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ORIGINAL PAPER

Preconception Care in International Settings

Sheree L. Boulet · Christopher Parker · Hani Atrash

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Abstract *Objectives*: This literature review briefly describes international programs, policies, and activities related to preconception care and resulting pregnancy outcomes. *Methods*: Electronic databases were searched and findings supplemented with secondary references cited in the original articles as well as textbook chapters, declarations, reports, and recommendations. *Results*: Forty-two articles, book chapters, declarations, and other published materials were reviewed. Policies, programs, and recommendations related to preconceptional health promotion exist worldwide and comprise a readily identifiable component of historic and modern initiatives pertaining to women's health, reproductive freedom, and child survival. *Conclusions*: The integration of preconception care services within a larger maternal and child health continuum of care is well aligned with a prevention-based approach to enhancing global health.

Keywords Preconception care · Reproductive health · International health

Introduction

Preconception health is widely recognized as a critical component of domestic and international maternal and child health promotion. Broadly defined as the provision of biomedical and behavioral interventions prior to conception in order to optimize women's wellness and subsequent pregnancy outcomes [1], the notion of preconception care can be found in various global policy and practice recommendations concerning women's health and child survival. Although programs and guidelines may vary in response to local needs, the overarching concept of preconception care is present among developing and industrialized countries, within socialized or market-based health care systems, and independent of political, cultural, or religious beliefs. Furthermore, the incorporation of various preconception care strategies and ideologies within international maternal and child health programs and policies spans nearly 30 years, indicating a long-term recognition of the relative importance of such interventions as a means of optimizing pregnancy outcomes.

This article describes international efforts to reduce adverse maternal and infant outcomes through programs, policies, and activities related to preconception care. Because widespread support for preconception health promotion is comparatively recent, explicit mention of preconception care programs and policies per se is often difficult to identify within the international literature. Furthermore, because many developing countries adopt strategies guided by the declarations of international agencies or other coalitions [2], the development of preconception health initiatives must be traced through the history of various international health movements, starting with the promotion of global primary health care, followed by Safe Motherhood initiatives, and culminating with the women's rights and health movements. Thus, whereas the activities described herein may not be immediately identifiable as preconception care, they represent essential pieces of the preconception health puzzle.

S. L. Boulet (✉) · C. Parker · H. Atrash
National Center on Birth Defects and Developmental Disabilities,
Centers for Disease Control and Prevention,
1600 Clifton Road, MS-E87, Atlanta, GA 30333
e-mail: sboulet@cdc.gov

Materials and methods

A MEDLINE search with English language and human subject restriction was conducted for the years 1980 through May 9, 2005 using the reference terms "preconception (preconception) care," "preconception counseling," "preconceptional care," "periconception care," and "periconceptional care." A total of 756 citations were identified using the initial search parameters. References for which preconception care programs or activities outside of the United States comprised the primary topic of interest were included. Articles detailing clinical or scientific evidence of specific periconceptional interventions were excluded. Also reviewed were other published articles as well as textbook chapters, declarations, reports, and recommendations not retrievable from these databases. The search terms were also entered in various internet search engines and relevant web-based information was used to supplement the findings. Pertinent abstracts from the National Summit on Preconception Care (CDC, June 2005) were also reviewed.

Results

A total of 42 articles, book chapters, declarations, and other published materials were reviewed. The findings were categorized into three main areas in order to present the material in a coherent fashion: international conferences and accords, professional organizations, and international preconception care programs.

International conferences and accords

As preconception health is closely linked to women's health, language in support of preconception care is found in declarations and agreements derived at international conventions on the topic of women's wellness and reproductive health. For example, although the primary goal of the 1978 International Conference on Primary Health Care was to promote the health of all by outlining essential primary health care strategies to be implemented throughout the world, one important provision of the declaration outlined the importance of maternal and child health care and family planning as integral components of primary health care [2–4].

The Safe Motherhood Initiative, initially drafted in 1987 at the first international Safe Motherhood Conference in Nairobi, Kenya, focused on reducing morbidity and mortality associated with pregnancy and childbirth among developing countries [3]. The Safe Motherhood Inter-Agency Group (IAG) cosponsored the event and is now comprised of various international and national agencies whose mission is to enhance maternal and neonatal survival through the development and promotion of cost-effective interventions. In a global technical consultation held 10 years after the launch of this initiative, the IAG assessed relevant health indicators and developed a package of services to be offered to all women as a means of ensuring safe motherhood. Various preconception care services were outlined, including family planning, adolescent reproductive health education services, and community-based education pertaining to sexual and reproductive health as well as safe motherhood [5].

Covenants related to preconception care were adopted by the 1988 World Congress of Obstetrics and Gynaecology and its predecessor, the General Assembly of the International Federation of Gynaecology and Obstetrics. The 1988 World Congress heralded the promotion of women's health with the first step being prevention as a social responsibility; the General Assembly of the International Federation advocated governments undertake concrete measures to improve women's health and social status [6]. The second International Congress for Maternal and Neonatal Health, held in Monastir, Tunisia, in November 1984, included in its recommendations the need to promote the expansion of health services including family planning services and other preconception interventions such as smoking cessation, increased birth spacing, and tetanus vaccination [7].

The 1993 Report of the World Conference on Human Rights reaffirmed the need for equal access to health care for women, including a wide range of family planning services and called for reductions in infant and maternal mortality rates and overall improvements in women's health and nutrition [5, 8]. Similarly, the International Day of Action for Women's Health, first held on May 28, 1990, through the collaborative efforts of the Women's Global Network for Reproductive Rights and the Latin American and Caribbean Women's Health Network/ISIS International, reiterated the need for significant reductions in maternal mortality, particularly in Latin American countries [3].

International conferences held in subsequent years reflected an important paradigm shift in which pregnancy outcomes and maternal health were considered within a broader context encompassing reproductive health and women's health as well as socio-cultural factors [3]. Held in Cairo in 1994, the third decennial International Conference on Population and Development (ICPD) emphasized the importance of reproductive freedom and developed a definition of reproductive health that included "access to appropriate health care services that enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant" [9]. In 1995, two additional international meetings took place—the World Summit for Social Development and the Fourth World Conference on Women—in which the tenets set forth by the ICPD with regard to maternal mortality and morbidity were reaffirmed and new goals for improving

access to maternal health services were also derived [3, 5, 9, 10].

More recent international activities related to preconception health include the 1998 World Health Day and the Millennium Declaration. World Health Day 1998 focused on safe motherhood with the assertion that every pregnancy faces risks that may be ameliorated by enhancing access to quality maternal health services, delayed childbearing, and preventing unwanted pregnancies [11]. The Millennium Declaration, adopted by all member states of the United Nations in September 2000, included eight millennium goals to be achieved on a global level. The goals were designed as a measure of development against which countries may compare health indicators, programs, and policies. Maternal health and child mortality are explicitly detailed in two main goals and are closely related to other key areas including poverty, gender equality, nutrition, education, and infectious diseases [3, 12].

References to preconception health can also be found in the declarations of conferences addressing the issues of child health and survival. For example, the 1989 Convention on the Rights of the Child recognized the right of children to attain the highest possible standard of health and contained provisions for reductions in infant mortality, prenatal and postnatal care for mothers, family planning education, and services and health education for children and parents regarding nutrition, clean drinking water, and environmental contaminants [13]. In addition, the World Declaration on the Survival, Protection, and Development of Children, developed at the 1990 World Summit for Children, included tasks pertaining to the reduction of maternal mortality with a specific emphasis on family planning and child spacing as well as efforts to reduce infant and child mortality [14].

Professional organizations and associations

International health care professionals also have long recognized the utility of preconception care, as evidenced by directives and recommendations supported by various professional organizations. In 1952, after significant changes to the system of reporting maternal deaths sparked concern within the medical community about maternal mortality rates in the United Kingdom, a series of inquiries were initiated that ultimately resulted in the ongoing Confidential Enquiries into Maternal and Child Health [3, 15]. In its current manifestation, the program seeks to improve the health of mothers, infants, and children through careful investigation of all maternal and perinatal deaths as well as issues associated with diabetes during pregnancy and child health.

In 1982, the International Federation of Gynaecologists and Obstetricians (FIGO) joined the World Health Organization (WHO) in creating a task force to assess safe motherhood within regional and international communities. Since then, FIGO has conducted needs assessments and funded demonstration projects to ascertain cost-effective methods of identifying and managing pregnancy complications [3, 16, 17]. One such project, the Averting Maternal Death and Disability Program (AMDD), was established at the Columbia University Mailman School of Public Health and has partnered with numerous international agencies and communities to improve access to quality emergency obstetric care [17].

Nurses and midwives also have played an important role in the promotion of preconception care among the medical community. Themes associated with International Nurses Day have incorporated various components of the preconception care paradigm, including safe motherhood, school health, healthy families, women's health, community health, domestic violence, and the AIDS stigma. The International Confederation of Midwives, a member of the FIGO working group on Safe Motherhood and Newborn Health, has hosted a number of workshops related to safe motherhood and midwifery. Topics addressed at the workshops have included HIV/AIDS, gender-based violence, and most recently, maternal and newborn health during birth and the postnatal period [3, 18].

International preconception care guidelines and programs

The structure of preconception care programs in the international community differs considerably according to the type of health system employed and the level of economic support. Wealthier countries tend to have better organized health systems [19] and therefore use broader policies and guidelines to direct the provision of preconception services within the health care sector. Thus, countries such Canada [1], the United Kingdom [20, 21], Spain [22], Australia, Hungary [23], and the Netherlands [24] are more likely to adopt various recommendations related to preconception health, whereas less-developed countries in the regions of Latin America [25], Africa, India, and the Middle East tend to use more targeted interventions [26]. For example, many African countries provide continuing education to community health care workers to help them deal with issues in preconception counseling and reproductive choices for patients with HIV.

Within the developing countries of Latin America, preconception care has afforded such nations as Ecuador, Honduras, Nicaragua, Paraguay, and Peru an opportunity to address inequitable (as compared with more developed countries) maternal and perinatal morbidity and mortality rates [25]. Maternal mortality in these countries is cited as one of the primary causes of death among women 15 to 39 years of age. Using a $250,000 grant provided by WHO, these countries have undertaken a demonstration project to deliver preconception health education via community programs.

The specific aims of the project are to develop and deliver a comprehensive preconception care package that includes (1) risk assessment (identify individual, family, and social risks and barriers to prenatal care); (2) health promotion (ensure proper nutrition; avoid substance, tobacco, and alcohol use; provide family planning; perform PAP smear screening, and provide ongoing care); and (3) treatment delivery (treat medical conditions and infections such as malaria and sexually transmitted diseases, update immunizations, provide nutritional supplementation such as folic acid, and conduct home visits).

In China before 2003, a premarital health check was required of all couples planning to marry and consisted of medical examinations and testing as well as health education. The requirement has since been abolished and this change has been followed by concomitant declines in the rates of premarital examinations [27]. As a result, pilot studies have been designed to test the feasibility and content of a social marketing campaign for preconception care in China. The findings indicate that although women are interested in information about preconception health, numerous barriers to implementing a national program exist, including vertical health systems, a lack of coordinated efforts among governmental organizations providing family planning and primary health care, and an abundance of potentially confusing media health messages [27]. Preconception care services are sometimes provided in private clinics such as the Pre-Pregnancy Preparation Service (PPPS) in Hong Kong which provides pre-pregnancy counseling, medical testing, health assessments, and educational services to approximately 4,000 couples each year [28].

To reach women and children residing in remote regions of the Philippines, a mobile health services program has been developed whereby a multidisciplinary team of physicians and nurse midwives travel to specified areas and provide services for 1 to 3 days per month. The team screens pregnant women for various risk factors and nonpregnant women of reproductive age for chronic medical conditions. Family planning services are also provided [29].

The Russian Association of Gynecologists and Obstetricians has developed and implemented the People's Health Movement with a primary objective of promoting health and preventing disease throughout the stages of a woman's reproductive life. Based on policy recommendations arising from an alert that the state of maternal and child health was one of crisis proportion, preconception care services inclusive of family planning are now being initiated [30].

The Office de la Naissance et de l'Enfance in Belgium is currently establishing a national preconception care campaign to educate all women of reproductive age and all health professionals engaged in the care of women and children regarding the importance of preconception health care. The marketing tools and plans for disseminating the information are now being developed [31].

In France, preconception care has focused on more targeted recommendations, such as good glycemic control prior to conception. It had previously been established that preterm delivery among diabetic mothers was much higher than among the general population and that fetal loss and congenital malformations were assoicated with poor glycemic control [32]. Using one of the goals of the 1989 International Diabetes Federation meeting in St. Vincent's, Italy, tertiary perinatal centers began offering preconception care in an attempt to reduce the level of adverse pregnancy outcomes of diabetic mothers [33]. Services included risk assessment of potential diabetic complications, education on nutritional and glycemic self-monitoring, and optimization of insulin treatment regimens as directed by treatment guidelines. Data from a cross-sectional study of 12 perinatal centers in France indicate that nearly half of all women with Type 1 diabetes received preconception care during 2000–2001 as compared to 24% of women with Type 2 diabetes. Because rates of adverse outcomes among infants of diabetic mothers were similar to those during 1986–1988, it was concluded that more effort was needed to achieve the targets set forth in the St. Vincent's declaration [33].

Canada's National Guidelines on Family-Centred Maternity and Newborn Care devotes an entire chapter to preconception care and describes the multitude of intrinsic and extrinsic factors that influence preconception health. Accordingly, various settings appropriate for the administration of preconception care interventions are discussed as well as various social and medical issues, including stress, social support, abuse and violence, healthy lifestyle practices, and nutrition [1].

Although information about the development of international preconception care clinics is scant, such programs have been noted in Hungary, the United Kingdom, and the Netherlands. In 1989, Hungary established the Optimal Family Planning Service (OFPS) under the direction of the WHO Collaborating Centre for the Community Control of Hereditary Diseases. The OFPS was comprised of 32 regional health care centers providing periconceptional care free of charge. The aim of this program was to reduce adverse perinatal outcomes and protect maternal health among all women. In 1996, the Hungarian government increased the number and scope of the centers to incorporate these services within primary health care [23]. Assessments of various indicators in Hungary 10 years after the creation of the OFPS indicate that the rates of major congenital anomalies decreased and that the use of protective factors such as folic acid supplementation, rubella vaccination, and infection screening increased. Barriers to the use of preconception care services included unnecessary medical examinations, an inability to

effect change among unintended pregnancies, and additional costs [24].

Despite the existence of numerous clinical genetic centers in the Netherlands, only two preconception clinics have been described in the literature. The first, an outpatient preconception care clinic established by the University Medical Center of Nijmegen, provides thorough evaluations of potential pregnancy risk and preconceptional interventions for women referred by health care practitioners [34]. Treatment for hyperhomocysteinemia and changes in drug therapies for women taking potentially teratogenic medications were the most common preconception interventions at the clinic. A pilot preconception clinic in Maastricht was developed as a forum in which women planning a pregnancy could address questions and concerns. Couples attending the clinic responded favorably to the program and indicated that they would not have asked their general practitioner such questions [35]. These findings are supported by the results of recent surveys of Dutch women in which more than 70% of the respondents reported an interest in preconception counseling when offered by their own general practitioner [36]. However, although the majority of Dutch health care providers are in favor of establishing preconception care clinics [37, 38], lack of specific knowledge and time constraints have been cited as barriers to the provision of adequate preconception counseling [38].

Preconception clinics have also been described in London and Glasgow. The London clinic opened in 1978 and consisted of one obstetrician who advised women with previous pregnancy complications about the management of subsequent pregnancies [39, 40]. During the first 18 months of the clinic's operation, 56 women were seen. Opened in 1982, the Glasgow clinic also served women affected by prior adverse pregnancy outcomes. The clinic remained operational for 9 years and relied on a research nurse for initial evaluation and screening followed by a physician consultation 4 weeks later [40, 41]. The most common reasons for referral to the clinic were previous miscarriage, previous fetal abnormality, and chronic maternal disease. Improvements in pregnancy outcome were noted only among the women with chronic conditions [41].

Conclusions

Global recognition of the potential benefits associated with preconception health promotion is not new. International policy directives and practice recommendations related to women's health, reproductive freedom, and child survival almost always include provisions for the enhancement of women's wellness and social status as a means of reducing adverse pregnancy outcomes. However, the relative success of preconception care programs in both developed and developing countries is directly related to the availability and accessibility of health care for women. Accordingly, WHO's *World Health Report 2005: Make Every Mother and Child Count* details the inherent interrelation of the needs of the mother and child, indicates that reproductive health comprises an essential element of the continuum of maternal and child health, and calls for a reformulation of interventions from vertical programs to those offering a wider range of services [42]. A similar longitudinal approach to women's wellness and reproductive health has been promoted in the U.S. in light of increasing rates of low birth weight and persistent racial disparities in maternal and infant outcomes [43–45].

The present description of international programs and perspectives on preconception care is limited in scope by numerous factors. The literature search was as comprehensive as possible but not exhaustive because of language restrictions, difficulty in retrieving documentation of international preconception care programs and policies, the relative scarcity of published information about international preconception care practices, and the myriad of maternal and child health outcomes that fall under the umbrella of preconception health and for which both population-based and targeted interventions exist. Finally, data pertaining to maternal and infant outcomes after the introduction of preconception care activities is often unavailable. Thus, this review provides only a broad overview of international activities related to preconception health. However, the findings are instructive as a preliminary step in the compilation and dissemination of information related to international preconception care recommendations and practices. Future research should include a regionalized inspection and comparison of preconception care programs, policies, and recommendations within and among various countries. The impact of these programs on community-specific indicators of maternal and perinatal health should also be evaluated.

Irrespective of setting, the wider application of the core components of preconception care (i.e., risk assessment, health promotion, and intervention) has the potential to enhance the health and overall well-being of women, infants, and children around the globe. In light of the numerous factors influencing pregnancy outcome, an integrated approach to preconception health promotion has been proposed as perhaps the most effective and efficient means of implementing preconception health care [43–47]. The benefits of service integration are apparent in even the most resource-poor settings, as evidenced by the introduction and expansion of the WHO's strategy, the Integrated Management of Childhood Illness, in various countries [48]. Indeed, the perspective that preconception care is part of a larger continuum of care is well aligned with a prevention-focused public health paradigm. As such, the widespread promotion of preconception health may be the most timely and logical step toward ensuring global health.

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References

1. Agrey N, Crowe KM, Levitt C, MacDonald J, MacLean D, Polomeno V. Preconception care. In: Hanvey L, editor. Family-centred maternity and newborn care: national guidelines. Ottawa: Health Canada, Minister of Public Works and Government Services; 2005. p. 3.1–3.29.
2. Zapata B, Godue CJM. International maternal and child health. In: Kotch J, editor. Maternal and child health: programs, problems, and policy in public health. Gaithersburg: Aspen; 1997. p. 345–82.
3. AbouZahr C. Safe motherhood: a brief history of the global movement 1947–2002. Br Med Bull 2003;67:13–25.
4. Declaration of Alma Ata. Geneva: World Health Organization; 1978.
5. Starrs A. The safe motherhood action agenda: priorities for the next decade. New York: Family Care International; 1998.
6. IPPF Medical Bulletin. Safe motherhood professional responsibility, notes from the World Congress of Obstetrics and Gynaecology in Rio de Janeiro. London: International Planned Parenthood Federation; 1989. p. 2–3.
7. IPPF Medical Bulletin. Declaration of Monastir. London: International Planned Parenthood Federation; 1985. p. 1–2.
8. Report of the World Conference on Human Rights. Geneva: World Health Organization; 1993.
9. Menken J, Rahman MO. Reproductive health. In: Merson M, Black RE, Mills AJ, editors. International public health: diseases, programs, systems, and policies. Gaithersburg: Aspen; 2001. p. 79–138.
10. Report of the Fourth World Conference on Women. Geneva: United Nations; 1995.
11. World Health Day 1998. Geneva: World Health Organization; 1998.
12. Indicators for Monitoring the Millennium Development Goals. New York: United Nations; 2003.
13. Convention on the Rights of the Child. Geneva: United Nations; 1989.
14. World Declaration on the Survival, Protection and Development of Children. New York: United Nations; 1990.
15. MacFarlane A. Confidential enquiries into maternal deaths: developments and trends from 1952 onwards. In: Why mothers die 2000–2002—Report on confidential enquiries into maternal deaths in the United Kingdom. London: RCOG Press; 2004.
16. Lodhi SK, Sohail R, Zaman F, Tayyab M, Bashir T, Hudson CN, *et al*. FIGO save the mothers initiative: the Pakistan–UK collaboration. Int J Gynaecol Obstet 2004;87:79–87.
17. Maine D, Rosenfield A. The AMDD program: history, focus and structure. Int J Gynaecol Obstet 2001;74:99–103;discussion 104.
18. ICM: Partners and Projects. International Confederation of Midwives: Netherlands; 2005. [cited 2005 Jul 27]. Available from: URL: http://www.medicalknowledgeinstitute.com/files/ICM%20-%20Partners%20and%20projects.pdf.
19. Mills A, Ranson K. The design of health systems. In: Merson M, Black RE, Mills AJ, editors. International public health: diseases, programs, systems, and policies. Gaithersburg: Aspen; 2001. p. 515–57.
20. Glenville M. Health Professionals' Guide to Preconception Care, FORESIGHT. West Sussex: The Association for the Promotion of Preconceptual Care; [cited 2005 Jul 27]. Available from: URL:http://www.foresight-preconception.org.uk/books/moretoread.html.
21. Smoking and Reproductive Life: The impact of smoking on sexual, reproductive and child health. London: British Medical Association, Science and Education Department; 2004. [cited 2005 Jul 27]. Available from: URL: http://www.bma.org.uk/ap.nsf/Content/smokingreproductivelife/$file/smoking.pdf.
22. Decree No. 147/1986 regulating the programme for the promotion of maternal and child health (Nov. 24, 1986). Annu Rev Popul Law 1988;15:213.
23. Czeizel AE. Ten years of experience in periconceptional care. Eur J Obstet Gynecol Reprod Biol 1999:84(1):43–9.
24. Bekkers RL, Eskes TK. Periconceptional folic acid intake in Nijmegen, Netherlands. Lancet 1999:353(9149):292.
25. Preconception Care to Improve Women's Health and Maternal and Perinatal Outcomes. Latin American Center for Perinatology and Human Development. [cited 2005 Jul 27]. Available from: URL: http://www.paho.org/English/CLAP/invpro03.htm.
26. World Health Orgainzation. Redesigning child care: survival, growth and development. In:. The World Health Report 2005: Make every mother and child count. Geneva: World Health Organization; 2005. p. 102–22.
27. Li Z, Zhu M. Social marketing preconception health care: a pilot study in the People's Republic of China. Unpublished abstract presented at National Summit on Preconception Care; 2005 Jun 21–22; Atlanta, Georgia.
28. Lo S. Pre-pregnancy preparation service of the family planning association of Hong Kong. Unpublished abstract presented at National Summit on Preconception Care; 2005 Jun 21–22; Atlanta, Georgia.
29. Ago AF. Preconception care to fill in gaps in prenatal care: improving maternal and child outcomes through preconceptional care in resource poor islands of the Philippines. Unpublished abstract presented at National Summit on Preconception Care; 2005 Jun 21–22; Atlanta, Georgia.
30. Massey S. Russia's maternal and child health care crisis: socio-economic implications and the path forward. New York: EastWest Institute: 2002. p. 1–7.
31. Delvoye P, Delestrait M, Collard S, Derzelle E, Guillaume K, Roos P, *et al*. Promotion of preconception care: the Belgian Project. Unpublished abstract presented at National Summit on Preconception Care; 2005 Jun 21–22; Atlanta, Georgia.
32. Diabetes and Pregnancy Group. Multicenter survey of diabetic pregnancy in France. Gestation and Diabetes in France Study Group. Diabetes Care 1991;14(11):994–1000.
33. Boulot P, Chabbert-Buffet N, d'Ercole C, Floriot M, Fontaine P, Fournier A, *et al*. French multicentric survey of outcome of pregnancy in women with pregestational diabetes. Diabetes Care 2003;26(11):2990–3.
34. de Weerd S, Wouters MG, Mom-Boertjens J, Bos KL, Steegers EA. Preconception counseling: evaluation of an outpatient clinic at a university hospital. Ned Tijdschr Geneeskd 2001;145(44):2125–30.
35. Schrander-Stumpel C. Preconception care: challenge of the new millennium? Am J Med Genet 1999;89(2):58–61.
36. de Jong-Potjer LC, de Bock GH, Zaadstra BM, de Jong OR, Verloove-Vanhorick SP, Springer MP. Women's interest in GP-initiated pre-conception counseling in The Netherlands. Fam Pract 2003;20(2):142–6.
37. Poppelaars FA, Cornel MC, Ten Kate LP. Current practice and future interest of GPs and prospective parents in pre-conception care in The Netherlands. Fam Pract 2004;21(3):307–9.
38. Gaytant MA, Cikot RJ, Braspenning JC, Grol RP, Merkus JM, Steegers EA. Preconception counseling in family practice; a survey of 100 family physicians. Ned Tijdschr Geneeskd 1998;142(21):1206–10.

39. Chamberlain G. The prepregnancy clinic. Br Med J 1980;281 (6232):29–30.
40. de Weerd S, Steegers EAP. The past and present practices and continuing controversies of preconception care. Community Genet 2002;5:50–60.
41. Cox M, Whittle BJ, Byrne A, Kingdom JC, Ryan G. Prepregnancy counseling: experience from 1,075 cases. Br J Obstet Gynaecol 1992;99(11):873–6.
42. The World Health Report 2005: Make Every Mother and Child Count. Geneva: World Health Organization; 2005.
43. Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. Matern Child Health J 2003;7:13–30.
44. Lu MC, Tache V, Alexander GR, Kotelchuck M, Halfon N. Preventing low birth weight: is prenatal care the answer? J Matern Fetal Neonatal Med 2003;13:362–80.
45. Misra DP, Guyer B, Allston A. Integrated perinatal health framework. A multiple determinants model with a life span approach. Am J Prev Med 2003;25(1):65–75.
46. Moos MK. Preconceptional wellness as a routine objective for women's health care: an integrative strategy. J Obstet Gynecol Neonatal Nurs 2003;32(4):550–6.
47. Moos MK. Preconceptional health promotion: opportunities abound. Matern Child Health J 2002;6(2):71–3.
48. Tulloch J. Integrated approach to child health in developing countries. Lancet 1999;354(Suppl 2):SII16–20.