

University of Ljubljana  
Faculty of Health Sciences



## **Issues on preconception health care**

### **International scientific conference**

9 – 10 May 2019, Ljubljana, Slovenia

### **Book of abstracts with peer review**

The conference is a part of Erasmus+ project PreconNet



#### **Editors:**

Ana Polona Mivšek,

Petra Petročnik

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## Program

### Issues on preconception health care

#### International scientific conference

9 – 10 May 2019, Ljubljana, Slovenia

#### **9.5.2019 Factors affecting reproductive health**

8.00-9.00 Registration

9.00 Welcome speeches

9.15 *Plenary lecture*: Presentation of Project PreConNet, *Anna Mari Aimala & Jouni Tuomi*

9.45 *Plenary lecture*: Experiences in developing preconception care (PrePreg Network), *Ilse Delbaere*

10.15 Fertility indicators, *Nava Rezaeinamini*

10.30 Age and fertility, *Anna Mari Aimala*

10.45 Psychotherapy and counselling for couples with fertility problems, *Maja Frencl Žvanut*

11.00 Environmental factors in preconception health, *Elina Botha*

11.15 Discussion

11.30 *Break*

12.00 Resting and sleeping – impact on reproductive hormones, *Marika Mettala & Elina Botha*

12.15 The role of physical activity in preconception health, *Mirko Prosen*

12.30 The role of body mass index in preconception care, *Petra Petročnik*

12.45 Professional sport activity and fertility, *Renata Vauhnik*

13.00 Smoking and alcohol as modifiable risk factors influencing fertility, *Melanie Brodinger*

13.15 The effect of maternal mental disorders on foetal programming, *Nava Rezaeinamini*

13.30 Vaccination as part of preconception care, *Anita Mitterdorfer*

13.45 Discussion

14.00 *Break*

- 15.00 Nutrition and preconception care, *Jouni Tuomi*  
15.15 Sexuality and preconception health, *Ana Polona Mivšek*  
15.30 Sensory processing difficulties and perinatal risk factors, *Neva Gričar*  
15.45 Medications and preconception health, *Marika Mettala*  
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16.15 Pregnant women in radiography, *Nejc Mekiš & Erna Alukić*  
16.30 Preconception health and care model for educational purposes, *Magali de Pauw*  
16.45 Perinatal care in delivery in patients with Chronic inflammatory bowel disease, *Vesna Fabjan Vodušek*  
17.00 Discussion

### **10.5.2019 Health promotion for family planning**

- 9.00 *Plenary lecture*: Review of Slovenian national statistics on preconception issues, *Barbara Mihevc Ponikvar*  
9.30 *Plenary lecture*: Josef Ressel Centre for the Investigation of Early Life Metabolic Programming regarding Dispositions of Obesity, a multi-dimensional study program, *Mounie van der Kleyn*  
10.00 The preconception care in non-invasive methods of infertility treatment, *Ana Tikvica Luetić, Matija Prka, Boris Ujevic, Ingrid Marton & Dubravko Habek*  
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10.30 Maternal nutrition and foetal development, *Evgen Benedik & Nataša Fidler Mis*  
10.45 Discussion  
  
11.00 Break  
  
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12.00 Pregnancy planning after the experience of unexpected event in childbirth - midwifery students' perspective, *Tita Stanek Zidarič & Metka Skubic*  
12.15 Meditation and pre-conceptual health care, *Paul Golden*  
12.30 Fertility of nurses and midwives in connection with the characteristics of their work, *Tina Gogova*  
12.45 Blood glucose levels in preconception period, *Tina Kamenšek*  
13.00 Discussion  
  
13.30 Closing the conference

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## **PreconNet project**

**Jouni Tuomi<sup>1</sup> and Anna-Mari Äimälä**

Tampere University of Applied Sciences, Tampere, Finland

### ***ABSTRACT***

Young adults (aged 18-40) postpone having children without proper knowledge of how age, cumulative health problems and lifestyle choices (obesity, substance abuse, smoking, inactivity, diseases) strip natural fertility. The need for infertility treatments and pregnancy complications increase, and the number of children in families remain smaller than they hoped for. The birth rate decreases and some couples remain childless against their will. Delayed parenthood can be a choice for the couples with better income, but socioeconomic problems, educational and cultural inequality may play its part in the inability for couples to receive reliable information to support their decisions and lifestyle choices. Good fertility health should be in the core of life course health development, even if the choice is not to have children. Numerous research studies have reported that good pre-pregnancy health of the mother-to-be is crucial for the health of the unborn child.

In addition, delayed parenthood affects the ability of the couple to conceive, the safety of pregnancy and the child's health in the long run. As a long-term effect, this implies also to the health of the next and even the following generations.

This subject has been researched and recognized in medicine, midwifery and from the aspect of social sciences; it has been declared as a serious problem that influences health in the long run. Current educational programmes of health professionals inadequately, inconsistently and sparsely address this subject. Therefore, health professionals lack knowledge to counsel their clients. Even in the current health care structure, there is no system to resolve the growing problem of people being kept in the dark, when it comes to their sexual and reproductive health and fertility awareness. The topic of preconception health is neither included in the health care nor in the nursing education.

When EU-directives for nursing and midwifery education were developed and implemented, this problem was not recognized and it is absent also in the directives concerning midwifery and nursing professions. The common directives for nurses are disease-centred. Now it is time to turn the focus on

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life course health development education and training regarding fertility awareness and health.

The focus of preconception health was previously on preventing unwanted pregnancies and sexually transmitted diseases. Nowadays other issues would deserve more attention. Equally, if not even more important, is the protection of natural fertility. The professional guidance and counselling is now directed towards girls and women. Equally important target group, to maintain good fertility, are the boys and men, who have previously been neglected and need to be reinstated.

PreconNet, Preconception Health of Youth, bridging the gap in and through education, is a three-year Erasmus+, Strategic Partnerships -project (September 1, 2018 – August 30, 2021). This project will create a European Model of Preconception health and care for educators, a Preconception Health Community and will also produce materials for teaching and learning.

**Key words:** Preconception health, fertility, lifestyle choices, education, PCHC-Community.

Five European universities are cooperating in this project:

- Carinthia University of Applied Sciences, Austria
- Tampere University of Applied Sciences, Finland
- University of Primorska, Slovenia
- University of Ljubljana, Slovenia
- VIVES University College, Belgium

We invite all colleagues to follow our progress and use our free products in the future.

**Web page:** <http://preco.tamk.fi>

**Youtube:**

<https://www.youtube.com/channel/UCDN71oNloSu5N5XF1gQLkgQ>

**Facebook:** <https://www.facebook.com/PreconNet/>

# Experiences in developing preconception care: the PrePreg Network

Ilse Delbaere<sup>1</sup>

VIVES University of Applied Sciences, Kortrijk, Belgium

## *ABSTRACT*

**Introduction:** In October 2010, the first European congress on preconception care and preconception health took place. Several international researchers presented their experiences with preconception care at this event. Swedish researchers approached colleagues from different countries at the congress with the purpose to set up a preconception network. As such, the ‘PrePreg’ network saw the light of the day. Immediately after the congress, the members of the ‘PrePreg’ network started to work on a project proposal in order to raise awareness of the topic of preconception health.

**Method:** In 2011, a FP7-project (now Horizon 2020) was submitted by the PrePreg network. The proposed work packages were: to evaluate the current status of preconception health and care in Europe, to assess planned and unplanned pregnancies among women attending antenatal care, to implement and evaluate a Reproductive Life Plan, to assess maternal health, lifestyle and molecular markers related to fertility and pregnancy outcome and to work on the preservation of fertility and prevention of STI. The proposed FP7 project was not among the selected funded projects; however, the different partners kept working together and tried to fulfill the workpackages with individual fundings.

**Results:** One partner (UK) collected the data on preconception care policy, guidelines, recommendations and services in six European countries. The results were presented in a paper with Jill Shawe as first author. As such, the first premised workpackage was completed. Two other partners (Sweden and Belgium) assessed the prevalence of unplanned pregnancies and associated factors in their countries, as was planned in the workpackage 2. The Swedish partners introduced a Reproductive Life Plan within contraception consultations and evaluated the data obtained (workpackage 3). Workpackage 4 (assessment of maternal health, lifestyle and molecular markers) was not been undertaken by any of the partners. In the workpackage 5, the Swedish group played a leading role in the topic of fertility awareness, with the study of Lampic (2006). The Belgian partner used a questionnaire to assess fertility awareness in adolescent, student and older population and three of the partners

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(Sweden, Belgium and UK) worked together on an adapted questionnaire to assess fertility awareness in medical students (data to be analyzed).

**Discussion:** Although the PrePreg network never received structural funding for a mutual project, the partners collaborated on different research proposals. More than eight years after the onset, the partners are still joined in a growing network of researchers with an interest in preconception care. The last (the 3<sup>rd</sup>) European congress on preconception care was organized by the network in Sweden and the next will be organized by the Danish partner in Copenhagen.

**Keywords:** preconception, collaboration, research.

# Fertility indicators according to fertility awareness based methods

Nava Rezaeinamini<sup>1</sup>

The Carinthia University of Applied Sciences, Austria

## **ABSTRACT**

**Introduction:** The American College of Obstetrics and Gynecologists endorsed using the menstrual cycle as a vital sign in 2015 (reaffirmed 2017). The physical changes relating to the hormonal fluctuation and the pattern of menstrual cycles are not only the prime signals of fertility, but also of the health status. Fertility awareness provides every woman with fundamental knowledge to characterize the events of the menstrual cycle, either ovulation signs or menstrual patterns. The former is the focus of this review. Fertility awareness-based methods (FABMs) of natural family planning use several approaches to detect the fertility phase of the menstrual cycle and to pinpoint the ovulation. This narrative review aims to determine fertility signs of a normal menstrual cycle.

**Methods:** A literature review in Medline and google scholar was undertaken. Eligible studies described fertility window of menstrual cycle, fertility signs, natural family planning and fertility awareness based methods. Time limitation was not necessary for the electronic search on the database because natural family planning methods use fertility signs of a normal menstrual cycle to avoid pregnancy for decades. The search was done after completing information about fertility signs of a normal menstrual cycle. This review does not include smartphone-based approaches, home device technology for hormonal detection and the efficacy of different methods of natural family planning.

**Result:** From 450 article, 22 articles described observable fertility signs of a normal menstrual cycle. Fertility signs are the foundation of natural family planning and fertility awareness based-methods. Fertility awareness based-methods rely on several techniques to distinguish between fertile and infertile phases of a normal menstrual cycle (fertile window) including calendar-based method (i.e. Cycle beads) ovulation method (i.e. Billings and Creighton) and symptothermal method (i.e. BBT). According to FABMs, charting the previous menstrual patterns, basal body temperature (BBT), cervical mucus and texture, uterine bleeding, pre-ovulatory opening of the endocervical canal (cervical pupil sign) constitute self-observable signs of fertility.

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**Discussion:** Fertility awareness based methods (FAMBs) teach to a woman to understand her body. Research shows that FAMBs are reliable methods for identification of fertility window. Therefore, there is a tremendous tendency to apply them to maximize the chance of conception and shorten the time-to-pregnancy (TTP). Fertility awareness education is an inexpensive primary care intervention for women during reproductive years. This knowledge is crucial and needs especial attention.

**Key Words:** fertility awareness, conceive, fertility indicators, natural family planning.

# Age and fertility

Anna-Mari Äimälä<sup>1</sup>

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## ABSTRACT

**Introduction:** There are several factors that affect both female and male fertility. A person's own choices can actually influence most of these factors. The most significant factor affecting fertility is age. It is an incorruptible factor. Every person will inevitably age, and no one can influence this process.

**Methods:** The data were collected by a scoping review based on 31 articles published within the last 10 years. The data were analysed using thematic analysis, focused on the theme of gender.

**Results:** The trend toward delayed parenthood is on the rise for both women and men. Even though the most fertile age of females is between 20 and 30, the mother's age of the first child is approaching 30 years in the developed countries and over 30 years in 28 European countries. For example, during the last years, the only age group in Finland whose fertility rate has risen are women aged 40-45 years. Female fertility declines after the age of 30, and it is even more pronounced after the age of 35. The older the woman, the greater are the risks of negative pregnancy outcomes. The latter may include miscarriage or premature birth, gestational diabetes or high blood pressure. Additionally, advanced maternal age can pose greater risks for the fetus, such as low birth weight or chromosome disorders.

The consequences of ageing in fertility of men is far less studied than that of women, and the results are more contradictory. Results of the studies as to the commencement of the critical years of male fertility are inconsistent; some authors claim that male fertility can be affected already after the age of 30, still others are convinced that the fertility age limit begins at the age of 40. It is important to note that men's ageing will affect not only the pregnancy and the fetus, but also the child.

**Discussion:** The youth have the right to learn the facts about the impact of ageing on fertility and conception especially considering one's own gametes. Information should be clear and based on research because media is picturing a false image of endless possibilities. Even in the case when an older womb can carry a fetus, the egg cells are usually donated. The best time for counselling about age-related fertility is before a couple is planning to start a family. Later it is more difficult to discuss this very sensitive and private issue.

**Keywords:** age and fertility, delayed parenthood, men and fertility.

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# Psychotherapy and counselling for couples with fertility problems

Maja Frencl Žvanut<sup>1</sup>

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## **ABSTRACT**

**Introduction:** Couples with fertility problems meet with numerous challenging emotions like guilt, sadness, worry, helplessness etc., which can develop into psychological symptoms of anxiety, depression or distress. Infertility may also create problems in their relationship, difficulties in interaction with their friends and family and difficulty in making decisions. Couples seldom share their feelings, thoughts and needs with their friends and relatives, and sometimes avoid talking about the issue even with each other. On the other hand, they may frequently complain to health professionals, contact them more often, or can be dissatisfied with healthcare services, which can greatly burden the caregivers. Recent research suggests that psychological distress of couples coping with infertility can lead to treatment termination and can diminish the probability of positive treatment's outcome (pregnancy). The facts stated above indicate the need to include psychological/psychotherapeutic help in the treatment of these couples while they are coping with such stressful life events. Hence, the following research questions were posed: (1) Is the cognitive behavioural approach appropriate for the treatment of these couples? (2) Which goals and interventions should be emphasised in the therapeutic sessions?

**Methods:** A literature review was performed in March 2019. Relevant monographies and research articles were reviewed and analysed by using the following key words and their combinations: cognitive behavioural approach, infertility, treatment.

**Results:** Cognitive behavioural approach is based on modifying distorted, unhelpful thoughts, emotions and behavioural patterns. Hence, is appropriate in the treatment of couples with fertility problems. Results of literature review indicate that in the treatment of these couples, the therapeutic interventions should be directed towards the accomplishment of four important goals: 1) changing unhelpful attribution and belief systems regarding infertility and marriage; 2) redirecting couples' focus not just on getting a child, but to other sources of satisfaction; 3) increasing expression of emotions, thoughts and needs through communication and problem-solving techniques; and 4) improving couple's sexual relationship. Last, but not least, in the third wave

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of cognitive behavioural therapy, mindfulness is used in the treatment of couples with fertility problems.

**Discussion:** Generally, cognitive behavioural therapy is scientifically proven to be effective in the treatment of different psychological disorders. It was also established that the therapy can decrease anxiety and depression in women coping with fertility problems. There is a large body of evidence about efficacy of mindfulness meditation in stress reduction in various groups of patients as well as non-patients. Recently, it has been evidenced that mindfulness group therapy is effective also in couples with fertility problems.

**Keywords:** couples, fertility problems, counselling, cognitive-behavioural therapy, mindfulness.

# Environmental factors in preconception health

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## ABSTRACT

**Introduction:** A literature review was conducted to find the environmental factors which have an impact on natural fertility and preconception health in general. The findings are preliminary.

**Methods:** A systematic search was conducted in cooperation with a librarian in August 24, 2018. The search was limited to the years 2013-2018, including only original articles in English. Only meta analyses, meta syntheses, reviews and systematic reviews were accepted in this search. The databases used in this search were Medline (999 articles of which 863 articles were excluded as not relevant) and Cinahl (123 articles of which 102 were excluded as not relevant). Only 136 were selected for further inspection from Medline and 21 from Cinahl. Of the remaining 157 articles, 17 were duplicates. Of the 140 selected articles, 117 were further excluded (not a systematic review, not meta-analysis, not relevant). The choice of 23 articles was based on the abstracts. After reading full texts, 13 articles were selected for this review. The data were analysed using thematic analysis.

**Results:** Endocrine disruptors are chemicals that interfere with the body's endocrine system. They produce adverse developmental, reproductive, neurological, and immune effects. These disruptors may be natural or man-made, such as pharmaceuticals, dioxin and dioxin-like compounds, polychlorinated biphenyls, DDT and other pesticides, and plasticizers, such as bisphenol A (BPA). These endocrine disruptors may be found in many products, including plastic bottles, metal food cans, detergents, flame retardants, foods, toys, cosmetics, and pesticides.

**Discussion:** The data obtained in the present review should be interpreted with caution. To control the confounding factors regarding semen, selection criteria and comparability of populations from different time periods is very difficult. There are many confounding factors and quality of laboratory methods for counting sperm, which complicates the interpretation of the available evidence. The findings are nonetheless disturbing as there is evidence that the environment causes certain fertility risks. The individuals who try to protect themselves might find the task impossible. It is the responsibility of healthcare professionals and teachers to provide sufficient information for the young people, without causing unnecessary anxiety. There

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are choices that an individual can make to protect their fertility and some relevant recommendations will be presented at the conference.

**Keywords:** fertility, reproduction, environmental impact, environmental exposure, plastics.

## Rest and sleep – impact on reproductive hormones

Marika Mettälä<sup>1</sup> and Elina Botha

Tampere University of Applied Sciences, Finland

### **ABSTRACT**

**Introduction:** Sleep plays a vital role in maintaining good health. It directly and immediately affects the quality of life, the overall health, and, consequently, also fertility. A sufficient amount of sleep helps refresh and restore the brain and other organ systems, and also regulates the hormones – including fertility hormones. Literature was searched to determine the impact of rest and sleep on natural fertility and on preconception health in general.

**Methods:** A literature search was conducted and synthesized to produce findings and materials that can be used in curriculum content and teaching material for healthcare students and youth. They can benefit from the new knowledge about rest and sleep and their beneficial effects on reproductive health.

**Results:** Little research has been so far conducted on the impact of rest and sleep on preconception health. However, there is a consensus that recovery from stress will benefit hormonal balance in both men and women. Stress impacts fertility to a larger extent than has been previously known. Reducing oxidative stress may improve a couple's chances of natural conception. Hormonal balance predetermines good fertility and preconception health. Sufficient and regular sleep aids in following a healthy diet and making healthy instead of unhealthy choices. Research findings show that maintaining normal weight is easier with sufficient rest. In addition, environmental circadian disruption (ECD) has been linked to reproductive dysfunction and subfertility. The internal or circadian timing system is integrated in reproductive physiology.

**Discussion:** It is imperative to find evidence of the impact of rest and sleep on hormones and fertility. These findings may be used in developing content and instructional materials for healthcare and teaching professionals who advise and teach the youth. Suggestions on how to improve sleep and recovery from stress and consequently promote preconception health will be presented at the conference.

**Keywords:** sleep, recovery, stress, reproductive hormones, preconception health.

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# The role of physical activity in preconception health: A scoping review

Mirko Prosen<sup>1</sup>

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## ABSTRACT

**Introduction:** Strong scientific evidence exists that pregnancy and childbirth outcomes are influenced by health behaviour long before conception. In this context, preconception health has been increasingly recognized as an opportunity for intervening on a variety of health practices that have been recognized as key preconception health practices in women as well as in men. Among these practices, physical activity was identified as an important behavioural preconception health indicator, however, the topic of preconception physical activity is less studied in literature than it was identified through preliminary literature review.

**Methods:** A scoping review was conducted in order to determine the role of physical activity in preconception health and its effect on fertility, pregnancy and later life of a child. The literature was searched in CINAHL, ScienceDirect and PubMed and restricted to publications written in English between January 2008 and January 2019. Additional criteria included studies involving males and females, studies performed on humans (13–44 years), published in scientific journals and access to a full text. The following search terms were used: preconception health, preconception care, prepregnancy care, fertility, and physical activity. A total of 755 published manuscripts were identified and imported in Endnote reference management software. Two additional manuscripts were identified through hand searching. In the first round, the titles were screened for eligibility and duplicates were removed, with a total of 41 manuscripts remaining. Following the second round abstract screening, 26 manuscripts were included. By reading through the remaining articles, a total of 17 manuscripts were selected.

**Results:** The selected studies can be grouped in two categories: (1) studies associated with physical activity and preconception health behaviour (n=8), and (2) studies associated with preconception physical activity, fertility and pregnancy outcomes (n=9). The findings confirm that preconception physical activity is understudied, especially in males. Among seventeen selected manuscripts only two manuscripts examined the physical activity associated with preconception health in males.

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**Discussion:** The evidence on physical activity and the impact on preconception health and outcomes related to reproductive health and pregnancy is inconsistent. Nevertheless, physical activity is strongly recommended in preconception period (as a preventive measure for infertility, polycystic ovary syndrome, weight gain, and to enhance well-being and higher quality of life). The recommendations encourage moderate exercises at least 30 minutes a day, 5 days a week, for a minimum of 150 minutes of moderate exercise per week. In view of the existing lack of knowledge on the effects of physical activity on preconception health, future research is needed, along with developing strategies how to address and influence behavioural change in both genders.

**Keywords:** preconception care, fertility, physical inactivity, public health, health promotion.

# The role of body mass index in preconception care

Petra Petročnik<sup>1</sup>

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## **ABSTRACT**

**Introduction:** Despite its reported limitations, the body mass index presents a prediction calculation tool for adults' nutritional status. Deviations of body mass index, especially obesity, influence the health of women and men in their reproductive period. As the levels of overweight and obese population are rising all over the world, obesity is becoming a major global health problem, affecting individuals' fertility and preconception health. It is estimated that in 2016, there were 1.9 billion adults who were overweight, 650 million of whom were obese. The aim of this review is to outline how body mass index affects the fertility and preconception period for both women and men.

**Methods:** A review of the professional and scientific literature was conducted. The literature was searched through different databases, mainly PubMed and Medline. All the included articles were in the English language, published within the time frame of the last ten years.

**Results:** The study findings indicate that there is a compelling evidence that obese individuals are at increased risk for several health problems. Increase in body mass index impacts women's amount of hormones, especially oestrogen. Obese women often face irregular menstruation cycle and polycystic ovary syndrome. Obesity also increases the risk of insulin resistance and negatively impacts the assisted reproduction techniques. These individuals are also at higher risk for increased blood pressure, they may have problems with respiratory tract system and often face mental health problems. It should also be outlined that women with increased pre-pregnancy body mass index face several health problems during pregnancy and birth. Moreover, obesity often impacts the health of their newborns. On the other hand, male obesity has also been found to coincide with decreased fertility. This is often related to lower testosterone levels and increases in scrotal temperature, which leads to impaired quality of semen. Research also shows that obese men have higher rates of erectile dysfunction.

**Discussion:** When discussing the role of a body mass index in preconception care, it is of great importance to consider both genders. The increasing rates of obesity globally demand greater awareness of this metabolic syndrome, also in relation to its effect on reproduction. Women and men who are planning a family should discuss their weight issue with their healthcare

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provider. Moreover, obesity prevention programmes should be offered much earlier prior to conception. Health professionals play a key role in obesity prevention and management by raising awareness of its negative effects on health and fostering healthy lifestyle behaviours.

**Keywords:** body mass index, obesity, preconception care, fertility.

# Sport and fertility

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## **ABSTRACT**

**Introduction:** Sport and physical exercise have been recognized to have the potential to affect fertility. The effect of sport on ovarian function is controversial and has not as yet been fully studied and assessed. The factors are related to the type of sport activity and characteristics of the two genders. Furthermore, in males, sexual and spermatogenic function can be improved by adequate and proper sport activity. The aim of this presentation is to present how sports and exercises might either improve or impair fertility in females and males.

**Methods:** Literature search was performed in PubMed, using the key words sport AND fertility. Inclusion criteria was review article, English and period from 2014 until 2019.

**Results:** Two review articles have been used for this presentation. One review article covers sport and female fertility and the other sport and male fertility. Menstrual irregularities occur among high-intensity exercising females. Furthermore, anovulation and luteal phase deficiency are more likely among exercising females. The effect of exercises on female fertility depends on the exercise intensity. How exercises affect male fertility is still unclear as contradictory results have been found in different studies. Male fertility is affected by different factors, which have either positive or negative effects on spermatogenesis. Despite evidence proving that excessive exercises might negatively affect male fertility, there is little knowledge regarding the potential mechanisms involved in the decrease of sperm quality.

**Discussion:** Sports and exercises may both have positive and negative effects on female and male fertility. High intensity exercises are associated with a higher risk of fertility problems as compared to low intensity exercises. Training intensity should be tailored to the athlete's status. In order to identify the proper training intensity, a trained specialist is recommended for athletes. In females, it is recommended to consider the effects of exercises on the ovarian function, and in males the effects of exercises on spermatogenesis and erectile function. However, it should be pointed out that changing training intensity in elite sport might be unrealistic.

**Keywords:** exercises, reproduction, hormones, females, males.

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# Smoking and alcohol as modifiable risk factors influencing fertility and pregnancy outcomes

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## **ABSTRACT**

**Introduction:** A good maternal and child outcome can be reached by supporting the population with preconception health interventions. Prenatal care is often too late because many risks occur before women even learn that they are pregnant. Especially the modifiable risk factors for both genders have to be taken into account when planning future health interventions. The statistical data show that there is a high prevalence of smoking and alcohol consumption in the population, so it is important to focus on smoking and alcohol abuse as modifiable risk factors for decreased fertility and adverse pregnancy outcomes. The aim of this review was to give evidence-based information regarding the effect of smoking and alcohol on fertility and pregnancy outcomes.

**Methods:** A scoping review was conducted from October 2018 up to February 2019. The literature was searched in the electronic databases Medline, Cinahl Plus with Full Text, PubMed, Science Direct and the Cochrane Library. The articles were selected according to the eligibility criteria determined by the project group. The total of 60 studies were included in the scoping review, which measured the effect of smoking and alcohol on fertility and pregnancy outcomes.

**Results:** Smoking affects female and male fertility and results in a decreased uterine flow velocity, decreased tubal function, impaired folliculogenesis and hormone levels. Evidence on the affected male fertility is more moderate but it has been established that semen parameters can be influenced by smoking and that DNA damage can also occur due to nicotine exposure. Not only the fertility but also the pregnancy outcomes are influenced by maternal or parental smoking. While maternal smoking can lead to low birth weight, intrauterine growth restriction, increased risk of preterm delivery, higher amount of NICU admissions and early neonatal morbidity, paternal smoking can cause DNA damage resulting in birth defects or childhood cancer. Alcohol consumption also affects male and female fertility but the adverse effects of low and moderate alcohol consumption have still not been fully investigated. Heavy alcohol consumption or binge drinking can lead to an impaired menstrual cycle and to a longer time frame for conceiving in

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women, and to an impaired testosterone level, semen volume, sperm count, sexual function and number of sperms with normal morphology and motility in men. The study results indicate that alcohol consumption during pregnancy results in FADS (Fetal Alcohol Disorder Syndrome). Up till now, there has been no evidence about the safe amount of alcohol, which can be consumed during pregnancy. Paternal alcohol consumption can lead to a higher amount of spontaneous abortions and there is a higher risk of developmental and behavioural alterations in offspring of alcohol consuming fathers.

**Discussion:** Smoking and alcohol can have hazardous effect on female and male fertility and on pregnancy outcomes. It is important to provide the population with the evidence-based information regarding these modifiable risk factors in order to enhance their opportunity to make healthy fertility decisions.

**Keywords:** preconception health, fertility, smoking, alcohol.

# The effect of maternal mental disorders on fetal programming

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## **ABSTRACT**

**Introduction:** There is a long tradition of speculation that perinatal events could influence an individual's health throughout their life. The developmental origins of health and disease (DOHaD) model proposes a link between fetal development and non-communicable diseases emerging in Adulthood. This model suggests that intrauterine events according to timing, duration and type can trigger specific programming in fetal development known as "fetal programming". Fetal programming is adaptive alternations in biological systems, which enhance the chance of the baby to survive. The aim of this review is to examine current literature to identify if there is any connection between maternal mental disorders and fetal programming.

**Method:** To determine the connection between maternal mental disorders and fetal programming, a literature search was performed in PubMed and Google Scholar. From 2257 studies, six descriptive studies were selected. These studies are published in the last five years in English language, defining the influence of maternal mental disorders (such as anxiety, depression or stress) on fetal programming. Animal-based studies were excluded.

**Result:** The studies have shown that prenatal stressors including anxiety and depression can affect fetal programming in different ways. However, current data suggest that fetal exposure to maternal hypothalamic-pituitary-adrenal axis dysregulation, excessive glucocorticoids, and inflammation with resulting epigenetic changes at both the placental and fetal levels are important areas of continued investigation.

**Conclusion:** The preconception interventions and promotion of health require considering strategies beneficial for offspring. DOHaD Model emphasizes on the connection between the intrauterine environment and fetal development. Due to complexity of mental disorders, further investigation is necessary for fully understanding the effect of maternal mental disorders on fetal programming. This knowledge can help to develop applicable strategies for psychological preparation for pregnancy.

**Key words:** fetal programing, mental disorders, DOHaD, prenatal stress.

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# The impact of vaccination as part of preconception care

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## ABSTRACT

**Introduction:** Vaccinations are considered to be one of the most successful prevention strategies, for individual- and collective protection in a population. Many vaccine-preventable diseases have serious consequences for a pregnancy and so vaccination is beneficial for a mother and the unborn child. In principle recommended vaccinations should be carried out before the beginning of a pregnancy. Healthcare professionals have a key role in providing advice on vaccination for health preservation.

**Methods:** Literature research was conducted in bibliographic databases PubMed, Cochrane Library, CINAHL Plus with Full text, MEDLINE and other available scholarly sources found via internet. Studies and articles were selected according to eligibility criteria determined by while travel vaccines were excluded. The scope of analysis included all relevant immunobiological issues in general terms and as applied to immunization against vaccine-preventable diseases for maternal preconception.

**Results:** Maternal immunization has the potential to reduce morbidity and mortality from infectious diseases of the foetus and the newborn. Vaccination against MMR, varicella and hepatitis B should be recommended to women without evidence of immunity before pregnancy. Self-reported vaccination status did not correlate with IgG seropositivity, so antibody titer is recommended. Maternal pertussis vaccination is highly effective in preventing severe disease in infants, but is less effective in protecting against infection or mild diseases. In case of tetanus immunization is a clear benefit for maternal, fetal and infant health. Results from a systematic review do not indicate that maternal influenza vaccination is associated with an increased risk of fetal death, spontaneous abortion or congenital malformations, but pregnant woman during influenza season will have additional benefits from the vaccination. HPV vaccination makes it possible to provide oncogene protection to avoid a hepatocellular cancer and cervical intraepithelial neoplasia. Although HPV vaccination exerts a minor effect on the overall fecundability, its positive effects have been found in women with a history of sexually transmitted infections. HPV Vaccination does not increase risk of infertility in teenagers.

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**Discussion:** The surveillance of vaccine preventable diseases and vaccination coverage is necessary in order to collect epidemiological data with respect to national vaccination recommendations, control targets and screenings. Knowledge about vaccination recommendations for preconception and monitoring for vaccine-induced protection are of vital importance. Due to its benefits, immunisation is an important part of preconception care without adverse effect to fertility and obstetric outcomes.

**Keywords:** preconception immunization, vaccine-preventable diseases, vaccination coverage, fertility.

# Nutrition and Preconception Care

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## **ABSTRACT**

**Introduction:** The importance of good nutrition to preconception health can never be overestimated. The nutrition problems present enormous challenges globally. The questions of over- or underweight and malnutrition are in the core of this discussion. It is obvious to link underweight and malnutrition, but it is not so clear that in many cases overweight and malnutrition go hand in hand, especially in industrialized countries, but also in other countries.

**Method:** This paper is a continuation and conclusion of two previous review research studies. Both studies were based on a descriptive research. The study of overweight was based on 17 articles, and the malnutrition study on 18 articles. The data were analysed using quality data based content analysis.

**Results:** There is evidence that overweight affects female fertility, but also male fertility. Women's obesity might increase the risk of irregular menses and ovulation, even omission of menstruation. On the other hand, it might affect the quality of egg cells and embryos. Obese men are likely to exhibit a reduction in semen quality, low sperm count, sperm motility and increased DNA damage as well. Nearly all research findings indicate that teenagers' overweight, especially obesity, could present a risk to sexual and reproductive health and even infertility in adulthood.

Maternal malnutrition has remarkable consequences since it affects child health in various ways. The affect might commence during pregnancy and emerge later as risks to the child's health. Maternal malnutrition may cause e.g. low birth weight and structural abnormalities in the fetus. It might also increase the risk of complications of pregnancy in the next generation.

**Discussion:** Each research in the overweight review study confirmed that being overweight has negative impact on preconception health. Overweight affects fertility in both women and men. The articles of malnutrition strengthen the perception that malnutrition has significant consequences to public health. High energy density foods along with inadequate nutrient intake present a threat and challenge especially to the population of Europe and North America. The research findings highlight the importance of guidance and counselling so that the youth and young adults would take better care of their reproductive health.

**Keywords:** preconception health, nutrition, overweight, malnutrition, gender.

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# Sexuality and preconception health

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## **ABSTRACT**

**Introduction:** Sexuality is closely connected to conception. Usually we think of sexuality only in the context of fertility and capacity of procreation. However, many sexual decisions in a person's history can affect the potential for conception. The aim of the literature search was to identify the risk factors of sexual health that can have a long-lasting effect on conception and sexual health, considering not only a woman, but also her partner.

**Methods:** A scoping review of the literature has been undertaken, searching the main medical databases like Cochrane, Medline, CINAHL and PubMed and other sources in order to retrieve information on the topic. The inclusion criteria were: English language texts, literature limited to the past 10 years. The texts that reported problems of past sexual decisions on pregnancy and birth were excluded. After elimination of the duplicates and content screening, 8 texts were selected for final analysis.

**Results:** Results show that sexual health of the couple prior to conception is very important. There is a strong evidence that sexually transmitted infections, such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are closely linked to infertility in women, causing tubal inflammation and consequent permanent damage. Contraception methods can also affect women's ability to conceive. Long-term pill use can thin uterine lining and harm the ability for nidation of the fertilized egg cell. Some studies even report the connection between preconception use of contraceptive pills with asthma in children. A number of studies strongly advise against the use of hormonal contraception in teenagers and claim that synthetic hormones reduce the natural ability of those young women to produce their own natural hormones.

**Discussion:** The literature reviewed reaffirms the detrimental effect of some STIs on female fertility, but no evidence was found that they also affect men's fertilizing capacity. The research conducted shows that infertility studies still largely focus on women and neglect male infertility. Further studies should be conducted on contraceptive issues since early and long-term use of some contraceptives provenly affect reproductive capacities of women. Therefore counselling about healthy sexuality should be introduced already in later years of primary school and become a compulsory topic at regular health check-ups.

**Keywords:** fertility, preconception, STI, hormonal contraception.

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# Sensory processing difficulties and perinatal risk factors

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## **ABSTRACT**

**Introduction:** Ayres described sensation as food that ‘nourish(es) the brain’ Healthy individuals require salient interactions with the environment that provide accurate sensory information to their central nervous systems. The individual's abilities to register and process the type, quantity and intensity of sensation provided by the environment results in behaviours and feeling states that are either organized or disorganized. Physical environmental factors, such as prenatal stress can cause sensory integrative deficits. Important for our sensory experiences are five external senses (touch, smell, sight, sound and taste) and three “internal” ones (movement - vestibular, body position – proprioception and interoception). Sensory integration occurs throughout the development and begins in prenatal period. Because of inefficient and irregular sensory processing in the brain, children can later in life develop hyperactivity and distractibility problems, learning difficulties at school, behaviour problems, muscle tone and coordination difficulties, etc. All these problems can prevent the children’s participation in community. The aim of the study was to examine the literature and determine whether any scientific research had been conducted on the relation between sensory processing difficulties and preterm labour.

**Methods:** A review of the scientific and professional literature was conducted. The Digital Library of Slovenia – dLib.si was used. The search was performed with the following keywords and phrases in the English language: sensory processing disorder, premature infant, pregnant women and pregnancy. Nine out of twelve articles were included in the final analysis.

**Results:** The study results indicate that an atypical sensory processing in extremely low gestational age children was common. Very preterm children show sensory processing difficulties regarding somatosensory registration and sensory modulation and preserved multisensory (audio-visual) integration. Children born prematurely were at risk of having atypical scores in the auditory, tactile and vestibular processing sections.

**Discussion:** It should be more promotion on healthy lifestyle and wellbeing of adolescent girls, women and couples in the preconception period to prevent premature birth and sensory integration disorder consequently. However, if a child is born prematurely it is necessary to detect atypical sensory behaviours

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as soon as possible and to integrate sensory approach in the occupational therapy treatment of premature children.

**Keywords:** sensory processing, premature, occupational therapy.

# Medications and preconception health – a review of current literature

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## **ABSTRACT**

**Introduction:** Adequate medication has a vital role in health and wellbeing, but medication in the context of preconception health and pre-pregnancy care plays a vast role. The use of prescription and over-the-counter medications and dietary supplements are common among women and men of reproductive age. The professionals should have enough knowledge and understanding to be able to give guidance about appropriate medication for women and men of reproductive age, particularly those with chronic health conditions, those who are planning a pregnancy, and those who may become pregnant.

**Methods:** A literature search was conducted and synthesized to produce findings and material that can be used in curriculum content and teaching material for healthcare students. They can benefit from the new knowledge about medication in the context of preconception health for themselves and in their future profession.

**Results:** Medication and supplements can affect hormonal balance and sperm quality in unexpected ways and present a problem for normal conception. The overall goal of preconception care is to ensure that a woman and her partner are healthy and live a healthy lifestyle before pregnancy. Many of the medical conditions, personal behaviours, and psychosocial risks associated with negative pregnancy outcomes can be identified and modified before conception. Principles outlined in the presentation will enhance healthcare students' and professionals' knowledge about the needed and beneficial medication and supplements for health and preconception health. Alongside, they will become aware also of the potential harmful effects of medication to preconception health.

**Discussion:** In recent years, there has been a growing concern regarding poor obstetric outcomes, poor knowledge of preconception health, and increased infertility. Adverse pregnancy outcomes may be largely prevented by comprehensive assessment and modification of risks associated with medication before pregnancy. It is important to inform women of reproductive age about the role of supplements before they get pregnant. By extending the knowledge of healthcare students and professionals, we can ensure healthy pregnancies, healthy mothers and healthy babies.

**Keywords:** medication, supplements, preconception health.

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# The use of folic acid in pregnancy – the Slovenian recommendations

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## ABSTRACT

**Introduction:** We would like to present Slovenian recommendations for the folic acid use in pregnancy.

The lack of folic acid in the early days of pregnancy may be clinically manifested in different forms of neural tube and cardiac defects in the foetus and, according to the latest studies, it may also influence the mental development of the foetus, especially in autism.

In the Ljubljana maternity ward, 24831 children were born during the years 2013-2016 and 83% (N=19971) of their mothers took folic acid during pregnancy. Currently we do not avail of the data about the dose and the time period during which they were taking folic acid supplements.

According to the Slovenian perinatal information system, 67 children with an anomaly of the central nervous system (0.3%) were born in the Ljubljana maternity ward during this period. 24 (35.8%) mothers of these children were not taking any folic acid supplement during pregnancy.

**Methods:** In order to identify the incidence of proper usage of folic acid in pregnancy, the study was conducted from June 2017 to December 2017 on a sample of 657 postpartum women, who participated in the survey completely voluntarily with filling out an anonymous questionnaire. Ethics permission was asked for but was not necessary by the opinion of the commission. The survey enquired about the amount of folic acid taken during pregnancy, the duration and timing of treatment. The participation in the study was voluntary and anonymous.

**Results:** Although the addition of folic acid during pregnancy in the first three months of pregnancy is the only preventive measure against the development of defects of the neural tube, the supplement was properly taken by less than one third of the pregnant women. The information of taking folic acid was given in 88.4% of women but the majority started to take folic acid after the pregnancy was confirmed (in the 6<sup>th</sup> - 7<sup>th</sup> week of pregnancy when it is too late for prevention of neural tube defects). It is extremely alarming that only 6% of pregnant women with chronic diseases who should take folic acid

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during the entire pregnancy had taken a proper amount of folic acid in the proper duration period.

**Discussion:** Folic acid is likely safe for most people when taken by mouth or injected into the body. Folic acid is possibly unsafe when taken by mouth in large doses, long-term and might cause abdominal cramps, diarrhea, rash, sleep disorders, irritability, confusion, nausea, stomach upset, behavior changes, skin reactions, seizures, gas, excitability, and other side effects. The study findings dictated an intensified health education of women regarding the use of folic acid during pregnancy. To that end, we decided to develop the guidelines with information on the proper dosage of this supplement and the rationale behind this usage. The document will inform the clients about the benefits of the folic acid for the healthy pregnancy and about the reduced risk of baby developing neural tube defects. The document will hopefully be prepared by the end of this year.

**Keywords:** folic acid, proper usage, pregnancy, neural tube defect, guidelines.

# Pregnant women in radiography

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## **ABSTRACT**

**Introduction:** Ionizing radiation causes damage to the human cell on a DNA level. Younger patients and especially foetuses are more sensitive to radiation due to faster cell division. The aim of the literature search was to present the research findings for pregnant women in radiology.

**Methods:** The research method used was a systematic review of the literature. In the review, we have included all the professional literature that describes the imaging of pregnant women in radiology. Search keywords were pregnant woman, radiology, radiation protection, pregnancy. We determined them based on the purpose and objectives. The exclusion factors were public safety and nuclear accidents, therefore, all documents that did not cover the scope of ionizing radiation for pregnant women.

**Results:** Unlike the professionals who work with radiation, the patients generally do not have any dose limitations. Pregnant women are therefore treated like other patients, but the radiation procedure must be justified, as is the case of every other patient. The female patients can be exposed to ionizing radiation through the menstrual cycle until the period is missed (28-day rule). According to ICRP 84, the termination of pregnancy is not justified when the foetal absorbed doses do not exceed the dose of 100 mGy. When the foetus is exposed to the dose between 100 and 500 mGy, the decision about pregnancy termination should be based upon individual circumstances. A patient may undergo a radiological examination before realizing that she is pregnant, in which case, the foetal dose should be estimated by a medical physicist. The evaluation is performed in view of radiographic factors affecting patient exposure during the procedure.

What about the professionals who work with radiation, can they still work after realising that they are pregnant? According to the Slovenian (and European) legislation, female professionals who work with radiation can continue working in an x-ray department as long as the absorbed foetal dose does not exceed 1 mGy during pregnancy. In Slovenia, female professionals may decide to temporarily change the place of work where they are not exposed to ionizing radiation from medical procedures.

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**Discussion:** The research findings show that fetal radiation doses during x-ray procedures usually do not exceed even half of the dose (49 mGy) at which termination of the pregnancy is medically indicated.

**Key words:** radiography, radiation protection, pregnant woman.

# Preconception health and care model for educational purposes

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## **ABSTRACT**

**Introduction:** Since maternal age in Western countries is advancing, it is crucial to preserve female reproductive capacity in their late thirties. Awareness among people of reproductive age about the factors (e.g. age) that influence fertility and reproductive outcomes is generally low. A provision of more comprehensive information on the effects of these factors on reproductive outcomes is necessary.

Healthcare professionals are expected to promote fertility awareness, reproductive life planning and preconception health education. While preconception care has been recognised in research, the current educational programmes of health professionals address this topic inadequately and the knowledge is dispersed.

Within this PreConNet project we intend to develop the necessary evidence-based information and training for health professionals in order to equip them with digital skills for adequate preconception counselling.

**Methods:** First, a review of the current situation of sexual and reproductive health statistics is conducted in the participating countries. The project partners perform also a careful review of the existing preconception-related topics in their curricula. Finally, the partners conduct a scoping literature review on preconception care in international publications. The conclusions will be gathered in a summary document. Using this information, the content and the elements of the pilot-model will be designed.

**Results:** The pilot-model is based on the recognized need in the participating countries. It describes the latest comprehensive approaches in preconception healthcare, including not only biological and health development facts but also the psychological, societal, ethical and cultural perspectives. It is transferrable to the healthcare education programmes of the participating countries.

**Discussion:** Although all participating countries are situated in Europe, wide differences are observed in the health statistics and the inclusion of preconception topics in the professional healthcare programmes. This will motivate the partners to design a comprehensive preconception health and care model.

**Keywords:** PreConNet, preconception model.

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# Perinatal care and delivery in patients with chronic inflammatory bowel disease

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## ABSTRACT

**Introduction:** We would like to present the data on perinatal care and delivery in patients with chronic inflammatory bowel disease in Slovenia.

The main factor which marks the course of chronic inflammatory bowel disease (CIBD) in pregnancy is the activity of the disease before pregnancy. The CIBD, which is in remission before pregnancy, usually remains in remission during pregnancy. Most relapses occur during the first trimester of pregnancy, mostly due to arbitrary interruption of treatment by the patient.

It is therefore of great importance that the CIBD patient is adequately advised prior to conception. The patient should be advised on the impact of the treatment on the course of pregnancy and the development of the foetus and, in some cases, a replacement therapy is necessary. The patient should be aware that the CIBD must be in remission for at least six months before conception, or else more complications in pregnancy may be expected (spontaneous abortion, premature delivery, intrauterine growth restriction, anaemia in pregnancy, severe deterioration of CIBD, etc.).

For a pregnant woman with CIBD an adequate (healthy) diet is very important. Pregnant women often experience lack of iron (Fe), essential vitamins, minerals and other substances, which is mainly due to the poor absorption or malabsorption of nutrients in the digestive tract. In the case of sideropenic anaemia, it is advisable to treat pregnant women with parenteral preparations of iron in support of vitamin B12. Pregnant women with CIBD are advised to take folic acid in therapeutic doses (e.g. Folicin 5mg/day).

**Methods:** Data on maternity, delivery and neonates in Slovenia are collected in the Perinatal Information System of Slovenia (NPIS RS) since 1986. The NPIS was designed to reduce perinatal morbidity and mortality. In the period from 1986 to 1992, a research information system for the monitoring of perinatal care was developed in the framework of the research project, which finally included all 14 maternity wards in 1987. In 1993 NPIS became a health register of births and deliveries in the country, but the basic collection preserved the characteristics of the register of births and deliveries, regardless of the place or the way of the event.

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**Results:** According to the data of the National Perinatal Information System of Slovenia (NPIS) for the past 10 years, the incidence of spontaneous abortion in pregnant women with CIBD is twice as high as in the healthy population (12.7% against 26.4%, OR 0.001) and similar incidence rate of premature deliveries has been reported (6.5% against 13.6%, OR 0.006). The percentage of intrauterine growth restriction (2.2% against 3.6%, OR 0.220) and oligohydramnios (2.0% against 1.8%, or 0.615) is the same as in the healthy population. The latter two percentages are likely the result of the very good perinatal care provided by gastroenterologists, perinatologists and family physicians.

An increased caesarean delivery rate in women with CIBD is mainly due to the consequences of surgical treatment of the complications of CIBD (adhesions after surgical treatment and inflammations in the abdominal cavity, stomas, etc.) or the complications of the disease itself (e.g. fistulas – mainly rectovaginal fistulas). According to NPIS data, the frequency of planned C-sections is slightly higher (16.2% against 24.5%, OR 0.012), while the frequency of emergency C-sections is the same as in the healthy population (9.6% against 11.8%, OR 0.253).

The incidence of anaemia in CIBD pregnant women is not higher than in the healthy population (3% to 4.5%, OR 0.236), but in the former more frequent treatment with Fe is recorded (3.6% to 16%, OR 0.001). The information on the way of administration of the Fe (p.o. or i.v.) is currently not available. Consumption of folic acid in pregnancy in the two groups is practically the same (77% against 78.3%, OR 0.647). Unfortunately, we do not avail of the information about the number of pregnant women who had been taking folic acid throughout the entire pregnancy and in what amount.

**Discussion:** According to the data of NPIS, the perinatal care in women with CIBD is excellent and the mode of delivery is only slightly different from that in the healthy population. It can therefore be concluded that multifaceted perinatal care of CIBD women in Slovenia, involving different medical specialists, is highly satisfactory.

**Keywords:** chronic inflammatory bowel disease, pregnancy, perinatal care, delivery, complications.

# Not all women of childbearing age are healthy

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## **ABSTRACT**

**Introduction:** Being aware that the first weeks of pregnancy are most vital to the healthy development of the foetus, women should ideally be healthy and avoid any harmful activities and substances near the time of conception. However, this is not always the case. Many women of childbearing age have unhealthy habits or chronic medical conditions that can affect pregnancy.

**Methods:** The data from Medical Birth Registry, the National Perinatal Information System of Slovenia (NPIS), were analysed for the period 2015 – 2017, using IBM SPSS Statistics for Windows. The NPIS contains over 100 different social, health and healthcare variables on every woman, pregnancy, birth, the postpartum period and the neonate. The data are collected in all 14 Slovenian maternity hospitals.

**Results:** A total of 59,176 women gave birth in Slovenia in the period 2015 – 2017, 48 % for the first time. On average, they were 30.8 years old, only 1 % were younger than 20 years, and 20 % were older than 35 years. According to their Body Mass Index at the beginning of the pregnancy, 5 % of women were underweight, 19 % were overweight and 10 % were obese. 10 % of women smoked during pregnancy. 94.4 % of women conceived spontaneously, 4.5 % with IVF-ET and 1.1 % after induction of ovulation and/or insemination. Almost every fifth woman experienced a miscarriage in the past, 3 % had a history of preterm birth and 0.3 % gave birth to a stillborn child. In reproductive history, 4 % of women reported a history of cervical excision procedure and 5 % underwent a surgical procedure due to anomalies of the uterus, most often hysteroscopic resection of uterine septum. In personal medical history, women most commonly reported thyroid disease (40 per 1000), cardiovascular disease (17 per 1000), chronic pulmonary disease (15 per 1000) and mental illness (9 per 1000). Epilepsy was recorded in 6 cases per 1000, diabetes in 4 per 1000, and history of cancer in 2 cases per 1000 women.

**Discussion:** The data show that at the time of conception many women are facing health conditions that can negatively affect the course of pregnancy. For these women, the preconception health care is of particular importance since by managing risk factors and appropriate treatment of medical conditions it is possible to contribute to better pregnancy outcomes. It is

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therefore important that women are encouraged to plan pregnancies and consult their healthcare professionals before pregnancy.

**Keywords:** preconception health care, pregnancy, risk factors, chronic disease.

# Josef Ressel Centre for the Investigation of Early Life Metabolic Programming regarding Dispositions of Obesity, a multi-dimensional study programme

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## ABSTRACT

**Introduction:** The worldwide prevalence of obesity which has tripled since the 1980s is having an increasing and strong effect on children. Metabolic imprinting through early childhood nutrition seems to play an important role in the etiology of obesity. Overweight at the age of two and later is associated with excessive weight gain during the months of life. However, there is a lack of evidence to precisely explain modifiable factors in early infancy that potentially contribute to health disparities later on.

The aim of the "Josef Ressel Centre for Early Life Metabolic Programming of Dispositions of Obesity" is to identify maternal and infant predictors of metabolic risks in childhood obesity. The concept is based on overfeeding during the first four months of life, seen as a critical window for the development of obesity. The main considerations of modifiable factors are early infant nutrition, the infant growth correlated to infant fat mass index, and molecular parameters. The second focus is given on maternal feeding style, infant eating behaviour and the recognition of satiety cues. (Pre)pregnancy maternal nutritional status and prepregnancy weight might also play a role.

**Methods:** A prospective longitudinal cohort of 100 healthy, normal-weight, non-smoking mothers and their term, healthy, normal-weight, singleton children are longitudinally observed (from the 36th week of pregnancy, follow up at the age one and two), allowing the comparison of exclusively breastfed and exclusively formula fed children. The methods used in the study are validated feeding questionnaires, fat mass index measurements by air displacement plethysmography PeaPod® and BodPod®, MIRIS breast milk analyzer. Samples, such as plasma, urine, saliva, and stool will be examined with GC/LC/, ELISA and other.

**Results:** Recruiting is ongoing. The timeframe 2017-2021 Perspective.

**Discussion:** Particular strengths of the multi-study-design include:

- the collection of prospective and therefore reliable breastfeeding data, distinguishing between exclusive breastfeeding and exclusive formula feeding, strictly according the WHO definitions. Also 24h-

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drinking volume measurements at four time points will put a direct focus on overfeeding during the first four months of life.

- the accurate measurements of infant fat mass components with air displacement plethysmography, longitudinal in the same cohort up to the second year of life, including biomarker and growth trajectories
- the analysis of mother-child-dyads, concentrating on the nutritional status and eating behaviours of both mother and child

The results of this study will stimulate further research in order to contribute to targeted interventions.

**Keywords:** metabolic programming, early childhood obesity research, maternal and infant nutrition.

## The preconception care in non-invasive methods of infertility treatment

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### ABSTRACT

**Introduction:** Non-invasive methods of infertility treatment include different methods of fertility diagnosis, supplementation therapy, ovarian stimulation, ultrasound assessment in natural or stimulated cycles and other methods excluding *in vitro fertilization* and insemination. The main goal is a holistic approach to female and male fertility, which takes into account all the aspects of wellbeing, not solely the short-term results usually observed in conventional fertility treatment methods. The aim of our presentation is to give comprehensive review of preconception care in couples dealing with fertility issues who are refusing assisted reproductive technology.

**Methods:** Several factors and conditions in women and men will be discussed in order to treat possible causes of infertility and to improve health condition of couples in general. The couples are also taught to observe their natural signs of fertility in order to improve their knowledge of reproduction and to strengthen their relationship in the process. The method mostly used among our patients is the Crighton model FertilityCare System. We will also give an overview on date published on English at PubMed related to our topic.

**Results:** The usual preconception care includes the regulation of endocrinological problems, such as diabetes mellitus or hypothyroid disorders, but less attention is paid to the weight issues, although the percentage of overweight persons is constantly increasing. Counseling on changing life habits is necessary to ensure good epigenetic environment for the embryo although it can be very time-consuming and requires participation of several different professionals. Hypovitaminosis of several vitamins like D and B12 should not be neglected. Since there is a growing prevalence of different types of food intolerance and allergy, the clients should be tested along with detailed counseling. The widespread chronic stress related to adrenal fatigue syndrome should also be considered due to its strong impact on fertility although the testing is difficult to perform.

**Discussion:** There are a growing number of couples seeking medical help due to the infertility who reject assisted reproductive technology. These patients

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can be very challenging since our interventions are limited and that is the reason why we conduct detailed diagnostic assessment and long-term management. A large number of reports have been published on microbiological fertility issues related to both female and male fertility. As the inflammation of reproductive organs is mostly caused by several different microbes, the treatment can be very complex. Women and men should be carefully microbiologically assessed to improve pregnancy rate and the percentage of full-term pregnancies. The fragmentation rate in sperm samples is also analyzed with the same goal. Since infertility can be a huge psychological burden, this aspect of help and treatment should also not be neglected.

**Keywords:** fertility, preconception care.

# The effect of lifestyle and environmental factors on fertility

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## **ABSTRACT**

**Introduction:** Different researchers consistently accentuate that the lifestyle patterns associated with diet, sleep and other habits, and the living and occupational environment have a profound effect on health and disease. Fertility is no exception. According to several studies, the prevalence of infertility has been increasing in recent years, both in the developed and developing countries.

**Methods:** The aim of the paper is to highlight the key environmental factors and lifestyle patterns that affect fertility. The data were collected by reviewing the key scientific literature in the Science Direct, Scopus and PubMed databases using the following words and phrases: living environment, chemicals and fertility.

**Results:** A number of lifestyle factors affect fertility in women, in men, or in both. These factors include, but are not limited to, environmental and occupational exposure to different chemicals and pesticides, exposure to physical or biological factors, exposure to smoking, alcohol or caffeine, recreational drug abuse, nutrition and obesity, physical and psychological stress, and also the socioeconomic status of individuals. Environmental causes of infertility and miscarriage provide a surprising evidence on how common chemicals in individuals' homes as well as chemicals in the workplace and outdoor living environment can weaken or damage the reproductive process in both men and women. Increasing concern has been raised recently as to the compounds, which could modulate or disrupt the endocrine system. Several studies correlate endocrine disruptors (which abound in our environment) with infertility, especially in men (sperm count and concentration decline, sperm morphology defect and sperm motility change are reported).

**Discussion:** Endocrine disruptors can impact also female fertility by altering ovarian development and function through estrogenic, anti-estrogenic, and/or anti-androgenic effects. Exposure to endocrine disruptors during the developmental period can cause not only reproductive abnormalities in adult life but can also transfer these abnormalities to next generations. Future research in the area of lifestyle and environmental factors affecting fertility is therefore needed. On one hand, the individuals are recommended to take appropriate self-protective measures, and on the other hand, it is necessary to develop broader public programmes to ensure chemical safety. It is of great

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importance to introduce and implement the risk management measures to control the chemical exposure and to raise public awareness of the significance of healthy lifestyle. Acting according to precautionary principle is the first step towards solution.

**Key words:** lifestyle, living environment, hygiene, chemicals, fertility.

# Maternal nutrition and fetal development

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## **ABSTRACT**

**Introduction:** Maternal nutrition is the major intrauterine environmental factor that alters expression of the foetal genome, aside from the benefits of stopping smoking, alcohol and substance abuse. It is widely recognized that optimum nutrition in early life is the foundation for long-term health (predisposing individuals to metabolic, endocrine, and cardiovascular diseases), not only during childhood but also through adulthood. It can even have an influence on descendants - which is called metabolic programming or metabolic imprinting.

**Methods:** Selected data from recent literature with special focus on rationale for and currently published results of maternal nutrition and foetal development.

**Results:** Preconception counselling of women of childbearing age should spread awareness of the importance of balanced maternal nutrition before and during pregnancy. This should include and promote cultural lifestyle change; especially important is a healthy weight before conceiving and balanced healthy nutrition with high-quality foods included.

Supplementation and/or fortification can be used when recommended micronutrient intakes are difficult to be met through food alone. In industrialized countries, although a balanced diet is generally accessible, a switch to mainly processed foods, high in energy density, while low in nutrient density is an increasing problem. Processed foods are high in: a) refined carbohydrates (free sugars in liquid (sugar-sweetened beverages, fruit juices, smoothies, and sweetened milk products) and solid form (confectionery, cakes, biscuits, pastries, sweets, sweetened spreads, breakfast cereals etc.), white flour/bread/pasta/rice); b) trans, saturated and/or omega-6 fats; c) salt; and/or d) additives). Simultaneous decreased intake of high quality, high nutrient, natural foods and water leads to inadequate vitamin and mineral intake during pregnancy.

**Discussion:** Evidence does not support a routine multiple micronutrient supplementation but highlights the importance of an individualized approach in order to recognize nutritional deficiencies of individuals, thus leading to

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healthful dietary practices prior to conception and eventually to tailored supplementation. However, the supplementation of three nutrients is generally advised. Firstly, folic acid (400 µg folic acid/day) from the moment they stop using contraception up to 12 weeks of pregnancy. Secondly, in case of insufficient regular intake of small sea fishes before and during pregnancy (at least 2 portions/week), the docosahexaenoic acid (DHA) is advised to be supplemented (200 mg DHA/day). Thirdly, vitamin D supplementation is also advised (at least 800 international units of vitamin D/day). Promoting optimal nutrition will not only ensure optimal foetal development, but will also reduce the risk of chronic diseases in childhood and adult life.

**Keywords:** maternal nutrition, foetal development, supplementation, metabolic programming.

# Midwife role in preconception care

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## ABSTRACT

**Introduction:** One of the competences of midwives is to provide pre-pregnancy care. In use is one conception of preconception care, to improve pregnancy outcomes and women's health in general. We can reach this goal through prevention of disease and management of risk factors that effect pregnancy outcome and the health of future generations. We use this concept in many models. The difference in model of care could explain why in some countries most women prefer to receive information from gynaecologists instead of midwives. The aim of the study is to identify the areas included in the preconception care and the possibility of midwives' participation in this care in Slovenia.

**Methods:** The study is based on literature reviews on preconception care and the role of midwives role therein. We searched using keywords on Research gate, PubMed, CINAHL in English for free articles. We used 12 full text articles and other important documents for preconception care as "Essential competencies for Midwifery practice", "What is Preconception Health and Care?" from PrePreg Network, document from World Health Organization about preconception care, a guide for optimizing pregnancy outcomes of The American College of Obstetricians and Gynecologists, District II/NY and the NHS website.

**Results:** The areas addressed by the preconception care package are: Nutritional conditions, Tobacco use, Genetic conditions, Environmental health, Infertility/sub-infertility, Interpersonal violence, Too-early, unwanted and rapid successive pregnancies, Sexually transmitted infections, HIV, Mental health, Psychoactive substance use, Vaccine-preventable diseases and Female genital mutation. In Slovenia midwives are bound by the legal acts that define midwifery practice (as "Kodeks etike za babice Slovenije", "Poklicne aktivnosti in kompetence v zdravstveni in babiški negi", "Pravilnik za izvajanje preventivnega zdravstvenega varstva na primarni ravni").

**Discussion:** The traditional system of antenatal care as well as the couples' health education, need to be reorganised in such a way that midwives could participate more in the preconception care. Midwives should receive additional training to deliver this care with more confidence, and to improve their knowledge, skills and awareness, because they have competencies, knowledge and skills to counsel. If we formulate national guidelines for

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preconception care in Slovenia, women will receive uniform, verified and standardized informations, even if they seek it outside national health system.

**Keywords:** preconception care, midwife role in preconception care, midwifery model preconception care, planning for pregnancy.

# Preconception care versus unplanned pregnancy - some indicators of the condition in Republic of Croatia

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## ABSTRACT

**Introduction:** To bring a new life to the world is the biggest decision in someone's life, and every parent hopes for normal pregnancy and the delivery of a healthy baby. To this end, it is advisable to prepare for pregnancy, although it is estimated that 50% of all pregnancies are unplanned.

Preconception treatment includes pregnancy planning which comprises specific examinations and counselling before conception in order to reduce and modify the many risk factors and to prevent poor maternal and child health outcomes. It may decrease pregnancy complications, thus enhancing more favourable pregnancy outcomes.

Future parents should assume the responsibility for successful pregnancy outcome and take an active role in their child's health. More precisely, preconception preparation should begin a few months before pregnancy, through identification and treatment of the current health status. However, preconception care should be considered also in a broader context.

Taking into consideration that parent's health, general and reproductive, is a precondition for pregnancy and healthy offsprings, by changing behaviour and by accepting healthy life habits we can affect it. From the earliest age and adolescence to the mature age, we create preconditions for our health. Smoking, alcohol consumption, drug addiction, eating disorders, obesity and sexually transmitted diseases, as public health problems can be also seen from this perspective.

Regular gynecological check-ups are the most obvious indication of a woman's attitude towards her reproductive health and her wish to protect it.

**Methods:** Data were collected from the Croatian Institute of Public Health (Childbirths in healthcare institutions in Croatia in 2017.)

**Results:** On the other hand, postponement of pregnancy is related to the socio-economic conditions in the state and an increasingly lower number of women decide to give birth at the medically or biologically optimal age. In comparison to last year, the mothers aged 35 – 39 (18,01%), as well as aged 40 – 44 (3.4%) have grown in number.

According to the data for the year 2017, perinatal mortality in Croatia is low, mostly related to low birth-weight. Other causes reported include pregnancy

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complications, congenital malformations and infections. It is therefore of special importance to provide preconception care to couples with disorders in previous pregnancies, e.g. premature birth, miscarriage, Rh immunization, malformed foetus, and family and hereditary diseases.

**Discussion:** A special group requiring medical attention are women with some chronic diseases. If a disease does not exclude pregnancy, it should be stabilized as much as possible. Since certain medications may have a teratogenic effect on the foetus, they should be temporarily suspended, changed or the dose corrected.

Women who want to conceive should undergo basic general and gynecological examination and some tests (blood pressure, Pap test, blood and urine analysis, blood type, Rh factor, etc.), which are followed by interventions for preconception protection. The latter should be person-centred and includes supplementation of folic acid, vaccination against rubella, identification and treatment of the existing health conditions (diabetes, hypothyreosis, HIV/AIDS, hepatitis B, phenylketonuria, hypertension, anemia, etc.)

**Key words:** pregnancy, planning, preparation, outcome, health.

# Pregnancy planning after the experience of unexpected event in childbirth – midwifery students’ perspective

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## **ABSTRACT**

**Introduction:** The death of a child, the birth of a preterm or a handicapped baby are unexpected events or occurrences in a childbirth that result in a crisis situation for parents and health care professionals. Midwifery students spend a great amount of time at the clinical settings. The aim of clinical practice learning is to enable students to develop the domains of competence and become safe, caring and competent professionals. To this end, the students should play an active role during clinical practice. The aim of the study is to explore how midwifery students deal with unexpected events in childbirth, and how the latter affect their own future pregnancy planning.

**Methods:** A quantitative non-experimental method of research was used. The researchers abide the Code of Ethics for Researchers at the University of Ljubljana. The data were collected through a structured questionnaire “The Impact of Event Scale” which was used for relatively direct measuring of the stress associated with a traumatic event. The purposive sample consisted of 21 undergraduate midwifery students. The data obtained were analysed using the descriptive statistics.

**Results:** The study found that 71% of the students dealt with unexpected events in their second study year. The majority of students (86%) reported that they felt sad, frightened and helpless. They sought help from their classmates and clinical mentors (71%). The experiences of unexpected event in childbirth do not influence their future pregnancy planning.

**Discussion:** Due to their youth and lack of experience, midwifery students may be considered a vulnerable population. They are not adequately prepared for the stress and intensity of emotions when confronted with a dead or a dying child or when they witness a birth of a preterm or handicapped baby during their clinical training. Teachers and clinical mentors must recognise the unique issues and situations in clinical settings and assist the students to overcome the challenges and solve potential dilemmas. This involves supporting learning, teaching, supervising, assessing practice and taking action to address concerns when they are identified.

**Keywords:** childbirth, death, preterm infant, abortion, midwifery students.

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# Meditation in preconceptual care

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## ABSTRACT

**Introduction:** It is clear that infertility causes stress. Studies generally focus on either fertility or infertility relationships with stress or relaxation. This presentation focuses on whether there is a causal link between relaxation through meditation and increased rates of fertility (quantitative), and, or increased sense of satisfaction (qualitative). The aim of this review is to outline how meditation relaxation increases preconceptual relaxation and satisfaction levels that increase fertility.

**Methods:** A review of the professional and scientific literature was conducted. The literature was searched through different databases, mainly PubMed. All included articles were in the English language and were limited to the period of the last 10 years.

**Results:** Meditation Mindfulness and fertility studies show that women who attended one programme experienced a significant decrease in depressive symptoms, shame, entrapment, and defeat. Inversely, they presented statistically significant improvement in mindfulness skills and self-efficacy to deal with infertility resulting in increased pregnancy rates. This was achieved through the use of CBT and yoga. *“Yoga ... including meditation ... decreases depression, anxiety, and stress; improving the physiological and psychological states of both men and women”* and lead to increased fertility rates. Recent research findings show that infertility patients consistently report significantly more symptoms of anxiety, depression and suicidal ideation than fertile individuals. Some studies have shown that the more distressed the women prior to and during treatment, the lower the pregnancy rates, while other studies do not corroborate these findings.

**Discussion:** Some studies demonstrate a causal link between meditation relaxation and increased fertility, others do not. However, all studies show increased sense of satisfaction and decreased negative feelings (self-loathing, depression, anxiety, guilt, shame, etc.). Meditation makes men and women focus on positive feelings which increase the general well-being apparently leading to increased fertility. Whilst looking at *“the efficacy of psychological interventions on both distress and pregnancy rates”* a clear increase in both and fertility rates can be observed.

Cortisol and a-amylase levels are measurable indicators of stress and both are reduced with mindfulness meditation yoga type practices. The pre-conceptual

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care perception of wellness is higher amongst those practicing meditation. We can conduct more studies yet the benefits are clear that mediation increases fertility in some individuals and where it does not, the perception of positive feelings is therapeutic. Therefore these findings suggest including meditation programmes in preconceptual care.

**Keywords:** fertility, infertility, mindfulness, meditation, preconception care.

# Fertility of nurses and midwives in relation to the characteristics of their work

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## **ABSTRACT**

**Introduction:** In nursing and midwifery most, healthcare workers are female and many of them are at a childbearing age. Nurses and midwives are exposed to various occupational hazards in their workplace, such as ionizing radiation, anesthetic gases, antineoplastic agents (chemotherapy), antiviral substances, sterilization agents and disinfectants. This profession is characterized by many physical/ergonomic and psychological burdens. These factors may affect the employees' reproductive system. The aim of the paper was to identify whether the ergonomic loadings of nurses and midwives (such as raising heavy loads or patients) and the characteristics of their working time (work in shifts, night work, work over 40 hours per week) affect their fertility and in what way.

**Methods:** A literature review through the DiKUL portal (Digital Library of the University of Ljubljana) was performed. The search of literature was limited to the period from 2009 to 2019. We searched only the articles in the English language, with free access, using the following keywords: nurses, midwives, fertility, working conditions and shift/night work. We used Boolean operators (AND, OR) for various possible combinations.

**Results:** Based on the inclusion and exclusion criteria, 13 relevant articles were identified for the literature review. The results of most of the studies indicate a variety of possible negative effects on the fertility of nurses and midwives regarding their exposure to the hazards of their work environment. Among the selected studies we most frequently detected the tendency to determine the influence of working conditions of nurses or midwives on abnormalities in the menstrual cycle (shorter, longer), the length of time needed for successful conception, the impact on pregnancy length, complications related to pregnancy, and possible negative outcomes of pregnancy and impact on the newborn. Results show that work schedule characteristics, such as night work, shift work, long working hours, a weekly workload of more than 40 hours, and heavy lifting, standing more than 6 hours/day can present a higher risk of adverse pregnancy outcomes.

**Discussion:** The results of the study suggest that some occupational factors can affect the nurses' and midwives' fecundity and their pregnancy outcomes.

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The literature review identified the problem of insufficient or limited evidence of our research question, which indicates the need for further research. Strong evidence is needed to clarify which factors really affect the reproductive health of nurses and midwives. Protection and support of healthcare professionals within their working environment is needed, especially for those who would like to become parents.

**Keywords:** nurses, midwives, fertility, working conditions, shift/night work.

# Blood glucose levels in the preconception period

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## **ABSTRACT**

**Introduction:** By preventing diabetes before pregnancy, the maternal and infant health outcomes can be greatly improved. The preconception period is a crucial time for chronic disease prevention, however, little is known about preventive programmes for reproductive-aged women at risk of developing diabetes. The purpose of the paper is to present the results of a literature review regarding preventive programmes in the preconception period throughout the world.

**Methods:** A literature review of the Slovenian and foreign literature was performed by searching scientific articles in the CINAHL, MEDLINE and ScienceDirect international databases. The search of the Slovenian literature was conducted by using the COBIB.SI library catalogue.

**Results:** The analysis of the data obtained suggests that the prevalence of the diagnosed diabetes in the reproductive-aged women as well as the prevalence in the entire population has been increasing. Consequently, more women start pregnancy with a preexisting diabetes. **Preconception** care should empower women with knowledge about a healthy lifestyle, including healthy diet, physical activity, weight management, stress management and the importance of minimizing risk behaviours. Macrosomia is the most constant consequence of non-regulated gestational diabetes and it also increase the risk of maternal, fetal and neonatal complications, birth defects and perinatal death. A recent study found that an extremely low percentage of non-pregnant reproductive-aged women received preconception care in out-patient care settings. In Slovenia, there are outpatient clinics, which provide specific management of primarily chronic diseases within the primary health care system. In these clinics, women over the age of 30 are treated. They are included in diabetes prevention programmes if their blood sugar level exceeds the recommended threshold and when at positional risk for diabetes type 2. Only negligible treatment, however, is provided to women below this age limit.

**Discussion:** The increased awareness of the importance of preconception care among other healthcare professionals who provide care to women of reproductive age, such as obstetricians and gynaecologists, may contribute to the improvement of diabetes prevention activities. Thus, the health of future

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generations will be promoted. Outpatient clinics in Slovenia are an example of good practice of prevention and management of chronic diseases at the primary level, but the preconception care requires an adjustment of the treatment programme of reproductive-aged women.

**Keywords:** preconception care, glucose level, nursing, preventive programs, diabetes.

