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Preconception Health and Care

A Window of Opportunity

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Abstract

Stern, J. 2015. Preconception Health and Care. A Window of Opportunity. (Rådgivning inför graviditet. Ett gyllene tillfälle). *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1160. 71 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-554-9402-5.

Women's health and lifestyle before pregnancy can influence both the fertility and the health of mother and child. The overall aim of this thesis was to explore current preconception health and care and evaluate a new tool for preconception care.

Study I was a qualitative descriptive analysis of preconception recommendations in six European countries. All six countries had guidelines for high-risk women, but guidelines for healthy women were fragmented and inconsistent. Guidelines regarding nutrition and lifestyle differed between countries. Preconception care was offered to high-risk women but otherwise on an opportunistic basis.

Study II was a cross sectional study measuring pregnancy planning among 3390 pregnant women at antenatal clinics. Three out of four pregnancies were very or fairly planned and 12 % fairly or very unplanned. Women with planned pregnancies were more likely to have a higher socioeconomic status and to have longer relationships than women with unplanned pregnancies. The level of pregnancy planning was associated with planning behavior, such as information seeking and intake of folic acid, but without a reduction in alcohol consumption.

Study III was a randomized controlled trial evaluating the Reproductive Life Plan (RLP) as a health promoting tool in contraceptive counselling. Women (n=299) at a student health center were randomized to standard care or standard care plus RLP. RLP-based counselling increased women's knowledge of both reproduction and folic acid intake prior to pregnancy, affected the women's RLP and was appreciated by the women.

Study IV explored the adaption of RLP among midwives using mixed methods with focus group interviews and a questionnaire. Midwives generally adopted the RLP in contraceptive counselling, had predominantly positive experiences of the RLP and considered it a feasible tool for promoting reproductive health.

In conclusion, preconception care is a public health issue. Pregnancy planning is associated with socioeconomic background, and preventive measures could have great health benefits both for women of reproductive age and their future children. There is a need for both national and European cohesive evidence-based preconception care guidelines. The RLP is a feasible tool for promoting preconception health and can potentially form the missing link between contraceptive counselling and antenatal care.

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*To the women,
future mothers or not*

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals:

- I Shawe J, Delbaere I, Ekstrand M, Hegaard HK, Larsson M, Mastroiacovo P, Stern J, Steegers E, Stephenson J, Tydén T. (2015) Preconception care policy, guidelines, recommendations and services across six European countries: Belgium (Flanders), Denmark, Italy, the Netherlands, Sweden and the United Kingdom. *The European Journal of Contraception and Reproductive Health Care*, 20:77-87.
- II Stern J, Salih Joelsson L, Tydén T, Berglund A, Ekstrand M, Hegaard H, Aarts C, Rosenblad A, Larsson M, Kristiansson P. (2015) Is pregnancy planning associated with background characteristics and pregnancy planning behaviour? *Accepted for publication in Acta Obstetrica et Gynecologica Scandinavica*.
- III Stern J, Larsson M, Kristiansson P, Tydén T. (2013) Introducing reproductive life plan-based information in contraceptive counselling: an RCT. *Human Reproduction*, 28(9):2450–2461.
- IV Stern J, Bodin M, Grandahl M, Segeblad B, Axén L, Larsson M, Tydén T. (2015) Midwives' adoption of the reproductive life plan in contraceptive counselling: a mixed methods study. *Human Reproduction*, 30(5):1146-55.

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Abbreviations

ANC	Antenatal Clinics
ART	Assisted Reproductive Technology
BE	Belgium
BMI	Body Mass Index
CG1	Control Group 1
CG2	Control Group 2
CI	Confidence Interval
DK	Denmark
FGI	Focus Group Interview
HBM	Health Belief Model
HCP	Health Care Provider
IG	Intervention Group
IT	Italy
IVF	In Vitro Fertilisation
NL	The Netherlands
NTD	Neural Tube Defect
PCC	Preconception Care
RLP	Reproductive Life Plan
SE	Sweden
SMH	Social Model of Health
SRH	Sexual and Reproductive Health
STI	Sexually Transmitted Infections
YHC	Youth Health Clinics
UK	The United Kingdom
WHO	The World Health Organization

Introduction

Most women in Sweden today have the choice to control their childbearing, mainly as a result of the introduction of the contraceptive pill in the 1960s and the legislation of free legal abortion in 1975. To plan for, carry and give birth to a child and become a mother has been described as a universal yet highly personal experience [1]. This thesis focuses on preconception health and care from a public health point of view. Although preconception health concerns both women and men, this thesis will focus on the women's perspective.

Preconception health and risk factors

Preconception health refers to the health before pregnancy. Maternal lifestyle in the period prior to conception, as well as during pregnancy, is an important determinant of healthy pregnancy and normal fetal development. By the time most women have realised that they are pregnant and have taken the first contact with antenatal care, the fetal organs have already been developed. Interventions aiming to prevent adverse pregnancy outcomes related to organogenesis are thus often too late [2]. Risk factors include insufficient nutrition, low levels of folate, overweight/obesity, medical conditions and its treatments, alcohol and tobacco use, and high age.

Maternal nutrition both preconception and during pregnancy can affect growth, development and later health outcomes of the fetus [3]. To reduce the risk of neural tube defects (NTDs) in the fetus, women are advised an intake of 400 µg folic acid daily in good time before conception and up to 12 weeks after [4].

As an increasing proportion of women of reproductive age use medications, and few medications are examined for possible teratogenic effects, women should discuss all usage of medications with their health care provider (HCP) if planning a pregnancy or becoming pregnant [5].

Obesity (Body Mass Index, BMI, of 30 or above) is associated with increased risks both for infertility [6] and complications during pregnancy, such as preeclampsia and gestational diabetes, as well as complications during delivery [7]. Sweden has increasing numbers of overweight pregnant women: in 2013, 38% of pregnant women were overweight or obese [8].

Alcohol use in early pregnancy has been associated with increased risk for spontaneous abortion, preterm delivery and low birth weight. The association

is evident even with low amounts of alcohol consumption, but binge drinking seems to be the most hazardous to fetal development [9-10]. One out of four Swedish women aged 16-29 years has an alcohol intake associated with potential health risks [11] and even though the majority of pregnant women reduce alcohol consumption during pregnancy, 6% continue to drink alcohol even after they have become aware of their pregnancy [8].

Smoking during pregnancy is a well-documented risk factor for adverse pregnancy and neonatal outcomes [12], and also snuff use increases the risk of stillbirth [13]. Stopping or reducing tobacco intake during pregnancy strongly reduces the risks [13, 14]. One out of ten Swedish women aged 16-29 smokes daily [61]. Approximately 3% of women aged 16-84 use snuff, but snuff use is becoming more common and the increase is greatest among younger people [15]. In 2013, the proportion of women who smoked in early pregnancy was 6% and 1% used snuff [8].

Except from lifestyle factors, female fertility can be impaired by a range of factors such as premature menopause, salpingitis, endometriosis, polycystic ovary syndrome and sexually transmitted infections (STI), but most importantly by physiological ageing [16].

The impact of age on fertility and pregnancy

Approximately 10-15% of the population is estimated to have difficulty conceiving naturally and about half of these seek medical help for infertility [16]. The possibility to use fertility and reproduce, the fecundity, is at its highest at the age of 20-24 [17]. Among heterosexual couples with women younger than 30 years, 90% become pregnant after one year of unprotected intercourse while the corresponding figure for women aged 35-40 is 50% [16]. The chance of a live birth after a cycle of in vitro fertilisation (IVF) also decreases with age [18-19]. For a couple to have a 90% chance of realizing a desired 2-child family without IVF, it is estimated that they should not postpone parenthood later than 27 years of age. The corresponding age if IVF can be considered is 31 [20].

Apart from decreased fecundity, older age at conception increases the risk for complications both for the mother and for the child. Risks for the mother include gestational diabetes, preeclampsia, multiple pregnancy, caesarean section and postpartum bleeding [21-24]. Children born to older mothers have an increased risk of chromosomal deviations [22, 25], being born prematurely or small for their gestational age [23, 24]. In addition, pregnancies among older women more often end in spontaneous abortion, extra uterine pregnancy and stillbirth [22, 26-28].

As in many other European countries, there have been demographic changes in Sweden with postponed childbearing and less stable relationships [29, 30]. The age of first time mothers has increased by five years since the 1970s, see Figure 1. In 2013, first time mothers were on average 29 years old [8]. Highly educated women tend to postpone childbearing more than women with lower education [30, 31].

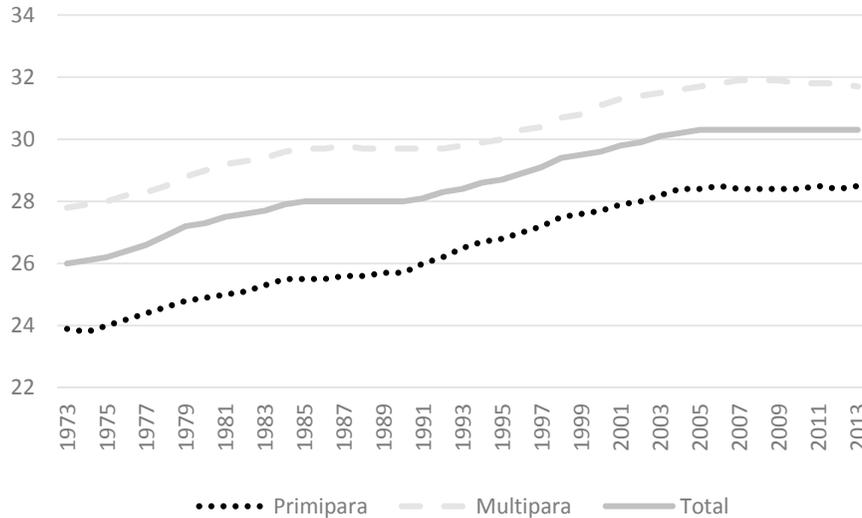


Figure 1. Mother's age among primiparas, multiparas and all, year 1973-2013 [8]

Family planning and postponed parenthood

On a population level, fertility postponement should be understood as a result of a large number of factors with mutual interplay. From a life course perspective the transition into adulthood has become blurred and prolonged, and sequencing norms are today stronger than age norms for childbearing, that is, fulfilling all preconditions before childbearing is more important than not being too young/old [32]. Indeed, six out of ten women answered they would choose to have an abortion if they became pregnant while they were a student [33].

Reasons for legal abortion are not captured in Swedish registers. However, studies have shown that the most frequent reasons for having an abortion were bad timing of the pregnancy, financial concerns and worries about the relationship. Non-use of contraception and contraceptive failure were common, often because the woman did not think she could get pregnant at the time [34, 35]. This suggests a need for improved counselling about fertility and family planning.

Attitudes towards future parenthood in Sweden have been investigated in different populations of reproductive age with similar results. The two child norm is predominant and postponing parenthood is motivated by the widespread understanding that some conditions should be fulfilled before starting a family: being sufficiently mature, having a partner to share the responsibility with, completed education and a stable economy [33, 36-40]. Similar preferences for family planning have been found in most European countries [41].

Knowledge of fertility and preconception health

Awareness about fertility issues has been investigated among university students showing that women and men have insufficient knowledge about the relationship between age and fertility, and overestimate the success rate of assisted reproductive technology (ART) [36, 37]. Corresponding knowledge gaps regarding fertility have been found among US, Finnish, Italian, Israeli, Canadian and Turkish students [42-47].

The knowledge of national guidelines is also insufficient, only one out of five Swedish women was aware of the recommendations about daily supplementation of folic acid before pregnancy [48]. In addition, false beliefs and myths about fertility, such as the effect of post-coital techniques on pregnancy rates, are common [49]. In a Swedish study exploring young people's experiences of sex education, only 20% stated they had received enough information about fertility and 18% thought the overall level of knowledge gained was good or very good [50].

Pregnancy planning

Optimizing preconception health requires the pregnancy to be planned. Most commonly pregnancies are described as planned if they happen at the "right time" and unplanned if they are mistimed (earlier or later than desired) or unwanted [51]. Other terms related to the concept of pregnancy planning are wanted/unwanted, intended/unintended, and desired/undesired which are often used interchangeably. There is no uniformity in the understanding and use of these terms [52, 53].

The proportion of unplanned pregnancies among live births differs widely across countries: 43% in the United States [54], between 16% and 34% in the United Kingdom [55, 56] and 18% in France [57]. The corresponding figure for Sweden is unknown as it is not captured in the antenatal records. However, 110,000 children are born, 3.5% of them as a result of ART, and more than 35,000 legal abortions are carried out annually [8, 58]. Previous studies have suggested the proportion of planned pregnancies is around 71-75% in Sweden [59, 60].

Consequences of unplanned pregnancies

Pregnancy planning status has been associated with a range of health outcomes both for the pregnant woman and for the child. Mothers reporting unplanned pregnancies are more likely to experience psychological problems, such as postpartum depression [61-63]. Associations between unplanned pregnancies and the health of the child include increased risk of behavioural problems [64] and lower scores on both measures of psychosocial development [65], educational attainment [66] and well-being [67]. Unplanned pregnancies have been associated with an increased risk of preterm delivery and low birth weight [68]. Unplanned pregnancies have also been suggested as being associated with reduced probability of breastfeeding and health-promoting behaviour such as early antenatal care and preconception intake of folic acid [69-73]. Evidence of associations between planning status and maternal risk behaviours during pregnancy, such as alcohol and tobacco use, is so far inconclusive [71]. Overall, the impact of pregnancy planning on child and parental health outcomes is still largely unknown.

Socioeconomic conditions of importance for sexual and reproductive health

The Social Model of Health (SMH) is a theoretical framework for explaining health and health behaviour that moves beyond the traditional medical model which focuses on the individual from a biological perspective.

In this thesis, the SMH has been used as an underlying theoretical framework for understanding the concept of pregnancy planning, as an explanatory model of the importance of recommendations explored in Study I and as hypothesis-generating for Study II.

According to the SMH, the health of an individual cannot be fully understood by biological factors alone; also social and environmental determinants need to be included, as illustrated in Figure 2 [88]. The social determinants of health can be divided into factors that can be altered by the individual (e.g. eating habits), factors that can be altered at societal level (e.g. health care services) and factors that cannot be altered (e.g. heredity). In many cases the interaction between the different levels are complex and can constitute both protecting factors and risk factors.

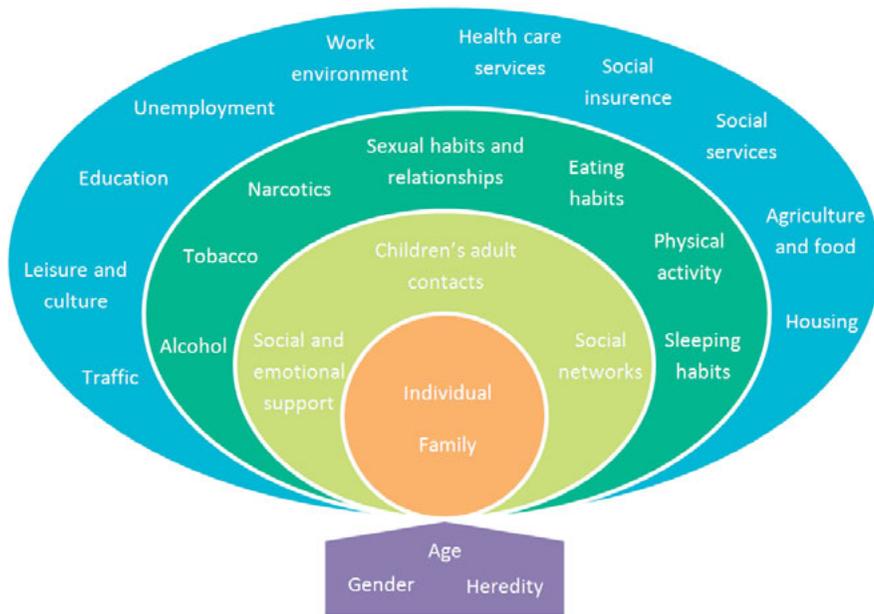


Figure 2. The Social Model of Health by Dahlgren & Whitehead [88], adapted by the Swedish National Institute of Public Health.

In the case of pregnancy planning, the SMH can be used both on an individual level to explain the health behaviour of planning a pregnancy, but also on a group level to understand what background variables might affect the level of pregnancy planning. It has been pointed out that an unintended pregnancy is not merely an individual's health situation, but a complex public health issue concerning a health inequity [75, 76].

The overall aim of Swedish national public health policy is to create societal conditions for good health on equal terms for the entire population [77]. Eleven objective domains of public health have been adopted, covering the most important determinants of health. The domains include both general living conditions and individual lifestyle habits, such as for example economic and social prerequisites, health-promoting health services, and sexuality and reproductive health [77].

Health is currently unevenly distributed in the Swedish population. Low socioeconomic status is an important determinant associated with for example shorter life expectancy, higher prevalence of diabetes and cardiovascular diseases and lower survival from breast cancer [11]. Immigrants, and especially immigrant women, are another vulnerable group. Female immigrants report worse general health than women born in Sweden [11], use contraceptives to lesser extent and have more pregnancies and induced abortions than Swedish-born women [78]. The proportion of women giving

birth born outside Sweden has increased from 10% in 1973 to 26% in 2013 [8].

One underlying factor that can contribute to socioeconomic differences in health is health literacy. The term health literacy is used to describe the ability to (i) access/obtain, (ii) understand, (iii) process/appraise and (iv) apply/use information relevant to health within the domains of health care, disease prevention and health promotion [79]. Low health literacy can for example be expressed by not understanding disease prevention, self-care guidelines or the process of care [80]. Low health literacy among pregnant women has been associated with self-efficacy barriers to information seeking and less use of the Internet as an information source [81]. Health literacy is often connected to other social determinants of health, and assisting pregnant women to understand health information might be imperative for the health of both the woman and her child [82].

Public health ethics and preconception care

As the area of public health is mainly concerned with populations rather than individuals and with prevention rather than cure, the ethical principles of medicine are not fully applicable to dilemmas within public health [83]. Within public health it is a constant quandary finding the appropriate level of interventions to increase the health of the population without intruding on individual liberties [84] and two key terms that have been closely discussed are paternalism and individual autonomy [85, 86]. In the case of reproductive public health, ethical dilemmas might be even more complex considering the many stakeholders with possibly conflicting interests: society, the woman, the woman's partner, if she has one, and the fetus/future child. When it comes to preconception care one also has to consider who a potential parent might be, how soon they should take preconception responsibility and how much responsibility can be placed on him or her [85, 87].

Sexual and reproductive health care

The World Health Organization (WHO) defines reproductive health as the ability for people to have a responsible, satisfying and safe sex life with the freedom and capacity to reproduce if, when and how often the person decides to do so [88]. The definition includes access to methods of fertility regulation and health care services that enable women to have safe pregnancies and childbirths with the best chance of having a healthy infant.

The preventive work within Swedish sexual and reproductive health (SRH) is divided between different agents. Although similar organisation is used across the country, there are regional differences in access to contraceptives, care and counselling within SRH and sex education and also regional differences in trends in SRH [89].

Sweden has a long tradition of providing sex education, including basic information about reproduction [90], and all teachers are expected to have knowledge of SRH. However, sex education is not a compulsory part of teachers' education and the national guidelines do not specify how or by whom the education should be implemented [91].

Within the primary health care organisation in Sweden, there are mainly two types of clinics working with SRH: Youth Health Clinics (YHC) and midwifery clinics. The overall objective for the approximately 220 YHCs is to promote physical and psychological health, to strengthen youths in developing their identity and sexuality, and to prevent STIs and unwanted pregnancies [92]. YHC normally has an upper age limit of around 20-24 years of age and visitors are predominantly girls, 85-90%. Girls with an immigrant background and boys are underrepresented [89]. The midwifery clinics are traditionally called antenatal clinics (ANC) as their main task is maternity care, however midwifery clinics are open to women of all ages and services also include contraceptive counselling, care and support in connection with unwanted pregnancies, cervical screening and STI testing [89]. The main sources of information regarding contraceptives and STIs for youths (15-24 years of age) are the internet, sex education and YHCs [93].

The official responsibility for family planning in Sweden lies with maternity care [94]. Although there is a national strategy and action plan for prevention of HIV and STIs, guidelines for overall SRH and prevention of unwanted pregnancies are lacking [89, 95]. Contraceptive counselling is free of charge and contraceptives are subsidized for youths and included in the high-cost protection. The national guidelines for contraceptive counselling have for long focused solely on medical history and information about the advantages and disadvantages of different contraceptive methods. After an update in the spring of 2014, the guidelines now state that the aim of the counselling is both to prevent unwanted pregnancies and to protect the reproductive health until a pregnancy is in question. They also state that the counselling provides a good opportunity to talk about relationships, sexuality, risk taking and future reproduction [96].

Preconception care

The WHO defines preconception care as follows:

Preconception care is the provision of biomedical, behavioural and social health interventions to women and couples before conception occurs, aimed at improving their health status, and reducing behaviours and individual and environmental factors that could contribute to poor maternal and child health outcomes. Its ultimate aim is improved maternal and child health outcomes, in both the short and long term. [97]

There are no recommendations or guidelines for preconception care within the Swedish health-care system and most women enter the maternal care system when already pregnant or when having difficulties conceiving [94]. Despite the introduction of health consultations as early as in pregnancy week 6, many women are still unaware of the recommended health-promoting lifestyle changes to increase their chances of becoming pregnant and of having a normal pregnancy and a healthy child until it is too late.

Interviews with HCPs in the UK show that most could explain the concept of preconception care, but with the significant misunderstanding that it could be left to antenatal care [102]. Although viewed as important, the HCPs generally felt it was someone else's responsibility and called attention to public health campaigns and the individual's responsibility.

A central part of preconception care is health education and risk communication. As maternity care historically has moved towards a more medical model of childbirth, the concept of risk has become a key concept. Within medicine, risk is often treated as objective and measurable. Still, communication about risk is a delicate task. It has been argued that a strong focus on risk and risk prevention can itself create risk by leading to unnecessary anxiety among women and creating doubts and low confidence about the ability to carry through a normal pregnancy [98]. Indeed, studies have shown that older women perceive there to be higher pregnancy risks than younger women, regardless of their own medical risk [99] and that even women with no pregnancy complications report diffuse and hypothetical perceived risks [100]. To minimise the likelihood of risk distortion, or risk magnification, it has been suggested that HCPs adopt a health promoting rather than disease preventive approach and use new and more effective ways of risk communication [98, 101].

In the US, preconception care is recommended to all women, men and couples by the Centres for Disease Control and Prevention to improve women's health and pregnancy outcome [103]. The recommendations to improve preconception health and care include developing, evaluating and disseminating the Reproductive Life Plan (RLP).

The Reproductive Life Plan (RLP)

The RLP aims to encourage both women and men to reflect on their reproductive wishes and to find strategies for successful family planning within the context of personal life goals and values; to have the desired number of children and to avoid unwanted pregnancies as well as ill-health that may threaten reproduction [104]. The RLP consists of a set of non-normative questions about having or not having children [105].

A theoretical understanding of the RLP was presented by Liu and colleagues [106]. Their concept analysis described RLP as preceded by reproductive potential, the need for reproductive planning and health literacy.

Six aspects were attributed to the RLP: inclusive of both sexes, responsibility, lifelong plan, communication, flexibility and personalization. Given these attributes, the consequences are family planning, contraception, preconception care and empowerment.

The RLP resonates well with the 3P conceptual framework suggested by Hall and colleagues [147]. They argue that to support women to have pregnancies by choice, not by chance, the health care system needs to provide both support for pregnancy planning and pregnancy prevention, and to deliver this, women's short-term pregnancy intentions should be inquired.

The RLP concept was tested by physicians at a Family Health Centre in the US targeting women with diabetes, hypertension and obesity. The intervention increased women's knowledge about reproductive health and the authors concluded that the RLP was a brief and cost-effective counselling tool for women with chronic diseases [107]. The RLP was also found well acceptable when introduced among low-income African-American and Hispanic women and men in American publicly funded clinics, more so among women than men [108]. No effect of RLP was seen on effective contraception use when evaluated among urban women utilising national family planning program in the US [109].

No previous study has evaluated the effect of using RLP in clinical practice on family planning intentions, its acceptability in a European setting, or its acceptance among HCPs.

The Health Belief Model (HBM)

The Health Belief Model (HBM) is a psychosocial model explaining the health-related behaviour of an individual.

According to the HBM, a person will take action to prevent a health condition only if five prerequisites are met. The person has to (i) perceive herself susceptible to the condition, (ii) judge the consequences of the condition to be severe enough, (iii) assess the specific action is effective in decreasing the risk, (iv) estimate that the benefit of the action outweighs the barriers to, or cost of, taking the action and (v) has enough self-efficacy. The way a person perceives these conditions is influenced by modifying factors, such as age, gender, ethnicity, socioeconomics and knowledge. Sometimes a trigger, a cue to action, is also needed to activate the individual behaviour [110]. The HBM is illustrated in Figure 3.

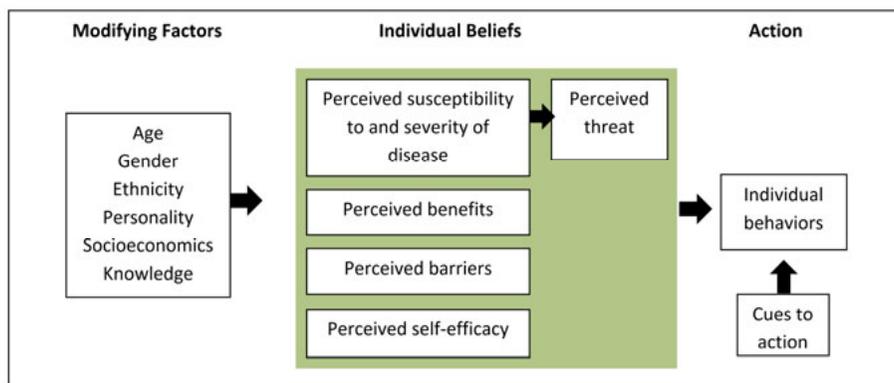


Figure 3. The Health Belief Model

The HBM was used in Study III to understand underlying and modifiable factors related to pregnancy planning and a health promoting lifestyle in connection with pregnancy and how interventions could target and possibly affect those factors.

Rationale for the thesis

Preconception health, i.e. maternal health and lifestyle before pregnancy, can influence both fertility and the health of mother and child. Risk factors include insufficient nutrition, low levels of folate, overweight/obesity, medical conditions and its treatments, alcohol and tobacco use, and high age. Preconception care is the delivery of biomedical, behavioural and social health interventions aiming to promote preconception health and reduce risk factors. American guidelines for preconception health and care are well established, but it is not known whether European countries provide preconception care recommendations and services.

Women in Sweden today postpone parenthood until an age when their reproductive capacity has started to decline. A high proportion of women of childbearing age have a lifestyle associated with risks for their fertility and a future child, but knowledge of fertility and preconception health is low. Optimizing preconception health requires the pregnancy to be planned, but the proportion of unplanned pregnancies varies internationally. Knowledge of whether, and to what extent, women in Sweden plan their pregnancies and engage in preconception health promoting behaviour is insufficient.

The Reproductive Life Plan has been suggested as a tool for improving preconception health, and has shown promising effects in a US setting when targeting women with medical conditions and low-income ethnic minorities. It is however not known if it can be an effective and feasible way for delivering routine preconception care and whether it is suitable in a European setting.

The ultimate purpose of gaining knowledge about these topics is to decrease the number of unwanted pregnancies and ill-health that may threaten reproductive capacity as well as increase the number of planned pregnancies and the chances for women to achieve the desired number of children. In the end, this would mean health gains for women of reproductive ages and for their future children, but also potentially lowered costs for health care, improved public health and possibly also increased nativity.

Aim

The overall aim of this thesis was to explore current preconception health and care and evaluate a new tool for preconception care.

Study

To explore and compare current preconception care policies, guidelines, recommendations and services in six European countries.

Study II

To investigate to what level women plan their pregnancies, what pregnancy planning behaviour women engage in and to investigate associations between pregnancy planning and different background variables.

Study III

To investigate if RLP-based information in contraceptive counselling increases women's knowledge of reproduction, particularly knowledge of folic acid intake prior to pregnancy, to evaluate the influence on women's family planning and to explore different aspects of the women's overall experience of the RLP-based information.

Study IV

To explore the adoption of the RLP in contraceptive counselling among midwives in a county in Sweden.

Methods and Materials

Design

An overview of the studies is presented in Table 1.

Table 1. Design, methods, and participants of the studies included in the thesis.

Study	Design	Data	Participants	Analysis
I	Qualitative descriptive	Electronic searches	Six European countries	Content analysis
II	Multi centre cross sectional	Questionnaire	3390 women registering at ANCs	Kruskal-Wallis H test Pearson's χ^2 -test Multinomial logistic regression
III	Randomised controlled trial	Baseline questionnaire and follow up interviews	299 women visiting a student health clinic	Independent t-test Mann-Whitney U-test Pearson's χ^2 -test Spearman's correlation coefficient Wilcoxon signed ranks test
IV	Explorative mixed method	Questionnaire Focus group interviews, FGI	n = 53/68 midwives n = 22 midwives in five FGI	Mann-Whitney U-test Pearson's χ^2 -test Qualitative content analysis

Settings

Study I was conducted in 2013 in six European countries: Belgium, Denmark, Italy, the Netherlands, Sweden, and the United Kingdom. Belgium has separate guidelines for the northern (Flanders) and southern (Wallonia) part of the country, and only Flanders is included in the study.

Studies II, III and IV were conducted in midwifery clinics in Sweden. Both contraceptive counselling and maternity care are mainly offered by nurse-midwives at midwifery clinics within the primary health care system.

Midwives are responsible for healthy women while women with chronic diseases and/or pregnancy complications are cared for by medical doctors. All midwifery activities within the primary health care system are led by a coordinating midwife and a chief physician.

Pregnant women are offered an early health consultation in pregnancy week 6-8 and are usually registered for antenatal care at the midwifery clinic in pregnancy week 10-12. In Study II, 215 antenatal clinics in ten counties were invited to recruit pregnant women at the time of registration and 153 chose to partake. Recruitment took place during the period September 2012 through July 2013.

Visits for contraceptive counselling are usually allotted 15-30 minutes. Study III was conducted between March and June 2012 at a Student Health Centre in central Sweden visited by women for contraceptive counselling, chlamydia testing or cervical screening. Study IV was conducted at all primary care midwifery clinics in one county from autumn 2013 to spring 2014. The county covers both rural and urban areas and employed 68 midwives in 21 clinics at the time of the study.

Participants, procedure and measurements

Study I

One author from each country performed electronic searches in Google using the country syntax and the following key words: preconception care; pre-pregnancy care; before pregnancy; conception; pregnancy planning; preconceptual and variations AND policy; guidelines, recommendations and services.

Five categories of websites were searched; (i) governmental policy and legislation; (ii) professional bodies and organisations; (iii) healthcare providers and organisations (both information and service provision); (iv) charitable organisations and associations; and (v) web-based information and internet sites aimed at the public. Additional manual searches were made to ensure complete coverage.

Study II

Pregnant women received written and oral information and were invited to partake by the midwives at registration at the antenatal clinic. The midwife listed all registrations, the number of women approached and their responses (accepted/declined) during the study period.

Swedish-speaking women were offered a questionnaire to fill out at the clinic or at home and return by post in a prepaid envelope. The midwife

registered contact information for all participants and a reminder was sent by text message or email to those who had not returned the questionnaire within two weeks. Informed consent was given by returning the completed questionnaire.

Non-Swedish-speaking women provided written consent and were offered a translated questionnaire by post (in English or Arabic) or a telephone interview (all other languages) where professional interpreters used a structured interview guide including 29 of the questions in the questionnaire. Non-Swedish-speaking non-responders received a reminder and a new copy of the questionnaire by post and several attempts were made to reach women through telephone interviews.

A total of 61% of all women approached completed the study ($n = 3390$), 98% used the Swedish questionnaire.

The study-specific questionnaire was designed for pregnant women registering at antenatal clinics. The following steps were taken to design the questionnaire. The overall aim and research questions were defined and relevant literature and previously used questionnaires were reviewed. A draft questionnaire was developed in dialogue with the research team including both experienced researchers and clinicians in the following professions: midwife, general practitioner, statistician, nurse, gynaecologist, obstetrician, district nurse, master of public health and dietician. The questionnaire was reviewed by approximately 20 laypersons with different ages, level of education and reproductive history. Two formal pilot tests were conducted among 270 [60] and 264 pregnant women [unpublished data], and revisions were made based on the results and feedback. The final questionnaire consisted of 148 items. A selection of questions was used for this study, see Table 2.

A single item was used for measuring the main outcome, level of pregnancy planning. The item was developed to nuance the dichotomised measurement planned/ unplanned while posed in a way that could be used routinely in the clinical setting and it has previously been used in Sweden and Denmark [60, 111].

Table 2. Overview of questionnaires used in Studies II, III and IV.

Study II	Study III	Study IV
Number of participants; response rate		
n = 3390; 61%	Baseline, n = 299; 88% Follow-up, n = 263; 88%	n = 53; 78%
Number of items		
Questionnaire: 148. Interview: 29	Baseline: 28. Follow-up: 35	12
Background questions		
Woman's age Country of birth Parents' country of birth Level of education Occupation Partner's age Current relationship Length of current relationship Household income Gestational duration	Date Age Level of university education Country of birth Parents' country of birth Sexual orientation Currently in a stable relationship/not	Age Length of professional experience Type of workplace No. of visits for contraceptive counselling/week Experience of RLP
Medical history before pregnancy <ul style="list-style-type: none"> Selected self-reported somatic diagnose/disorder Reproductive history <ul style="list-style-type: none"> Previous pregnancies Pregnancy planning <ul style="list-style-type: none"> Main outcome measure: How planned was your current pregnancy? <i>Very planned / fairly planned / neither planned nor unplanned / fairly unplanned / very unplanned</i> Who took the initiative to the pregnancy Time frame of becoming pregnant Consideration of induced abortion Pregnancy planning behaviour <ul style="list-style-type: none"> Intake of folic acid and/or multivitamin supplement one month prior to conception Weekly alcohol consumption and/or daily tobacco use during the three months prior to conception Average weekly frequency of vaginal intercourse during the three months prior to conception Information seeking Use of ovulation tests Use of ART treatment prior to pregnancy 	Reproductive history <ul style="list-style-type: none"> Ever tried becoming pregnant; problems achieving pregnancy; previous pregnancies; history of STI; contraception method(s) Family planning <ul style="list-style-type: none"> Wish for children If yes: how many; preferred age at first; preferred age at last; confidence in having desired no. of children (0-10); likelihood of planned pregnancy the following 6 months (<i>likely - unlikely</i>) Knowledge about reproduction <ul style="list-style-type: none"> Factors that can impair female fertility (<i>open ended</i>) Healthy lifestyle during pregnancy planning (<i>open ended</i>) The fecundity of an ovum (<i>day/s</i>) Chance of pregnancy by unprotected intercourse at ovulation (%) Age of marked decline in women's fecundity (<i>years</i>) Chance of giving birth after IVF (%) Pregnancy planning perceptions <ul style="list-style-type: none"> <i>Perceived susceptibility</i> <ul style="list-style-type: none"> Likelihood of experiencing unplanned pregnancy <i>Perceived severity of consequences</i> <ul style="list-style-type: none"> Importance of timely pregnancy <i>Cue to action</i> <ul style="list-style-type: none"> Likelihood of lifestyle changes during pregnancy planning <i>Perceived self-efficacy</i> <ul style="list-style-type: none"> Control over pregnancy planning 	If experience of RLP <ul style="list-style-type: none"> No. of visits where the RLP was used <i>Five-step Likert scales with a neutral centre:</i> <ul style="list-style-type: none"> The overall concept (<i>good/ bad</i>) General practical experience (<i>positive/negative</i>) The booklet (<i>useful/unusable</i>) The RLP guide (<i>useful/unusable</i>) Intended RLP usage in the future (<i>always/never</i>) If no experience of RLP <ul style="list-style-type: none"> Reasons for not using RLP: <i>No information / No time/energy to engage in a new project / Insufficient information / Dislike the idea / Time constraints or special circumstances at the clinic / Sick leave or parental leave / Other</i>
	7 additional items evaluating the intervention at follow-up.	

Study III

Before the study, midwives were informed about the concept of RLP and the study procedure by the first author. During the study each consultation was scheduled for five extra minutes.

A power calculation based on the assumption that the intervention would increase the knowledge of folic acid from 20% [48] to 40% resulted in the need for 82 women in each group.

During the study period, 338 women visiting the clinic were assessed for eligibility. Non-Swedish-speaking women were excluded. Eligible women received verbal and written information in the waiting room and were invited to participate. A total of 299 gave their written consent and were randomized into an intervention group (IG, n = 101) or one of two control groups (CG1, n = 100 and CG2, n = 98) by receiving a sealed envelope containing instructions. The study procedure is illustrated in Figure 4. Women in the IG and CG1 completed a baseline questionnaire before the counselling. Women in CG2 did not receive a questionnaire to enable analyses of the effect of the questionnaire *per se*.

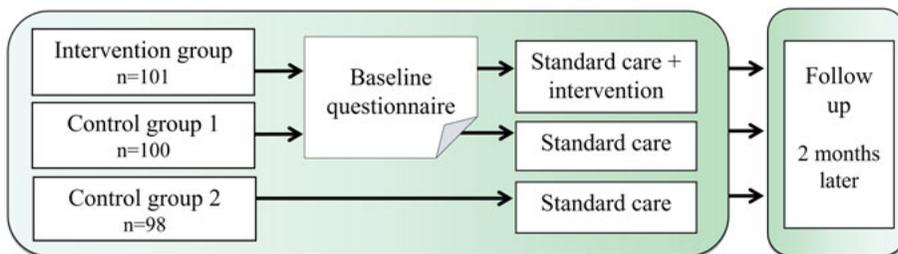


Figure 4. Procedure of Study III

The study specific questionnaire was based on previous research [104, 110, 33, 36, 37] and designed to evaluate the intervention. The questionnaire was reviewed and commented by researchers, clinicians and laypeople and tested in a pilot study for face and construct validity. The final questionnaire is presented in Table 2.

All groups received standard care, and in addition the IG received the RLP-based intervention. The intervention was based on the RLP and consisted of a semi-structured discussion aimed to encourage the woman to reflect on her own RLP and give her information about reproduction. An interview guide based on the RLP as described by Moos [105] and an information sheet served as guidance for the midwife.

All women received the same information regarding reproduction and folic acid, but the information was delivered in an individualised way guided by the woman's answers. Emphasis was placed on information on how to preserve their fertility and what to do when they wished to become pregnant for women

who wanted to have children, and on how to avoid an unplanned pregnancy and preserve fertility for women who did not wish to have children. During the intervention, the women also received a booklet inspired by RLP booklets used in the US that included both information about the RLP and information about reproduction.

Follow-up interviews were conducted by telephone two months after the visit by research assistants using a structured interview guide with questions equivalent to the baseline questionnaire, see Table 2. After repeated approaches to non-responders, 88% of the women who entered into the study participated in the follow-up interview. Women in CG1 and CG2 were provided with the brochure via email after the interviews.

Study IV

The study procedure is illustrated in Figure 5. Midwives were informed about the RLP and invited to participate in the study during an educational meeting held by the coordinating midwife and the chief physician. Midwives who were absent were contacted by telephone. A total of 53 out of 68 midwives volunteered to use the RLP and received an RLP guide and a booklet.

The RLP guide aimed to support the midwife in the counselling and takes off from the question “Do you want (more) children in your life?” and then provides different suggestions for topics to discuss depending on the woman’s answer. The booklet was designed for the women and included among other things reproductive physiology and different factors affecting fertility and preconception health.

After three months, midwives who had used RLP in contraceptive counselling were invited to participate in a focus group interview (FGI). All who volunteered were included. Five FGIs were conducted in neutral office space with 4-5 midwives from different clinics in each group (n = 22). A nurse and a midwife functioned as moderator and observer. The interviews were recorded and the midwives received a gift voucher for their participation.

The interview guide was study-specific with open-ended questions exploring: (i) overall experiences, (ii) recall of specific experiences, (iii) the overall concept of the RLP, (iv) the materials (RLP guide and booklet), (v) reactions from women, (vi) the future and (vii) the RLP for partners and/or for men. The interviews ranged between 64-118 minutes (average 91 min) and were transcribed verbatim.

A study-specific questionnaire was distributed to all midwives (n=68), both those who had used RLP and those who had not. The questionnaire is described in Table 2. Participants in the FGI completed the questionnaire before the interview and the remainder received it by post. One reminder was sent after two weeks, and the response rate was 78%. The group of midwives who answered the questionnaire is not equal to the group who were willing to use the RLP although the number of midwives is the same.

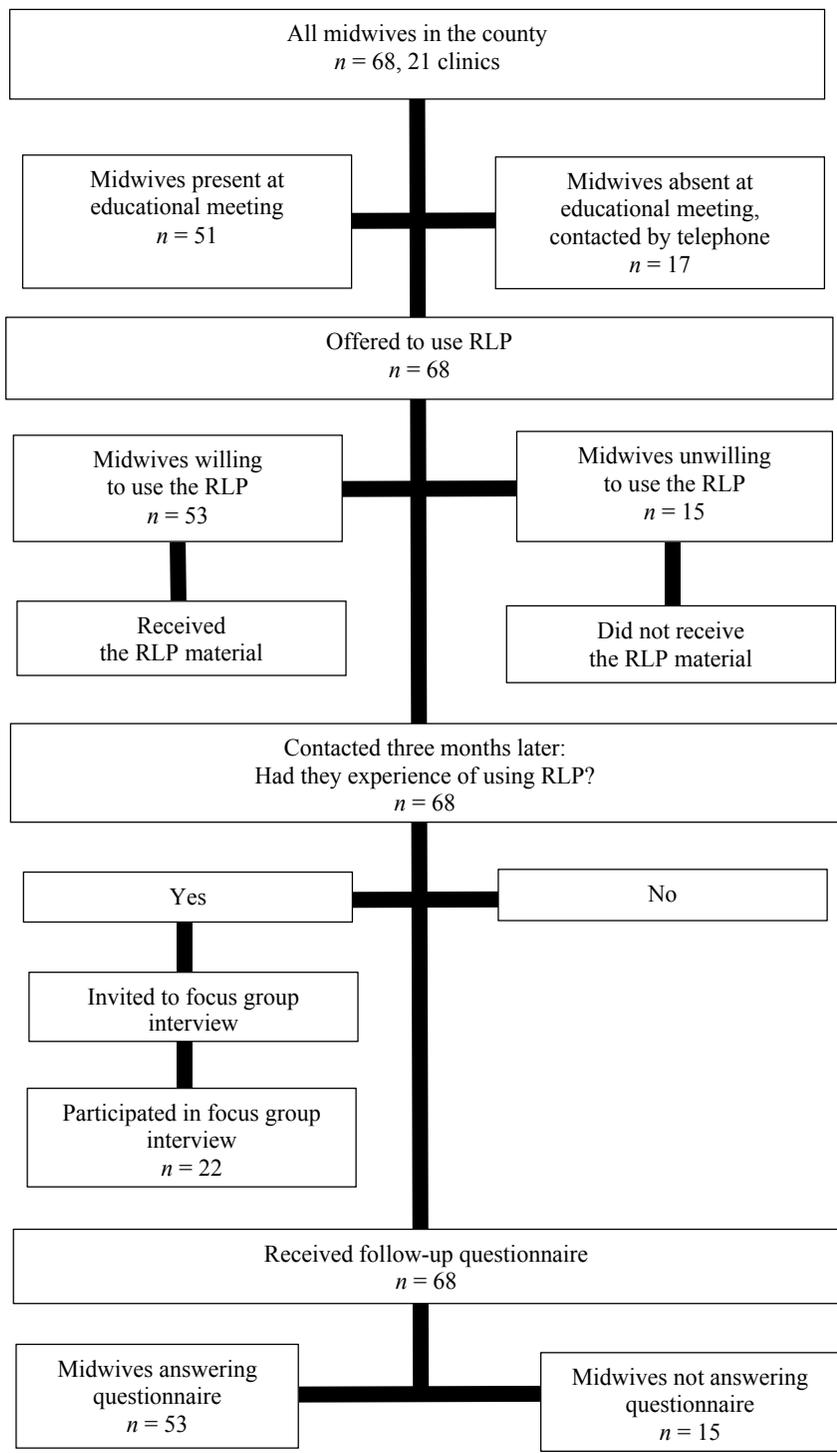


Figure 5. Procedure of Study IV

Data analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (version 20, IBM, Armonk, NY, USA) and SAS (version 9.3, SAS Institute, Cary, NC, USA). For all statistical analyses, a two-sided p value < 0.05 was considered significant.

Study I

Data, or the lack thereof, were compiled and analysed with content analysis [112]. Recommendations for six topics important for preconception health according to previous research were categorised and compared in detail: (i) folic acid supplementation; (ii) vitamin and mineral supplements; (iii) general nutrition; (iv) smoking and alcohol; (v) infection and immunisation; and (vi) preconception care services provided to healthy and high risk women. Within each category, the guidelines from different countries were analysed for similarities and differences.

Study II

To analyse the effect of background variables on pregnancy planning, a multinomial logistic regression was used with pregnancy planning as the dependent variable categorised as planned (very or fairly), neither planned nor unplanned or unplanned (very or fairly).

The independent variables used were: age (years), level of education (high/middle/low), household income (SEK), occupation (currently working $\geq 50\%$ /not), country of birth (SE/other), parents' country of birth (SE/other), relationship length (years), previous children (y/n), somatic diagnoses (y/n), psychiatric diagnosis (y/n) and partner's age (years). Variables significant in univariate regression analysis were included in a multivariate model. Results are presented as odds ratios (ORs) with 95% confidence intervals (CI).

Differences between pregnancy planning and pregnancy planning behaviour were analysed using the Kruskal-Wallis H test for ordinal variables and Pearson's χ^2 test for categorical variables.

Study III

The IG was compared to CG1 and non-responders at follow-up to responders with respect to background variables and reproductive history with independent t-test for continuous variables, the Mann-Whitney U test for ordinal variables and Pearson's χ^2 test for categorical variables.

The knowledge questions were scored separately and then summarised into a total knowledge score ranging between 0 and 20. Differences between groups regarding total knowledge score, desire to have children, preferred age

for having children and confidence in having the desired number of children were analysed using the Mann-Whitney U test. Differences between baseline and follow-up within the groups were analysed using the Wilcoxon Signed Rank test. To evaluate the effect of baseline knowledge, a multiple linear regression analysis was conducted using the total knowledge score as the dependent variable and baseline knowledge score and group assignment as independent variables.

Correlations between total knowledge score and background variables and reproductive history were analysed using Spearman's correlation coefficient and proportion of knowledge of folic acid across group assignment with Pearson's χ^2 test.

Study IV

Differences in background variables between midwives who used the RLP and midwives who had not used the RLP were analysed using the Mann-Whitney U test for continuous and ordinal variables and Pearson's χ^2 test for categorical variables.

The focus group interviews were analysed with qualitative content analysis [113]. The data were coded by summarizing notes in the margins in accordance with the aim of exploring midwives' experiences and opinions of the RLP. All initial codes were collated, duplicates deleted, and the remaining codes compiled into subcategories and categories during a back and forth movement to the transcripts to ensure validity. Three of the authors coded and compiled the preliminary analysis and two others validated the results.

Ethical considerations

Studies II, III and IV were all approved by the Regional Ethical Review Board in Uppsala, Sweden (2010/085, 2012/101). The studies were conducted in line with the WMA Declaration of Helsinki [114]. When comparing the risk and burdens of the approached participants to the potential benefit and usefulness of the studies' results, the benefits were estimated to outweigh the risks.

The studies were conducted in such a way that the participants' well-being and rights were safeguarded. For example, in Study III the booklet used in the intervention was distributed to women in the CG1 and CG2 after follow-up to provide them with the same information that was given to the IG. In all studies personal information and other data were stored separately and locked away to protect the privacy of participants.

Great effort was made in Study II to involve and provide appropriate access for non-Swedish-speaking women who are usually underrepresented in medical research.

All participants were informed of the right to decline to participate or to withdraw consent to participate at any time without consequences. In Studies II and IV, the return of the completed questionnaire was regarded as providing informed consent for Swedish-speaking women. Non Swedish-speaking women in Study II were asked to provide written consent before being contacted. In Study III and in the FGI in Study IV all participants provided written informed consent.

As Study I did not include human subjects, no ethical approval was needed.

Results

Study I

All six countries had guidelines but to various extent and from different kinds of sources. An overview of the type of preconception care recommendations found in the respective countries is presented in Table 3. No country had specific guidelines directed at men, but information to women sometimes included recommendations for men.

Table 3. Type of preconception recommendations in six European countries

	BE	DK	IT	NL	SE	UK
Web-based resources	X	X	X	X	X	X
National guidelines to HCPs for healthy women	-	-	X	X	-	X
Specific guidelines for men	-	-	-	-	-	-
Recommendations included in antenatal and pregnancy guidelines	X	X	X	X	X	X
Guidelines to HCPs for women with medical conditions	X	X	X	X	X	X
Guidelines for interconception care	-	X	-	-	-	-
National strategy	-	-	-	X	-	-

Recommendations about folic acid

Healthy women in all six countries were recommended a daily intake of 400µg folic acid prior to pregnancy. In two countries (IT, SE) the recommendation was directed at all women of childbearing age/who could become pregnant. The time period for recommended intake ranged between undefined to four weeks before, until 10-12 weeks of pregnancy. Folic acid was available in pharmacies and supermarkets and in two countries (IT, UK) free of charge on prescription.

High risk women, i.e. women with previous NTD pregnancy, NTD in family history, diabetes, epilepsy or BMI >30 kg/m², were recommended about ten times higher dose of folic acid (4-5mg) on prescription one month before and up to 8-12 weeks of pregnancy, or throughout childbearing age.

Vitamin and mineral supplement recommendations

No country had general guidelines for supplements of vitamin D, but two countries (IT, NL) included notions that it may be considered. Three countries (IT, NL, UK) dissuaded women from high vitamin A intake, the amount varied between 700-10000 IU. Recommendations in one country (IT) mentioned that iron supplements might be required.

Nutritional recommendations

Three countries (BE, DK, UK) had no general nutritional recommendations specifically for the preconception period. Two countries (NL, SE) recommended a varied diet and one (IT) a Mediterranean diet. Specific advice included dissuasion from eating Baltic Sea fish, predator fish, high caffeine intake, liver, blue cheese and pâté.

Smoking and alcohol recommendations

All countries had recommendations for cessation of smoking and offered support in different forms. Recommendations for preconception alcohol consumption varied from total abstinence (DK, IT, NL) to moderate intake of up to 1-2 units up to five times a week.

One country (NL) had a specific recommendation to men; to refrain from alcohol from the moment the couple attempts to become pregnant until pregnancy has been confirmed.

Recommendations regarding infection and immunisation

All countries but one (SE) had recommendations for discussion and/or screening of vaccination status and potentially harmful infections. Recommendations regarded one or more of the following: toxoplasmosis, rubella, measles, varicella, hepatitis B, whooping cough, chickenpox and shingles.

Preconception care services provided to healthy and high risk women

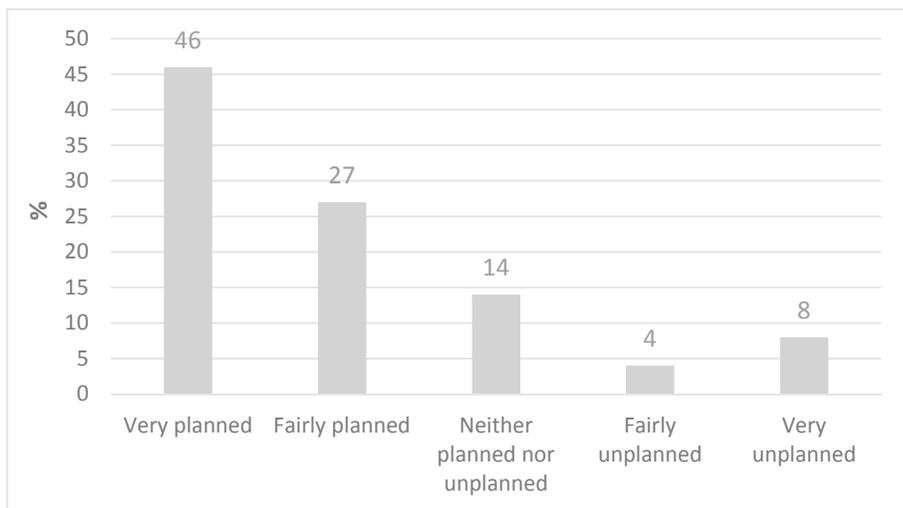
High risk women, i.e. women with medical conditions, in all countries were provided with preconception care by gynaecologists, obstetricians or other medical specialists. Preconception care to healthy women was provided on an opportunistic basis in all countries and delivered by general practitioners, gynaecologists, midwives, family planning clinics, HCPs in general and/or health visitors. Two countries (IT, DK) had programmes or clinics for preconception care, but not to a national extent.

Study II

Level of pregnancy planning

Levels of pregnancy planning are presented in Figure 5. Three out of four women described their pregnancy as very or fairly planned. Five percent of women had considered having the pregnancy terminated, but the proportion differed between the levels of pregnancy planning ($p < 0.001$). Less than 1% of women with very planned pregnancies had considered having a termination compared to 32% of women with very unplanned pregnancies.

Figure 6. Proportion (%) of level of pregnancy planning, N = 3390



Associations between pregnancy planning and background characteristics

In univariate regression analyses the level of pregnancy planning was positively independently associated with the following background characteristics: woman's age (years), level of education (high/middle/low), household income (SEK), occupation (currently working $\geq 50\%$ /not), country of birth (SE/other), parent's country of birth (SE/other), length of relationship (years), psychiatric diagnoses (y/n) and the partner's age (years).

In multivariate multinomial regression analysis, with all factors except previous childbirth and somatic diagnosis included, length of the current relationship, level of education, current working status and household income were positively and independently associated with level of pregnancy planning when women with planned and unplanned pregnancies were compared. The chance of having a planned pregnancy increased by 10% (95% CI; 1.1-1.2) for each additional year the current relationship had lasted. The

highest level of education, currently working and highest household income level showed an OR of 2.0 (95% CI; 1.3-3.3), 1.6 (95% CI; 1.2-2.1) and 1.1 (95% CI; 1.0-1.2), respectively.

When women with neither planned nor unplanned pregnancies were compared to women with unplanned pregnancies, in the multivariate regression model, currently working was the only factor that was significantly and independently associated with having neither a planned nor an unplanned pregnancy, OR 1.5 (95% CI; 1.1-2.1).

Pregnancy planning behaviour in connection with the current pregnancy

Eighty per cent of women with planned pregnancies stated that both they and their partners equally initiated becoming pregnant ($n = 1986$), while 14% initiated it themselves ($n = 343$) and 2% stated that the partner initiated it ($n = 60$). A third had set a timeframe within which they planned to get pregnant, most often within a year ($n = 739$).

For all five levels of pregnancy planning, the median frequency of vaginal intercourse during the three months before pregnancy was two times per week. Over a fifth had used ovulation tests in connection with the current pregnancy, and 5% had received assisted reproduction. Use of ovulation tests and assisted reproduction were more common among women with higher level of pregnancy planning than lower ($p < 0.001$).

More than three out of five women had sought information prior to the current pregnancy and almost half of all women had undertaken at least one health promoting action in preparation for pregnancy. Both information seeking and health promoting actions were more common among the higher levels of pregnancy planning than the lower ($p < 0.001$).

A third of all women stated having taken folic acid at least five times a week the month before pregnancy. During the three months before pregnancy, daily use of tobacco was reported by 17% and weekly alcohol consumption by 11%. There was a difference across the levels of pregnancy planning regarding folic acid ($p < 0.001$) and tobacco use ($p < 0.001$), but not alcohol consumption ($p = 0.100$).

Study III

Knowledge of reproduction and folic acid

The total knowledge score for the IG and the CG1 was on average 6.2 out of maximum 20 at baseline (Md 6.0, range 0.0-14.0), see Table 4. The groups did not differ at baseline ($U = 4715$, $p = 0.416$). The IG scored higher at

follow-up than at baseline ($Z = -6.301, p < 0.001$) with a mean of 9.0 (Md 9.0, range 3.5-15.5), but the women in the CG1 did not ($Z = -1.686, p = 0.092$). IG scored higher at follow-up than both CG1 ($U = 2147, p < 0.001$), and CG2 ($U = 1843, p < 0.001$), and no difference was found between CG1 and CG2 ($U = 3393, p = 0.291$).

Taking the baseline variation into account in the multiple regression analysis, the total score was on average 8.9 in the IG; 6.8 in the CG1; and 6.4 in the CG2. There was a difference in knowledge score between the IG and the two CGs ($p < 0.001$), but no difference between the two CGs ($p = 0.114$). Knowledge score at baseline and group assignment had a significant effect on the total knowledge score at follow-up in the adjusted model.

Table 4. Total score for knowledge of reproduction in the IC, CG1 and CG2 at baseline and follow-up

	Score (no. of points)	IG		CG1		CG2
		baseline <i>n</i> = 101 (%)	follow-up <i>n</i> = 89 (%)	baseline <i>n</i> = 100 (%)	follow-up <i>n</i> = 85 (%)	follow-up <i>n</i> = 88 (%)
Mean ±SD	0-20p	6.4 ±2.9	9.0 ±2.8	6.1 ±2.6	6.8 ±2.5	6.3 ±2.2
95% CI		5.8-7.0	8.4-9.5	5.6-6.6	6.3-7.4	5.9-6.8
Adjusted mean			8.9*		6.8*	6.4*

* = Difference between IG and CG1 in the multiple regression analysis: $p < 0.001$; difference between IG and CG2: $p < 0.001$. Difference between CG1 and CG2: $p = 0.114$.

There was no difference between IG and CG1 at baseline regarding the proportion who mentioned folic acid among things to do when planning to get pregnant ($\chi^2 (2) = 0.25, p = 0.881$); 4% respectively 5%. At follow-up, 22% in the IG and 3% in the CG1 mentioned folic acid intake as a preconception measure ($\chi^2 (2) = 31.67, p < 0.001$).

Family planning intentions

At baseline 82% wanted to have (or to have more) children, 8% did not want children while 8% were unsure in the IG. Corresponding figures in the CG1 were 77%, 9% and 12%. There was no difference between the IG and CG1 regarding the wish to have children at baseline ($U = 4608, p = 0.371$). A higher proportion in both IG and CG1 wanted children at follow-up than at baseline (95%; 87%), and fewer were unsure or unwilling to have children (2%; 9%), ($Z = -2.428, p = 0.015$; $Z = -2.066, p = 0.039$).

No differences were seen over time regarding desired number of children, preferred age at first child or years until preferred age at first child. The IG

wanted to have their last child on average one year earlier in life at follow-up than at baseline ($p < 0.005$), but no difference over time was found in the CG1.

A higher proportion of women in the IG stated it was likely that they would make lifestyle changes prior to pregnancy at follow up than at baseline ($p = 0.028$), 85% versus 78%, but no statistically difference over time was found in the CG1, 79% versus 71%.

Experience of the intervention

Nine out of ten of the women in the intervention group rated the midwife's initiative to discuss the RLP as very or rather positive and stated that midwives should routinely discuss RLP with their patients.

Study IV

Midwives' adoption of the Reproductive Life Plan

The majority of midwives (78%) were willing to use the RLP in their contraceptive counselling, and 68% of respondents had used RLP three months after the educational meeting. The midwives were 31-65 years of age with 0.5-40 years of experience of contraceptive counselling. Most worked at a public health care provider (77%), midwifery clinic (70%) and the number of contraceptive counselling sessions per week ranged between 3-30.

The midwives who had not used RLP at follow-up most often stated the reason was that they had not received information about the RLP, and they had fewer visits for contraceptive counselling than midwives who had used RLP.

Among midwives who had used RLP, 97% considered the very idea of RLP was very or rather good, 92% had had very or rather positive experience of RLP and regarding future use of RLP, 53% would use it always/often and 44% sometimes. The RLP guide was considered very or rather useful by 89% and 92% stated the same about the booklet.

Experiences and opinions of working with the RLP

The analysis of the midwives' experiences and opinions of working with the RLP resulted in four categories; 1) a predominantly positive experience; 2) the RLP – a health promoting tool; 3) individual and societal factors influence the RLP counselling; and 4) long term implementation comprises opportunities, risks and needs. Subcategories and examples of quotations are presented in Table 5.

Table 5. Overview of the results from the qualitative analysis

Category	Subcategory
<i>Quotation [Focus group interview number]</i>	
1 A predominantly positive experience	<p>Rewarding and easier than expected</p> <p>Good start for broadening the counselling</p> <p>Time efficient or time consuming - different experiences</p> <p>Predominantly positive reactions from women</p> <p>Informing without intruding requires tactfulness and professionalism</p> <p><i>There is a difference; now I take this up... otherwise you would just talk about it if the patient has taken up the issue of children. [FG14]</i></p>
2 Opinions about the RLP - a health promoting tool	<p>Motivates health promoting actions</p> <p>Women need knowledge about fertility, but the RLP cannot always be prioritised</p> <p>Disagreement on RLP suitability for all groups</p> <p>Family planning counselling is suitable for RLP discussions</p> <p><i>Even those of a young age start to think about things in a different way, I think... 'perhaps I should take care of myself, not just get the Pill and then come in every other week for a Chlamydia test. What I do can lead to other things'. [FG13]</i></p>
3 Individual and societal factors influence the RLP counselling	<p>The midwife's clientele and her prejudices</p> <p>Women's individual knowledge, norms and premises</p> <p>Influences by societal norms and media</p> <p><i>Adolescence is getting longer and you begin to talk about young adults up to the age of 25 or 30 . Then it's late . . . before you are an adult and have children [FG13]</i></p>
4 Long term implementation comprise opportunities, risks, and needs	<p>Making the RLP mandatory might be a double-edged sword</p> <p>Facilitating and problematic documentation</p> <p>Expanding RLP usage</p> <p><i>Not everyone comes to us! So there must certainly also be another forum. [FG11]</i></p>

Discussion

Summary of findings

All six participating countries had preconception care policies, guidelines or recommendations for women with chronic diseases. Guidelines for healthy women were fragmented and partly inconsistent, and even more so regarding guidelines for men.

A majority of pregnancies among women registered at Swedish antenatal clinics were planned. More than half engaged in pregnancy planning behaviour such as seeking information or carrying out health promoting actions in preparation for pregnancy. However, only a third took folic acid as recommended, almost a fifth used tobacco daily and one out of ten consumed alcohol weekly. Women with planned pregnancies were more likely to have higher socioeconomic status and to be in a longer relationship than women with unplanned pregnancies.

Using Reproductive Life Plan-based information in contraceptive counselling increased the women's knowledge of reproduction, including knowledge of folic acid, and made them plan for their last child earlier in life. The RLP was appreciated by the women and nine out of ten were of the opinion that midwives should include RLP in contraceptive counselling routinely.

A majority of midwives adopted the RLP in their contraceptive counselling after they had been offered brief information and RLP materials. Their experiences of using the RLP were predominantly positive and they considered the RLP a feasible tool for promoting reproductive health. Lack of information was the most common explanation for non-use.

Preconception health from the individual's perspective

Although there was an association between pregnancy planning and health promoting lifestyle prior to pregnancy in Study II, many continued with an unhealthy lifestyle while planning for pregnancy. One reason might be low knowledge about preconception health. Adding this to previous studies showing a general low level of knowledge of reproduction [36, 37, 42-47], it is very promising that the RLP intervention in Study III affected women's knowledge of reproduction. Increased knowledge may enable women to make

informed choices about their reproductive life plan, and thereby prevent unwanted pregnancies and ill-health, as well as promote preconception care.

One can argue that increasing knowledge does not automatically change behaviour and that interventions targeting knowledge are unlikely to change behaviour. The association between knowledge and behaviour is indeed complex, and according to the HBM the key to understanding individual behaviour is to understand her beliefs about the behaviour. Given the low knowledge among women in Study III, it is likely that many women have beliefs about fertility and pregnancy planning built on false knowledge. A woman who believes it is difficult to become pregnant will be more likely to perceive herself as less threatened by unwanted pregnancy and be more likely to have unprotected intercourse without the wish for a child than a woman who believes it is easy to become pregnant. A woman who believes it is easy will, on the contrary, more likely not feel as susceptible to involuntarily childlessness. Similarly, a woman who does not perceive it as a threat to her or her future child's health to use alcohol or tobacco when trying to conceive, will most likely not change her lifestyle until the pregnancy is confirmed. Indeed, it has been found that women nurturing mental models of being insusceptible to health consequences of not taking folic acid supplements are the lowest users of folic acid supplements [115]. Women have also been found to be more likely to take health promoting measures if knowledgeable about fertility and feeling susceptible to infertility, but this was only the case among women under 35 years of age [116].

Women in the IG in Study III wished for their last child earlier in life after the intervention. This indicates that the increased knowledge affected their individual beliefs, probably both perceived threats and perceived benefits of not postponing childbearing to higher ages. Increased knowledge can in this respect be considered as empowering. Still, it is not known whether women with increased knowledge actually adopt a health promoting lifestyle prior to pregnancy to a higher extent, and to what extent the planned behaviour will be translated into behaviour. Finally, it is important to acknowledge the influence of other modifying factors on reproductive life planning than knowledge. These include for example ethnicity, personality, and socioeconomics, which naturally are not possible to affect through counselling.

One objection against individual-oriented approaches such as the HBM is that it does not take into account the partner's interactive behaviour and views [117]. This might be considered of special importance within sexual and reproductive health in general and family planning in particular as sexuality and reproduction most often, although not always, involve a couple. I suggest that the significant others and their beliefs, norms and demands can be regarded as one modifying factor and possibly also as a cue to action.

The result that a high proportion of women with planned pregnancies and their partner equally initiated becoming pregnant in Study II echoes previous

studies showing high agreement regarding pregnancy planning among couples expecting a child [118] and reproductive intentions among childless couples [119]. This implies that pregnancy planning is often negotiated within a couple, and the decision often taken jointly. However, as all studies are cross-sectional, it is not possible to know what precedes the agreement and whether this is a retrospective construction or not.

Informing without intruding – the key role of midwives

Despite an increasing body of evidence for the adverse effect of risk factors on pregnancy outcomes, there are still few evidence based interventions for health promotion and disease prevention [120]. This might be one reason for the lack of guidelines and routine provision of preconception care and the mainly opportunistic approach employed today in all the participating European countries.

Even though the overall view was positive and favourable, several potential barriers for adopting the RLP as a tool for preconception care were revealed in Study IV. Barriers were described as related to characteristics of the organisation (lack of time, competing tasks, not being able to reach certain groups), characteristics of the user, i.e. the HCP, (importance of tactfulness and professionalism), characteristics of the innovation, i.e. RLP (uncertainty approaching certain groups) and characteristics of the innovation strategy (initial hesitation, making RLP mandatory, documentation) analogous with the categorisation of Fleuren and colleagues [121]. Multifactorial barriers for the implementation of preconception care have also been found in British, American and Australian contexts [102, 122, 123].

Worth highlighting is that no midwife stated that they did not like the idea of RLP in contraceptive counselling as an explanation of why they had not used RLP. Both the women in Study III and the midwives in Study IV seem to agree upon the view that the family planning clinic is a suitable arena for RLP and that it is a feasible way of working in contraceptive counselling. These findings are consistent with research from the Netherlands where a majority of midwives feel preconception care falls within their scope of work and are willing to provide preconception care [124], but contrast to British findings where different profession all expressed preconception care as someone else's responsibility [102]. The women's positive attitudes towards RLP are also consistent with previous research regarding preconception care in general from Australia, the US and Sweden [125, 126, 127]. In the Swedish study, 92% of young women stated it would be very-fairly appropriate to discuss wish to become pregnant in connection with gynaecological examinations, but 80% stated never to have been asked [127].

The concept of preconception care in general, and RLP in particular, also resonates well with the current recommendations for contraceptive

counselling being described as a good opportunity to talk about relationships, sexuality, risk-taking and future reproduction [96]. The counselling can be described as a possible teachable moment, i.e. naturally occurring health events thought to motivate individuals to spontaneously adopt risk-reducing health behaviours [128].

Carefully delivered, the use of RLP holds great potential to improve reproductive public health by promoting preconception health and preventing both unwanted pregnancies and health problems such as STIs. Still, the importance of tactfulness and professionalism cannot be underestimated, as was pointed out by the midwives in Study IV. The topic of family planning can be permeated by different and sometimes conflicting norms, values and demands. It is important that the midwife does not transfer her values onto the woman seeking counselling, but carefully explores and supports what is important for the woman. An American interview study among HCPs reviled two sometimes competing discourses regarding pregnancy planning, the individual choice or normative expectations of readiness, and that HCPs sometimes prioritized the normative notion over the individual's desires [148].

Providing information without intruding can also be a delicate task, especially related to risk communication and behavioural change. The new law protecting patients' rights (2014:821) expresses the key terms integrity, empowerment and participation in health encounters, and stresses the importance of giving the individual adjusted and tailored health information, regardless of her/his situation and needs. The midwives in Study IV described that certain groups would be more challenging than others to counsel, e.g. non-Swedish-speaking women and women with cognitive disabilities. It is possible that improved education for midwives about health literacy and how to counsel women with low health literacy would make them more prone to approach also challenging groups.

One increasingly widespread strategy to support behavioural change is motivational interviewing. Motivational interviewing is an interactive, person-centred form of communication focusing on facilitating and engaging intrinsic motivation within the client in order to change behaviour in an accepting and empathic atmosphere [129] and is well suitable in connection with RLP.

Public health perspectives on preconception care

A high proportion of pregnancies in Study II were planned, almost three out of four, which corresponds well to a Danish study where 72% of pregnancies were fairly or very well planned, but stands in contrast to previous studies in the US [54, 130] and the UK [55, 14]. Still, it is important to take into account the use of different measures of pregnancy planning as well as differences

between countries regarding availability and social acceptability of teenage childbearing and of induced abortion. The liberal Swedish law on abortion can partly explain the high number of well-planned pregnancies among women attending antenatal care. This is a good example of how the individual's biological factors, such as age, have to be supplemented with the social setting and environmental determinants in which she exists to fully understand reproductive life planning and preconception health as described by the SMH. In this perspective, reproductive life planning cannot be regarded as isolated to an individual or a couple, but affected by a wide range of factors. Among general socio-economic, cultural and environmental conditions, important factors might be educational opportunities, unemployment, housing opportunities, parental insurance, provision of child welfare and health promoting care. Social and community networks might constitute either facilitating or hindering factors, or both.

Midwives in Study IV acknowledged factors concerning the woman's social setting as influential in the counselling, e.g. social norms about who and when one should start a family, as well as support from parents and friends. Indeed, childless women in a British qualitative study by Lavender and colleagues described social comparability as more influential on their reproductive decision-making than risks associated with delayed childbearing [149].

Further, the midwives expressed frustration with inadequate parental insurance for students and conflicting and unrealistic demands on women: one should have travelled, finished education, have a high income job and good housing before starting a family with the perfect partner before 30 years of age.

Ethical perspectives

The complex nature of preconception care might be another reason that it is still an emerging concept in many European countries. Although the evidence for several risk factors is clear, there are reasons to discuss the implications of introducing routine preconception care. Apart from questions of a practical nature, such as which health care provider and what profession should provide it and bear the cost, there are important ethical questions to consider. One might ask whose responsibility reproductive life planning is and in whose interest, and who should be the target for preconception care. Several values are at stake, both on the societal, individual and organisational level. Public health interventions are generally based on the moral basis of utilitarianism [131]; to provide the best outcome possible (health gains for both mothers and future children) for as many as possible with limited resources. There are likely benefits and cost savings [150, 151] associated with successfully delivered preconception care, i.e. a reduction of unplanned pregnancies and risk factors among prospective parents. The topic of preconception care is

thereby concerned with the principle of beneficence [86], but also with justice, as Study II in line with previous research [111, 132, 133] has shown there are socioeconomic differences regarding pregnancy planning.

Still, from a liberal point of view it is relevant to question whether prospective parents have a moral responsibility towards their future children to prevent them from harm and if so, when it would start and what consequences it would have for the autonomy of women [87]. The question is brought to a head in situations where the autonomy of the woman conflicts with the principle of no harm to the foetus. The difficult balance is between the woman's responsibilities to the foetus and the respect for her freedom of choice. One can argue that it is not the woman's choice to smoke during pregnancy because it implies a significant risk for the child. However the woman's right to decide for herself is also seen as an important value. One can question how far the responsibility goes in the relationship with the future child. A risk of neglecting the woman's autonomy is that she is seen only as a vessel for a future child rather than as an autonomous person.

A common definition of the concept of paternalism is someone interfering with the liberty or autonomy of another person to promote or prevent harm to that person. Often liberty and paternalism are seen as contrasts and impossible to combine. However Thaler and Sunstein [134] suggest that if no coercion is involved some types of paternalism should be acceptable. In those cases when it is known that individuals would change their minds if they had complete information and no lack of willpower, it would be acceptable with some paternalistic action. They call it *libertarian paternalism*. In this context it is important to point out that people seldom have a single universal desire, but rather several and sometimes conflicting desires with different priority. This is referred to as first and second order desires [135]. Many women would have both a desire to smoke and a wish to protect her future child from harm. If a midwife strongly encourage a woman to refrain from smoking while trying to conceive, it might actually support the woman's second order desire and could thereby be seen as an acceptable form of paternalism.

Introducing guidelines for preconception health and care might also have normative connotations. If social norms sanctioned by society dictate that pregnancies should be planned and prepared there is a risk that women with unplanned pregnancies would feel blamed because they were not in line with the guidance. Concerns have also been raised that guidelines might increase the number of abortions, even among wanted pregnancies, due to the fact that women might not fully have adopted a health promoting preconception lifestyle and become afraid it might have harmed the child [136].

To sum up, it is important to carefully consider the intention, the target group and the way of delivering preconception care if introduced in a routine manner.

Methodological considerations

The studies in this thesis used quantitative and qualitative methods and included the perspectives of both women of fertile age and HCPs.

Reflexivity

Reflexivity is a notion most commonly discussed within qualitative traditions, but relevant also to quantitative research. It concerns the importance of being aware of the researcher's own biases, preferences and preconceptions regarding the studied subject and how it might influence the study e.g. through the chosen study design, data collection, analysis and interpretation of findings. All studies in this thesis were repeatedly discussed among the interdisciplinary project team to ensure that a single pre-understanding would not permeate. Research ideas and draft manuscripts were also presented and discussed during research seminars. Still, the thesis has undoubtedly been coloured by being conducted from a medical and public health perspective in a European context.

Validity and reliability (Study II, III and IV)

Validity refers to the extent to which the used measures capture the intended phenomenon and can be divided into four types: statistical conclusion validity, internal validity, construct validity and external validity [137].

Statistical conclusion validity concerns the question of whether the empirical relationship found can be considered true and is related to statistical power. Statistical power is needed to decrease the risk of type II errors, i.e. the failure to reject a false null hypothesis [137].

The power calculation for Study III indicated a need for 82 women in each group to detect the intended increase of folic acid knowledge, and as 85-89 women eventually participated in follow-up the results can be considered statically valid. An initial aim for Study II was to compare Somali-speaking, Arabic-speaking and Swedish-speaking women regarding pregnancy planning. However, as the recruitment of non-Swedish-speaking women was less successful than planned, there was not enough power to pursue such an aim.

For the purpose of studying factors associated with pregnancy planning in Study II, several variables were included in the regression analysis. Variable selection was based on previous research in combination with a consideration of the clinical relevance of variables. To prevent over adjustment, only variables statistically significantly associated with the outcome in univariate analyses were entered into the final regression model.

Internal validity concerns whether the study outcome is caused by the independent variables rather than other factors. There are several potential threats to internal validity.

Temporal ambiguity concerns whether the independent variable precedes the dependent variable and can be a cause for concern in correlational studies. Although measured with a cross sectional design, the nature of the background characteristics studied in relation to pregnancy planning in Study II (country of birth, educational level etc.) is such that they by necessity precede the pregnancy planning. Still, it would be ideal to follow a cohort of women of fertile age prior to and during pregnancy as many unplanned pregnancies might end in legal abortion and those who carry their pregnancy might be affected by recall bias.

Selection concerns whether there are pre-existing group differences. This was counteracted by the randomisation in Study III and inclusion of all midwives in Study IV.

History concerns whether there have been external events that could affect outcomes, such as intense media coverage of a certain topic or the introduction of a new routine in health care. This aspect has not been an issue for the studies conducted in the present thesis.

Maturation concerns processes affecting study subjects that are related to time rather than the studied intervention. This was managed in Study III by including two control groups that would reveal such processes by changes in outcome without receiving the intervention.

Mortality/attrition refers to differences in attrition in groups being compared. This was a potential threat to the validity of Study III, but the women lost to follow-up were evenly distributed between the three groups and no differences in background characteristics were found between responders and non-responders in IG and CG1.

Testing concerns potential effects of taking a pre-test and this effect was controlled for in Study III by having the design include two control groups: one who filled out the baseline questionnaire and one who did not.

Instrumentation concerns changes in measures used between two data collections. This was avoided by using corresponding measures in baseline as in follow-up in Study III.

Construct validity refers to the degree to which the operationalized exemplars of the study relate to the intended construct that they are intended to represent. The measures used in Study II, III and IV were all study specific.

Measuring level of pregnancy planning was a critical challenge in Study II. A plethora of ways to measure and categorise a pregnancy planning status is evident in the literature. In this study we used a single item designed as a five-step Likert scale with a neutral centre to nuance the often used dichotomised alternatives. As the aim of the study was to correlate the pregnancy's status with preconception health preparations, the focus was placed on planning rather than wantedness/desire. This construct should be understood as closer

to the concept of intendedness and related to but not equal to timing. Still, the item captures the woman's subjective view, which may or may not correspond to the view of others, such as HCPs. If the woman perceives it socially normative to have a planned pregnancy, it might result in reporting bias towards the 'better', socially desired answer [138].

An alternative measure has been suggested by Barrett and colleagues [139], the London Measurement of Unplanned Pregnancies (LMUP). This instrument uses six predefined criteria of a planned pregnancy, which summed up results in a total score that indicates whether the pregnancy is planned, ambivalent or unplanned. Although rigorously developed and psychometrically evaluated, some objections can be raised. First, LMUP has been developed for a heterosexual couple conceiving naturally. Homosexual women, women who consciously decide to have children on their own and women who have received fertility treatment would score lower due to their situation even though their pregnancy was as planned as can be, because of the structure of the questions. Second, the last question of improvement of health in preparation for pregnancy requires that the woman has a more or less unhealthy lifestyle before she became pregnant. A final remark is that LMUP with its six questions and separate scoring is lengthy and somewhat complicated to use. For these reasons we chose to design the single item instead. Regardless of measure, one can question whether a retrospective measure of level of pregnancy planning is valid or distorted by recall bias. The women in Study II rated their planning status at registration at the antenatal clinic, and by far the majority would indeed already have decided to carry the pregnancy. Still, the women participated in early pregnancy and a group clearly described mixed feelings by having considered legal abortion.

Knowledge of reproduction was the main outcome in Study III. To minimize the risk of overestimation of the knowledge, the questions measuring knowledge were open ended. Three had previously been used in similar settings [33, 36, 37] and one question was developed with the same structure. To measure knowledge of factors that can impair female fertility and health promoting preconception lifestyle, two questions were developed with free text answers. The questionnaire was pre-tested for face validity, i.e. acceptance and relevance of the items [138], by several women of reproductive age and in a pilot study among the intended population and adjusted based on the comments. As the aim was to measure general knowledge of reproduction, the questions were scored separately and summarized into a total score. It can be difficult, and perhaps not necessary, to know the exact answer on the knowledge questions, and points were therefore given both for "correct" and "almost correct" answers.

Several steps were taken to increase the return rate in Study II: usage of a carefully developed invitation letter, enclosing a stamped, self-addressed envelope, pre-coded questions and one reminder [138, 140]. There is conflicting evidence for the effect of tokens of appreciation within

questionnaire studies [140], but we chose to include a promise of an unspecified gift in the invitation letter.

The questionnaire in Study II was voluminous. However, research on the topic points towards questionnaire length being of secondary importance in comparison to motivating participants to partake at all and questions' comprehensiveness [138, 141, 142]. The questionnaires were generally carefully filled out. Among those who took the opportunity to leave a comment on the last page, many expressed their gratitude for the opportunity to participate and suggested additional topics to be included in the study. This illustrates that pregnant women are a committed group, especially first time mothers-to-be. It is likely that the pregnant women felt that they contributed, were being heard and saw it as an opportunity to reflect on their own situation by participating in the study, as was described by respondents in a study exploring respondent satisfactions [141].

Reliability refers to the extent to which a measure can produce the same result in repeated measures [137]. Two pilot studies were made before the definitive data collection in Study II, one of which included a test-retest approach with two weeks' interval [138]. The test-retest reliability for the measure of pregnancy planning was found excellent ($\kappa = 0.87$, unpublished data).

External validity, generalisability, refers to whether the findings hold true over variations in people, conditions, settings, outcome measures and operationalisations of the independent variable. One criterion for external validity is the usage of representative sample and setting.

The participation rate in Study II was average. Comparing the study sample to the total population of childbearing women in Sweden shows that the study sample is age-wise equivalent, but fewer have the lowest level of education (7% vs. 11%), more are primiparas (46% vs. 43%) and more had received ART (5% v. 3%).

The participation rate was, as expected, lower among non-Swedish speaking than Swedish-speaking women despite great efforts made to include them. This group is often not yet well established in Swedish society and often has temporary accommodation that leads to their contact information often being unreliable. Another barrier to the inclusion of non-Swedish speaking women was that some midwives were unmotivated to recruit this group. Some midwives said that they would not put time and effort into the recruitment as these women were already so time consuming and often in great need of support. It is however important to note that the majority of midwives saw it as particularly important to recruit this group as they are often excluded from studies but in even greater need of increased knowledge.

The overall proportion of women born outside Sweden was lower in the study than in the total population of childbearing women, 13% vs. 22% [8]. This raises the question of what groups of non-Swedish born women that participated, if there was a healthy user bias. Indeed, there were more women

born in another Nordic country represented in our sample than in the total population (13% vs. 5%), fewer born in another European country (25% vs. 30%) and slightly fewer born outside Europe (61% vs. 65%) [8].

These findings indicate some selection bias, which has implications for the interpretation of the overall findings. Given that women with a less favourable socioeconomic situation seem to have been underrepresented, there might have been an underestimation of the effect of unplanned pregnancies and overestimation of healthy lifestyle in connection with pregnancy planning.

The participation rate in Study III was high and differences in background characteristics between the study groups would be equalized by the randomization procedure. The question is to what extent the results drawn from the sample of university students are applicable to the total population of women of reproductive age. One could consider this as a best case scenario, as university students in general could be expected to have higher knowledge levels than women with lower levels of education. It is also reasonable to believe that university students in general have higher health literacy, which possibly would lead to a better increase in knowledge based on the intervention.

Notably, Study III was conducted in a controlled environment with a small number of dedicated midwives and over a limited time period. It is possible that the results will be different in an everyday setting.

In Study IV, all midwives active in contraceptive counselling in the county were invited to use RLP and received the follow-up, regardless of public/private health care provider, length of experiences and age etc. The participation rate in the follow-up was relatively high, 68%, but non-responders were more often employed by private health care providers than responders. One can only speculate whether this difference mirrors different attitudes towards research in general or the RLP in particular. Although there are variations in organization and guidelines between different counties in Sweden, it is our belief that the results are not influenced by these variables to the extent that the results would not be applicable to other counties.

Trustworthiness (Study I and IV)

The trustworthiness of studies with qualitative approaches can be assessed based on the interrelated concepts of confirmability, credibility, dependability and transferability [143]. These can be described as the qualitative equivalent to the quantitative concepts objectivity, validity, reliability and generalisability.

Credibility can be described as the qualitative equivalent to the concept of validity and concerns confidence in the truth of the data and interpretations of them. Credibility was enhanced in Study IV by peer debriefing with co-authors during data collection and unstructured negative case analyses [143]. Member checking was performed in that the coordinating midwife

participated in writing the manuscript. The findings were also presented to all midwives during an educational meeting. The midwives recognized their experience and agreed with the overall findings. Finally, the mixed method with a concurrent triangulation design contributed to increasing the credibility, as findings were confirmed, cross-validated and corroborated within the study [144].

Saturation is a concept describing the point where more data no longer contribute with a wider range of ideas or information [145]. Usually, the researcher should proceed with the data collection until saturation is reached. In the case of both Studies I and IV, the question of saturation was however not applicable as all informants who volunteered to partake in the FGIs participated (IV) and all data available were collected (I). No further data collection was possible.

Transferability refers to the extent to which the findings are transferrable to other groups, settings or contexts. This aspect was enhanced in both Studies I and IV by providing a description of setting, participants, procedure and analysis to provide the readers with enough information to evaluate whether the findings are transferable in a certain respect.

Dependability refers to the stability over time and over conditions. The use of an interview guide in Study IV ensured that the discussions covered the study-specific areas and thereby limited the risk of inconsistency during data collection. Similarly, the agreement upon search terms and types of electronic sources assured consistent data collections in Study I. During data analysis in Study IV, three of the authors all conducted an initial coding of data and the results were then compared and discussed until consensus was reached, i.e. stepwise replication [143]. Similar courses of action were undertaken during the whole analytical process.

Confirmability refers to the neutrality of the data; that they are not biased by the perspectives of the researchers but represent the information provided by the participants. To decrease the risk of bias or distortion during the analytical process, analysis was conducted both individually and together in both Studies I and IV. The data were discussed thoroughly during the process and there were frequent returns to the original transcripts/sources to ensure credible interpretations. In Study IV, one of the senior researchers functioned as an ‘auditor’ – examining the processes of the analysis and following the audit trail [143]. In the article, one example of the analysis process was presented as well as several quotes to enhance the trustworthiness.

Conclusion

The overall aim of this thesis was to explore current preconception health and care and evaluate a new tool for preconception care. These are the conclusions:

- Preconception guidelines were available for women with chronic diseases. That was less the case for healthy women, for whom guidance was fragmented and inconsistent. There is a need for both national and European cohesive evidence-based preconception care guidelines for healthy women and men.
- Preconception care is a public health issue as socioeconomic background was associated with pregnancy planning, and preventive measures could have great health benefits both for women of reproductive age and their future children. Although a majority of Swedish women who registered at antenatal clinics had planned their pregnancies, comparatively few had taken health promoting actions prior to that pregnancy.
- There was no routine provision of preconception care in the six countries studied. The reproductive life plan is a feasible health promoting tool that can potentially form the missing link between contraceptive counselling and antenatal care. It increased knowledge of reproduction among female students, made them wish for their last child earlier in life and was appreciated both by women seeking counselling and midwives providing it.

Implications

The present thesis provides insight into current preconception health and care. Using the RLP in contraceptive counselling was found to be a feasible way to introduce preconception care in Swedish health care. The translation of innovations and new evidence into daily practice is far from an automatic process. As the field of implementation research is relatively new, evidence regarding the best ways to implement innovations is still scarce, but multifaceted interventions seem to be more effective than single interventions to improve practice [146]. The findings in Study IV can be used as a starting point for developing a tailored multifaceted implementation strategy for future implementation efforts.

There is also a need for evaluation of the effectiveness of preconception care on adverse pregnancy outcomes and an exploration of alternative ways to provide preconception care. This might include other arenas, such as sex education, the school health service, YHCs and primary care health centres, and other professions such as nurses and doctors. A key factor would be exploring the perceived need and preferences for preconception care services among women of reproductive age.

Implications on the societal level include the need to establish national preconception recommendations for both HCPs and the public. The perspective of preconception care should be included in general health promoting efforts that are already taking place, to increase knowledge and awareness of fertility and a health promoting preconception lifestyle.

The midwives' key role can be strengthened by expanding the topic of preconception care in midwifery education, and including preconception care/fertility counselling in the public procurement and economic compensation system.

To individualize care to women, pregnancy planning should be investigated routinely at registration at antenatal clinics. The measure of pregnancy planning used in Study II would be easy to implement both in patient records and national registries. This would enable extra support to be given to risk groups and also further studies on the effect of pregnancy planning status on health outcomes for the mother and child.

Finally, it takes two to tango. To enable equal responsibility for sexual and reproductive health, and equitable health care, future research also needs to address preconception care directed at men, in terms of interest, perceived need and potential arenas and professions.

Sammanfattning på svenska

Utgångspunkter

Kvinnans hälsostatus och levnadsvanor inför en graviditet kan påverka hennes fertilitet och hälsan hos såväl hennes själv som ett framtida barn. Otillräcklig nutrition, lågt folsyrintag, övervikt/fetma, kroniska sjukdomar och dess behandling, alkohol, tobak och hög ålder är kända riskfaktorer. Rådgivning/vård inför graviditet omfattar alla former av biomedicinska, beteendemässiga och sociala interventioner med syftet att förbättra hälsan och minska riskfaktorer. Det finns väletablerade amerikanska riktlinjer för hälsa och rådgivning/vård inför graviditet, men det är oklart huruvida det finns riktlinjer och vårdutbud i Europa.

Kvinnor i Sverige skjuter idag upp sitt barnafödande till åldrar när fertiliteten har börjat minska. En hög andel kvinnor i reproduktiv ålder har levnadsvanor associerade med risker för fertiliteten och ett framtida barn, men kunskapen om fertilitet och hälsofrämjande levnadsvanor inför graviditet är låg. För att kunna optimera sin hälsa och sina levnadsvanor inför en graviditet krävs att graviditeten är planerad. Andelen oplanerade graviditeter varierar internationellt, men vi vet mycket lite om i vilken utsträckning svenska kvinnor planerar sina graviditeter och om de vidtar några hälsofrämjande åtgärder inför sina graviditeter.

Reproduktiv livsplan är ett verktyg för rådgivning inför graviditet som har gett lovande resultat i USA bland kvinnor med kroniska sjukdomar och en grupp av etniska minoriteter med låg inkomst. Det är inte studerat om det är ett effektivt och genomförbart sätt för rutinmässig vård, eller hur det passar i en europeisk kontext.

Genom kunskapen som framkommer i denna avhandling hoppas vi i förlängningen kunna minska andelen oönskade graviditeter och ohälsa som kan hota den reproduktiva förmågan likväl som öka andelen planerade graviditeter och chanserna för kvinnor att få så många barn de önskar. Detta kan i sin tur leda både till hälsovinster för kvinnor i reproduktiv ålder och deras framtida barn och till sänkta kostnader för vård, förbättrad folkhälsa och ökad nativitet.

Tillvägagångssätt

Syftet med avhandlingen var att utforska hälsa och rådgivning/vård inför graviditet och att utvärdera en ny metod för rådgivning.

Syftet med Studie I var att utforska och jämföra riktlinjer och vårdutbud inför graviditet i sex europeiska länder: Belgien (Flandern), Danmark, Italien, Nederländerna, Sverige och Storbritannien. Författarna gjorde elektroniska sökningar i respektive land utifrån förbestämda sökord. Därefter sammanställde vi riktlinjerna och analyserades dem med innehållsanalys. Särskilt jämfördes riktlinjer för folsyra, tillskott, nutrition, rökning och alkohol, infektioner och immunisering och vårdutbud.

Studie II var en tvärsnittsstudie med syftet att undersöka i vilken utsträckning kvinnor planerar sina graviditeter, om och i så fall vilka hälsofrämjande åtgärder kvinnor vidtar inför graviditet och slutligen om det finns något samband mellan graviditetens planeringsgrad och kvinnans bakgrund. Barnmorskor på 153 mottagningar erbjöd alla gravida kvinnor som kom in för inskrivning under studieperioden in att delta. Totalt deltog 3390 kvinnor antingen genom att fylla i en enkät på svenska, engelska eller arabiska eller att delta i en telefonintervju med tolk på valfritt språk.

Studie III var en interventionsstudie med syftet att utvärdera om preventivmedelsrådgivning baserad på konceptet Reproduktiv livsplan (RLP) ökar kvinnors kunskaper om reproduktion och folsyraintag inför graviditet. Ytterligare ett syfte var att utvärdera effekten på kvinnans familjeplanering och kvinnans upplevelse av att få RLP-baserad rådgivning. Totalt 299 kvinnor som besökte barnmorska på en studentmottagning deltog och lottades in i interventionsgruppen (IG) eller en av två kontrollgrupper (KG1; KG2). Kvinnorna i IG och KG1 fyllde i en enkät med frågor om deras familjeplanering och kunskap om reproduktion i väntrummet. Förutom sedvanlig vård fick kvinnorna i IG också extra rådgivning utifrån RLP och en broschyr att ta med sig hem. RLP-rådgivningen utgick från frågan ”Vill du ha (fler) barn i ditt liv?” och följde kvinnans svar. Två månader senare ringde vi upp alla kvinnor och ställde samma frågor som i väntrumsenkäten.

I Studie IV kombinerades fokusgrupper med en enkät för att undersöka anammandet av RLP bland samtliga barnmorskor i ett län. Barnmorskorna fick information om RLP vid en länsgemensam studiedag. De som inte var närvarande kontaktades efteråt via telefon. Totalt 53 av 68 barnmorskor anmälde sig och fick en RLP-guide som stöd i samtalet och en broschyr att dela ut till kvinnorna. Alla barnmorskor som tre månader senare hade provat RLP i sin preventivmedelsrådgivning blev inbjudna att delta i en fokusgruppsintervju (FGI). Sammanlagt 22 barnmorskor deltog i en av fem FGI. Intervjuerna spelades in och transkriberades. Alla barnmorskor, oavsett om de hade provat RLP eller inte, fick också en enkät med frågor om deras åsikter om och erfarenheter av att använda RLP eller orsaker till att de inte använt RLP.

Övergripande resultat

Alla sex länder i Studie I hade riktlinjer för kvinnor med kroniska sjukdomar, men det fanns få och fragmenterade riktlinjer för friska kvinnor och för män. Ländernas riktlinjer för nutrition och levnadsvanor skiljde sig bitvis åt. Vård inför graviditet erbjöds kroniskt sjuka kvinnor, och friska kvinnor enbart på opportunistisk basis.

Tre av fyra graviditeter i Studie II var mycket/ganska planerade och 12 % mycket/ganska oplanerade. Av kvinnor med mycket oplanerade graviditeter hade 32 % övervägt abort. Kvinnor med planerade graviditeter hade med större sannolikhet en högre utbildningsnivå, högre hushållsinkomst, arbete med sysselsättningsgrad över 50 % och längre förhållanden än kvinnor med oplanerade graviditeter. Det fanns samband mellan hur planerad graviditeten var och planeringsbeteende såsom informationssökning och folsyraintag, men inte med alkoholkonsumtion inför graviditet. En tredjedel av alla kvinnor tog folsyra månaden innan befruktning, 17 % använde tobak dagligen och 11 % drack alkohol varje vecka tre månader före befruktning.

Studie III visade att preventivmedelsrådgivning baserad på RLP ökade kvinnors kunskaper både om reproduktion och folsyra, påverkade kvinnornas RLP och uppskattades av kvinnorna. Kvinnor som fick sedvanlig vård fick inte bättre kunskaper.

Barnmorskorna i Studie IV anammade överlag RLP i sin preventivmedelsrådgivning, hade övervägande positiva upplevelser av det och ansåg att det var ett användbart verktyg för reproduktivt hälsofrämjande. Den vanligaste orsaken för att inte provat RLP var otillräcklig information.

Reflektioner

Trots att det fanns ett samband mellan graviditetens planeringsgrad och hälsofrämjande åtgärder inför graviditeten var det fortfarande många som hade ohälsosamma levnadsvanor. En orsak kan vara otillräcklig kunskap om betydelsen av hälsosamma levnadsvanor redan före graviditeten. Tidigare studier har visat låga kunskapsnivåer om fertilitet. Av denna anledning är resultatet av Studie III lovande, att en kort intervention i samband med preventivmedelsrådgivning kan öka kvinnors kunskaper. Det är viktigt att vara medveten om att ökad kunskap inte nödvändigtvis leder till bättre levnadsvanor, men kunskapsökningen kan påverka personliga uppfattningar som i sin tur kan göra det mer sannolikt att vidta hälsofrämjande åtgärder.

Trots att det övergripande gensvaret var positivt och fördelaktigt framkom flera hinder till att använda RLP i Studie IV. Exempelvis sågs tidsbrist, betydelsen av fingertoppskänsla, svårigheter att bemöta känsliga grupper, dokumentation och initial tveksamhet som hindrande. Ingen barnmorska beskrev dock att de ogillade RLP, och både barnmorskorna i Studie IV och

kvinnorna i Studie III beskrev att barnmorskemottagningen är en lämplig arena för RLP-rådgivning. RLP stämmer dessutom bra överens med de nyligen uppdaterade riktlinjerna för preventivmedelsrådgivning som anger att detta är ett bra tillfälle att tala om sexualitet, risktagande och framtida reproduktion. För att fungera hälsofrämjande och i enlighet med Patientlagen, är det dock mycket viktigt att RLP-rådgivningen ges på ett professionellt sätt, med respekt för och anpassat utifrån individen, vilket barnmorskorna i Studie IV var noga att påpeka. Ett sätt att uppnå detta kan vara att utgå från metoden motiverande samtal.

Den stora andelen planerade graviditeter stämmer överens med tidigare studier från Skandinavien, men skiljer sig från andra delar av världen. Det är emellertid viktigt att påpeka att studierna använt olika sätt att mäta graviditetsplanering och att det finns stora skillnader i social acceptans när det gäller t.ex. tonårsföräldrar och aborter. Sverige har en mycket liberal abortlag och ett internationellt sett högt aborttal vilket gör att det rimligt att de graviditeter som fullföljs i hög utsträckning är planerade. Detta är ett tydligt exempel på hur en fråga som familjeplanering inte bara påverkas av biologiska faktorer, utan att även samhällseliga socioekonomiska, kulturella och miljömässiga faktorer måste vägas in för att ge en fullständig förståelse av en individs beteende. Frågans komplexitet kan vara en av orsakerna till att det ännu inte finns samlade riktlinjer för hälsa och rådgivning/vård inför graviditet, trots att evidensen för olika riskfaktors negativa påverkan på hälsan för såväl kvinnan som ett framtida barn är tydlig. Förutom praktiska frågor som vilken profession och vilken vårdinstans som ska ansvara för det och vem som ska betala, finns många etiska aspekter att ta hänsyn till. Det finns flera värden att respektera, på både samhällsnivå, individnivå och organisationsnivå. Det ligger i samhällets intresse att göra så mycket gott för så många som möjligt med så lite medel som möjligt. Eftersom Studie II visade att graviditetsplanering har samband med socioekonomisk bakgrund kan rådgivning/vård inför graviditet ses som en rättvisefråga, och relaterat till principen att göra gott. Samtidigt är det viktigt att värna om kvinnans rätt till självbestämmande. Svårigheter uppstår när kvinnans autonomi och fostrets välmående står i konflikt med varandra. Ett förslag som framförts för att balansera detta är att samhällsinsatser som kan befaras strida mot kvinnans autonomi är godtagbara så länge de inte inkluderar tvång.

Slutsatser

Det övergripande syftet med avhandlingen var att utforska hälsa och rådgivning/vård inför graviditet och att utvärdera en ny metod för rådgivning.

Det fanns riktlinjer i alla sex länder för kvinnor med kroniska sjukdomar, men enbart fragmenterade rekommendationer för friska kvinnor. Både

nationella och europeiska evidensbaserade riktlinjer behöver utformas för friska kvinnor och män.

Hälsa inför graviditet är en folkhälsofråga i beaktande av att graviditetsplanering visade samband med socioekonomisk bakgrund och att förebyggande insatser kan ge hälsovinster för både kvinnor i reproduktiv ålder och deras framtida barn. Trots att en majoritet av svenska kvinnor som skrev in sig hos mödravården hade planerat sin graviditet hade jämförelsevis få vidtagit hälsofrämjande åtgärder inför graviditeten.

Det fanns ingen rutinmässigt vårdutbud inför graviditet i de sex länderna. RLP visade sig vara ett användbart verktyg för att främja reproduktiv hälsa och kan potentiellt överbrygga glappet mellan preventivmedelsrådgivning och mödrahälsovård. Det ökade kunskapen om reproduktion bland kvinnorna, påverkade deras familjeplanering och uppskattades av såväl kvinnorna som barnmorskorna.

Förslag på åtgärder och framtida forskning

RLP visade sig vara ett användbart verktyg och Studie IV kan användas som utgångspunkt för att utforma en strategi för att implementera RLP rutinmässigt.

Alternativa sätt att arbeta med rådgivning inför graviditet behöver utforskas, t.ex. utifrån andra arenor och med andra professioner. Kvinnors behov och preferenser behöver studeras.

Nationella riktlinjer behöver utformas, både riktade till hälso- och sjukvårdspersonal och till allmänheten. Nuvarande hälsofrämjande arbete bör inkludera även hur levnadsvanor påverkar fertiliteten.

Vi kan stärka barnmorskans nyckelroll genom att tydligare beskriva frågan i legitimationsbeskrivning för barnmorska och i barnmorskeprogrammet. Rådgivning inför graviditet och/eller fertilitetsrådgivning kan även prioriteras och tas upp i landstingens upphandlingar och ekonomiska ersättningsystem, vilket redan görs i delar av landet.

Vi bör rutinmässigt fråga och dokumentera hur planerad varje graviditet är vid inskrivning i mödravård för att kunna ge stödinsatser till riskgrupper och möjliggöra vidare forskning om planeringsgradens betydelse.

Avslutningsvis är graviditetsplanering naturligtvis inte bara en fråga för kvinnor. För att skapa jämlikt ansvar för sexuell och reproduktiv hälsa och en jämlik vård behöver framtida forskning även studera upplevt behov av och tänkbara arenor och professioner för rådgivning riktad till män.

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