

## The midwife, the coincidence, and the hypothesis

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Finding an archive of health records is one thing—and being able to talk your way into accessing them may depend on coincidence

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Development of the hypothesis that adverse conditions in utero and during infancy increase the risk of cardiovascular disease in later life required epidemiological studies of a kind never undertaken before. It was necessary to find records of birth weight and living conditions during infancy for people born at least 60 years ago and to link these to their current cardiovascular health. After a search lasting several years, a large collection of records came to light in Hertfordshire. The existence of this collection was due to the foresight of one midwife, Ethel Margaret Burnside. Getting access to the records, however, was down to a fortunate coincidence, and the subsequent research probably would not be possible today.

### Hertfordshire records

At the beginning of the 20th century, there was widespread concern about the physical deterioration of the British people. One in 10 infants died before they were a year old, and many of those who survived reached adult life in poor health. During 1902, reports in the national press claimed that up to two thirds of the young men who volunteered to fight in the Boer War in South Africa (1899 to 1902) had been rejected because of unsatisfactory physique. An interdepartmental committee set up in 1903 drew a shocking picture of the nation's children—malnourished, poorly housed, and deprived. Moreover, the birth rate was falling. The medical officer of health for Hertfordshire at around this time stated:

Hertfordshire does less than forty out of the fifty-five counties to perpetuate the national stock; for England and Wales the birth-rate has for thirty-three years been steadily declining, only two Continental countries (Belgium and France) having lower birth-rates, while that for Japan is increasing and is now ahead of every white race but Russia and three of the Balkan States. The new census figures show a lower rate of increase than in any decennium of the last century. This decay must betoken the doom of modern civilisation as it did that of Rome and Greece, unless some new moral or physical factors arise to defeat it. It is of national importance that the life of every infant be vigorously conserved.

Ethel Margaret Burnside, the county's first "chief health visitor and lady inspector of midwives," responded to this challenge. In 1911, she set up an army of trained nurses to attend women in childbirth and to advise mothers on how to keep their infants healthy after birth. The only known photograph of this remarkable and dedicated woman was taken when she was 17 years old (fig 1). In later life she was described as "a big, bony woman, about 5 ft 10 inches tall, with a long thin face and dark hair, which she wore scraped back, a very imposing presence, a penetrating voice and a dominant personality." The clerk to the county council is known to have lived in fear of her and would make himself immediately available if he knew she wished to see him. She persuaded him to provide 60

spring balances at 5 shillings each, so that each baby born in the county could be weighed at birth and at 1 year old.

She was no desk bound manager, but a leader who travelled across the county supervising and encouraging her nurses. To begin with she travelled on her bicycle. "The cyclometer on my bicycle registered 2921 miles this year," she wrote. Later she persuaded the county council to buy her a car, and she called it "little hero."

She ensured that the activities of her nurses were recorded. A health visitor went to each baby's home at intervals and recorded its illnesses and development on a card. A sample of mothers whom we have since interviewed remembered the midwives and health visitors as helpful people who skilfully delivered and cared for their babies. When the baby reached 1 year old the card was handed in to the county office, where the information was transcribed into ledgers in immaculate handwriting, a separate ledger for each village (fig 2). So began the now famous Hertfordshire records, which were maintained across the county until the NHS was formed in 1948.

### The search

At Southampton University, we became aware of the ledgers during a systematic search of the nation's archives. During the 1980s we searched archives and hospital record departments throughout Britain look-



Fig 1 Ethel Margaret Burnside

ing for maternity and infant welfare records from the early 20th century. Many had been destroyed, but some were preserved in large collections that had accumulated over many years or in small collections kept by one clinic or even one midwife. Some records were detailed and some perfunctory. Some were in archives; others were in lofts, sheds, garages, boiler rooms, or flooded basements. The largest set of records we found was in Hertfordshire.

In 1986, we discovered Miss Burnside's ledgers for six villages in east Hertfordshire. They were stored, uncatalogued, in the county record office. We had written to hundreds of doctors who had worked as medical officers of health before these posts were abolished in 1974. At that time many records were moved out of the town halls or destroyed. A doctor who had worked in Hertfordshire county hall remembered records being sent to the records office. I hastened there. The ledgers were on the senior archivist's desk. My request to borrow them was declined. They were to remain closed for another 50 years, he explained. The midwives and health visitors had sometimes written harsh comments about the mothers' habits and skill and it was better that such comments were not made public while some of the mothers were still alive.

I noticed that one of the ledgers was for the village of Much Hadham. By a remarkable coincidence I had lived in this village during the war, having left London with my mother and brother to escape German bombs. My sister was born there in 1943. Her birth would have been recorded. When the archivist learnt that my mother and sister would be in the ledgers, and that I would therefore protect their confidentiality, they were handed over to me. The only condition he imposed was that the university should keep them in a safe archive. A telephone call to the vice chancellor's office confirmed that we had only one such archive, built to house the private papers of the Duke of Wellington. Miss Burnside's ledgers were thus moved into illustrious company, where we were allowed to visit them at specified times each day to transcribe the data.

On the journey back to Southampton I looked in the Much Hadham ledger. My sister's birth was recorded. My mother, however, was notably independent. She did not allow her baby to be weighed, and the health visitor never visited. We subsequently searched the county and discovered other ledgers, covering the entire county except St Albans, scattered in record offices and stores. Happily, few women took my mother's hostile view of Miss Burnside's nurses. The Hertfordshire records are remarkably complete.

## Research

In the first study, we used the NHS Central Registry to trace 15 000 men and women born in the county before 1930. Three thousand of them were dead, almost half from coronary heart disease or related disorders. A disproportionate number of these deaths had occurred among people who had had low birth weight. The risk of a fatal heart attack in people who weighed 5 pounds (2268 g) or less at birth was half that in those who weighed 10 pounds or more. Men who put on weight slowly during infancy also had higher rates of coronary heart disease. The risk of the disease among men who weighed 18 pounds or less at 1 year of age

Weight at Birth.	Weight 1st Year	Food.	No. of Visits.	Condition, and Health Vis		
				W	V	T
8 1/4 lbs	24 1/2 lbs	B.	11	Y	.	.
Healthy & well developed.				Buckland School.		
7 lbs	18 1/4 lbs	B	12	h	.	Y.
Moved to Nury Green Lt. Hadham.				Had measles, pn		
8	20	Bot.	11	Y.	.	Y.
F.B. above in neck opened. Ant. fontanelle still open 23 yrs. Abdomen						
8 1/2	22	B.B.	9	Y	.	Y
Health & normal.				Buckland School.		

**Fig 2** Extract from one of the ledgers kept by Miss Burnside's nurses was three times that among men who weighed 27 pounds or more. It seemed remarkable that the weights of babies measured by Miss Burnside's simple spring balances, often in badly lit cottages and hovels, could so strongly predict events more than 50 years later.

These early findings raised the question of what processes are initiated in fetal and infant life and lead ultimately to disease and premature death. To answer this, my colleagues at Southampton invited men and women who were born in Hertfordshire before 1940 and still lived in the county to attend clinics that were set up in hospitals and doctors' surgeries. Over the years, thousands have agreed to do so and have given generously of their time, allowing all manner of intrusions into their privacy. A second army of nurses has taken the place of Miss Burnside's.

While awaiting tests in the clinics, men and women have become reacquainted with relatives and friends they have not seen since childhood. Many of them tell us that they are pleased to be members of "the club." They are glad to help for no reward other than the feeling that they are part of something important that

## Summary points

Development of the fetal origins hypothesis depended on linking records of births in the early 20th century with health in later life

Meticulous birth records were maintained throughout Hertfordshire from 1911 onwards and have been preserved

These records are the legacy of a dedicated and visionary midwife, Ethel Margaret Burnside

A fortunate coincidence enabled researchers to access the records

The willingness of Hertfordshire people to cooperate in research has helped show the importance of fetal and infant nutrition for future health

will one day help others. Some have even visited us in Southampton and spent time in our clinical research centre. We are grateful to all of them, and do our best to keep them and their general practitioners informed of our findings.

The results of the research have more than justified all the activity. As a group, people who are small at birth or during infancy remain biologically different throughout their lives. They have higher blood pressures and are more likely to develop type 2 diabetes. They have different patterns of blood lipids, reduced bone density, altered stress responses, thicker left ventricular walls, less elastic arteries, and different hormonal profiles, and they are ageing more rapidly. Out of these observations has arisen the fetal origins hypothesis, which proposes that cardiovascular disease originates through the responses of a fetus or infant to

undernutrition that permanently change the structure and function of the body.

### Future research

Through the happy chance of my sister's birth we got access to the Hertfordshire records, and thereafter discovered the others. At that time we had no difficulty in getting permission to trace, interview, and examine large numbers of people. It is unlikely that such permission would be so readily obtained today. Had current data protection laws been in force 15 years ago, they might have prevented thousands of willing Hertfordshire people from taking part in medical research—and the fetal origins hypothesis would not exist.

Competing interests: None declared.

## Thoughts for new medical students at a new medical school

Richard Smith

Giving advice to medical students makes doctors think about what is important in what they do

Earlier this year I had the privilege of speaking to new medical students at a new medical school—the Hull York Medical School. What should I say? I felt almost overawed. It seemed a major responsibility, although I knew that most of what I said would—thankfully—be forgotten or ignored as the ramblings of yet another “old fart.” Needing help and a method, I started by asking members of our editorial board, doctors from all over the world, what I should say. They responded with enthusiasm, giving me the thought that it might be a good idea to broaden the debate. That's the main reason for this article: it's a preliminary statement in what I hope might be a rich debate. In thinking what we want to say to new entrants to the profession we have to think of what is important about what we do.

What follows is a mixture of my own ideas and those I selected from the responses of the members of the editorial board. Box 1 summarises responses from the *BMJ*'s editorial board, and box 2 gives the full advice of Dave Sackett, the “father of evidence based medicine” (and a member of the board). I also spent some time exploring advice from literature to young people, not specifically medical students (see boxes 3, 4, 5, 7).

### “To thine own self be true”

Perhaps the most famous advice to young people in the English language is the speech of Polonius—a tiresome old windbag—to his departing son Laertes in Shakespeare's *Hamlet* (box 3). The speech contains much excellent advice, but perhaps the quintessence is, “To thine own self be true.” Everybody—but perhaps especially medical students—experiences pressure to be somebody else. In the competitive world of medicine there is strong tendency to try to be “the best.” But the simplest mathematics shows that everybody cannot be the best: there is only one best.

I asked the students when I spoke to them, “What was the greatest invention of the 20th century?” Was it quantum mechanics, aircraft, penicillin, the atomic bomb, the double helix, the randomised controlled trial? I suggested (slightly tongue in cheek) that it was D W Winnicott's “the good enough mother.” (Actually, it was jazz.) The attempt to be the best mother in the world, the best neurosurgeon, or the best medical editor will end in tears. Being a good enough mother is to be a good mother, whereas the attempt to be the best will guarantee that you won't be (indeed, you may be a highly damaging mother). Similarly, you should aim to be a good enough medical student and doctor.

One of the curses of doctors is that they have such strong stereotypes. Doctors are upstanding, trustworthy, clever, straitlaced, conservative, authoritarian,



“You are only dust and ashes, but the world was created just for you”

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Please tell us through rapid responses to this article what advice you would offer to new medical students. We will then later run a vote to decide on what is most important.