The best start in life

Children's health is dramatically affected, not just by their lifestyle, but by that of their parents, even before conception. **Professor Hazel Inskip** of the University of Southampton leads the Southampton Women's Survey, a ground-breaking study into the links between parent and child health.

We all want our children to be healthy, but to give them the best start in life we may need to look to our own lifestyles. The first thousand days of a child's life – from conception to age two – is a key period for intervention to minimise health problems for a lifetime. First introduced in the developing world to combat malnutrition and under-development, the concept is equally applicable to developed countries suffering epidemics of obesity and chronic conditions, such as heart disease and diabetes.

THE FIRST THOUSAND DAYS

In recent years, it has become clear that parents' choices before, during and after pregnancy can impact on their children's health, not only in childhood but well into adulthood. For instance, there are strong correlations between low birthweight and high risk of heart disease and other conditions in later life. However, little research has been conducted to tease out the influence of multiple pre-conception lifestyle factors on child health, let alone been translated into effective guidelines. Professor Hazel Inskip, an epidemiologist by training, has made it her mission to fill that gap.

THE SOUTHAMPTON WOMEN'S SURVEY

To obtain data on influences on child health from pre-conception onwards, between 1998 and 2002 Prof Inskip recruited over 12,000 women of reproductive age into a research project – the Southampton Women's Survey, one of the largest of its kind. These women were questioned about all aspects of their lifestyle and background, and monitored for body composition and hormone levels.

Over subsequent years, the women were followed-up through any pregnancies, and the health of their children recorded up to the age of three, with further assessments being carried out currently until age 13. This has generated a mass of data with which to investigate the effects of multiple factors, such as socio-economic status, lifestyle factors, nutrition, body composition and genetic makeup, on parent behaviour and child development.

YOU ARE WHAT YOU EAT

One of the most intensively-studied factors was diet. Great differences were seen between those women with the healthiest and unhealthiest diets, according to contemporary recommendations. For instance, the healthiest quarter of eaters consumed an average of 45 portions of fruit or vegetables per week; the unhealthiest quarter only 19. The unhealthiest diets contained an average of 21 portions of added sugar each week; the healthiest contained zero.

With her colleagues, Prof Inskip was keen to figure out the reasons underlying these differing dietary choices. She found that the most strongly correlated factor was the

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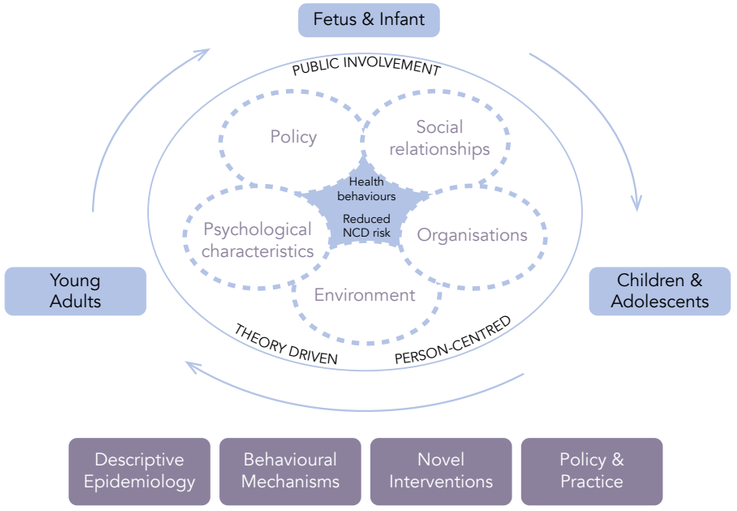
women's level of education: those educated to degree level or above had much healthier diets than those achieving a lower level of education. Other factors linked to a healthy diet were not smoking, being older, taking strenuous exercise, not having children already, watching little TV, and dieting.

Crucially, when Prof Inskip examined the habits of women before and after they became pregnant, she found that, on average, pregnancy had little effect: although women were likely to start taking folic acid supplements and marginally more likely to stop smoking, overall, they made no major changes to their diets. In fact, if anything, women were found to do less exercise in the weeks leading up to pregnancy. Prof Inskip concludes from this that it is vital to establish good habits from an early age, and certainly prior to becoming pregnant, in order to maintain healthy habits through pregnancy and motherhood.



Dr Inskip's work with the Southampton Women's Survey follows a behavioural systems approach to risk reduction from before conception, during pregnancy and in early life. Their approach recognises that behaviour change occurs within a complex adaptive system and that it is the product of non-linear relationships

YOUR CHILDREN ARE WHAT YOU EAT

Another part of the study considered whether the diets of young children also conformed to recommended guidelines (i.e., based around fruit, vegetables and healthy carbohydrates, with a high proportion of home-prepared foods). The strongest indicator of the quality of a child's diet was the mother's diet before she became pregnant, confirming that mothers' eating habits are determined prior to pregnancy – influencing the way they feed their children.

But it is not just a mother's diet that impacts upon her children. Factors such as the father's diet, education, age, and smoking also had an impact. Prof Inskip and her colleagues identified five key 'risk factors' that predispose children to obesity: maternal obesity, excessive weight gain during pregnancy, smoking during pregnancy, low vitamin D levels during pregnancy, and a short duration of breastfeeding. Children of mothers displaying four or more of these risk factors are five times more likely to be obese by the age of six years.

Remarkably, this influence does not just extend to the child's diet and weight. The Survey team found a clear correlation between the infants' eating habits and their IQ measured at age 4 years, both of course affected by the diet of the mother.

In sum, the Southampton Women's Survey identified a cycle of risk factors for child and adult health that can spiral from generation to generation: women with a poor diet and/or obesity, making minimal changes to their diet in pregnancy, in turn feed their children a poor-quality diet. Those children are more likely to become obese and have a lower IQ, maturing into a generation of adults with lower educational attainment, poor quality diets and high levels of obesity – the mothers and fathers of the next generation of children. Prof Inskip's colleagues have also shown that a father's influence is important too, so positive changes to a father's lifestyle will have a positive impact on the child's health outcomes.

BREAKING THE CYCLE

So how can we break this cycle? Prof Inskip's next step was to identify stages in the cycle where public health initiatives could be implemented to change behaviours. She and many colleagues have developed a range of programmes, from 'Lifelab' (encouraging adolescents to understand health from a scientific standpoint) to Healthy Conversations Skills (enabling professionals to engage people in modifying their health behaviours), which are being tested in 'BELLA' (helping midwives discuss the importance of diet with young mothers) and 'SPRING' (investigating the impact of promoting vitamin D supplements alongside training healthcare staff in the best way to empower mothers to improve their diets).

Many of these initiatives are still in the early stages or undergoing evaluation. However, if they are successful, the results could last well beyond the first thousand days. In other words, improving the health of one generation of children will have knock-on effects on their children and grandchildren.

Thanks to the Southampton Women's Survey and other studies, the cycle of bad habits could ultimately become a cycle of good health.

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Q&A

Why do you think we were so slow to catch on to the impact of pregnancy and pre-pregnancy habits on child health?

When I started in research, the focus was mainly on adult health – cardiovascular disease and cancer – and the thinking at the time was that the main risk factors for these diseases were adult health and behaviours such as smoking. Concern about pregnancy was about a healthy baby, not on the long term health into adulthood. It took till the 1980s before David Barker (former director of the MRC Unit in Southampton) and his colleagues identified and publicised the links between early life factors and later disease. The idea was strongly resisted for a long time but has now become mainstream.

Why do you think women fail to make healthy changes to their lifestyle during pregnancy?

It is a bit surprising that women don't make these changes when they are concerned about the wellbeing of their unborn child, but habits are very hard to change. We get used to our health behaviours, which are 'normal' for us; when coping with morning sickness and growing larger through pregnancy, making changes can be hard. Our research has shown that partners' and children's preferences strongly influence the family diet, thus affecting women's eating habits. Of course, making lifestyle changes at any time of life is far from easy.

Is it ever too late to switch to a healthier lifestyle? What is the optimum age to make changes?

It's never too late. Clearly the earlier we start the better and I would argue even before conception. Changes in older life can help reduce illness and frailty, though the impact is likely to be less than if the changes were made earlier. It's also important to realise that we all influence others by our behaviours, so grandparents with good health behaviours can affect those of their grandchildren even if they themselves are beyond their reproductive years.

Making changes is not easy, unless driven by society or government legislation, as with the smoking ban

Some of your initiatives have shown only minimal impact so far. Why do you think it is so hard to change people's habits?

We all know in theory what we should do but fail to put it into practice. Our society doesn't really value good health behaviours, and shifting the whole population is challenging. Influences come at many levels: home, work, shops and advertising. In the developed world, we now have too much food available, much of it convenience and processed food, packed with sugar and fat. Our social lives involve eating and drinking. Historically, food was expensive and work was hard physically. Making changes is not easy, unless driven by society or government legislation, such as with the smoking ban.

How is the role of fathers important in child health?

Children have two parents, whether they live with them both or not. Family diets and activity levels are influenced by what each member of the family is willing to eat or do. Fathers provide important role models in the household, for good or bad. Before children are born, the father can support the mother in good health behaviours, as they eat and do activities together. Importantly, sperm quality can be affected by health behaviours making the role of fathers vital at conception. Our LifeLab work is driven by the need to influence adolescents of both genders before they become parents.

Detail

RESEARCH OBJECTIVES

Prof Inskip leads a programme of research within the MRC Lifecourse Epidemiology Unit. She has mainly been involved with running the Southampton Women's Survey (SWS) leading to intervention studies assessing measures to improve public health.

FUNDING

Medical Research Council; National Institute for Health Research Southampton Biomedical Research Centre; University of Southampton and University Hospital Southampton National Health Service Foundation Trust; British Heart Foundation; European Union's Seventh Framework Programme (FP7/2007-2013), project EarlyNutrition (grant 289346)

COLLABORATORS

Colleagues in the University of Southampton and the National Institute for Health Research Biomedical Research Centre: Janis Baird, Mary Barker, Cyrus Cooper, Sarah Crozier, Keith Godfrey, Wendy Lawrence, Siân Robinson, Taylor Rose, Sofia Strömmer, Christina Vogel, Mark Hanson, Marcus Grace, Janice Griffiths, Kathryn Woods-Townsend, and local, national and international collaborators.

BIO

Professor Hazel Inskip is deputy director of the MRC Lifecourse Epidemiology Unit and professor of statistical epidemiology at the University of Southampton. She directs the Southampton Women's Survey, a cohort study of women and their children from before conception, which has led to interventions that are now being assessed.

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