This article provides an overview of a life-course approach to women's health, with some specific examples of implementation in the UK. The Royal College of Obstetricians and Gynaecologists (RCOG) recently adopted the life-course model as the cornerstone of their twin reports on the future of women's health care and specialist training (1, 2), prompting an enthusiastic assessment of a life-course approach more widely across Europe (3).

First, what does a life-course approach mean? The research that underpins a life-course approach investigates the long-term effects of biological, behavioural and psychosocial exposures during gestation, childhood, adolescence and young adulthood on health and chronic disease in later life and across generations (4). In simpler, more practical terms, a life-course approach focuses on the potential for early intervention to reduce disease risk or severity in later life. At the most general level, therefore, it includes stopping smoking to reduce the risk of cardiovascular disease and cancer. In this sense, much of health promotion exemplifies the life-course approach. However, the life-course approach outlined here goes beyond general health promotion to those aspects of sexual and reproductive health (SRH) that have particular implications for women's future health and, through pregnancy, the health of the next generation (see Figure 1) (5).

Screening and immunization are classic examples of public health interventions that fit the life-course model. More specifically, screening for cervical dysplasia and genital chlamydia infection both illustrate a life-course approach to women's health aimed at preventing cervical cancer and pelvic inflammatory disease (leading to ectopic pregnancy and infertility) respectively. But experience in the UK of implementing these two screening programmes and the evidence for their impact on women's health are very different. In the mid-1960s, National Health Service (NHS) clinics were offering women regular cervical smear tests, but since the approach was opportunistic, women at greatest risk of cervical cancer were not being screened and follow-up procedures for women who screened positive were inadequate. It was only after introduction of a centrally-managed call-recall system in 1998 that screening coverage increased to around 80% and cancer rates began to fall. Over the last 20 years, screening in England has reduced the incidence of cervical cancer by a third and deaths by more than a half (6).

A national chlamydia screening programme (NCSP) in England was launched in 2003 to offer opportunistic screening to sexually active women and men under 25 years of age. However, due to many factors, evidence that screening has directly reduced the prevalence of chlamydia or the incidence of clinical complications (pelvic inflammatory disease, ectopic pregnancy or infertility) is lacking. Consequently key questions about the programme’s effectiveness remain unanswered and its value for money unknown (7). These contrasting examples illustrate the huge challenge and high stakes involved in establishing successful screening programmes i.e. those that do more good than harm and at reasonable cost. More recently, the UK and most other European countries have implemented HPV vaccination programmes for adolescent girls before they become sexually active; if successfully implemented, these programmes should reduce cervical cancer rates by around 70%.

The examples above of protecting sexual health across the life-course to prevent cancer, ectopic pregnancy and infertility are relevant to all sexually active women regardless of whether or not they go through pregnancy. ‘Life-course interventions’ in maternal healthcare can target the future health of the mother, or the child, or both. Some such interventions derive from the stressor effect of pregnancy on maternal metabolic or cardiovascular function providing an ‘early warning’ of health problems in later life (see Figure 2) (8). For example, women who develop diabetes in pregnancy (gestational diabetes) have a much higher risk of developing type 2 diabetes in the years following their pregnancy even if their blood sugar returns to normal just after delivery; two out of every five women with gestational diabetes will have type 2 diabetes within 5 years. Furthermore, babies born to mothers with gestational diabetes
diabetes have significantly higher birth weight, which is associated with increased risk of childhood obesity and diabetes. While the precise contribution of genes versus environment to this increased risk is unclear, gestational diabetes has been called a disease of two generations. Fortunately, it is clear that maternal screening and treatment of gestational diabetes leads to better pregnancy and birth outcomes. Because of the high risk of developing type 2 diabetes in the years following pregnancy, evidence based guidance in the UK recommends annual review of all women with gestational diabetes (9). However, since the transfer of information from maternity care to primary care is highly inconsistent in the UK, general practitioners (family doctors) are often unaware that their patients have been diagnosed with gestational diabetes: a recent study in England showed that less than 20% of women were followed up within 6 months of delivery and less than 1% were followed up annually for 5 years (10).

A similar situation pertains for women found to have raised blood pressure in pregnancy or pre-eclampsia: these women are at much higher risk of hypertension and heart disease in later life, but annual review, as recommended by the National Institute for Health and Care Excellence (NICE), is seldom delivered in practice. Implementing a life-course approach to reducing cardiovascular disease by effective review of women with diabetes or high blood pressure in pregnancy, including annual risk assessment and healthy lifestyle counseling, should become more feasible as electronic systems for linking health care records improve.

Interventions around the time of conception that target the baby’s health have long been recommended, with folic acid supplementation to prevent neural tube defects being one of the best known examples; the evidence from randomized trials that folic acid reduces neural tube defects by around 70% is clear cut (11). Although there is substantial observational data linking pre-conception exposures (e.g. smoking and alcohol) to birth outcomes (e.g. low birthweight and congenital defects) evidence for the effectiveness of preconception interventions in reducing adverse outcomes is relatively sparse (12).

Implementing interventions before conception may be limited by the extent of pregnancy planning and awareness of preconception health issues, but robust evidence shows that over two thirds of pregnancies leading to childbirth are planned to some extent and a recent observational study found that women who reported advice from health professionals before pregnancy were significantly more likely to adopt healthier behaviours before pregnancy, including taking folic acid and eating a healthier diet (13). This is encouraging because new research has shown that a mother’s diet before conception can permanently affect how her child’s genes function (14). In this study, researchers took advantage of a ‘natural experiment’ in the Gambia where people’s normal diet differs markedly between rainy and dry seasons. By measuring blood levels of nutrients in pregnant women who conceived in rainy versus dry seasons and later analyzing blood samples from their infants, researchers found that a mother’s diet before conception led to significant changes (epigenetic modifications) to her child’s DNA. Although the health significance of the DNA changes is not yet clear, this study is an important step towards defining an optimal diet for mothers-to-be, ultimately with known health benefits for their children.

In conclusion, these few examples illustrate the impact, both potential and achieved, of interventions designed to improve women’s health across the life-course. Interventions may differ according to the target population including, for example, all girls aged 11-12 years (for HPV vaccination), all women preparing for pregnancy (for folic acid supplementation) or high risk subgroups of pregnant women (for screening and management of gestational diabetes). Such interventions may be intended to benefit women’s future health, their child’s, or both. Action for successful implementation may be required primarily at individual level (such as stopping

---

Figure 2. Potential for life-course interventions in pregnancy to improve long term health. Adapted from Sattar N and Greer IA (8).
smoking before becoming pregnant), at health service level (for example annual follow-up of women with gestational diabetes in primary care) or at the level of public health policy for implementation of national screening or vaccination programmes.

Judith Stephenson, BA, MBBS, Margaret Pyke Professor of Sexual and Reproductive Health, Programme Director for Maternal Health, Institute for Women’s Health, University College London, Judith.stephenson@ucl.ac.uk

References


This excellent impact paper nicely outlines the rationale for a life-course approach to women’s health care, including the implications for health service delivery. Available in English at: https://www.rcog.org.uk/en/guidelines-research-services/guidelines/sip27/