, namely related to the woman, medical prescriber, healthcare system, policies, and the society where the decision is made.

Many women are not aware of all the options available for contraceptives, namely those beyond oral contraceptives³¹, or have misconceptions about them. The beliefs of each woman affect her choice of using a certain type of contraceptive.³² Similarly, it is critical for the medical professional who advises on contraceptives to know the options and characteristics of the available contraceptive methods, as this influences the variety of contraceptives the professional advises.^{32,33} A proactive approach for more effective methods can be acceptable.³⁴ The cost of some contraceptive methods in the local setting is also a barrier.^{31,32} Government funding for certain types of birth control has an impact on the birth control method that women choose.³¹

Socioeconomic factors of the women have shown to be associated with the use and method of contraception in some settings. For instance, a nationwide matched case-control Finnish study found that women with lower socioeconomic status were less likely to use contraceptives compared with those with higher socioeconomic status, even after adjusting for other sociodemographic variables.³⁵ On the other hand, an

Australian study stated that users of contraceptives were more likely to have studied beyond high school than non-users of contraceptives.³⁶ A study conducted in the United States of America found that unmarried women and women with higher levels of education generally preferred more effective methods, including long-acting reversible contraceptives (LARC) and hormonal (non-LARC) methods; interestingly, this association was not found with higher levels of income.³⁷ In Ghana, a developing country, education seemed to have an impact on the use of contraception, more than wealth.³⁸ The results are difficult to interpret due to heterogeneity in the contraceptive methods chosen as variables, different definitions of socioeconomic classes, and different contexts and policies regarding contraception from country to country.

The countries' policies on family planning and contraception may, thus, influence users' access to contraceptives and its use. The European Parliamentary Forum for Sexual & Reproductive Rights, in their 2022 edition of the Contraception Policy Atlas, ranked 46 European countries based on their government policies on access to contraceptive supplies, family planning counseling, and availability of online information on contraception.³⁹ They concluded that 19 countries (41%) included at least one LARC as subsidized by their national health system; 41 countries (89%) covered counseling within the national health system, and 18 countries (39%) provided governmental websites about contraception.³⁹ The same institution, in collaboration with local experts, also created a Global Contraception Policy Atlas concerning Africa, launched in 2020, which showed even more striking inequities within the region.⁴⁰

The United Nations have included in their 2030 Agenda for Sustainable Development the goal of, by 2030, ensuring sexual and reproductive health-care services, including family planning, information, and education, as well as the integration of reproductive health into national strategies and programs.⁴¹ Reproductive rights are human rights, and thus human rights principles and institutional duties apply.⁴²

The Portuguese context

The Constitution of Portugal, dating back to 1976 and last reviewed in 2005, states that the Portuguese State ought to “guarantee, in the respect of individual freedom, the right to family planning, promoting information and access to methods and means that assure it”.⁴³ In 2022, the Contraceptive European Atlas placed Portugal amongst the European countries with the best government policies regarding contraception – in 8th place out of 46 countries.³⁹ Coverage of contraceptives and counselling were deemed as superior; online information was considered to be provided mostly by non-governmental institutions but was overall considered of good quality.

In Portugal, primary health care centers and obstetrics and gynecology (OBGYN) services in hospitals should ensure universal and free access to family planning appointments.^{44–46} In general, the appointments should be done in the primary care health centers and, upon referral, to the hospitals. Family planning appointments include healthcare, counselling, and education connected with sexual and reproductive health, promoting a safe and positive sex life, preparing for healthy maternity and paternity, preventing unintended pregnancy, reducing maternal, perinatal and child mortality and morbidity, as well as reducing the incidence of sexually transmittable diseases.⁴⁶

The list of contraceptive methods available for free in the primary health care centers of the National Health Service has been updated in 2015⁴⁷ and includes different types of contraceptive pills, the vaginal ring, contraceptive patch, intra-uterine devices, subcutaneous implant, and condoms. This approach to contraception is more generous and inclusive than, for instance, Scandinavian countries.⁴⁸

Hormonal contraceptives in pharmacies are paid and, except for emergency contraception⁴⁹, formally require medical prescription⁵⁰ from any medical doctor, but, in practice, most methods are widely available without prescription in any pharmacy.⁵¹

In a Portuguese survey, 46.9% of women had access to contraceptives for free through their healthcare center or hospital; 18% got them in the pharmacy with a medical prescription, and 15% buy them without a medical prescription.⁵² This widespread availability without a medical prescription is uncommon in other countries of a similar

level of socioeconomic development, though a trend towards easier access to hormonal contraceptives is emerging in high-income countries.⁵¹

A cross-sectional study with 4,000 women living in Portugal in 2015 aimed to know the current choices and views on contraception in the country.⁵² Most (94%) of sexually active women used contraception: from these, 58.1% used the pill, 14.3% the male condom, 11.8% used the IUD, 5.4% the subcutaneous implant, 3% the contraceptive patch, 2.7% the vaginal ring, 2.6% permanent female sterilization, 0.7% withdrawal, 0.7% fertility awareness methods, and 0.5% the DMPA shot; the female condom, as well as “other” types of contraceptives aside from the above, had a 0% rate of use on this survey. In comparison, in Spain the most current contraceptive is the condom (31.3% of all women), followed by the pill (19.2% of all women, including those without an active sexual life) and intra-uterine devices (8.3% of all women)⁵³; in other European countries such as Germany, Italy, and the UK, as well as in the USA, the most common contraceptive also was the pill.⁵⁴

Furthermore, since 2007, the Portuguese law allows for abortion due to women’s voluntary choice up until 10 weeks of pregnancy.⁵⁵ The process can be done in public hospitals (for free) or private institutions (paid out-of-pocket), and after the abortion women should be referred to a family planning appointment.⁵⁵ In 2018 (last report published to date) there were 14,306 abortions due to women’s voluntary choice and 306 for other reasons, corresponding to a total incidence of 172 abortions per 1000 live births in that year (lower than the average European incidence of 230 per 1000 live births in the same year).^{56,57} Abortions by women’s voluntary choice have steadily declined 27.1% from 2011.⁵⁶ A study¹⁷ estimated that there were annually 21 (95%CI 18 to 25) unintended pregnancies per 1000 women aged 15–49 years in 2015–2019 (fewer unintended pregnancies than the average of 35 in European and Northern American countries).

“Why is this important?”

Contraception and its essential role in the prevention of unintended pregnancies has a major impact on a woman's empowerment over her course of life. Access to contraceptives is a matter of human rights.

It is important to understand if, in Portugal, a country considered by the Contraceptive European Atlas as 8th in the ranking of with good contraception policies, socioeconomic women's status influence contraception use and methods. This evidence is much needed to inform the existing or new policies of contraception. If there are socioeconomic factors that favor - or disfavor – the use and method of contraception, these differences should be noted and taken into account in the definition of public policies.

We looked more closely at the pill, the vaginal ring, and the contraceptive patch as these three contraceptive methods are the most commonly used short-acting reversible hormonal contraceptives; also, the vaginal ring and contraceptive patch provide lower and more stable hormonal blood concentration than the pill⁵⁸, and do not have to be taken daily (unlike the pill), which could improve compliance and, therefore, contraception effectiveness.³⁰ We considered it important to understand if the socioeconomic factors status can be a barrier to the use of contraceptives and, specifically, of these newer methods.

Our hypothesis:

According to our literature review, we hypothesize that women's socioeconomic status influences the use of contraceptive, as well as the method used, with women from more favored strata having a higher probability of using contraceptives, especially vaginal ring and contraceptive patches. We also hypothesize that a higher healthcare use increases the odds of the use of contraceptives and, in particular, the use of vaginal ring and contraceptive patch, and that it can acts as a mediator between socioeconomic status and the use and method of contraceptive.

Research question:

Is women's socioeconomic status associated with the use and method of contraceptives, in Portugal?

Goals and objectives:

This study aimed to understand:

- if the socioeconomic status of women in Portugal is associated with the use of contraceptives;
- if the socioeconomic status of women in Portugal is associated with the use of the pill, contraceptive patch, or vaginal ring;
- if the eventual differences were explained by differences in healthcare use.

Methods

Study design

We conducted a cross-sectional study, using the data from the 2017 Epiteen cohort, to understand the association between the use of contraceptive and method and the socioeconomic status of 27 years-old women.

Data Source

The basis of the data for this study was the 2017 survey from the Epidemiological Health Investigation of Teenagers in Porto (Epiteen) cohort (the most recent survey of this cohort). The Epiteen is a cohort that started in 2003 and aimed to include all the adolescents born in 1990 that studied in public or private schools in the city of Porto.⁵⁹ The 2942 participants were so far evaluated at 13, 17, 21, 24 and 27 years old, including fulfilling surveys, and being evaluated for objectives measurements (such as arterial pressure) and blood analysis.⁵⁹

From the 2942 initial participants, follow-up losses up to 2017 were excluded. From the participants, all men were excluded.

Variables

The dependent variable was current or past use of contraceptives and method, which could range from the pill to vaginal ring, contraceptive patch, subcutaneous implant, and others (where the only answer given was intra-uterine devices). The use of contraceptive was dichotomized whether women were using/had ever used hormonal contraception (or copper IUD) (ever used/never used), whether they were using/had ever used the contraceptive pill (ever used/never used), and whether they were using/had ever used the vaginal ring or contraceptive patch (ever used/never used).

As independent variables, we used individual net monthly income, education level, and the number of medical appointments in the last twelve months (all self-reported by the women during the survey), which were analyzed and grouped: the monthly income

in “less than 500 euros”, “501-1000 euros”, and “more than 1000 euros”. The woman education level was grouped as “high school or lower”, “bachelor’s degree” and “master’s or PhD”. The number of medical appointments in the last 12 months was used as a proxy for access to healthcare, and was grouped into “0 appointments”, “one appointment”, “two appointments” and “three or more appointments”.

Data Analysis

A descriptive analysis of the sample was conducted, studying the proportion of women that were using and/or ever used the pill, vaginal ring, contraceptive patch, subcutaneous implant, and intra-uterine devices as contraceptive methods, and the users versus non-users socioeconomic characteristics (ie., education level, individual net monthly income, and access to healthcare). We further described the proportion of women who had used the pill, vaginal ring and contraceptive patch, and their socioeconomic characteristics. A chi-squared test was used to test for differences in socioeconomic characteristics between those who had ever used hormonal contraception (or the copper IUD) or not, who were (or were not) using/had ever used the contraceptive pill, and who were (or were not) using/had ever used the vaginal ring or the contraceptive patch.

Binary logistic regression models were used to estimate the association [crude odds ratios (OR) and respective 95% Confidence Intervals (95%CI)] between the use of contraceptives and method of choice with individual monthly income, education level and number of medical appointments in the previous 12 months.

A multivariate logistic regression was carried out to assess the association [adjusted ORs and 95%CI] between education and income with (1) having ever used a hormonal contraceptive (or the copper IUD), (2) having ever used the contraceptive pill, and (3) having ever used the vaginal ring or the contraceptive patch. Those three regressions were then repeated also taking to account the effect of the number of medical appointments in the previous 12 months.

The analyses were performed using IBM SPSS v.26. A significance level of 0.05 was used.

Ethics

The data used for this study was a small part of all data included in the Epiteen cohort, which had already been approved by ethical committees. No statistical data released in this study allows the identification of its participants. No ethical or data protection issues thus arise, and, as data has already been collected, a contingency plan was not mandatory.

Results

Characterization of the sample

The Epiteen cohort included 2942 people, 1507 women (51.2%) and 1435 men (48.8%). From those, 1137 (38.6%) participated in the 2017 survey, 576 (50.7%) women and 561 (49.3%) men. We studied the 576 women who participated in the 2017 wave. These women were around 27 years of age (26-28 years old).

Use of and method of contraceptives

Concerning the present or past use of contraceptives, 43 women (7.5%) had never used contraceptives, 529 (91.8%) had used or were using contraception, and four women did not answer (0.7%). These four women were excluded from the study, and our final sample had 572 women (Figure 2), with 92.5% using or having ever used contraceptives (Figure 3).

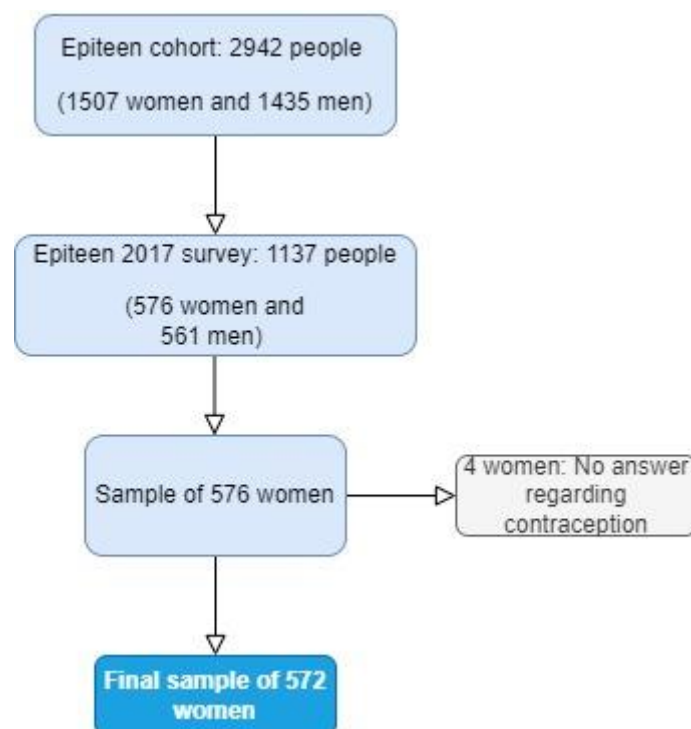


Figure 2: sample selection

Concerning past or present use of the contraceptive pill, most women (90.9%) have ever used it; data were missing for 44 (7.7%) women (Figure 3). The use of the vaginal ring was less frequent, with only 55 women (9.6%) currently using or having used it in the past (data were missing for 10.8% of participants), as well as the use of the contraceptive patch, with six women (1%) that use or have ever used it (data is missing for 10.5% of participants). Data were similar concerning the use of the subcutaneous implant, as 24 women (4.2%) using or having ever used it (data was missing for 10.7% of participants). Concerning past or present use of other contraceptive methods, 17 women (3%) were using or had ever used intrauterine devices (seven were classified as using or have used a copper IUD and 10 use or have ever used a progesterone intrauterine device) and information is lacking on 63 (11%) of women.

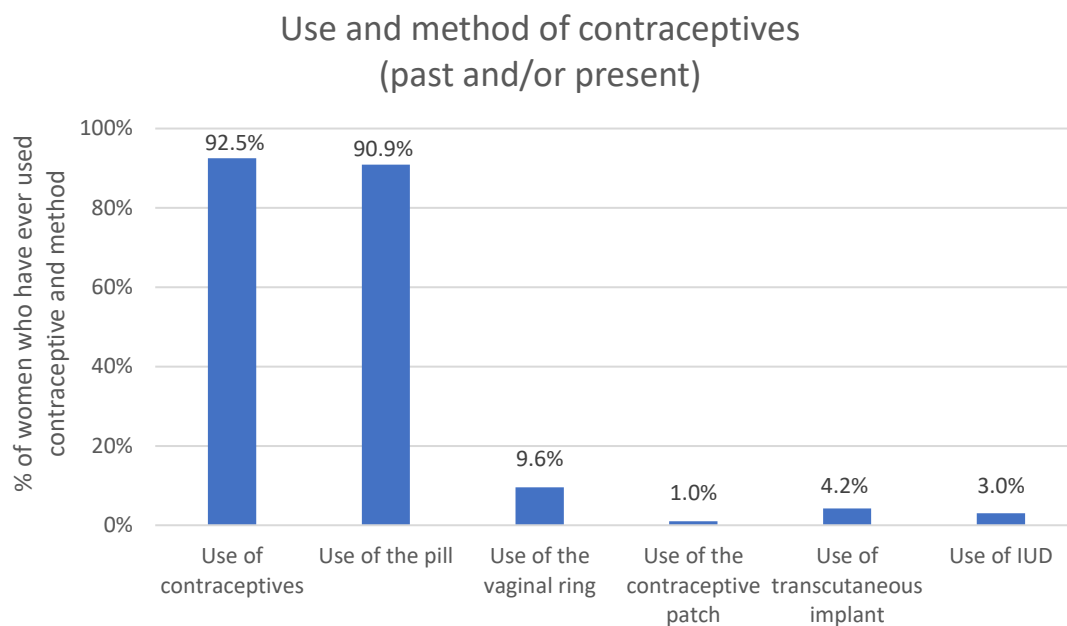


Figure 3: use of contraceptives and method of choice (both past and present)

Education, income, and access to healthcare:

In this sample, 132 women (23.4%) completed high school or lower level of education, 186 (33%) had a bachelor's degree, 245 (43.5%) had a master's degree (243 women), and two held a PhD. Information was missing on nine women.

Concerning individual monthly income, 117 (20.5%) of the 572 women had a monthly income of less than 500 euros; 286 (50%) had a monthly income between 501 and 1000 euros, and 169 (29.5%) women had a monthly income over 1000 euros.

Of the 572 women, 83 (14.5%) of them have not any medical appointment in the 12 months before the survey, 152 women (26.6%) had one, 128 women (22.4%) had two, and 209 (36.5%) had three or more appointments. The median number of appointments in the 12 months before the survey was 2.

Women who use or have ever used a contraceptive tended to have a higher income than those that had never used it, as well as those that were using or have ever used a vaginal ring or contraceptive patches (Table 1). The remaining differences in the distribution of the sample and its subgroups by education and access to healthcare were not statistically significant.

Table 1 – Characterization of the sample and its subgroups

Variables	Full sample	Women who use/have ever used a hormonal contraceptive (or copper IUD)	Women who use /have used the pill	Women who use/have used the vaginal ring or the contraceptive patch
Sample size (n)	N=572	N=529	N=520	N=60
Education level:				
Highschool or below	132 (23.4%)	119 (22.8%)	117 (22.9%)	13 (21.7%)
Bachelor's degree	186 (33.0%)	172 (33.0%)	170 (33.2%)	14 (23.3%)
Master/PhD	245 (43.5%)	230 (44.1%)	225 (43.9%)	33 (55%)
Chi-square		p=0.422	p=0.886	p=0.165
Individual monthly income:				
Less than 500 euros	117 (20.5%)	100 (18.9%)	98 (18.9%)	5 (8.3%)
501-1000 euros	286 (50%)	265 (50.1%)	264 (50.8%)	27 (45%)
More than 1000 euros	169 (29.6%)	164 (31%)	158 (30.4%)	28 (46.7%)
Chi-square		p=0.001	p=0.079	p=0.012
Number of medical appointments in the previous 12 months:				
0 medical appointments	83 (14.5%)	77 (14.6%)	76 (3.0%)	7 (11.7%)
1 appointment	152 (26.6%)	139 (26.3%)	138 (26.5%)	8 (13.3%)
2 appointments	128 (22.4%)	116 (21.9%)	112 (21.5%)	16 (26.7%)
3 or more appointments	209 (36.5%)	197 (37.2%)	194 (37.3%)	29 (48.3%)
Chi-square		p=0.609	p=0.279	p=0.057

Bivariate analyses

Table 2 shows the association between contraceptive use and method, socioeconomic characteristics, and access to health care.

Women who had an individual monthly income of less than 500 euros were less likely to use or have ever used hormonal contraceptives (or the copper IUD) than women who had a monthly income of more than 1000 euros [OR 0.179 (95% CI 0.064-0.501), $p < 0.005$]. Similarly, women who had an individual monthly income of less than 500 euros were less likely to use or have ever used a vaginal ring or contraceptive patch [OR 0.276 (95% CI 0.103-0.743), $p < 0.05$], and those with a monthly income between 501 and 1000 euros were also less likely to use or have ever used those methods [OR 0.553 (95%CI 0.313-0.978), $p < 0.05$], comparing to women who earned over 1000 euros per month.

Compared to those that had three or more medical appointments in the previous year, women who had had one medical appointment seemed less likely to use or have ever used the vaginal ring or the contraceptive patch [OR 0.357 (95%CI 0.158-0.807), $p < 0.05$], but no statistically significant associations were found when women did not have any or had two appointments in the past year.

Women with bachelor or high school education levels were less likely to use or have ever used contraceptives, the vaginal ring or contraceptive patch and more likely to use or have ever used the pill compared to those with masters or a PhD, but the associations were not statistically significant.

Table 2 – Association between the present or past use of contraceptives, the pill, and vaginal ring or contraceptive patch, and the education level, monthly income level, and number of medical appointments in the previous 12 months

Variables	Women who use/have ever used a hormonal contraceptive (or copper IUD) OR [95% CI]	Women who use/have used the pill OR [95% CI]	Women who use/have used the vaginal ring or the contraceptive patch OR [95% CI]
Sample size (n)	N=529	N=520	N=60
Education level (Reference category: Master/PhD)			
Highschool or lower	0.597 [0.275-1.296]	1.040 [0.188-5.762]	0.727 [0.366-1.442]
Bachelor's degree	0.801 [0.377-1.704]	1.511 [0.274-8.347]	0.537 [0.278-1.041]
Individual monthly income (Reference category: More than 1000 euros):			
Less than 500 euros	0.179** [0.064-0.501]	1.551 [0.295-8.148]	0.276* [0.103-0.743]
501-1000 euros	0.385 [0.142-1.040]	8.354 [0.967-72.158]	0.553* [0.313-0.978]
Number of medical appointments in the previous 12 months (Reference category: 3 or more):			
0	0.782 [0.283-2,157]	0.784 [0.070-8.768]	0.587 [0.245-1.406]
1	0.651 [0.289-1.470]	1.423 [0.128-15.846]	0.357* [0.158-0.807]
2	0.589 [0.256-1.354]	0.289 [0.052-1.601]	0.947 [0.489-1.833]

Note: OR - Odds Ratio; * p-value<0.05, ** p-value<0.005

Multivariate analyses

The multivariate analyses have shown that the association of individual monthly income with the use of contraceptives remained significant in model 1 (which also included education level): women with an individual monthly income of less than 500 euros had an 81% lower probability of have ever used hormonal contraception (or copper IUD) compared to women with a monthly income over 1000 euros [OR 0.186 (95%CI 0.063-0.545), $p<0.005$]. This association remained overall unaltered after the inclusion of the number of medical appointments in the last 12 months (model 2) [OR 0.179 (95%CI 0.061-0.528), $p<0.005$].

The same association was found considering the use of a vaginal ring or contraceptive patch: women with an individual monthly income of less than 500 euros had a 70% lower probability to have ever used contraceptives compared to women with a monthly income of over 1000 euros [OR 0.305 (95%CI 0.110-0.848), $p<0.05$, model 1]. This association remained unaltered even after the inclusion of the number of medical appointments in the last 12 months, and a smaller effect was found among those that had an income of 501-1000 euros per month [OR 0.517 (95%CI 0.279-0.959), $p<0.05$, model 2].

Differently, the use of the pill was only positively associated with 501-1000 euros monthly income [OR 9.981 (95%CI 1.045-95.301), $p<0.05$] in model 1, but with a wide confidence interval, and this association became non-significant after the inclusion of the number of medical appointments in the last 12 months in the model.

The association between the use of hormonal contraception and the number of medical appointments remained overall non-significant, except for the negative association between only one medical appointment and vaginal ring/contraceptive patch use [OR 0.328 (95%CI 0.143-0.750), $p<0.05$].

These results are summarized in table 3.

Table 3 – Multivariable binomial logistic regression between the present or past use of contraceptives, the pill, and vaginal ring or contraceptive patch. Model 1 contains (as independent variables) education level and monthly income level, and Model 2 further includes the number of medical appointments in the previous 12 months.

	Women who use/have ever used a hormonal contraceptive (or copper IUD) OR [95% CI]		Women who use/have used the pill OR [95% CI]		Women who use/have used the vaginal ring or the contraceptive patch OR [95% CI]	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Education level (Reference category: Master/PhD):						
Highschool or lower	0.890 [0.396-2.002]	0.873 [0.385-1.980]	0.540 [0.079-3.714]	0.501 [0.071-3.543]	0.989 [0.473-2068]	1.011 [0.479-2.133]
Bachelor's degree	1.027 [0.473-2.232]	1.030 [0.471-2.255]	1.181 [0.206-6.769]	1.062 [0.180-6.248]	0.617 [0.315-1.209]	0.602 [0.305-1.188]
Individual monthly income (Reference category: More than 1000 euros):						
Up to 500 euros	0.186 [0.063-0.545]**	0.179 [0.061-0.528]**	1.774 [0.286-11.010]	1.663 [0.266-10.406]	0.305 [0.110-0.848]*	0.292 [0.104-0.816]*
501-1000 euros	0.396 [0.143-1.098]	0.376 [0.135-1.048]	9.981 [1.045-95.301]*	9.439 [0.975-91.410]	0.560 [0.305-1.027]	0.517 [0.279-0.959]*
Number of medical appointments in the previous 12 months (Reference category: 3 appointments or more)						
0	-	0.716 [0.256-2.009]	-	0.927 [0.079-10.822]	-	0.524 [0.214-1.284]
1	-	0.705 [0.304-1.635]	-	1.736 [0.154-19.576]	-	0.328 [0.143-0.750]*
2	-	0.530 [0.227-1.236]	-	0.356 [0.062-2.031]	-	0.827 [0.419-1.631]

Note: OR - Odds Ratio; * p-value<0.05, ** p-value<0.005

Discussion

The percentage of women who used or have ever used contraception, at 27 years of age, was quite high (92.5%); 90.9% of the women in our sample used or have ever used the pill, which makes it a far more popular contraceptive than the vaginal ring (9.6% of present or past use), the subcutaneous implant (4.2%), IUD (3%) or contraceptive patch (1%). The high use of contraception and popularity of the pill compared with other hormonal methods does align with a 2015 descriptive study on contraceptive practices in Portuguese women⁵², and with literature from other countries, such as Germany, Italy, UK and the USA.⁵⁴

Overall, in this sample of over 500 women, we found that those with a lower individual monthly income seemed to have a lower probability of having ever used contraception, and, particularly, fewer chances of using the vaginal ring or the contraceptive patch. Moreover, the education level and the number of medical appointments did not have a clear association with the use and method of contraception.

These results are different from the ones found in Spain, a neighboring country, where a study based on a 2006 interview survey found an association between the use of contraception (including condoms) and education level, but not with women's nor household's social class based on occupation.⁶⁰ On the other hand, a French study looked into contraception and women's social classes, based on a mix of education level and occupation categories, and found differences in use, methods, and trends of contraception, as from 2010 to 2016 there was a decline in pill use in all social classes, but a significant uptake of IUD use in upper social classes.⁶¹

One possible explanation for the differences in the use and methods of contraception between women with different levels of income could be the differential access to specialized medical care. Studies in other countries have shown different contraceptive recommendations from gynecologists and general practitioners⁶¹, and the same has been shown to happen in Portugal, where family doctors seem to privilege counseling hormonal contraceptives, mainly the pill, whilst gynecologists favor new ways of administration of contraceptives with both an estrogen and a progestin component - such as the vaginal ring and the contraceptive patch - and LARC.⁵² Nevertheless, this dataset did not differentiate which specialties were consulted, nor if those occurred in

the public or private sectors. Another explanation may be related to the purchase of contraceptives: women may not seek primary care services to access contraceptives and may prefer to buy them directly in the pharmacy, where the pill is overall less expensive than the vaginal ring and contraceptive patch.

The non-significance of education level on the use and method of contraception could be related to the fact that higher education level might not imply better health literacy, and health literacy on contraception might not significantly improve between high school (which ought to be the mandatory minimum education level in Portugal in women of this age) and university education. Moreover, the education levels of this sample were quite high and homogenous (75.34% had either a bachelor's degree, a master or a PhD), which may attenuate differences' assessment. In addition, the women on this survey were all around 27 years of age; these women (particularly the ones with higher levels of education) might have joined the workforce very recently (or perhaps have not even started to work yet) and their education level may not yet reflect in a higher income, that would have an impact of their use and method of contraception. Furthermore, in Portugal, most salaries are right-skewed and the education status is not strongly correlated with individuals' income.^{62,63} Also, we cannot exclude the hypothesis that this result is due to the sample size, which may have not been large enough to express those differences.

The overall non-significance of access to healthcare (based on the number of medical appointments in the 12 months before the survey) was surprising; the negative association between one medical appointment in the last year (comparing to three or more appointments) with the use of a vaginal ring or contraceptive patch might be an incidental finding without actual real-life significance. According to a survey on Portuguese contraceptive practices⁵², in teenage Portuguese women the internet, as well as peers and friends, are more popular as an information source on contraceptives than doctors (or other healthcare professionals), and in young women (20-29 years of age), the internet is roughly as popular for contraception advice as doctors; this, together with the informal availability of contraceptive methods without prescription in Portuguese pharmacies⁵¹, might make healthcare access to women in our study (who are around 27 years old) somehow redundant for contraceptive access and use, and contribute to these results. Moreover, the same survey⁵² shows that

younger women have less frequency of family planning or gynecology appointments than older adult women (11.9% of teenage women had at least one of those appointments in the year before the survey, compared to 48.7% of women between 20 and 29 years, and with around 76% of older reproductive-age women). Also, as previously stated, recommendations and prescriptions of contraceptives may differ among gynecologists and general practitioners^{61,64}. As we do not have information about what specialty was consulted, we cannot know if these consultations were provided by general practitioners, gynecologists, or even other unrelated specialties. Indeed, some of these women who had a higher number of medical appointments may have any health issue that limits the use of contraceptives; though, this hypothesis would not explain the results regarding the method of contraceptive.

Limitations of the study

Some limitations of the current study should be considered. First, this study captures a snapshot of contraceptive choices (both in the present and in the past) in a group of women around 27 years old. Nevertheless, contraceptive choices (as well as the context within which they are made, including income, education, and access to healthcare) might change during the reproductive life of a woman, and these results may differ when younger or older age groups are studied.

Second, the questionnaire did not ask about all forms of contraception: it asked only about hormonal contraception (yet copper IUD appeared sometimes in the answers), and it did not include methods of non-hormonal contraception such as condoms, sterilization, and “fertility awareness” methods, which did not allow us to study potential socioeconomic differences in women who use those methods.

Third, the sample of 572 women might not have been large enough to study with detail less frequent types of contraception, and it might have been insufficient to stress the differences in healthcare access and education levels.

Fourth, other socioeconomic factors, as religion, could have an influence on the use and method of contraceptives, but were not available in the dataset.

Despite these potential limitations, to our knowledge, there is no other study concerning contraception, socioeconomic status, and healthcare access in Portugal, a country with universal health coverage, and the international evidence is also overall limited.

Conclusion

Contraception is an essential tool to fulfill sexual and reproductive rights, which are part and core of Human Rights. Universal access to quality family planning - in which contraceptives play a fundamental role – is one of the goals of the 2030 Agenda of Sustainable Development, as it has had a remarkable impact on the life of women and society, by reducing unintended pregnancies and their consequences. Policies facilitating contraceptive access are fundamental to maximize the potential of contraception and, in Portugal, health policies on family planning aim to provide universal access to contraceptives.

However, in this sample of 27 years old Portuguese women, those with a lower monthly income were less likely to use contraceptives, and, particularly, to use the vaginal ring or contraceptive patch.

These results show that income may still be a limiting factor for the access and use of contraceptives, especially of newer, simpler-to-use, short-acting hormonal methods such as the vaginal ring and contraceptive patch. We hypothesize that differential access to adequate counselling and contraceptives could, in part explain these differences, which could be minimized with training, both theoretical and practical, of healthcare staff, together with the redefinition of family planning policies to support a more equitable access to contraceptives, that are much needed to ensure that women, independently of their socio-economic status, can effectively have access to quality reproductive care.

Future health policies ought to take these findings into account to guarantee that universal access to family planning – and to highly effective and easy to use contraceptives – occurs in the real world.

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