MRC Lifecourse Epidemiology Unit

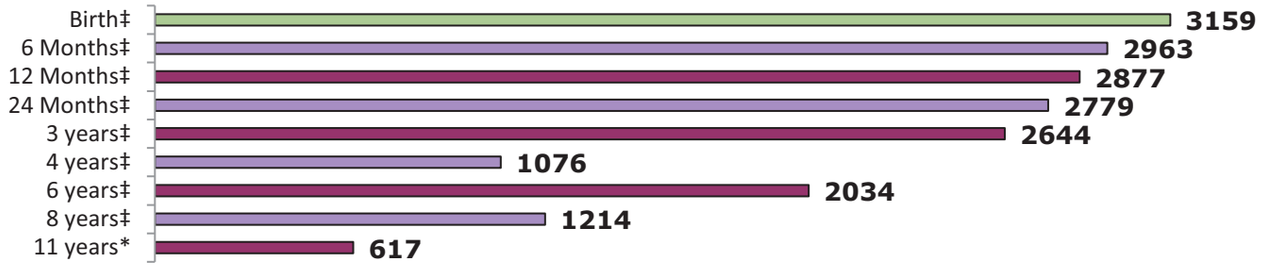
SWS

UNIVERSITY OF Southampton

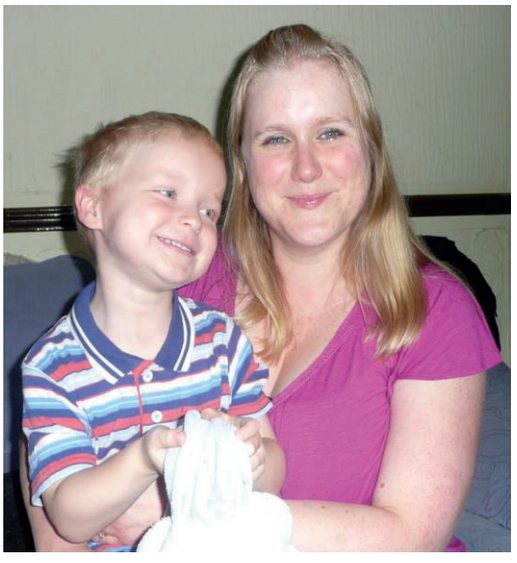
Dear Participants,

There have been lots of developments since we started in 1998, we thought you might be interested in finding out a little more about what we are doing. We would also like to take this opportunity to thank you for all the time and effort you have given to the Southampton Women's Survey (SWS), without which it would not have been possible for us to carry out this work.

Progress so far .....



These numbers show how many children have taken part at each stage of the study to date



Jacob was the final SWS child to be seen at three years of age. We visited Jacob and his mum, Jennifer, in March 2011. Here are some of their thoughts about taking part in the study:

Did you find giving up your time to take part in the study difficult? *It was not a problem because the study team were always happy to fit in with me and I knew I was helping a worthwhile project.*

Do you find the long-term commitment to SWS a problem? *I enjoy being part of the study and have found it a benefit to me and Jake – the scans and his measurements. The food questions also gave me the opportunity to reflect on his diet.*

How do you feel about us catching up with you again in three years time? *The time will whizz by and I look forward to the findings and it's always good to catch up.*

How do you think Jacob feels about us taking part and being measured?
He has enjoyed the attention.

Kerrie gave birth to the 1,000th SWS baby, Neve-Marie, who weighed in at 10lb 2oz. Hopefully Kerrie spoke for many of you when she said I really like taking part in the SWS. "I particularly enjoyed the scan pictures. It's good to take part in medical research to help improve future health".

For contact details and more information
Visit our web site at: www.swsurvey.soton.ac.uk ***Keep in touch!***

Background to the SWS

Heart disease, stroke, Type 2 diabetes and osteoporosis (thin/brittle bones) are among the commonest causes of ill health and early death in the Western world. They are also increasing fast in the Third World, and the cost of these diseases is enormous - both personally and financially, individually but also to society.

Research into the causes of these chronic diseases has usually looked at adult lifestyle factors such as diet, smoking and stress. But more recently scientists have shown that the way babies develop in the womb may explain why some go on to suffer ill health in adulthood.

A new way of investigating these diseases looks at what young women and their babies eat. Scientists are organising research projects in different countries, including the SWS here in the UK.

We are unique!

The Southampton Women's Survey is the largest and most detailed of its kind. ALL women in the Survey provide valuable information about the health and diets of young women. However, the Survey is *unique* as it is the only one to study women before they become pregnant, and record the progress of pregnancies from the earliest days.

The main aim is to find out how women's lifestyles before and during pregnancy affect their babies' health. In other words, identify the main factors (e.g. diet, body shape & size, hormones, etc.) that have a lasting effect on the health of the child.

As you know, women are followed through their pregnancies and the babies measured at birth. These children are then followed-up regularly to assess their growth, diet, illnesses & allergies, sleep & activities, and many other factors.

Did you know you are world famous?

SWS data, and data from a study in Bristol, have been used to assess the new World Health Organisation head growth standards for infants. It has been discovered that British children have heads that are slightly larger than the standard around the world and that they grow more rapidly in the first few months of life.

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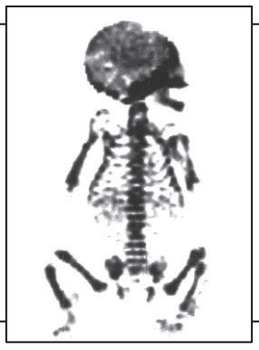
Collecting our data

Blood samples: Blood was collected from many of the SWS women following their initial interview, and again during pregnancy. We are currently looking at anaemia and folate levels in the blood, to see how these relate to women's health & lifestyles.
Spots of blood are collected from all babies at birth by midwives nationally. They are initially used by the hospital to check all new-borns for certain very rare abnormalities, which families are advised of immediately. We collect a small "spot" of this dried blood and store it here at the MRC. In time these frozen spots will be analysed to assess the babies' metabolic and hormonal profiles. This will allow us to assess relationships between these profiles and the babies' growth and health.

Lung Function/Allergies: A team based at Southampton General Hospital tested some of our babies' **lung function** soon after birth, to see if this is related to the development of various allergies. Families were then given symptom diaries to complete and post back at 4½, 6, 9 and 12 months. At 9mths there was also a home visit to collect dust & samples of babies' **urine**. We also **allergy test** all our SWS mums and children at the regular 1-year follow-up visit; and then test the children again at 3yrs. We looked to see if they are sensitive to dog, cat, egg, milk, grass or house dust mite.



What babies and children eat: Information about the diets of women and children in the SWS was collected at different stages of the survey. The main method of assessing diet is using a **food frequency questionnaire** which is used to record how often a set list of foods and drinks are consumed.

Bones: Osteoporosis makes the bones fragile and more likely to break after even a simple fall. Professor Cyrus Cooper leads our research to see if we can find ways of preventing this. We know that the time spent in the womb is when the skeleton is growing at its fastest; and this may significantly affect that person's risk of osteoporosis and having a fracture in later life. By studying the SWS women and babies, the research team is aiming to find out what might affect babies' bone growth. During pregnancy, women have two heel scans that show their bone changes during pregnancy.
Some of the babies have had a **bone density scan** within a few weeks of birth to measure their bones. This provides an idea of how the baby's skeleton grew during the pregnancy. This will be compared with the lifestyle information from the parents to help identify key factors that can affect a baby's bone growth before it is born.

Six year olds were scanned on a 'bone density' scanner, to establish the strength of their bones. The children have three **DXA scans** taking less than 10 minutes. One is of their whole body; one is of the spine; and the other of a hip. From the scans we are able to see how strong their bones are.

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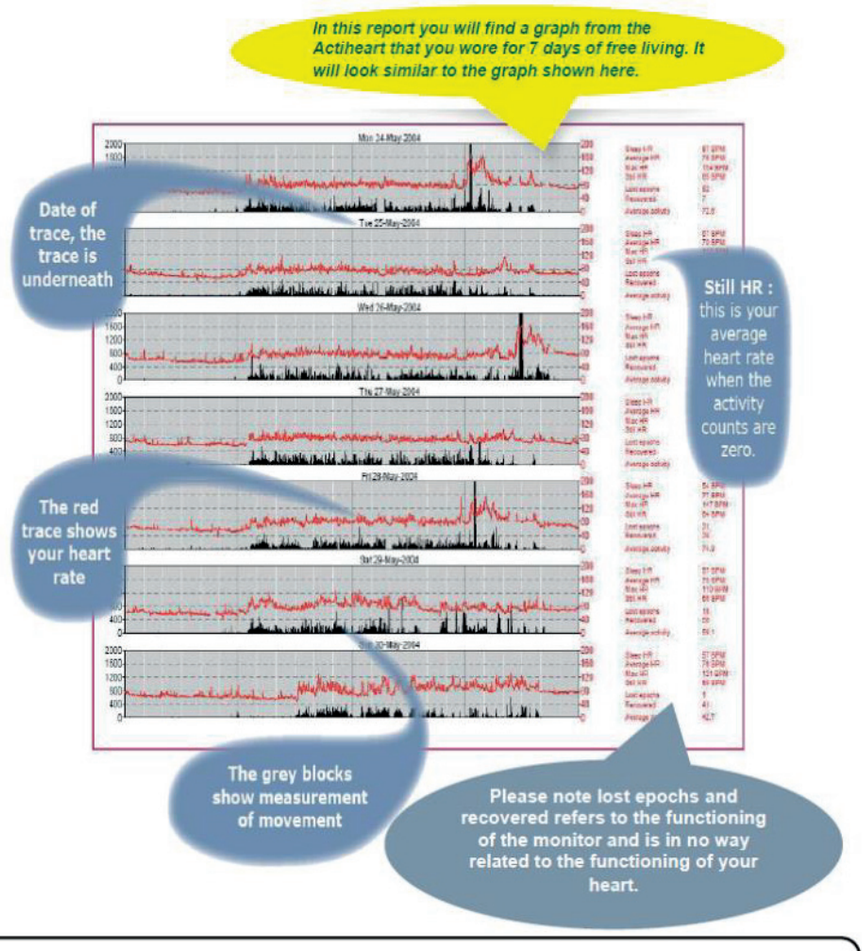
Physical activity

At the four-year and six-year measurements, some children and their mothers were asked to wear an **Actiheart activity monitor** for up to 7 days. We also asked mothers to complete a questionnaire about factors related to physical activity.

More than 600 mothers and children took part in the four-year Actiheart activity readings and we are currently looking at these data, which will hopefully answer some important questions. We looked at how physical activity is linked with health, such as weight gain and bone strength. In addition, we're interested in how mothers' and children's physical activity behaviours are linked and what factors in the home and family environment can predict how active children are. We also did these same measurements at the six-year visits, which will help us study how and why children change their behaviour. All of this information aids in the development of interventions to promote healthy living in young children

Heart and Activity Monitor reading



Here is an example of the information we download from the monitors you wear. It will help us gain information about patterns of physical activity and related energy expenditure.

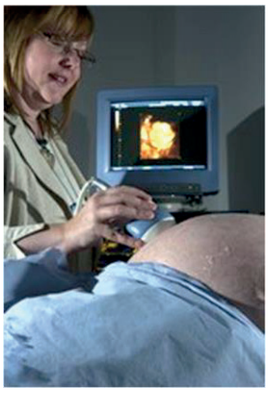
Thinking skills: At the six-year follow up visit we carried out some assessments on the children to gain information on **thinking skills**. They completed four different activities on a touch screen computer, which they normally enjoy, as well as two other activities which we also ask the mums to complete. Parents and children are often very alike in their abilities, so knowing about the mums' thinking skills will help us when we look at the information on the children.

SWS eight-year follow-up

The children came up to see us at our clinic in the Princess Anne Hospital. This visit focused on how the heart and blood vessels work and how much the children have grown. We use special **ultrasound** equipment to look at the heart and blood vessels. A bone scan tells us the size of the children's skeleton and how much fat and muscle they have. The children have to lie still for a few minutes while they are having this done so that the pictures are not too fuzzy, and the research nurses measure the children to see how much they have grown.

Ultrasounds and why we use them

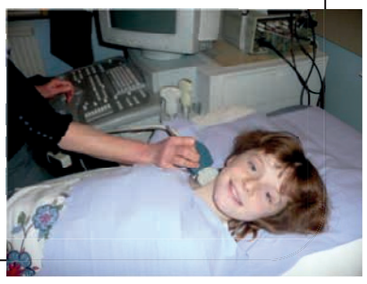
This is the first time we have used ultrasound for the follow-ups and it is an opportunity for our sonographers, Pam and Corinne, to meet up with the children they last scanned nine years ago as unborn babies!



Sound waves, scans and healthy circulation

By using ultrasound, we can see the blood vessel walls and measure blood flow, check development of the heart and the children's blood pressure.

All of these results will be related to the children's diet and lifestyle, and the diet and lifestyle of their mums whilst they were developing.



Magnetic Resonance Imaging (MRI) scans

As part of the eight-year follow-up some of the children were invited to have a **Magnetic Resonance Imaging (MRI) scan**. This is a very safe, non-invasive type of scan that does not involve the use of x-rays, and gives us excellent images of the heart and body. We are looking at the heart, the aorta (the major artery in the body that takes blood away from the heart), and body composition on the scans.

Jen Bryant-Radiographer

MRI scans are excellent at demonstrating body fat so we are also looking at the composition of the body. We are able to measure the amount of body fat both within the abdomen, and around it.

We looked at the information collected at earlier stages in the study such as maternal diet, birth-weight and lifestyle to see how these affect the development of the child's heart and blood vessels, and body composition at the age of 8 to 9 years.

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Findings so far ...

Pregnancy

Thanks to the data provided from the 3159 pregnancies we monitored between 1998, and some of our discoveries have been:

- Before pregnancy, 27 per cent of mothers smoked but this reduced to 15 per cent during pregnancy, so many mothers successfully managed to quit. Mothers also cut their alcohol and caffeine intakes. However, there was little change from before to during pregnancy in fruit and vegetable intake, and in overall quality of diet.

- Higher levels of vitamin D in the blood of the mothers during pregnancy were associated with improved development of the baby's femur (the long bone in the thigh) in the womb. Also, research indicated that mothers whose vitamin D levels were low during pregnancy had babies who were born with some splaying of the end of the bone which indicates poorer bone development.

- We currently don't have recommendations for suitable or optimal weight gain during pregnancy in the UK. Using SWS data we have shown that women who put on too much weight during pregnancy, or not enough weight, are more likely to bear children with more fat in their bodies at age six. It will be important, using the data we collect at eight years, to see if this effect is still evident as the children grow up.

Folate and depression

Many of you are aware that folic acid supplements are recommended for women before pregnancy and during the first trimester to boost folate levels in the blood. This helps prevent neural tube defects in the child, such as spina bifida.

Good diets, rich in green leafy vegetables also contribute to raising folate levels. There have also been a number of studies showing that people who are depressed have lower levels of folate in their blood. This has led to suggestions that folic acid supplements might prevent depression.

However, the SWS data suggests that being depressed leads to lower folate levels rather than the other way round. This could be because becoming depressed can affect the quality of your diet.

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Factors associated with depression

The SWS has found that women who suffer from depression and anxiety before pregnancy tend to have infants whose sleep is more disturbed.

Grip strength

Grip strength is an indication of general muscle strength. Grip strength of SWS women in pregnancy was associated with their own birth weights; bigger babies tended to have stronger grip in adult life.

Although grip strength of the SWS children aged four was also related to their birth weight, it was more dependent on their current size; taller children had stronger grip.

It is not known how grip strength changes as children grow and so we will continue to measure grip strength on our six- and eight-year follow-up visits.

Vitamin D

We have previously shown, both in the SWS and an earlier study, that women who have higher levels of vitamin D in pregnancy tend to have children with stronger bones. These findings have led to a trial to test whether giving vitamin D supplements to pregnant women will result in improved bone strength in their babies.

SWS six-year follow-up: what we learnt

From 2007–2010, when more than 900 SWS children were around 6 years old, they helped us to find out information about children's lungs and the development of asthma. We found that babies' and children's diets did not seem to affect the health of the lungs, but levels of some vitamins in the mother's blood when she was pregnant were linked particularly to allergies.

More recently .... we have started to see children aged 10-12 years during which their teeth are photographed, a bone scan is taken, thinking skills and grip strength are assessed again and an exercise step test assesses physical fitness. Some children are kindly providing blood samples at this visit.

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Meet some of the SWS staff

As you might imagine, we have a large network of staff. You, the SWS families generally only come into contact with some of our research nurses and midwives. But behind the scenes we have support from computing staff, clerical & research assistants, dietitians & nutritionists, scanners, blood processors, statisticians, scientists & doctors.
We work on three sites in the grounds of the University of Southampton, Southampton general Hospital and, of course, at Princess Anne Maternity Hospital.

Hazel Inskip

Hazel is Deputy Director of the MRC Lifecourse Epidemiology Unit, and Professor of Statistical Epidemiology at the University of Southampton. She has run the SWS since it began. Her work involves planning all stages of the Survey with others, applying for funding to keep it going, getting all the necessary regulatory approvals, ensuring that the data are of high quality, analysing the data and writing up the results for publication.

Jane Lucas

Jane Lucas is a children's allergy and respiratory consultant at Southampton General Hospital. Within the SWS, she has been investigating factors that might increase the risk of children developing allergies or asthma. Early on, Jane measured the lung function of some very young SWS babies and found that lung development is poorer in babies who did not grow well during pregnancy.

Jane says "*Being involved with the SWS study has been one of the highlights of my career. Respiratory doctors all over the world have been interested in our results and the implications for advice that we can give pregnant women in the future. I am so grateful to the families who have taken part*."

SWS nurses

Left to right back row –
Julia Hammond, Sue Collins, Sue Macey, Suzanne Wood, Valerie Davill
Left to right front row –
Dian Rogers, Christine Taylor, Sue Higginbottom

All in a Day's Work – by Christine Taylor

A disgruntled three year old once shouted from behind the sofa, "Why don't you just go and measure yourself?" A baby once vomited in my handbag. I've worked in wee-soaked clothes more than once. And one dismal December day, struggling to find someone's house, I drove the wrong way down a one way street and met a police car! Yes, I'm an SWS nurse.
With a mind-blowing 3,000 unique families in SWS, every day is different. I love it, even the misunderstandings. One Mum mishearing the word 'wheezed,' was shocked to be asked if their child has 'wee-ed ' in the last 12 months!

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