

# The Polish women's experience and level of knowledge about fertility and its disorders — a cross-sectional study

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## ABSTRACT

**Objectives:** To assess the experience and knowledge of Polish women up to 50 years of age about fertility and its disorders.

**Material and methods:** A self-composed questionnaire consisting of 44 questions, divided into six sections, was available in social media from January until February 2020. The answers to 13 single-choice questions were analyzed to assess the level of knowledge. Statistical analysis was performed with the use of Statistica 13.0, with p value < 0.05 considered significant.

**Results:** A total of 3,321 correctly filled out questionnaires were obtained. The average result was 8.88 out of 13 single-choice questions regarding the basics of the menstrual cycle and infertility (median 9, standard deviation [SD] 2.21). As many as 65.2% of respondents did not know which days in the cycle were fertile days. The women who had been and/or were pregnant at the time of survey, more often answered better than those, who had never given birth. They had a better mean score of 13 single-choice questions compared to those who had never been pregnant (9.02 vs 8.61,  $p < 0.001$ ). Respondents who obtained information about infertility from doctors in 86.97% knew that regular intercourse meant 2–3 times per week in comparison to 79.7% of those who were not educated by medical practitioners ( $p < 0.0001$ ). 69.8% respondents from the first group knew that the test of ovarian reserve existed in comparison to 55.63% of women from the second group ( $p < 0.0001$ ).

**Conclusions:** The research has shown that the knowledge about fertility and its disorders is not satisfying among Polish women.

**Key words:** reproductive failure; infertility; menstrual cycle; ovulation

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## INTRODUCTION

Reproductive failure is a serious and growing problem nowadays. It is a phenomenon not only of medical and emotional significance for couples trying to conceive, but also demographic. Consequently, the World Health Organization (WHO) recognized infertility as a social disease. It affects about 70 million people worldwide [1, 2]. It is estimated that the infertility rate in Poland is similar to that in

developed countries and ranges between 13–18% (France 16.4%, Great Britain 17%) [3, 4]. It is difficult to discuss the awareness of infertility, while the insufficient knowledge of the basics of menstrual cycle and fertility in general is a commonly observed phenomenon confirmed by recent publications [5–11].

Infertility, as defined by the WHO, is the failure to achieve a clinical pregnancy after at least 12 months of regular

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unprotected sexual intercourse. In general, this definition refers only to women under 35 years of age. According to American College of Obstetricians and Gynecologist (ACOG) and the Polish Society of Reproductive Medicine and Embryology (PTMRIE), the diagnosis and possible treatment of infertility in women over 35 years of age is implemented after six months, while patients over 40 years of age — immediately [12, 13]. Multiple social reasons, such as delayed childbearing trends, have a significant impact on problems related to reproduction and perinatal care [14]. Demographic data obtained by the Central Statistical Office indicate an increasing average age at first delivery among Polish women over the last 30 years. In the years 1990-2018 it increased by about five years. Mothers over 30 accounted for 52% of women giving birth to a child in 2018. The fertility rate in Poland at that time was 1.43. In comparison, in 1990 it was 1.99 and in 1980 — 2.28 [15].

### Objectives

The objective of the study was to investigate the knowledge and experience of women up to 50 years of age regarding fertility and its disorders.

### MATERIAL AND METHODS

A questionnaire in the Polish language was self-composed by the authors of the study and distributed among Polish women up to 50 years of age between January and February 2020. It was available for 3.5 weeks via Facebook and Instagram groups designed for mothers and students of various subjects. Groups were chosen randomly. The self-prepared questionnaire translated into English has been attached as Appendix 1. It consisted of 43 closed questions — 29 single and 14 multiple-choice and one open-ended question about the profession. The questions were divided into six sections concerning: sociodemographic data, personal health data, pregnancy data, knowledge about the menstrual cycle, fertile days, infertility and its diagnosis. The questionnaire invented by the authors was administered by Google Forms. Moreover, the link to it was presented on Facebook groups. The statistical analysis was performed with the use of STATISTICA 13.0. The level of knowledge was analyzed using the Student's t-test.  $P < 0.05$  was considered statistically significant.

The general knowledge and experience of Polish women with regard to fertility and its disorders was evaluated. The level of knowledge was afterwards compared in two different groups. The first comparative analysis was performed between women who had been pregnant with those who had never conceived before. The second comparative analysis included women who had learnt about infertility from physicians with those who educated themselves through other sources, such as the Internet, books and television.

The number of correct answers to the selected single-choice questions was evaluated, changed into the percentage values, compared between groups and assessed in terms of statistical significance.

In addition, the answers to 13 single-choice questions were analyzed (6 concerning knowledge about the menstrual cycle and 7 concerning infertility). It was assumed that obtaining four or more correct answers in the cycle part indicated a good level of knowledge. Afterwards the level of knowledge about infertility was assessed in the group that was potentially more conscious. The purpose of this was to verify whether women who had a significant knowledge of the cycle were equally aware of the phenomenon of infertility. The average results of the respondents regarding age were also compared.

### RESULTS

A total of 3,321 correctly completed questionnaires were obtained. There were 1,127 women that had never been nor pregnant at the time of survey. The largest number of responses to the questionnaire was obtained from women aged 26–30, with higher education, living in cities with more than 100,000 inhabitants. Most of them were in formal relationships. In total, 87.3% of the respondents were not employed in the medical profession nor studied medicine.

Sixty percent of women did not have any gynecological disorders diagnosed. The vast majority (98%) had never had cancer. Also, 58.5% had used hormonal contraceptives — in the past and/or at the time of the survey. Additionally, 65.4% had never smoked cigarettes or any other tobacco products. Sixty-four percent had never experienced pregnancy. Seventeen percent of women had a miscarriage once or twice, 1.7% — more than two times. Among women who had never been pregnant, 50% were trying to conceive — the majority (57.2%) for less than one year.

Among the group of Polish women, the average result was 8.88 out of 13 single-choice questions regarding the basics of the menstrual cycle and infertility (median 9, standard deviation [SD] 2.21). Also, 61.76% of the respondents showed sufficient knowledge about the basics of the physiology of the menstrual cycle (they answered correctly to at least 4 out of 6 questions). Among them, the level of knowledge about infertility was evaluated. In this case, the mean score was 4.43 out of 7 questions (median 5, SD 1.16). The most difficult question was the one regarding fertile days in the cycle. As many as 65.2% of Polish women did not know that these are 3 to 5 days before ovulation and 1 day after ovulation. General knowledge including questions and answers is presented in Table 1.

Women who had been pregnant in the past and/or were pregnant at the time of survey significantly more often gave correct answers than women who had never conceived.

**Table 1. General knowledge about menstrual cycle and infertility**

Questions	Answers n (%)					
	1. How long is a regular menstrual cycle?	28 ± 1 day	25–35 days	There is no definition of regular cycle	Don't know	
	889 (26.8)	2,288 (68.9)	125 (3.8)	19 (0.6)		
2. How do you measure the length of a monthly cycle?	From the first day of the menstruation to the last day before next menstrual bleeding	From the last day of the menstruation to the last day before next menstrual bleeding	From the first day after menstruation to the last day before next menstrual bleeding	From the last day of menstruation to the first day of next menstrual bleeding	Don't know	
	238 (85.2)	74 (2.2)	107 (3.2)	238 (7.2)	71 (2.1)	
3. Do you know which days in the menstrual cycle are fertile days?	3–5 days before and day after ovulation	3–5 days before and 3 days after ovulation	3–5 days before and 5 days after ovulation	Don't know		
	1,157 (34.8)	1,507 (45.4)	364 (11)	293 (8.8)		
4. When does ovulation occur?	In the middle of the menstrual cycle	Always on the 14th day of the menstrual cycle	About 14 days before next menstruation	Don't know		
	978 (29.4)	270 (8.1)	1,906 (57.4)	167 (5)		
5. Which anatomical organ does fertilization take place in?	In the ovary	In the Fallopian tube	In the uterus	In the cervix	Don't know	In the vagina
	360 (10.8)	1,982 (59.7)	696 (21)	106 (3.2)	162 (4.9)	15 (0.5)
6. Does the number of ovarian follicles decrease during life in your opinion?	Yes	No	Don't know			
	2,613 (78.7)	169 (5.1)	539 (16.2)			
7. How much time of regular unprotected intercourse (according to WHO) followed by failure to conceive is essential to define infertility?	3–6 months	1 year	2 years	More than 2 years	Don't know	
	105 (3.2)	1,952 (58.8)	408 (12.3)	482 (14.5)	374 (11.3)	
8. What does regular intercourse according to WHO definition mean?	2–3 times per week	Once per month during ovulation	Once per week	Don't know		
	2,750 (82.8)	78 (2.3)	224 (6.7)	269 (8.1)		
9. Which side does the reason of infertility in relationship stand on?	On both sides equally	May stand on the both, but more on female side	May stand on both, but more on male side	Don't know	On female side only	On male side only
	2,790 (84)	343 (10.3)	103 (3.1)	83 (2.5)	1 (0.05)	1 (0.05)
10. How many couples in Poland are affected by infertility?	Less than 10%	15–20%	More than 30%	Half of the population		
	128 (3.9)	1,781 (53.6)	1,218 (36.7)	194 (5.8)		

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Table 1. cont. General knowledge about menstrual cycle and infertility						
Questions	Answers n (%)					
	11. Have you ever heard about the examination of Fallopian tubes patency?	Yes	No	There is no examination of Fallopian tubes patency		
2,634 (79.3)		683 (20.6)	4 (0.1)			
12. Does examination checking egg cells' resources exist?	Yes	No	Don't know			
	2,047 (61.6)	134 (4)	1,140 (34.3)			
13. Do you know how a man can easily check his fertility?	Yes, he should perform the semen test	Yes, he should go to the urologist and have examinations done	Yes, he should have a testicular ultrasound done	Don't know		
	2,753 (82.9)	241 (7.3)	30 (0.9)	296 (8.9)		

They had a better mean score of 13 single-choice questions compared to women who had never been pregnant (9.02 vs 8.61,  $p < 0.001$ ). Detailed information regarding the above comparison is provided in Table 2. The analysis also showed that significantly better results were achieved by the respondents in relationships than single women (8.99 vs 7.94,  $p < 0.001$ ) and by women using hormonal contraception compared to never-users (9.08 vs 8.59,  $p < 0.001$ ). There was also a significant difference between women aged 31–35, who obtained the highest mean score of 9.33 points, and the remaining age groups

The most common causes of infertility selected by the respondents were: in women — tubal obstruction, endometriosis and ovulation disorders; in men - impaired sperm quality and quantity, testicular injuries and tumors. An important aspect of the presented study was to identify factors that reduce fertility, both female and male. According to 92.6% of the respondents stress negatively affects female fertility, according to 85.1% — smoking and 80.5% — alcohol consumption. A total of 72.7% of the surveyed women chose the age of 35+ as a fertility reducing factor. Also, 61.2% mistakenly believe that hormonal contraception is contributing to the deterioration of fertility in women, including 56.7% among those who had ever used hormonal contraception and 67.6% among never-users ( $p < 0.001$ ). The results of the study indicated that 89.6% of women are aware of the negative impact of obesity on fertility, but only 56.2% believe that a diet rich in processed foods and fast food meals may also have a negative effect. As many as 69.8% of women are unaware that food in plastic packaging may be one of the factors that could impair fertility. Women most commonly pointed to smoking (89.7%), stress (88.8%) and obesity (84.3%) as major factors affecting male fertility.

Out of the group of 1,639 respondents who answered the question whether they had introduced changes in their lifestyle while trying to conceive in the past, 40% declared that they had changed their diet to a healthier one, 12.4% quit smoking, 0.6% changed cigarettes to other tobacco products. Whereas 12.6% declared that they had always had a healthy diet and regular physical activity, had not smoked cigarettes or drink alcohol. Similarly, out of 3,321 women who answered the question whether they would change their lifestyle while trying to conceive in the future, 46.3% answered that they would change their diet to a healthier one, 45.6% — would start exercising more, 27.3% — would eliminate alcohol consumption, 14.3% would quit smoking. On the other hand, 14.9% declared that they were constantly leading a healthy lifestyle and would not introduce changes.

The Internet was the most common source of knowledge about infertility (77.6%), followed by books, magazines and medical articles — 45.6% and a medical practitioner — only 42.5%. Women who were educated by doctors significantly more often gave correct answers to all the questions in comparison to those who obtained knowledge from other sources. Detailed information is presented in Table 3.

## DISCUSSION

There are only few papers regarding the state of knowledge and experience of Polish women regarding fertility, its disorders and, in particular, infertility in the available literature. There is also a lack of studies comparing the level of above-mentioned awareness of women in terms of age, the fact of ever being pregnant, trying to conceive and sources of education. The above study presents a survey aimed not only at making such comparisons and showing how obvious the gaps in the education of Polish women are, but also at increasing awareness of the growing problem

**Table 2. Comparison of correct answers between women who had been pregnant and/or were at the time of survey and those who had never given birth**

Questions	Women who had been pregnant and/or were at the time of survey n = 2,194 n (%)	Women who had never given birth n = 1,127 n (%)	p value
1. Do you know which days in the menstrual cycle are fertile days?	776 (35.4)	381 (33.8)	< 0.0001
2. When does ovulation occur?	1,311 (59.7)	595 (52.8)	< 0.0001
3. Does the number of the ovarian follicles decrease during life in your opinion?	1,760 (80.2)	853 (75.7)	0.002
4. Which anatomical organ does fertilization take place in?	1,266 (63.5)	716 (57.7)	< 0.0001
5. How much time of regular unprotected intercourse (according to WHO) followed by failure to conceive is essential to define infertility?	1,323 (60.3)	629 (55.8)	< 0.0001
6. What does regular intercourse according to WHO definition mean?	1,875 (85.5)	875 (77.6)	< 0.0001
7. Have you ever heard about examination of the Fallopian tubes patency?	1,823 (83.1)	811 (72)	< 0.0001

**Table 3. Comparison of correct answers between women who were educated by doctors and those who obtained knowledge from the other sources**

Questions	Women who were educated by doctors n = 2,194 n (%)	Women who obtained knowledge from the other sources n = 1,127 n (%)	p value
1. Do you know which days in the menstrual cycle are fertile days?	517 (36.6)	640 (33.53)	< 0.0001
2. When does fertilization occur?	865 (61.26)	1,041 (54.53)	< 0.0001
3. Does the number of the ovarian follicles decrease during life in your opinion?	1,171 (82.93)	1,442 (75.54)	< 0.0001
4. Does examination checking egg cells' resources exist?	985 (69.76)	1,062 (55.63)	< 0.0001
5. How much time of regular unprotected intercourse (According to WHO) followed by failure to conceive is essential to define infertility?	899 (63.67)	1,053 (55.16)	< 0.0001
6. What does regular intercourse according to WHO definition mean?	1,228 (86.97)	1,522 (79.73)	< 0.0001
7. Which side does the reason of the infertility in relationship stand on?	1,203 (85.2)	1,587 (83.13)	0.02

of infertility. There are several publications presenting the society's knowledge about the menstrual cycle, fertility and factors having a negative impact on it.

In our study 61.76% of Polish women showed sufficient knowledge about the physiology of the menstrual cycle. The results of Warzecha et al. [16] study, analyzing the knowledge of 20002 Polish women regarding reproductive health and the level of knowledge about the menstrual cycle and infertility, appeared much better. As many as 90.1% of Polish women answered correctly how long the regular menstrual cycle was, 85.7% knew when the ovulation took place, 62.5%

were aware where fertilization occurred and over 60% knew the definition of infertility. Lundsberg et al. [17] studied the knowledge regarding factors influencing fertility (including the effect of aging), ovulation, fertilization and misunderstandings related to conception among 1000 women from the United States. Twenty-five percent of respondents in their study were unaware that a regular menstrual cycle lasted between 25 and 35 days. In addition, 40% of women did not know that ovulation usually occurs approximately 14 days before the expected period and that vaginal mucus was a symptom of upcoming ovulation.

What is very satisfactory, 72.7% of the respondents from the presented study were aware of the impact of women's age on the reduction of reproductive abilities. Only almost every second (54.7%) believed that the best age to conceive is between 26 and 30 years of age. However, about 40% of Polish women believe that "the ovaries continue to produce new eggs throughout reproductive years". Interestingly, similar results were obtained in the previously mentioned American study by Lundsberg et al. [17]. More than one-fifth of the respondents were not aware of the impact of aging on female fertility. In a French study of 285 female students in 2013 the results were much worse. Only 22.5% of respondents knew that female fertility decreased after the age of 35 [18]. Hammarberg et al. [19] analyzed the knowledge of Australians between the ages of 18 and 40 and observed that 31% of the surveyed women believed that fertility started to decline before the age of 35, while 36% pointed to the age between 35 and 40.

While the advanced age of a woman is a well-known factor deteriorating fertility, little is mentioned about the influence of male age in this aspect. In the presented study only 30.3% of women indicated the age above 35 as a factor affecting male fertility as well. Similar results were obtained by Hammaberg et al. and Daniluk et al. [19, 20].

Surprisingly, the presented research showed that 84% of Polish women were aware that the problem of infertility was distributed equally between males and females. The study by Daniluk et al. [20], analyzing the knowledge of 3345 Canadian childless women aged 20–50, showed that only 46.4% of the respondents knew that the problem of infertility was not only due to female factor. In the study by Quach et al. [9] 78.4% of 772 Canadian high school female and male students pointed out that infertility was a problem of women only.

In the presented study 85.1% of respondents indicated smoking and 80.5% — alcohol consumption as factors negatively impacting female fertility. Moreover, 89.7% of them were aware that smoking might negatively affect male fertility, but surprisingly only 0.1% pointed the same regarding alcohol consumption. According to the literature smoking has a significant impact on the deterioration of female fertility. Menopause occurs 1 to 4 years earlier in smokers compared to non-smokers [21]. Cigarette smoking also has an enormous influence on semen parameters. Sharma et al. [22] showed that smoking affects semen volume, sperm count and motility. The negative role of this factor seems to be well-known among females: In the study by Swift et al. [23] smoking was indicated by 88.6% of respondents. Interestingly, Canadian research conducted among high school students revealed that 66.4% of young people knew smoking could affect their fertility in the future. Seventy-eight percent of them were also aware of similar consequences generated by alcohol [9]. Furthermore, 67.4% of women

in the research of Deatsman et al. [24] perceived drinking alcohol as potentially harmful for future conception abilities.

The results of the presented study indicated that only slightly more than half of Polish women were aware that a diet rich in highly processed products and fast-food meals may negatively affect female fertility, while the vast majority (89.6%) was aware of the negative impact of obesity. Similar answers were obtained from women in the Homan et al. survey [25]. All the respondents pointed out that overweight and obesity are significant risk factors of infertility.

Interestingly, as many as 61.2% of the surveyed women considered hormonal contraception to be one of the factors decreasing female fertility. Daniluk et al. [20] showed that less than half of Canadian women (46.9%) realized that taking contraceptive pills for more than five years had no negative long-term effects on fertility. The awareness among Canadian fertility clinic patients in Swift et al. [23] study turned out to be much worse. Only 26.4% of respondents believed that there was no impact of prolonged use of hormonal birth control on fertility. Almost half of them answered that this factor may negatively influence conception. In a meta-analysis of 22 studies, recruiting 14,884 women who withdrew hormonal contraception in order to implement their procreation plans, Girum and Wasie [26] showed that the use of hormonal contraception, its type and duration did not adversely affect the resumption of conception.

Regrettably, over 40% of the respondents from our study did not know how relevant the history of past sexually transmitted diseases (STDs) is for future fertility. Quach et al. and Swift et al. reported alike results with respect to that factor — respectively only 57% and 60.7% of women from their studies acknowledged that STDs could decrease fertility [9, 23]. The results of Deatsman et al. [24] appeared much better — 72.6% of women were aware of potential risks of STDs.

The role of reliable education by healthcare professionals remains unquestionable. It was proven in the presented study that women educated by their doctors presented better levels of knowledge than respondents who indicated other sources of information. Interesting conclusions were presented by Childress et al. [27]. They tested whether the knowledge about fertility awareness changed after the doctor consultation at the fertility clinic. Patients presented with a modest level of infertility knowledge, and their scores improved after the initial consultation. Skogsdal et al. [28] evaluated the knowledge about fertility and awareness of preconception health, use of contraception, and experience of reproductive life plan counseling (RLPC) among women attending contraceptive counseling. Those who were in the intervention group and received RLPC increased their knowledge about fertility and, what is more, they increased their awareness of factors affecting preconception health, such as tobacco usage, alcohol consumption and obesity.



Finally, there are some limitations of the presented research. First, the relatively low participation rate as a representative of the entire population of Polish women could be controversial. Nonetheless, we hope the number of questionnaires obtained will be enough to cross-functionally assess the level of knowledge. Moreover, the study group was not specifically selected, which makes it difficult to compare our results to others. There are some concerns whether the questionnaire studies are appropriate and reliable. However, in the reign of social media, it seems to be the most available way to evaluate the respondents' awareness.

## CONCLUSIONS

Based on the analysis of the results, it can be concluded that the knowledge of Polish women about fertility and its disorders is unsatisfactory. As the vast majority of respondents mention the Internet as their source of knowledge, social media could help in increasing fertility awareness. However, it is healthcare professionals who should be responsible for reliable educational materials and popularization of the problem.

## Article information and declarations

### Conflict of interest

The authors declare no conflict of interest.

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## APPENDIX 1

### The self-composed questionnaire

#### Section 1. Sociodemographic data.

1. Age:
  - a. < 18
  - b. 18–25
  - c. 26–30
  - d. 31–35
  - e. 36–40
  - f. 41–45
  - g. 46–50
2. Place of residence:
  - a. Village
  - b. City up to 50,000 residents
  - c. City up to 100,000 residents
  - d. City over 100,000 residents
3. Education:
  - a. Higher
  - b. Secondary
  - c. Vocational
  - d. Elementary
4. Occupational status (multiple choice question):
  - a. Working person
  - b. Student
  - c. Unemployed person
  - d. High school student
  - e. Pensioner
5. Are you a medical professional or are you studying medicine?
  - a. Yes, I'm a doctor
  - b. Yes, I'm studying medicine
  - c. Yes, I'm another health professional, such as a nurse/midwife/physiotherapist
  - d. Yes, I am a student of another medical field (nursing, midwifery, physiotherapy)
  - e. No
6. Profession (open-ended question)
7. Relationship status:
  - a. Single
  - b. Informal relationship
  - c. Formal relationship
  - d. Widow
  - e. Divorcee

#### Section 2. Personal health data

1. Do you have a diagnosed gynecological disease? (multiple choice question)
  - a. Yes, PCOS
  - b. Yes, endometriosis
  - c. Yes, benign tumor of the reproductive organs (fibroids, polyps, cysts)

- d. Yes, malignant tumor of the reproductive organs
- e. Yes, other than listed
- f. I am not aware of any
- g. No
2. Have you had a malignant neoplasm in the past? If not, please go to question no. 4
  - a. Yes
  - b. No
3. Have you been treated for this?
  - a. Yes, only surgically
  - b. Yes, only chemotherapy
  - c. Yes, only radiotherapy
  - d. Yes, surgically and chemoradiotherapy
  - e. I haven't been treated
  - f. I have never had cancer
4. Are you currently using or have you ever used hormonal contraception (i.e. pills, patches, vaginal rings, implants or IUD)?
  - a. Yes, I am currently using it
  - b. Yes, I have been using it in the past, but I'm not using it at present
  - c. No
5. Do you smoke or have you ever smoked?
  - a. Yes, I smoke cigarettes
  - b. Yes, I smoke tobacco products other than cigarettes (IQOS, e-cigarettes)
  - c. Yes, I used to smoke cigarettes in the past and then switched to other tobacco products (IQOS, e-cigarettes)
  - d. Yes, I used to smoke in the past but I quit
  - e. No, I do not smoke and never have
6. Are you physically active?
  - a. Yes, I exercise 3 times a week for 30–60 minutes
  - b. Yes, I exercise more than 3 times a week
  - c. Yes, I exercise regularly, but less than 3 times a week
  - d. Yes, but I exercise irregularly
  - e. No

#### Section 3. Pregnancy data.

1. Have you ever been pregnant?
  - a. Yes
  - b. No
2. Are you pregnant right now?
  - a. Yes
  - b. No
  - c. I don't know
3. Have you ever lost your pregnancy (*i. e.* miscarriage, ectopic pregnancy)? (multiple choice question)
  - a. Yes, I have had a miscarriage once or twice
  - b. Yes, I have had a miscarriage more than two times
  - c. Yes, I was in an ectopic pregnancy
  - d. No



4. If you have never been pregnant — have you been trying for a baby? If not — please go to question no. 7
    - a. Yes
    - b. No
  5. How long have you been trying for a baby?
    - a. Less than 1 year
    - b. 1 year
    - c. 2–5 years
    - d. More than 5 years
  6. Did you make lifestyle changes when you were trying to get pregnant? (multiple choice question)
    - a. Yes, I changed my diet to a healthier one
    - b. Yes, I started exercising more
    - c. Yes, I started working less
    - d. Yes, I quit smoking
    - e. Yes, I replaced cigarettes with other tobacco products (IQOS, e-cigarettes)
    - f. I have limited my alcohol consumption
    - g. I stopped drinking alcohol
    - h. No, because I had always had a healthy diet and regular physical activity
    - i. Not really
    - j. None of the above
  7. Would you make lifestyle changes if you were trying to get pregnant in the future? (multiple choice question)
    - a. Yes, I would change my diet
    - b. Yes, I would start doing more sports
    - c. Yes, I would start working less
    - d. Yes, I would limit my alcohol consumption
    - e. Yes, I would stop drinking alcohol
    - f. Yes, I would quit smoking
    - g. No, I already have a healthy diet, I exercise regularly, I do not smoke nor drink alcohol.
    - h. Probably I would not make any changes
    - i. I'm not going to try to get pregnant
  8. What is the best age to get pregnant in your opinion?
    - a. Under 20 years of age
    - b. 20–25
    - c. 26–30
    - d. 30–35
    - e. 36–40
    - f. Above 40 years of age
  9. Please, justify your answer (multiple choice question)
    - a. It is better to give birth to a child before 30, when a woman is the most physically fit
    - b. The younger the women is during pregnancy, the lower the risk of genetic defects in the fetus
    - c. It is better to wait with having children until you finish your college and find a good job
    - d. First you need to become independent, buy a flat and then start a family
    - e. I'm postponing maternity plans because of my partner's decision
    - f. I don't have an opinion
    - g. Another answer
- Section 4. Knowledge about the menstrual cycle and fertile days**
1. How long is a regular menstrual cycle?
    - a. Always 28 days  $\pm$  1 day
    - b. 25–35 days
    - c. I don't know
    - d. There is no definition of the regular cycle
  2. How do you measure the length of a monthly cycle?
    - a. From the first day of the menstruation to the last day before the next bleeding
    - b. From the last day of the menstruation to the last day before the next bleeding
    - c. From the first day after the menstruation to the last day before the next bleeding
    - d. From the last day of the menstruation to the first day of the next bleeding
    - e. I don't know
  3. Do you know which days in the menstrual cycle are fertile days?
    - a. 3–5 days before and 1 day after ovulation
    - b. 3–5 days before and 3 days after ovulation
    - c. 3–5 days before and 5 days after ovulation
    - d. I don't know
  4. What symptoms do you think indicate fertile days? (multiple choice question)
    - a. Spotting
    - b. Abdominal pain
    - c. Clear, stretchy, wet and slippery mucus — much like a raw egg white
    - d. Thick mucus
    - e. Tender breasts
    - f. The day after ovulation, the body temperature rises by about 0.5 degrees
    - g. The day before ovulation, the body temperature rises by about 0.5 degrees
  5. When does the ovulation occur?
    - a. In the middle of the menstrual cycle
    - b. Always on the 14th day of the menstrual cycle
    - c. About 14 days before the next menstruation
    - d. I don't know
  6. Does the number of ovarian follicles decrease during women's life?
    - a. Yes, it decreases
    - b. No, it doesn't change – old ovarian follicles are constantly replaced with the new ones
    - c. I don't know

7. Which anatomical organ does fertilization take place in?
  - a. In the ovary
  - b. In the Fallopian tube
  - c. In the uterus
  - d. In the cervix
  - e. In the vagina
  - f. I don't know

**Section 5. Knowledge about infertility**

1. How much time of regular unprotected intercourse (according to WHO) followed by failure to conceive is essential to define infertility?
  - a. 3–6 months
  - b. 1 year
  - c. 2 years
  - d. More than 2 years
  - e. I don't know
2. What does regular intercourse according to WHO definition mean?
  - a. 2–3 times per week
  - b. Once per month during ovulation
  - c. Once per week
  - d. I don't know
3. Which side does the reason of infertility in relationship stand on?
  - a. On both sides equally
  - b. It may stand on both, but more on female side
  - c. It may stand on both, but more on male side
  - d. On female side only
  - e. On male side only
  - f. I don't know
4. What are the possible causes of infertility in women? (multiple choice question)
  - a. Endometriosis
  - b. Menstrual cycle abnormalities
  - c. Tubal obstruction
  - d. Ovulation disorders
  - e. Genetic diseases
  - f. Premature menopause
  - g. Anatomical defects of the uterus
  - h. Cancer
5. Which of the following factors may affect female fertility? (multiple choice question)
  - a. Obesity
  - b. Lack of physical activity
  - c. Genitourinary infections
  - d. Sedentary lifestyle
  - e. Lack of sleep
  - f. Environment pollution
  - g. Smoking
  - h. Alcohol consumption

- i. Stress
  - j. A diet rich in processed foods and fast food meals
  - k. Age over 35
  - l. Chronic diseases
  - m. Hormonal contraception
  - n. Wearing tight pants and thongs
  - o. Keeping electronic devices such as a laptop or smartphone near the abdomen
  - p. Drinking colorful carbonated drinks
6. What are the possible causes of infertility in men? (multiple choice question)
    - a. Impaired sperm quality and quantity
    - b. Genetic disorders
    - c. Testicular injuries
    - d. Genitourinary infections
    - e. Testicular cancer
    - f. Hormonal disorders
    - g. Inguinal hernia operations, perineal or abdominal surgeries
    - h. Cardiovascular, kidney or thyroid diseases
  7. Which of the following factors may affect male fertility? (multiple choice question)
    - a. Smoking
    - b. Obesity
    - c. Sedentary lifestyle
    - d. Lack of physical activity
    - e. Daily consumption of coffee and coca-cola
    - f. Stress
    - g. Chemicals in food
    - h. Lack of sleep
    - i. Unhealthy diet.
    - j. Medications
    - k. Age above 35
    - l. Tight underwear
    - m. Use of anabolic steroids in the gym
  8. Can food (including drinks) in plastic packaging reduce male fertility?
    - a. Yes
    - b. No
    - c. I don't know
  9. How many couples in Poland are affected by infertility?
    - a. Less than 10%
    - b. 15–20%
    - c. More than 30%
    - d. Half of a population
  10. What are the sources of your knowledge about infertility? (multiple choice question)
    - a. Doctors
    - b. The Internet
    - c. Midwives/nurses
    - d. Medical books, magazines, articles

- e. Educational programs on TV
- f. Lessons at school
- g. Educational campaigns
- h. Family
- i. Medical documentaries

**Section 6** *Knowledge about the diagnosis of infertility*

1. What are the ways to check whether ovulation has occurred? (multiple choice question)
  - a. Ovulation test
  - b. Ultrasound examination
  - c. Body temperature monitoring
  - d. Observation of mucus density
  - e. Observation of symptoms such as spotting, abdominal pain
2. Have you ever heard about examination of Fallopian tubes patency?
  - a. Yes
  - b. No
  - c. There is no examination of the Fallopian tubes patency

3. Does the examination checking egg cells' resources exist?
  - a. Yes
  - b. No
  - c. I don't know
4. According to your knowledge, what tests are ordered/performed by a gynecologist to diagnose infertility? (multiple choice question)
  - a. Basic gynecological examination through the vagina
  - b. Blood tests, including hormone testing
  - c. Transvaginal ultrasound examination
  - d. Patency of the Fallopian tubes
  - e. Cytology
  - f. I don't know
5. Do you know how a man can easily check his fertility?
  - a. Yes, he should perform the semen test
  - b. Yes, he should go to the urologist and have examinations done
  - c. Yes, he should have a testicular ultrasound done
  - d. I don't know