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**Fetal Origins, Childhood Development, and Famine:
A Bibliography and Literature Review**

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FETAL ORIGINS, CHILDHOOD DEVELOPMENT, AND FAMINE: A
BIBLIOGRAPHY AND LITERATURE REVIEW¹

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ABSTRACT

The human costs of famines outlast the famines themselves. An increasing body of research points to their adverse long-run consequences for those born or in utero during them. This paper offers an introduction to the burgeoning literature on fetal origins and famine through a review of research on one well-known case study and a bibliography of published work in the field generally.

FETAL ORIGINS, CHILDHOOD DEVELOPMENT, AND FAMINE

Famine historiography has been rather slow to absorb the implications of research claiming that famines might have long-run consequences for the health of those born during them—the fetal origins hypothesis (FOH)—for the human cost of famines. There is a literature on the long-term of famine in terms of individual and collective trauma, but the kinds of link posited by versions of the FOH are missing, for example, in recent accounts of famine in China, Greece, Ireland, Bengal, and elsewhere (Dikötter 2010; Ó Gráda 1999; Hionidou 2004; Maharatna 1996). Economists too have been rather slow to employ famines as testing grounds for the FOH, although in recent years they have been making up for their earlier disinterest (Almond and Currie 2011). Here, by way of an introduction to the literature on severe malnutrition, famine and the FOH, I offer a review of studies published on the case study that has attracted most research so far, followed by a bibliography of work, mostly published, on FOH and famine from a range of disciplines. The bibliography contains separate sections on three case studies that have attracted a lot of attention: the Dutch Hungerwinter of 1944-45, the Finnish Male Birth Cohort Study (Osmond *et al.* 2007), and the Swedish Överkalix project (http://en.wikipedia.org/wiki/%C3%96verkalix_study). It should be noted that the Finnish and Swedish studies refer more to the

consequences of severe malnutrition than to those of famine specifically.

Two preliminary points about the costs implied by versions of the FOH seem worth making at the outset. First, the added cost imposed by FOH-related factors is likely to be small compared to the demographic cost in terms of lives lost. In the case of the Netherlands in 1944-45, for example, there might have been at most 450 cases of schizophrenia among survivors relative to twenty thousand or so lives lost to famine. Second, even though these added costs must be borne in mind, they do not necessarily mean that survivors on average would have been better off had there been no famine.

In the literature on the fetal origins hypothesis (FOH) the Dutch Hunger Winter of 1944-45 holds a special place. The resulting famine is the *locus classicus* for famine-related research on the link between fetal exposure to malnutrition, on the one hand, and adult health and disease susceptibility, on the other. It is far better documented and more extensively researched than any other historical episode employed as a 'natural experiment'. Even allowing for the broad interest in the FOH, the extent of the specialist literature based on the Hunger Winter is extraordinary (see Section A of the bibliography below).

The following pages offer a brief review of a literature that originated in the early 1970s with the work of husband-and-wife team

of Zena Stein and Ezra Susser. It bears noting that the original focus of South African-born Stein and Susser was on cognitive development rather heart disease, as in the early research of David Barker and his team. Stein and Susser were not the first scholars to be interested in the link between fetal origins and cognitive development, but they began early: Susser dated their initial interest back to 1952 (Stein *et al.* 1972, 1975: vi-vii). In 1967 Stein and Susser realized that the subjects of Clarence Smith's analysis of fetal growth during the Dutch Hunger Winter (Smith 1947) would by then have reached adulthood. The idea of a study that would overcome two difficulties with testing any version of the FOH—that of being able to study the required individual nutritional levels in 'free-living populations' and the long interval between fetal exposure and adulthood—germinated with an initial research proposal and visit to the Netherlands in 1968. Collaboration from the Dutch government and military was secured, along with research funding from the U.S. National Institutes of Health.

The project yielded its first fruits in 1972 (Stein, Susser, Saenger, and Marolla 1972a, 1972b) and the much-cited *Famine and Human Development: the Dutch Hunger Winter of 1944/45* followed in 1975. These works compared measures of cognitive development for Dutch conscripts exposed to famine *in utero* to conscripts born before and after the famine and to conscripts born in non-famine regions of the Netherlands. *Famine and Human Development* (1975) concluded with an acceptance that 'poor prenatal nutrition cannot be considered a

factor in the social distribution of mental competence among surviving adults in industrial societies' (1975: 236; compare Stein *et al.* 1972: 708), an outcome which Stein *et al.* described as 'negative'. Much later Zena Stein would relate how many colleagues were 'furious with us because it would have been much more satisfactory (in terms of social justice) to have found that food did matter' (Willcox and Stein 2003; see too Davey Smith and Susser 2002: 35). But they attributed their finding that 18-year old army recruits who had been *in utero* during the famine were *more* intelligent² than both recruits from non-famine areas and recruits born just before and after the famine in the affected area (see Figure 2a) to selection bias. This was because more resilient and better-resourced households, whose children were on average brighter, experienced less of a fertility decline during the famine than the remained. So what Stein and Susser initially deemed a disappointing outcome was due to the famine's impact on the social composition of famine birth cohort.³

The Dutch famine struck towards the end of World War II, when access to outside food supplies in the German-occupied, heavily urbanized western Netherlands was severely restricted for several months (Banning 1946; Dols and van Arcken 1946; Sellin 1946; Smith 1947; Hart 1993; Trienekens 2000; Futselaar 2009). The famine-affected

² From scores based on Raven's widely-used tests.

³ As noted below this finding has been contested by de Rooij, Wouters, *et al.* 2011.

area is shown in Figure 1. There is some slight ambiguity about precisely how long the accompanying famine lasted⁴, but Figure 2b, based on data in Stein *et al.* (1975: 244-46), tracks birth weights by month in the worst-affected part of the country and offers quite a precise guide to the famine's duration and intensity.

Although mortality was already rising before the famine, which makes estimating excess mortality tricky, it is likely that the famine resulted in about twenty thousand excess deaths in a population of 4.5 million. Age and gender were better predictors of death during the famine than socio-economic class. Thus in the Hague, for example, nearly four-fifths of all deaths from malnutrition in the first half of 1945 were of people aged 55 years and above. Those aged 20-39 years accounted for less than four per cent of the total (Banning 1946) [see Figure 3]. This must not be taken as evidence that the elderly suffered relatively more: the contrary is true, since they were also more vulnerable in non-crisis years.

Moreover, nearly two-thirds of those who died in the Hague at the famine's peak during the first three months of 1945 were male. The gender gap in mortality was much greater than usual during famines. The wartime context must partly account for the marked male disadvantage. There was a class aspect to the famine too; in the

⁴ Lumey *et al.* (2010) refer to a 'well-defined period lasting approximately six months'; but Stein, Zybert, and Lumey (2004) refer to 'an acute severe famine of seven months' duration', whereas Lumey and Stein ('In utero exposure', 1997) refer to 'a severe 5-month famine'. Scholte, van den Berg, and Lindeboom (2010) refer to '4 months', while Ralf Futselaar (2009) refers to the famine being at its most intense for about nine weeks (p. 47).

Hague the female share of deaths was 31.5 per cent in working-class households, 40.2 per cent in middle-class households, and 46.8 per cent in the relatively small number of upper-class households. Those who suffered most, relatively speaking, were prime-age males from working-class households. Deaths in working-class households were also more likely to be from malnutrition, although the share of all deaths in the Hague due to malnutrition was also significant in middle-class households, reaching two-fifths at the peak in April (Banning 1946; Human Mortality Database).

Food ration entitlements before and during the Hunger Winter are well documented, but a shortcoming of Dutch research on the FOH is that individual-level consumption levels at different stages of the famine are not. That the average mother was malnourished may be inferred by the low weights of full-term births during the famine but there is no hard evidence on how badly off individual mothers were. This is quite a serious but unavoidable shortcoming of the Dutch studies. The self-administered questionnaire on which Abeelen *et al.* base their 2011 paper contains questions about 'experience of hunger and weight loss' during the famine to which the women who agreed to participate could answer 'hardly', 'little', or 'very much'. The respondents were living in Utrecht between 1993 and 1997. Of those aged 0-9 years during the Hunger Winter 2,084 were categorized as having 'no' exposure, 1,557 'moderate' exposure, and 639 as severe' famine exposure. Given the severity of the crisis, these rates seem

implausibly modest, but Abeelen *et al.* do not distinguish between women born in the famine area and those born outside it. As Lumey and van Poppel (2010) complain, it is 'difficult' to establish the validity of such self-recall measures of individual-level nutrition (compare Kesternich *et al.* 2011).

Stein *et al.* (1975) made the point at the outset that 'Nutritional deprivation confined to the prenatal period may be too brief to produce much effect' and concluded that 'post-natal learning [might be] an attractive explanation for a great part of [the] differences among social strata' (1975: 236). However, the short duration of the Dutch famine is critical for research purposes because it permits analysis of the impact of exposure by trimester, a feature that research on the Hunger Winter has focused on from the start.

Between 1975 and 1990 Susser and Stein focused mainly on issues other than the Hunger Winter, and produced just a few papers related to it (e.g. Stein and Susser 1985; Susser 1989). With the arrival in Columbia in the early 1990s of Lambert H. Lumey from the Netherlands and the involvement of psychiatrist Ezra Susser (son of Stein and Susser), however, the output of the Columbia-based group began to grow. In an important paper published in 1992 Lumey identified 3G birth-weight effects using Hunger Winter data. The main focus in this period was on birth-weights, but Ezra Susser also co-authored two linked papers about the link between fetal origins and schizophrenia.

In 1995 Nigel Paneth and Mervyn Susser challenged the Southampton group led by David Barker to produce 'a much more careful and specific a priori formulation of the component parts of the baby's nourishment hypothesis' and then to subject this to rigorous testing and go further than loose hypothesis (Paneth and Susser 1995). Perhaps this was the gauntlet that prompted Barker to invade Columbia University's territory and to begin work on the Hunger Winter with a group of scholars based mainly at the Amsterdam Medical Centre of the University of Amsterdam?

Barker's FOH focused initially on the risk of coronary heart disease, not on cognitive or neural development (see Barker and Osmond 1986; Barker and Martyn 1992; Barker 1995). The first papers emanating from the AMC/Southampton group in 1998-99 concerned glucose tolerance, obesity, and hypertension rather than cognitive development or mental disease. Then in November 2000 Barker's Amsterdam group published a paper in *Heart* (Roseboom *et al.* 2000) which, according to one of its Dutch co-authors, provided 'the first evidence that undernutrition during gestation increases the risk of coronary heart disease'

[<http://news.bbc.co.uk/2/hi/health/1027845.stm>]. In another paper published in 2001 Barker's group claimed to have found 'the first evidence in humans that maternal undernutrition during gestation is linked with the risk of CHD in later life' (Roseboom, van der Meulen, *et al.* 2001). However, they added that the timing of malnutrition during

gestation was crucial, and that adult health might be compromised even though birth weight was unaffected, giving the FOH 'a new dimension'.

These papers cited the work of Susser, Stein, and their colleagues sparingly, and at the outset relations between the Columbia and AMC/Southampton groups seem to have been rather tense. Meanwhile research groups based at the Utrecht medical school (e.g. Elias *et al.* 2004) and at the Maastricht University Medical Center (e.g. Hughes *et al.* 2009, 2010) have also been active in the field. In the past the Utrecht group, which has recently been collaborating with the AMC (e.g. van Abeelen *et al.* 2011), has focused more on cancer and on early childhood rather than fetal origins, and the link between fetal and early childhood exposure with cancer has also been the main focus of Maastricht researchers.

- 1 *FERTILITY*. Lumey and Stein (1997) found that prenatal exposure had no effect on age at menarche, the proportion having no children, age at first delivery, or family size'. But the AMC group (2008) dispute this, finding that 'women who were exposed to the Dutch famine of 1944-1945 *in utero* are more reproductively successful than women who were not exposed to famine during their fetal development; they have more offspring, have more twins, are less likely to remain childless and start reproducing at a younger age' (Painter, Westerdorp, *et al.* 2008). They speculated

that under-nutrition in utero followed by better nutrition in early infancy or childhood might produce 'a female phenotype characterized by greater reproductive success'.

- 2 *HEART DISEASE*. As noted above the AMC/Southampton group have highlighted this aspect (e.g. Painter, de Rooij *et al.* 2006; Roseboom, van der Meulen, *et al.* 2000). But the literature reviews by Lumey *et al.* (2010) and Lumey and van Poppel (2010) conclude that research outcomes on CHD are 'inconclusive', having been 'reported for only one of the birth cohort studies for the Netherlands'. Research on the remote northern Swedish parish of Överkalix (Bygren, Kaati, and Edvinsson 2001) identifies 2G impact on CHD through lack of food during father's slow growth period (as compared to 3G impact on diabetes through too much food in grandfather's slow growth period).

A 2011 paper from the AMC/Utrecht group (van Abeelen *et al.* 2011) supports the link between exposure to famine and CHD and claims to be the first to find a lower risk of stroke in adulthood in exposed women. However, 'exposed' here refers not to fetal origins but to women of all ages (0-9, 10-17, and 18+ years).

- 3 *3G EFFECTS*. The AMC group failed to find 'transgenerational effects of prenatal exposure to famine on birthweight or on

cardiovascular and metabolic disease rates' (Painter, Osmond, *et al.* 2008), but claimed to have identified a link between G2 exposure in utero and increased G3 neonatal adiposity and poor health in later life. They claimed that their results were 'the first direct evidence' of 3G effects. This elicited a swift protest from Lumey and Stein (2009) that previous work of theirs had been ignored. To be fair, in an important paper published more than a decade earlier they had compared birth weights of children born to mothers exposed (or not) during the Hunger Winter, and the analysis led them to speculate that there might be 'long-term biological effects, even into the next generation, of maternal intrauterine nutrition, which do not correspond to the effects on the mothers' own birthweights' (Lumey and Stein 1997). Their finding that mothers exposed to the Hunger Winter early in gestation gave birth to underweight babies had a broader resonance, and was taken up by anthropologist Jared Diamond.⁵

⁵ Diamond (2000) puts it like this: 'The implication is that babies were somehow affected by the starvation of their grandmothers many decades earlier. This result might have been easier to understand if the mothers themselves had been underweight at birth or were small as adults. Neither was true. Recall that starvation in the first or second trimester produced babies with normal birth weights. Only third-trimester starvation led to small babies. Yet, paradoxically, when these small babies later became mothers, they gave birth to normal-size babies. It was the women who were themselves normal size at birth who became mothers babies. Yet, paradoxically, when these small babies later became mothers, they gave birth to normal-size babies. It was the women who were themselves normal size at birth who became mothers of underweight infants. Somehow the grandmothers' suffering programmed their children in utero so that the

4 *COGNITIVE FUNCTION*. Both the Columbia and AMC/Southampton groups have recently produced papers on the link between prenatal famine exposure and adult cognition. The former (Groot *et al.* 2011) found no link between fetal exposure and cognitive functioning at age 59—except for the faint possibility of a link with early pregnancy exposure—but the latter (de Rooij *et al.* 2010) identify an impact on selective attention in middle age. Using the Stroop task, they find that ‘at age 56 to 59, men and women exposed to famine during the early stage of gestation performed worse on a selective attention task, a cognitive ability that usually declines with increasing age’. The former corroborates research going back to Stein and Susser (who in 1972 found that cognitive performance in 19-year old male conscripts was unaffected by exposure to the famine before birth) but the claims for accelerated aging in the latter are novel and, naturally, have been taken up in the media⁶.

grandchildren would be affected. This astonishing result will undoubtedly inspire experiments aimed at identifying the still-unknown cellular mechanism.’

⁶ ‘World War II Dutch famine babies’ brains ‘aging faster’ , 13 September 2010 [<http://www.bbc.co.uk/news/health-11286462>].

- 5 *HEIGHT*: Much of the work on FOH and famine focuses on height, because this is the most easily identifiable outcome in the available data. For instance, Dercon and Porter (2010) report that children who aged under three years at the peak of the 1984 Ethiopian famine were at least 3 cm shorter in adulthood than those at less vulnerable ages (compare too Khoroshinina (2005) on the impact of the Leningrad blockade-famine). However, height has not been the focus of Dutch work.

Van den Brandt *et al.* (1997) report a positive association between height and the risk of breast cancer. So might growth stunting due to the Hunger Winter have reduced the incidence of cancer? One Dutch study that claims that fetal exposure had an effect on height is van Noord and Arias-Careaga (1995). This is the work of an Utrecht scientist and his Spanish co-author, based on results in the latter's dissertation. It found that height was reduced among women severely exposed to the famine which, van Noord and Arias-Careaga speculate, would square with an expected effect of a reduction in breast cancer risk.

- 6 *MENTAL DISORDERS*. Ezra Susser and Lin (1992) found that cohorts exposed to severe deprivation during the first trimester 'showed a substantial increase in hospitalized schizophrenia for women but not for men', concluding that their findings suggested gender-specific effects of early prenatal nutrition on the risk of

schizophrenia. The issue was taken up again in a more ambitious study by Susser *et al.* (1996), which found that the impact of early prenatal nutritional deficiency was not confined to women.⁷ Moreover, they found that only those born between October 15th and December 31st 1945, i.e. when the famine was at its peak, were affected; babies born between August 1 and mid-October 1945 (and thus conceived between the beginning of November 1944 and mid-January 1945) were unaffected (Susser *et al.* 1996: Figure 1). Next, Hoek *et al.* (1999) investigated the evidence for schizophrenia spectrum personality disorder, as distinct from schizophrenia *per se*, in men conceived at the height of the Hunger Winter. They found that the exposed cohort was much more likely to develop a schizoid personality disorder by age 18 years (see too Hoek *et al.* 1996).

- 7 *CANCER*. The Utrecht group claims that malnutrition increased the risk of breast cancer for women aged 2 to 33 years during the Hunger Winter (Elias *et al.* 2005). Painter *et al.* (2006) found an increased incidence of breast cancer among those conceived during the Hunger Winter, but the difference was not statistically significant. Another Maastricht paper (Hughes *et al.*

⁷ According to St. Clair *et al.* (2005) and Xu *et al.* (2009), the Great Leap famine doubled the risk of schizophrenia in adults, an outcome that 'almost exactly replicate[s] the Dutch findings'. Given the vast differences in economic contexts and scale of the two famines, exact replication is surely almost coincidental.

2009) claims to be the first to establish a link between 'severe environmental condition in adolescence or early adulthood' and the incidence of colorectal cancer in later life. Lumey *et al.* (2010) cite but do not discuss three papers on breast, prostate, and colon cancer by the Maastricht group (Dirx *et al.* 1999, 2001, 2003) and by van Noord and Kaaks (1991) because they were concerned with post-natal rather than *in utero* exposure.

Heijmans *et al.* (2008) and Tobi *et al.* (2009) found that fetuses exposed to famine early in pregnancy had lower rates of DNA methylation—a biochemical process which is important in the development of most kinds of cancer--than their same-sex siblings. The rate of methylation influences how much gene cells will synthesize. Almost simultaneously, the Maastricht group (Hughes *et al.* 2009) reported finding that exposure to famine in adolescence and young adulthood may produce persistent epigenetic changes that increase the risk of colorectal cancer.

- 8 *THE TRIVERS-WILLARD HYPOTHESIS.* Since bearing male children exacts a greater toll on mothers and male infants are less likely to survive, it is sometimes argued that, for evolutionary reasons, during famines the proportion of males born falls (e.g. Gibson and Mace 2003). This is what is known in the literature as the Trivers-Willard effect. In general the evidence in favour of the

hypothesis is thin. The Columbia group denies its presence in the Netherlands during the Hongerwinter on Hunger Winter (Stein, Zybert, and Lumey 2004; Cramer and Lumey 2010) and—see Figure 4—it is absent also in Ireland in the 1840s, in Leningrad in the 1940s, and in Finland in the 1860s (Ó Gráda 2009: 107-108).

9 *GENDER*. The literature on early childhood points to some gender differences in links between treatments and subsequent cognitive functioning. On the FOH and gender differences in general, the survey by Lumey *et al.* (2010) is quite equivocal, but it posits a gender effect on DNA methylation (citing Tobi *et al.* 2009). The Överkalix project highlights how parental food supply (poor in the case of the father, good in the case of the mother) reduced the risk of death from heart disease (Kaati *et al.* 2002), but its focus is on the pre-growth spurt period rather than on *in utero*.

10 *SELECTION*. As noted above, Stein *et al.* (1972, 1972) attributed their ‘negative’ result to selection bias. However, this problem—in a sense the original sin of studies like those described here (Bozzoli, Deaton, and Quintana-Domeque 2009)—has been rarely addressed. An exception is the important study by Lumey and Stein (1997) of the impact of exposure on birth weights of mothers and their children, in which they controlled for selection

by making 'pairwise comparisons of parity-specific birth weights with siblings'.⁸ Similarly the study of obesity by Stein, Rundle et al. (2009), that of DNA methylation by Heijmans, Tobi, *et al.* (2008), and that of cognitive functioning at age 59 by de Groot, Stein, *et al.* (2011) use siblings as controls. See too Lumey, Stein, *et al.* (2007); Stein, Kahn, *et al.* (2007). Using siblings as controls gets rid at least of selection due to time-invariant factors. This is not a feature of Southampton/Amsterdam studies.

Nearly four decades on, there is an amusing quality to the complaint of a reviewer of *Famine and Human Development* that Zena Stein and her co-authors had wrung 'the last ounce of juice from the subjects of the House of Orange' (A. M. Thomson, *Science*, (1976) 188: 832). Today the FOH/Hongerwinter enterprise rolls on, and with no signs of slackening. New research alliances are being formed: some of David Barker's Southampton team have spread their wings to Helsinki, while the Columbia group have plans to collaborate with the Umeå University group responsible for the northern Swedish Överkalix studies. The recent interest in epigenetics has probably broadened interest in their work; variants of the term 'epigenetic' entered the literature on the Hunger Winter only in the late 2000s.

⁸ Their conclusion (1997: 819) anticipates later findings: 'Long-term health effects after undernutrition may occur in the absence of a birth-weight effect, and may not be apparent even in its presence'.

Several of the principals have provided useful summaries of findings to date (e.g. Lumey and van Poppel 1994, 2010; Lumey, Stein, and Susser 2011). There seems to be broad agreement on a link between exposure and obesity (already noted in 1976 by Ravelli-Stein-Susser in a frequently-cited paper, although that study referred to males only) and on later life implications for the risk of diabetes, heart disease, and schizophrenia. The initial mutual hostility between the Columbia and AMC groups, and their tendency not to cite each other's work, has given way to healthier competition. But on some key issues, rival groups are producing conflicting results from seemingly very similar databases, and it is not clear whom to believe. I will mention two examples. In a recent paper Stein, Rundle, *et al.* (2009) could not replicate the 'couch-potato' finding of Lussana *et al.* (2008) that gestational exposure led to a preference for high fat foods. They put the 'discordant' findings down to 'sampling variability' (2009: 1559). And Lumey *et al.* (2010: 246) attribute the conflicting findings of the Columbia and Amsterdam groups regarding the impact of exposure on fertility to 'minor differences in the selected study populations and in the definitions of famine exposure'.⁹ Unfortunately, in epidemiological research replicability is not as straightforward as in the social sciences,

⁹ In a very useful recent survey Lumey and van Poppel (2010b) lament the 'diffuse and conflicting' nature of the findings of different studies, which they attribute to 'limited sample size and chance observations'. For that reason they must still be considered 'exploratory and hypothesis generating'. Lumey and van Poppel counsel 'common analytic strategies across comparable studies to further explore specific hypotheses'.

and research teams guard their databases jealously. From a social science and economic-historical perspective this is a regrettable outcome.

Both the AMC/Southampton and Columbia groups have broadened their focus considerably. A recent paper 'explores' the impact on sexual differentiation, on the basis that animal experiments have found that 'underfeeding of the mother can result in feminization of the male offspring', but finds that prenatal exposure to famine did not affect sexual orientation in men or in women'. But they add that 'the small sample size of participants with non-exclusively heterosexual identification (possibly due to underreporting of homosexuality) may have reduced our power to detect any differences.' There is a paper on irritable bowel syndrome which finds that 'exposure to severe wartime conditions *in utero was not associated* with the prevalence of IBS in adulthood', but that early-life exposure to severe wartime conditions *was*.

Research outcomes on the FOH and the Hunger Winter have a broad appeal. They have prompted advice to women not to try to lose weight during pregnancy, to the claim that it 'may have accelerated brain ageing'.¹⁰ And Jared Diamond has warned that we ignore the lessons of the Dutch Hunger Winter 'only at our children's, and our grandchildren's, expense'.

¹⁰ 'Birthweight link to lifelong health: <http://www.bbc.co.uk/news/health-14576961>;
<http://www.bbc.co.uk/search/news/?q=famine%20brain%20ageing>.

Finally, it is striking how little involvement there has been so far by Dutch economists and economic historians in FOH studies of the Dutch famine. This seems a pity, since some of the Dutch research has been rather insensitive to worries that matter more in the social sciences such as the small size of samples, various selection issues (likelihood to respond to questionnaires, socio-economic background of parents), the role of historical context, and replicability. The field seems ripe for interdisciplinary collaboration.

The rest of this paper consists of a bibliography of published work on the FOH and famine. It is in four sections. Section A contains both general items and case studies. Section B lists work so far on the Dutch Hunger Winter. Section C refers to studies based on the Finnish Cohort Finnish Male Birth Cohort. Section refers to papers published on the Swedish Överkalix Study. Work continues apace!

BIBLIOGRAPHY

A. Items bearing on the link between famine and the FOH generally (items relating to the Chinese Great Leap Forward famine are hi-lited in yellow)

Ahmed F. 2009. Epigenetics: tales of adversity. *Nature* 468[7327]: S20.

Almond D. 2006. Is the 1918 influenza pandemic over? Long-term effects of *in utero* influenza exposure in the post-1940 U.S. population. *Journal of Political Economy* 114: 672-712.

Almond D and Currie J. 2010. Human capital development before age 5. *Handbook of Labor Economics*, vol. 4b.

Almond D and Currie J. 2011. Killing me softly: the fetal origins hypothesis, *Journal of Economic Perspectives*, 25[3]: 153-72.

Almond D, Edlund L, Li H, and Zhang J. 2010. Long-term consequences of early life development: evidence from the 1959 to 1961 China famine, In Takatoshi Ito and Andrew Rose, eds., *The Economic Consequences of Demographic Growth in East Asia*, Chicago: University of Chicago Press, pp. 321-45.

Almond D, & Mazumder B. 2005. The 1918 influenza pandemic and subsequent health outcomes: An analysis of SIPP data. *American Economic Review*, 95: 258-262.

Almond D and Mazumder B. 2011. Health capital and the prenatal environment: the effect of maternal fasting during pregnancy. *American Economic Journal: Applied Economics*, forthcoming.

Amato I. 2009. Genes Take A Back Seat: Epigenetics, the molecular framework that controls genes' expression, takes its cues from both nature and nurture. *Chemical and Engineering News* 87[14]: 28-32 (April 6).

Andersson R and Bergstrom S. 1998. Is maternal malnutrition associated with a low sex ratio at birth? *Human Biology*. 70: 1101-6.

Angell-Andersen E., S. Tretli, R. Bjerknes, T. Forsen, T. I. A. Sorensen, et al. 2004. The association between nutritional conditions during World War II and childhood anthropometric variables in the Nordic countries. *Annual Human Biology*. 31:342-55.

Banerjee A, Duflo E, Postal-Vinay G, Watts T. 2010. Long run impacts of income shocks: wine and phylloxera in 19th century France. *Review of Economics and Statistics* 92[4]: 714-28.

Banning C. 1946. Food shortage and public health, first half of 1945: the Netherlands during German occupation. *Annals of the American Academy of Political and Social Science*, 245: 93-11.

Barber J and Dzeniskevich A, eds. 2005. *Life and Death in Besieged Leningrad, 1941–44*. Basingstoke: Palgrave Macmillan.

Barker DJ and Osmond C. 1986. Infant mortality, childhood nutrition, and ischaemic heart disease in England and Wales. *Lancet* 327(8489): 1077-1081.

Barker DJ and Martyn CN. 1992. The maternal and fetal origins of cardiovascular disease. *Journal of Epidemiology and Community Health* 46:8–11.

Barker DJ. 1995. Fetal origins of coronary heart disease, *British Medical Journal* 311(6998): 171-174.

Bengtsson T and Lindström M. 2003, Airborne infectious diseases during infancy and mortality in later life in southern Sweden, 1766–1894, *International Journal of Epidemiology* 32:286–294.

Bosch, Alinda. 2005. *Adolescents Reproductive Health in Rural Bangladesh: the Impact of Early Childhood Nutritional Anthropometry*. Amsterdam: Dutch University Press [available online].

Bozzoli, Carlos, Angus Deaton, and Climent Quintana-Domeque. 2009. Adult health and childhood disease. *Demography*, 46[4]: 647–669.

Brandt, L., A. Siow, & C. Vogel. 2008. Large shocks and small changes in the marriage market for famine born cohorts in China, University of Toronto, Department of Economics Working Paper 334.

Broad KD and Browne EB. 2011. Placental protection of the fetal brain during short-term food deprivation. *Proceedings of the National Academy of Sciences*, August 2.

Brown, R. 2011. The 1918 U.S. influenza epidemic as a natural experiment, revisited. Duke University, typescript [available online].

Buckles K and Hungerman D. 2010. Season of birth and later outcomes: old questions, new answers, mimeo.

Burger G, Stanstead H, Drummond J. 1948. *Malnutrition and starvation in Western Netherlands, September 1944–45. Part I and II*. The Hague: General State Printing Office

Cai Y. and W. Feng. 2005. Famine, social disruption, and involuntary fetal loss: evidence from Chinese survey data. *Demography* 42:301–22.

Case A and Paxson C. 2008. Stature and status: height, ability, and labor market outcomes. *Journal of Political Economy* 116(3): 499–532.

Case A and Paxson C. 2010. Causes and consequences of early life health, N.B.E.R. Working Paper 15637.

Chen Y and Zhou L. 2007. The long-term health and economic consequences of the 1959–1961 famine in China. *Journal of Health Economics*. 26(4): 659–681.

Cutler DM, Miller G, Norton DM. 2007. Evidence on Early-Life Income and Late-Life Health from America's Dust Bowl Era. *Proceedings of the National Academy of Sciences of the United States of America* 104[No. 33]:13244–49.

Deaton A. 2010. Instruments, randomization, and learning about development. *Journal of Economic Literature* 48(2): 424–55.

Dercon, Stefan and Catherine Porter. 2010. Live aid revisited: long-term impacts of the 1984 Ethiopian famine on children, typescript.

Diamond J. 2000. War babies. In Ceci SJ and Williams WM, eds. *The Nature-Nurture Debate: the Essential Readings*. New York: Wiley-Blackwell.

Dikötter 2010. *Mao's Great Famine: the History of China's Most Devastating Catastrophe*. New York: Walker.

Doblhammer G. 2004. *The Late Life Legacy of Very Early Life*, Berlin: Springer.

Doblhammer G and Vaupel JW. 2001. Lifespan depends on month of birth, *Proceedings of the National Academy of Sciences* 98(5): 2934–2939.

Doblhammer G, van den Berg G, and Lumey LH. 2010. Long-term effects of famine on life expectancy: a re-analysis of the Great Finnish Famine of 1866–1868, paper presented at the European Population Conference, Vienna.

- Dols MJL, van Arcken JAM. 1946. Food supply and nutrition in the Netherlands during and immediately after World War II *Milbank Memorial Fund Quarterly* 24: 319–58.
- Dubos R, Savage D, Schaedler R. 1966. Biological Freudianism: lasting effects of early environmental influences. *Pediatrics* 38: 789–800.
- Ellison GT and Kelly M. 2005. Growth of Jersey schoolchildren during the 1940–1945 German occupation: comparison with schoolchildren on mainland Britain. *Human Biology*. 77: 761–72.
- Forsdhal, Anders. 1977. Are poor living conditions in childhood and adolescence an important risk factor for arteriosclerotic heart disease? *British Journal of Preventive Social Medicine*. 31: 91-5.
- Forsdahl A. 1978. Living conditions in childhood and subsequent development of risk factors for arteriosclerotic heart disease. *Journal of Epidemiology and Community Health* 32:34–37.
- Fung, Winnie and Ha W. 2010. Intergenerational effects of the 1959-61 China famine, in Ricardo Fuentes-Neva and Papa A. Seck, eds. *Risks, Shocks, and Human Development: On the Brink*. London: Palgrave Macmillan, pp. 224-254.
- Futselaar R. 2009. *Lard, Life and Longevity: the Standard of Living in Occupied Denmark and the Netherlands, 1940-1945*. Amsterdam: Amsterdam University Press.
- Garthwaite, Craig. 2008. The effect of in-utero conditions on long term health: evidence from the 1918 Spanish flu epidemic, typescript, University of Maryland.
- Gibson MA, Mace R. 2003. Strong mothers bear more sons in rural Ethiopia. *Proceedings Royal Society: Biological Sciences*, 270: S108-S109.
- Gillespie DOS, Russell AF & Lummaa V. 2008. When fecundity does not equal fitness: evidence of a quantity-quality trade-off in pre-industrial humans. *Proceedings of the Royal Society of London: Biological Sciences* 275, 713-722.
- Gørgens T, Meng X, and Viathianathan R. 2012. Stunting and selection effects of famine: a case study of the Great Chinese Famine. *Journal of Development Economics*, 97(1): 99-111.
- Grantham-McGregor S. 1995. A review of studies of the effect of severe malnutrition on mental development. *Journal of Nutrition* 125(8 Suppl. S): 1413-26.

- Hales CN and Barker DJ. 2001. The thrifty phenotype hypothesis. *British Medical Bulletin* 60: 5–20.
- Harding JE. 2001. The nutritional basis of the fetal origins of adult disease. *International Journal of Epidemiology* 30: 15–23.
- Hart N. 1993. Famine, Maternal nutrition and infant mortality: a re-examination of the Dutch Hunger Winter. *Population Studies* 47[1]: 27–46.
- Hatton TJ. 2010. Infant mortality and the health of survivors: Britain, 1910–50 *Economic History Review* 64[3]: 951-972.
- Hatton TJ. 2011. How have Europeans grown so tall? CEPR DP No. 8490, July.
- Havari E and Peracchi F. 2011. Childhood circumstances and adult outcomes: Evidence from SHARELIFE [available at: http://www.eief.it/files/2011/11/wp-15-childhood-circumstances-and-adult-outcomes_evidence-from-sharelife.pdf].
- Hertzog M, Birch H, Richardson S, and Tizard J. 1972. Intellectual levels of school children severely malnourished during the first two years of life. *Pediatrics* 49(6): 814-824.
- Hionidou, Violetta. 2006. *Famine and Death in Occupied Greece 1941-1944*. Cambridge: Cambridge University Press.
- Huang, Cheng. 2011. Famine exposure and adult height: disentangling stunting from survival selection.
- Huang, Cheng, and Irma T. Elo. 2008. Mortality of the oldest old Chinese: the role of early-life nutritional status, socio-economic conditions, and sibling sex-composition. *Population Studies*. 63: 7-20.
- Huang C, Li Z, Wang M, and Martorell R. 2010. Early life exposure to the 1959-61 Chinese famine has long-term health consequences. *Journal of Nutrition*. 140: 1874-1878.
- Huang C, Li Z, Venkat Narayan KM, Williamson DF, and Martorell R. 2010. Bigger babies born to women survivors of the 1959-61 Chinese famine: a puzzle due to survivor selection? *Journal of Developmental Origins of Health and Disease*. 1: 412-418.
- Hult, Martin, Per Tornhammer, Peter Ueda, Charles Chima, Anna-Karin Edstedt Bonamy, Benjamin Ozumba, and Mikael Norman. 2010. Hypertension, diabetes and overweight: looming legacies of the Biafran famine. *Plos ONE*. 5[10]: e13582.

- Joseph, KS and Michael S Kramer. 1996. Review of the evidence on fetal and early childhood antecedents of adult chronic disease. *Epidemiological Reviews* 16[2]: 158-74.
- Jürges H. 2011. Collateral damage: Educational attainment and labor market outcomes among German war and post-war cohorts, mimeo.
- Kannisto V, Christensen K & Vaupel JW. 1997. No increased mortality in later life for cohorts born during famine. *American Journal of Epidemiology* 145(11): pp. 987-994.
- Kermack WO, McKendrick AG, and McKinley PL. 1934. Death rates in Great Britain and Sweden: some general regularities and their significance. *Lancet* 1: 698-703.
- Kesternich I, Siflinger B, Smith J, and Winter J. 2011. The effects of World War 2 on Health outcomes across Europe. Paper presented to the Princeton University Conference on Fetal Origins, Early Childhood Development, and Famine, 13 September.
- Khoroshinina L. 2005. Long-term effects of lengthy starvation in childhood among survivors of the siege. In Barber and Dzeniskevich, *Life and Death in Leningrad*, pp. 197-212.
- Kim S, Deng Q, Fleisher BM and Li S. 2010. The lasting impact of mothers fetal malnutrition on their offspring: evidence from the China Great Leap Forward Famine. IZA Discussion Paper 5194.
- Kin CF, Shan WS, Shun LJ, Chung LP and Jean W. 2007. Experience of famine and bone health in post-menopausal women. *International Journal of Epidemiology*. 36(5): 1143-50.
- Klemp M and Weisdorf J. 2011. The lasting damage to mortality of early-life adversity: evidence from Englands famine of the late 1720s *European Review of Economic History*, forthcoming.
- Koupil I, Shestov D, Sparén P, Plavinskaja S, Parfenova N, and Vågerö D. 2007. Blood pressure, hypertension and mortality from circulatory disease in men and women who survived the siege of Leningrad *European Journal of Epidemiology* 22(4): 223-234.
- Koupil I, Plavinskaja S, Parfenova N, Shestov DB, Danziger PD, Vagero D. 2009. Cancer mortality in women and men who survived the siege of Leningrad (1941–1944). *Int. J. Cancer* 124: 1416–21.
- Kozlov I and Samsonova A. 2005. The impact of the siege on the physical development of children. In Barber and Dzeniskevich, *Life and Death in Leningrad*, pp. 1174-196.

- Kuh D, Davey-Smith G. 1993. When is mortality risk determined? Historical insights into a current debate. *Social History of Medicine* 6:101–123.
- Kuzawa CW. 2005. Fetal origins of developmental plasticity: are fetal cues reliable predictors of future nutritional requirements? *American Journal of Human Biology* 17: 5-21.
- Lee C. 2011. In-utero exposure to the Korean War and its long-term effects on economic and health outcomes. Typescript, Seoul National University, May.
- Li Y, He Y, Qi L, Jaddoe VW, Feskens EJ, *et al.* 2010. Exposure to the Chinese Famine in early life and the risk of hyperglycemia and type 2 diabetes in adulthood. *Diabetes* 59: 2400–6.
- Lindeboom M, Portrait F, and van den Berg GJ. 2010. Long-run effects on longevity of a nutritional shock early in life: the Dutch Potato Famine of 1846-1847, *Journal of Health Economics* 29(5): pp. 617-629.
- Lucas A, Fewtrell MS, Cole TJ. 1999. Fetal origins of adult disease—the hypothesis revisited. *British Medical Journal*. 319:245–49.
- Lummaa V. 2001. Reproductive investment in pre-industrial humans: consequences of offspring number, gender and survival. *Proceedings of the Royal Society of London Series B* 268: 1977-1983.
- Lummaa V. 2003. Early developmental conditions and reproductive success in humans: downstream effects of prenatal famine, birthweight, and timing of birth. *American Journal of Human Biology* 15[3]: 370-79.
- Lummaa V and Tremblay M. 2003. Month of birth predicted reproductive success and fitness in pre-modern Canadian women. *Proceedings of the Royal Society: Biological Sciences* 270(1531): 2355–61.
- Luo, Z, Mu R, and Zhang X. 2006. Famine and overweight in China. *Review of Agricultural Economics* 28(3): 296-304.
- Macintyre, K. 2002. Famine and the female mortality advantage, in T. Dyson and C. Ó Gráda, eds. *Famine Demography*. Oxford: OUP, pp. 240-60.
- Maharatna A. 1996. *The Demography of Indian Famines: an Indian Historical Perspective*. Delhi: OUP.

Marmot M. 2001. 'Aetiology of heart disease: fetal and infant growth and socioeconomic factors may act together. *British Medical Journal* 323:1261.

Mu, Ren and Xiabo Zhang. 2011. Why does the Great Chinese Famine affect the male and female survivors differently? Mortality selection versus son preference. *Economics and Human Biology* 9[1]: 92-105.

Meng, X and Qian N. 2006. The long-run consequences of famine on survivors: evidence from a unique natural experiment using China's Great Famine, N.B.E.R. Working Paper 14917.

Modi N, Murgasova D, Ruager-Martin R, Thomas EL, Hyde MJ, Gale C, Santhakumaran S, Doré CJ, et al. 2011. The influence of maternal body mass index on infant adiposity and hepatic lipid content. *Pediatric Research* 70: 287-291.

Moore SE. 1998. Nutrition, immunity and the fetal and infant origins of disease hypothesis. *Proceedings of the Nutrition Society* 57: 241-41.

Moore SE, Cole TJ, Collinson AC, Poskitt EM, McGregor IA, Prentice AM. 1999. Prenatal or early postnatal events predict infectious deaths in young adulthood in rural Africa. *International Journal of Epidemiology* 28:1088-95.

Moore SE, Cole TJ, Poskitt EM, Sonko BJ, Whitehead RG, et al. 1997. Season of birth predicts mortality in rural Gambia. *Nature* 388: 434.

Moore SE, Halsall I, Howarth D, Poskitt EM, Prentice AM. 2001. Glucose, insulin, and lipid metabolism in rural Gambians exposed to early malnutrition. *Diabetic Medicine* 18: 646-53.

Moore SE, Fulford AJ, Streatfield PK, Persson LA, Prentice AM. 2004. Comparative analysis of patterns of survival by season of birth in rural Bangladeshi and Gambian populations. *International Journal of Epidemiology* 33: 137-43.

Morgan SL. 2007. Stature and Famine in China: The Welfare of the Survivors of the Great Leap Forward Famine, 1959-61. Paper presented at the Asia Pacific Economic and Business History Conference, University of Sydney, 12-14 February.

Mu R, Luo Z and Zhang X. 2006. Famine and Overweight in China. *Review of Agricultural Economics* 28(3): 296-304.

Mu R, Yang Z, Zhao W, Zhang X, Zhai Y, Kong L and Chen C. 2008. Impact of famine during pregnancy and infancy on health in adulthood. *Obesity Reviews* 9 (Suppl. 1), 95-99.

Mu R and Zhang X. 2008. Gender Difference in the Long-run Impact of Famine, IFPRI Discussion Paper 00760, March.

Neelsen S and Stratmann T. 2011. Effects of parental and early life nutrition: evidence from the Greek famine. *Journal of Health Economics* 30[3]: 479-488.

Nicoletto SL and Rinaldi A 2011. In the womb's shadow: the theory of prenatal programming as the fetal origin of various adult diseases is increasingly supported by a wealth of evidence *EMBO reports* 12:30-34.

Osmani S and Sen A. 2003. The hidden penalties of gender inequality: fetal origins of ill-health. *Economics and Human Biology* 1: 105–121.

Paneth N and Susser M. 1995. Early origin of coronary heart disease (the "Barker hypothesis"): hypotheses, no matter how intriguing, need rigorous attempts at refutation. *British Medical Journal* 310: 411–412.

Phillips DIW. 2006. External influences on the fetus and their long-term consequences. *Lupus* 15[11]: 794-800.

Ó Gráda C. 1999. *Black '47 and Beyond: the Great Irish Famine in History, Memory and Economy*. Princeton: Princeton University Press.

Ó Gráda C. 2009. *Famine: A Short History*. Princeton: Princeton University Press.

Ó Gráda C. 2011. Great leap into famine. *Population and Development Review*. 37(1): 191-202.

Osmani S and Sen A. 2003. The hidden penalties of gender inequality: fetal origins of ill-health. *Economics and Human Biology* 1: 105–121.

Paul Annie Murphy. 2010. How the first nine months shape the rest of your life. *Time Magazine* Sept. 22.

Porter C. 2009. The long term impact of severe shocks in childhood: evidence from the Ethiopian famine of 1984, typescript.

Rasmussen, Kathleen M. 2001. The "fetal origins" hypothesis: challenges and opportunities for maternal and child nutrition. *Annual Reviews of Nutrition* 21: 73–95.

Rickard IJ, Holopainen J, Amuli S, Elama H, Helle S, Russell AF, Irpi V, Ummaa L. 2010. Food availability at birth limited reproductive success in historical humans. *Ecology* 91[12]: 3515-25.

Rush D, Stein Z, Susser M. 1980. A randomized controlled trial of prenatal nutritional supplementation in New York City. *Pediatrics* 65[4]: 683-97

St. Clair D, Xu M, Wang P, Yu Y, Fang Y, Zhang F, Zheng X, Gu N, Feng G, Sham P, and He L. 2005. Rates of adult schizophrenia following prenatal exposure to the Chinese Famine of 1959-1961, *Journal of the American Medical Association* 294(5): 557-562.

Schick A and Steckel RH. 2011. 'Height as a proxy for cognitive and non-cognitive ability' NBER Working Paper 16570 [http://www.nber.org/papers/w16570].

Schultz TP. 2010. Health Human Capital and Economic Development. *Journal of African Economies*, 19(suppl 3): iii12-iii80.

Sellin T. 1946. The Netherlands during German Occupation. *Annals of the American Academy of Political and Social Science* 245: i-180.

Sharygin, E. 2010. Stunting and selection effects of famine: a case study in Russia. Paper presented to the 2010 University of Melbourne Conference on Modern Famines [available at: <http://regconf.hse.ru/uploads/9ffefa6f2d2ef44b7aa7bd62b8e87191a5d1f359.pdf>].

Shi Xinzheng. 2008. Famine, fertility and fortune in China. University of Michigan Working Paper.

Silventoinen K, Zdravkovic S, Skytthe A, McCarron P, Herskind AM, Koskenvuo M, de Faire U, Pedersen N, Christensen K and Kaprio J. 2006. Association between Height and Coronary Heart Disease Mortality: A Prospective Study of 35,000 Twin Pairs. *American Journal of Epidemiology* 163[7]: 615-21.

Smith CA. 1947. Effects of wartime starvation in Holland on pregnancy and its products. *American Journal of Obstetrics and Gynecology*. 53: 599-608.

Song S. 2010. Mortality Consequences of the 1959-1961 Great Leap Forward Famine in China: debilitation, selection, and mortality crossovers. *Social Science & Medicine* 71(3):551-558 [version available at: <http://www.escholarship.org/uc/item/92p3c5pf?display=all#page-3>].

Song S. 2011. Assessing the intergenerational Effect of Prenatal Exposure to Acute Malnutrition on Infant Mortality: Evidence from the 1959-1961 Great Leap Forward Famine in China. *Paper presented at the 2011 Population Association of America meetings*.

Song S, Hu P, and Wang W. 2009. Famine, death, and madness: schizophrenia in early adulthood after prenatal exposure to the Chinese Great Leap Forward Famine. *Social Science & Medicine* 68(7):1315-1321.

Song S. 2009. Does famine have a long-term effect on cohort mortality? Evidence from the 1959-1961 Great Leap Forward Famine in China. *Journal of Biosocial Science* 41(4): 469-491

Song S. 2010. Does famine have long-term effects on female fecundity? Evidence from the Great Leap Forward Famine in China [available at: <http://paa2010.princeton.edu/download.aspx?submissionId=100166>]

Sparén P, Vågerö D, Shestov DB, Plavinskaja S, Parfenova N, Hoptiar V, Paturot D, and Galanti MR. 2003, Long term mortality after severe starvation during the siege of Leningrad: prospective cohort study, *British Medical Journal*, doi:10.1136/bmj.37942.603970.9A.

Stanner SA, Bulmer K, Andrès C, Lantseva OE, Borodina V, Poteen VV and Yudkin JS. 1997. Does malnutrition in utero determine diabetes and coronary heart disease in adulthood? Results from the Leningrad Siege Study. *British Medical Journal* 315(7119): 1342-1348.

Stanner SA and Yudkin JS. 2001. Fetal programming and the Leningrad Siege study. *Twin Research*. 4: 287–292.

Stein AD, Barnett PG, and Sellen DW. 2004. Maternal undernutrition and the sex ratio at birth: evidence from a national sample. *Proceedings Royal Society B (Biological Sciences)*, 271: S37-S39.

Trienekens, G. 2000. The food supply in the Netherlands during the Second World War, in David F. Smith and Jim Phillips, eds. *Food, Science, Policy and Regulation in the Twentieth Century*. London: Routledge, pp. 117-134.

Trivers RL and Willard RE. 1973. Natural selection and the ability to vary the sex ratio of offspring. *Science*. 179 (4068): 90-92.

Umana-Aponte M. 2011. Long-term effects of a nutritional shock: the 1980 famine of Karamoja, Uganda [available at: www.bris.ac.uk/cmpo/publications/papers/wp258.pdf].

Van den Berg GJ, Doblhammer-Reiter G, and Christensen K. 2008. Being born under adverse economic conditions leads to a higher cardiovascular mortality rate later in life: evidence based on individuals born at different stages of the business cycle, I.Z.A. Discussion Paper 3635.

Van den Berg GJ, Doblhammer G, and Christensen K. 2009. Exogenous determinants of early-life conditions, and mortality later in life, *Social Science & Medicine* 68: 1591–1598.

Van den Berg, GJ, Lindeboom M, and Portrait F. 2006. Economic conditions early in life and individual mortality. *American Economic Review* 96(1):290-302.

Van Ewijk, Reyn. 2009. Long-term health effects on the next generation of Ramadan fasting during pregnancy. *Journal of Health Economics* forthcoming.

Woods RI. 2009. *Death before Birth: Fetal Health & Mortality in Historical Perspective* Oxford: Oxford University Press.

Xu MQ, Sun WS, Liu BX, Feng GY, Yu L, Yang L, et al. 2009. Prenatal malnutrition and adult schizophrenia: further evidence from the 1959-1961 Chinese famine, *Schizophrenia Bulletin* 35(3): 568-76.

Xu G. 2011. Long-run consequences of natural disasters: evidence from Tangshan [available at: http://econstor.eu/bitstream/10419/48351/1/82_xu.pdf]

Yang Z, Zhao W, Zhang X, Mu R, Zhai Y, et al. 2008. Impact of famine during pregnancy and infancy on health in adulthood. *Obesity Reviews* 9(Suppl. 1): 95-99.

Zhou, L and Corruccini RS. 1998. Enamel hypoplasias related to famine stress in living Chinese *American Journal of Human Biology* 10: 723-733.

B. Studies using Dutch Hunger Winter Databases (by date):

2011:

- 1 de Groot RH, Stein AD, Jolles J, van Boxtel MP, Blauw GJ, van de Bor M, Lumey LH. 2011. Prenatal famine exposure and cognition at age 59 years. *International Journal of Epidemiology* 40(2): 327-37.
- 2 de Rooij SR, Painter RC, Phillips DI, Raikkonen K, Schene AH, Roseboom TJ. 2011. Self-reported depression and anxiety after prenatal famine exposure: mediation by cardio-metabolic pathology?. *Journal of Developmental Origins of Health and Disease* 2(3): 136-143.
- 3 de Rooij SR, Veenendaal MV, Räikkönen K, Roseboom TJ. 2011. Personality and stress appraisal in adults prenatally exposed to the Dutch famine. *Early Hum Dev.* Sep 26.
- 4 de Rooij SR, Costello PM, Veenendaal MV, Lillycrop KA, Gluckman PD, Hanson MA, Painter RC, Roseboom TJ. 2011. Associations between DNA methylation of a glucocorticoid receptor promoter and acute stress responses in a large healthy adult population are largely explained by lifestyle and educational differences. *Psychoneuroendocrinology*. Oct 4.
- 5 Lumey LH, Stein AD and Susser E. 2011. Prenatal famine and adult health. *Annual Reviews of Public Health* 32: 237-262.
- 6 Roseboom TJ, Painter RC, de Rooij SR, van Abeelen AF, Veenendaal MV, Osmond C, Barker DJ. 2011. Effects of famine on placental size and efficiency. *Placenta*. 32(5): 395-9.
- 7 Roseboom TJ, Painter RC, van Abeelen AF, Veenendaal MV, de Rooij SR. 2011. Hungry in the womb: What are the consequences? Lessons from the Dutch famine. *Maturitas* 27 July.
- 8 Tobi EW, Heijmans BT, Kremer D, Putter H, Delemarre-van de Waal HA, Finken MJ, Wit JM, and Slagboom PE. 2011. DNA methylation of IGF2, GNASAS, INSIGF and LEP and being born small for gestational age. *Epigenetics* 6(2)
- 9 van Abeelen AF, de Rooij SR, Osmond C, Painter RC, Veenendaal MV, Bossuyt PM, Elias SG, Grobbee DE, van der Schouw YT, Barker DJ, Roseboom TJ. 2011. The sex-specific effects of famine on the association between placental size

and later hypertension *Placenta*, July 9.

- 10 van Abeelen AFM, Elias SJ, Bossuyt PMM, Grobbee DE, van der Schouw YT, Roseboom TJ, and Uiterwaal CSPM. 2011. Cardiovascular consequences of famine in the young. *European Heart Journal*, published August 25.

2010:

- 1 Cramer JS and Lumey LH. 2010. Maternal preconception diet and the sex ratio. *Human Biology*. 82(1): 103-7.
- 2 de Rooij SR, Wouters H, Yonker JE, Painter RC, Roseboom TJ. 2011. Prenatal undernutrition and cognitive function in late adulthood. *Proceedings of the National Academy of Sciences* 107: 16881–16886.
- 3 Haars G, Van Gils CH, Elias SG, Lokate M, Van Noord PAH, Peeters PHM. 2010. The influence of a period of caloric restriction due to the Dutch famine on breast density. *International journal of cancer: Journal international du cancer* 126[9]: 2211-15.
- 4 Hughes LAE, van den Brandt PA, Goldbohm RA, de Goeij AFPM, de Bruine AP, van Engeland M, Weijnenberg MP. 2010. Childhood and adolescent energy restriction and subsequent colorectal cancer risk: results from the Netherlands Cohort Study. *International Journal of Epidemiology* 39(5): 1333-44.
- 5 Lumey LH and van Poppel F. 2010a. De Hongerwinter als laboratorium; prenatale blootstelling aan ondervoeding en de gevolgen voor de gezondheid later in de levensloop, in L. Bonneux, ed. *De gezonde levensloop; een geschenk van vele generaties*. Boekaflevering *Mens & Maatschappij* 85, Amsterdam: Amsterdam University Press, pp. 57-82.
- 6 Lumey LH and van Poppel F. 2010b. Prenatal famine and adult disease. *Bijdrage M en M* Aug 19.
- 7 Roseboom T and van de Krol R. 2010. *Babys van de hongerwinter, de onvermoede erfenis van ondervoeding*, Amsterdam: Augustus.
- 8 Scholte, Robert S, Gerard J. van den Berg, & Maarten Lindeboom. 2010. The long-run effects of birth in the Dutch Hunger Winter on income and hospitalization. Typescript [available at: http://www.smye2011.org/fileadmin/fe_user/rscholte/con_per315.pdf

- 9 Schulz, Laura C. 2010. The Dutch Hunger Winter and the developmental origins of health and disease. *Proceedings of the National Academy of Sciences* 107(39): 16757–16758.
 - 10 Stein AD, Kahn HS, and Lumey LH. 2010. The 2D:4D digit ratio is not a useful marker for prenatal famine exposure: evidence from the Dutch hunger winter families study. *American Journal of Human Biology* 22(6): 801-6.
- 2009:
- 1 Hughes LAE, van den Brandt PA, de Bruine AP, Wouters KAD, Hulsmans S, Spiertz A, Goldbohm RA, van Engeland M et al. 2009. Early life exposure to famine and colorectal cancer risk: a role for epigenetic mechanisms. *PLoS ONE*, 4[11]: e7951.
 - 2 Heijmans BT, Tobi EW, Lumey LH, Slagboom PE. 2009. The epigenome: archive of the prenatal environment *Epigenetics* 4: 526-31.
 - 3 de Rooij SR, Painter RC, Swaab DF, Roseboom TJ. 2009. Sexual orientation and gender identity after prenatal exposure to the Dutch famine. *Archives of Sexual Behavior* 38: 411–16.
 - 4 Kahn HS, Graff M, Stein AD, Lumey LH. 2009. A fingerprint marker from early gestation associated with diabetes in middle age: the Dutch Hunger Winter Families Study *International Journal of Epidemiology* 38(1): 101-9.
 - 5 Klooker TK, Braak B, Painter RC, de Rooij SR, van Elburg RM, et al. 2009. Exposure to severe wartime conditions in early life is associated with an increased risk of irritable bowel syndrome: a population-based cohort study *American Journal of Gastroenterology* 104: 2250–56.
 - 6 Lumey LH, Stein AD, Kahn HS. 2009. Food restriction during gestation and impaired fasting glucose or glucose tolerance and type 2 diabetes mellitus in adulthood: evidence from the Dutch Hunger Winter Families Study. *Journal of Developmental Origins of Health and Disease* 1: S164.
 - 7 Lumey LH, Stein AD, Kahn HS. 2009. Food restriction during gestation and a metabolic syndrome in later life: evidence from the Dutch Hunger Winter Families Study, *Journal of Developmental Origins of Health and Disease* 1(S1): S25.
 - 8 Lumey LH and Stein AD. 2009. Transgenerational effects of prenatal exposure to the Dutch famine: a comment. *British*

Journal of Obstetrics and Gynaecology 116(6): 868, [with a reply by Painter *et al.*]

- 9 Lumey LH, Stein AD, Kahn HS, Romijn JA. 2009. Lipid profiles in middle-aged men and women after famine exposure during gestation: the Dutch Hunger Winter Families Study. *American Journal of Clinical Nutrition* 89(6):1737-1743.
 - 10 Lumey LH and Stein AD. 2009. Increased reproductive success of women after prenatal undernutrition? *Hum Reproduction* 24(2):491-2.
 - 11 Stein AD, Rundle A, Wada N, Goldbohm RA and Lumey LH. 2009. Associations of gestational exposure to famine with energy balance and macronutrient density of the diet at age 58 years differ according to the reference population used. *Journal of Nutrition* 39(8): 1555-61.
 - 12 Stein AD, Pierik FH, Verrips GH, Susser ES and Lumey LH. 2009. Maternal exposure to the Dutch famine before conception and during pregnancy: quality of life and depressive symptoms in adult offspring. *Epidemiology* 20(6): 909-15.
 - 13 Susser M and Stein Z. 2009. *Eras in Epidemiology: The Evolution of Ideas*. Oxford: OUP.
 - 14 Tobi EW, Lumey LH, Talens RP, Kremer D, Putter H, Stein AD, Slagboom PE, and Heijmans BT. 2009. DNA methylation differences after exposure to prenatal famine are common and timing- and sex-specific. *Human Molecular Genetics* 18(21): 4046-53.
 - 15 van Hoek M, Langendonk JG, de Rooij SR, Sijbrands EJG, Roseboom TJ. 2009. A genetic variant in the IGF2BP2 gene may interact with Fetal Malnutrition on Glucose Metabolism. *Diabetes* 58(6):1440-4.
 - 16 Whincup PH, Kaye SJ, Owen CG, Huxley R, Cook DG, Anazawa S, Barrett-Connor E, Bhargava SK, Birgisdottir BE, Carlsson S, Osmond C, Power C, Rich-Edwards JW, Roseboom TJ, Sachdev HS, Syddall H, Thorsdottir I, Vanhala M, Wadsworth M, Yarbrough DE. 2009. Birth weight and risk of type 2 diabetes: a systematic review. *JAMA* 300(24): 2886-97.
- 2008:
- 1 Brown, AS and Susser A. 2008. The environment and susceptibility to schizophrenia. *Prog Neurobiol.* 93(1): 23-58.

- 2 Franzek E. J., N. Sprangers, A. C. Janssens, C. M. Van Duijn, B. J. Van De Wetering. 2008. Prenatal exposure to the 1944-45 Dutch hunger winter and addiction later in life *Addiction*. 103(3): 433-8.
- 3 Haars G, van Gils CH, Elias SG, Peeters PHM, Grobbee DE, van Noord PAH. 1976. The influence of a period of caloric restriction due to the Dutch famine on breast density, ch. 4 of Haars G., A new look at breast density and breast cancer risk. Utrecht University dissertation, Faculteit Geneeskunde.
- 4 Heijmans BT, Tobi EW, Stein AD, Putter H, Blauw GJ, Susser ES, Slagboom PE, Lumey LH. 2008. Persistent epigenetic differences associated with prenatal exposure to famine in humans. *Proceedings of the National Academy of Sciences* 105(44): 17046-9.
- 5 Kahn HS, Graff M, Stein AD, Zybert PA, McKeague IW, Lumey LH. 2008. A fingerprint characteristic associated with the early prenatal environment *American Journal of Human Biology*, 20(1): 59-65.
- 6 Lussana F, Painter RC, Ocke MC, Buller HR, Bossuyt PM, Roseboom TJ. 2008. Prenatal exposure to the Dutch famine is associated with a preference for fatty foods and a more atherogenic lipid profile, *American Journal of Clinical Nutrition* 88(6):1648-1652.
- 7 Mariman ECM. 2008. Epigenetic manifestations in diet-related disorders. *Journal of Nutrigenetics and Nutrigenomics* 1[5]: 232-39.
- 8 Painter RC, Westendorp RG, de Rooij SR, Osmond C, Barker DJ, Roseboom TJ. 2008. Increased reproductive success of women after prenatal undernutrition. *Human Reproduction* 23(11): 2591-5.
- 9 Painter RC, Osmond C, Gluckman P, Hanson M, Phillips DI, Roseboom TJ. 2008. Transgenerational effects of prenatal exposure to the Dutch famine on neonatal adiposity and health in later life, *British Journal of Obstetrics and Gynaecology* 115(10): 1243-9.
- 10 Susser E, St Clair D, He L. 2008. Latent effects of prenatal malnutrition on adult health: the example of schizophrenia. *Annals of the NY Academy of Sciences*. 1136: 185-92.

2007:

- 1 de Rooij SR. 2007. The metabolic consequences of prenatal exposure to the Dutch famine, Academic thesis. Universiteit van Amsterdam. 8 Nov.
 - 2 de Rooij SR, Painter RC, Holleman F, Bossuyt PM, Roseboom TJ. 2007. The metabolic syndrome in adults prenatally exposed to the Dutch famine, *American Journal of Clinical Nutrition*, 86(4): 1219-24.
 - 3 Elias SG, van Noord PAH, Peeters PHM, den Tonkelaar I, Kaaks R, Grobbee DE. 2007. Menstruation during and after caloric restriction: the 1944–1945 Dutch famine. *Fertility and Sterility* 88: 1101–1107.
 - 4 Elias SG, Peeters PHM, Grobbee DE, and van Noord PAH. 2007. Transient caloric restriction and cancer risk. *Cancer Causes and Control* 18(1): 1–5.
 - 5 Lumey LH, Stein AD, Kahn HS, Van der Pal-de Bruin KM, Zybert PA, & Susser ES. 2007. Cohort profile: the Dutch Hunger Winter Families Study, *International Journal of Epidemiology* 36(6): 1196-1204.
 - 6 Lumey LH, Stein AD, Kahn HS, van der Pal-de Bruin KM, Blauw GJ, Zybert PA, Susser ES. 2007. Cohort profile: the Dutch Hunger Winter families study. *International Journal of Epidemiology*, 36(6): 1196-1204.
 - 7 Painter RC, de Rooij SR, Hutten BA, Bossuyt PM, de Groot E, Osmond C, *et al.* 2007. Reduced intima media thickness in adults after prenatal exposure to the Dutch famine. *Atherosclerosis* 193(2): 421-7.
 - 8 Painter RC, de Rooij SR, Bossuyt PM, de Groot E, Stok WJ, Osmond C, *et al.* 2007. Maternal nutrition during gestation and carotid arterial compliance in the adult offspring: the Dutch famine birth cohort. *Journal of Hypertension* 25(3):533-40.
 - 9 Stein AD, Kahn HS, Rundle A, Zybert PA, van der Pal-de Bruin K, and Lumey LH. 2007. Anthropometric measures in middle age after exposure to famine during gestation: evidence from the Dutch famine. *American Journal of Clinical Nutrition* 85(3): 869-876.
- 2006:
- 1 de Rooij SR, Painter RC, Phillips DI, Osmond C, Tanck MW, Bossuyt PM, Roseboom TJ. 2006. Cortisol responses to

- psychological stress in adults after prenatal exposure to the Dutch famine, *Psychoneuroendocrinology* 31(10): 1257-65.
- 2 de Rooij SR, Painter RC, Roseboom TJ, Phillips DI, Osmond C, Barker DJ, Tanck MW, Michels RP, Bossuyt PM, Bleker OP. 2006. Glucose tolerance at age 58 and the decline of glucose tolerance in comparison with age 50 in people prenatally exposed to the Dutch famine, *Diabetologia* 49(4): 637-43.
 - 3 de Rooij SR, Painter RC, Phillips DI, Osmond C, Michels RP, *et al.* 2006. Hypothalamic-pituitary-adrenal axis activity in adults who were prenatally exposed to the Dutch famine. *European Journal of Endocrinology* 155: 153-60.
 - 4 de Rooij SR, Painter RC, Phillips DI, Osmond C, Michels RP, *et al.* 2006. Impaired insulin secretion after prenatal exposure to the Dutch famine. *Diabetes Care* 29:1897-901.
 - 5 de Rooij SR, Painter RC, Phillips DI, Osmond C, Tanck MW, *et al.* 2006. The effects of the Pro12Ala polymorphism of the peroxisome proliferator-activated receptor-gamma2 gene on glucose/insulin metabolism interact with prenatal exposure to famine. *Diabetes Care* 29: 1052-57.
 - 6 Kyle UG, Pichard C. 2006. The Dutch famine of 1944-1945: a pathophysiological model of long-term consequences of wasting disease. *Current Opin Clinical Metab Care.* 9[4]: 388-94.
 - 7 McClellan JM, Susser E, King MC. 2006. Maternal famine, de novo mutations, and schizophrenia. *JAMA.* 296(5): 582-4.
 - 8 Painter RC, de Rooij SR, Bossuyt PM, Simmers TA, Osmond C, Barker DJ, *et al.* 2006. Early onset of coronary artery disease after prenatal exposure to the Dutch famine, *American Journal of Clinical Nutrition* 84(2): 322-7.
 - 9 Painter RC, de Rooij SR, Bossuyt PM, Phillips DI, Osmond C, Barker DJ, Bleker OP, and Roseboom TJ. 2006. Blood pressure response to psychological stressors in adults after prenatal exposure to the Dutch famine. *Journal of Hypertension* 24[9]: 1771-1778.
 - 10 Painter RC. 2006. The pathophysiology of cardiovascular disease after prenatal exposure to maternal undernutrition during the Dutch famine, Academic thesis. Universiteit van Amsterdam. 8 Nov.

- 11 Painter RC, De Rooij SR, Bossuyt PM, Osmond C, Barker DJ, Bleker OP, *et al.* 2006. A possible link between prenatal exposure to famine and breast cancer: a preliminary study. *American Journal of Human Biology* 18(6): 853-6.
 - 12 Roseboom T, de Rooij S, Painter R. 2006. The Dutch famine and its long-term consequences for adult health. *Early Human Development* 82[8]: 485-491.
 - 13 Stein AD, Zybert PA, van der Pal-de Bruin K, Lumey LH. 2006. Exposure to famine during gestation, size at birth, and blood pressure at age 59 years: evidence from the Dutch Famine. *European Journal of Epidemiology* 21(10): 759-65.
- 2005:
- 1 Elias S, van Noord P, Peeters P, den Tonkelaar I, and Grobee D. 2005. Childhood exposure to the 1944-1945 Dutch famine and subsequent female reproductive function *Human Reproduction* 20(9): 2483-2488.
 - 2 Elias SG, Peeters PHM, Grobbee DE *et al.* 2005. The 1944-45 Dutch famine and subsequent overall cancer incidence. *Cancer Epidemiology, Biomarkers and Prevention* 14:1981-1985.
 - 3 Neugebauer R. 2005. Accumulating evidence for prenatal origins of mental disorders. *JAMA* 294[5]:621-3.
 - 4 Painter RC, Roseboom TJ, Van Montfrans GA, Bossuyt PM, Krediet RT, Osmond C, and Barker DJ. 2005. Microalbuminuria in adults after prenatal exposure to the Dutch famine. *Journal of the American Society for Nephrology* 16(1): 189-194.
 - 5 Painter RC, Roseboom TJ, and Bleker OP. 2005. Prenatal exposure to the Dutch Famine and disease in later life: an overview. *Reproductive Toxicology* 20(3): pp. 345-52.
 - 6 Painter RC, Roseboom TJ, Bossuyt PM, Osmond C, Barker DJ, and Bleker OP. 2005. Adult mortality at age 57 after prenatal exposure to the Dutch famine. *European Journal of Epidemiology*. 20: 673-676.
 - 7 Ravelli AC, Bleker OP, Roseboom TJ, Montfrans GA, Osmond C, Barker DJP. 2005. Cardiovascular disease in survivors of the Dutch famine. *Nestlé Nutrition Workshop Series Pediatric Program*, 55: 183-195.

- 8 Roseboom T. 2005. Commentary: Maternal diet during pregnancy and blood pressure in the offspring. *International Journal of Epidemiology* 34 (2): 385-6.

2004:

- 1 Elias SG, Peeters PH, Grobbee DE, van Noord PAH. 2004. Breast cancer risk after caloric restriction during the 1944–1945 Dutch famine *Journal of the National Cancer Institute* 96: 539–46.
- 2 Elias SG, Onland-Moret NC, Peeters PH *et al.* 2004. Urinary endogenous sex hormone levels in postmenopausal women after caloric restriction in young adulthood. *British Journal of Cancer* 90: 115–117.
- 3 Elias SG, Keinan-Boker L, Peeters PH *et al.* 2004. Long term consequences of the 1944–1945 Dutch famine on the insulin-like growth factor axis. *International Journal of Cancer* 108: 628–630.
- 4 Stein AD, Zybert PA, van de Bor M and Lumey LH. 2004. Intrauterine famine exposure and body proportions at birth: the Dutch Hunger Winter. *International Journal of Epidemiology* 33(4): 831-6.
- 5 Stein AD, Zybert PA, Lumey LH. 2004. Acute undernutrition is not associated with excess of females at birth in humans: the Dutch Hunger Winter. *Proceedings: Biological Sciences* 271(S4): S138-S141.
- 6 van Noord PAH. 2004. Breast cancer and the brain: a neurodevelopmental hypothesis to explain the opposing effects of caloric deprivation during the Dutch Famine of 1944–1945 on breast cancer and its risk factors. *Journal of Nutrition* 134(12 Suppl): 3399S-3406S.

2003:

- 1 Dirx MJ, van den Brandt PA, Goldbohm RA, Lumey LH. 2003. Energy restriction early in life and colon carcinoma risk: results of the Netherlands Cohort Study after 7.3 years of follow-up *Cancer* 97: 46–55.
- 2 Elias SG, van Noord PA, Peeters PH, den Tonkelaar I, Grobbee DE. 2003. Caloric restriction reduces age at menopause: the effect of the 1944–1945 Dutch famine. *Menopause* 10: 399–405.

- 3 Lumey LH and Susser ES. 2003. Long-term effects of prenatal and early postnatal nutrition on adult psychosocial outcomes. In *Encyclopedia on Early Childhood Development* [online], ed. R. E. Tremblay, R. G. Barr, R. Peters, pp. 1–7. Montreal, Quebec: Centre for Excellence in Early Childhood Development.
 - 4 Roseboom TJ, van Der Meulen JH, Ravelli AC, Osmond C, Barker DJ, Bleker OP. 2003. Perceived health of adults after prenatal exposure to the Dutch famine, *Paediatric and Perinatal Epidemiology* 17(4): 391-7.
 - 5 Willcox AJ and Stein Z. 2003. A conversation with Zena Stein. *Epidemiology* 14[4]: 498-501.
- 2002:
- 1 Davey Smith G and Susser E. 2002. Zena Stein, Mervyn Susser and epidemiology: observation, causation and action. *International journal of Epidemiology* 31[1]: 34-37.
 - 2 Elias SG, van Noord PA, Peeters PH, den Tonkelaar I, Grobbee DE. 2002. The 1944–1945 Dutch famine and age at natural menopause: the value and validity of individual exposure assessment. *International Agency for Research on Cancer (IARC) Scientific Publications* 156:311–313.
- 2001:
- 1 Challis J. 2001. Glucose tolerance in adults after prenatal exposure to famine: a comment. *Lancet*. 357[9270]:1797-8.
 - 2 Dirx MJ, van den Brandt PA, Goldbohm RA, Lumey LH. 2001. Energy restriction in childhood and adolescence and risk of prostate cancer: results from the Netherlands Cohort Study *American Journal of Epidemiology* 154: 530–37.
 - 3 Editorial. 2001. An overstretched hypothesis? *Lancet*. 357[9254]: 405.
 - 4 Gluckman P, Pinal C. 2001. Glucose tolerance in adults after prenatal exposure to famine: a comment. *Lancet*. 357[9270]: 1798.
 - 5 Lumey LH. 2001. Glucose tolerance in adults after prenatal exposure to famine. *Lancet* 357(9254): 472-3.
 - 6 Roseboom TJ, van Der Meulen JH, Ravelli AC, Osmond C, Barker DJ, Bleker OP. 2001. Effects of prenatal exposure to the

Dutch famine on adult disease in later life: an overview.
Molecular and Cellular Endocrinology 185: 93-98.

- 7 Roseboom TJ, van der Meulen JH, van Montfrans GA, Ravelli AC, Osmond C, Barker DJ, *et al.* 2001. Maternal nutrition during gestation and blood pressure in later life. *Journal of Hypertension* 19(1): 29-34.
 - 8 Roseboom TJ, van der Meulen JHP, Osmond C, Barker DJP, Ravelli ACJ, Bleker OP. 2001. Adult survival after prenatal exposure to the Dutch famine 1944-1945. *Paediatric and Perinatal Epidemiology* 15: 220-225.
 - 9 Roseboom TJ, JHP van der Meulen, ACJ Ravelli, C Osmond, DJP Barker, OP Bleker. Effects of prenatal exposure to the Dutch famine on adult disease in later life: an overview. *Twin Research* 4(5): 293-98.
 - 10 Terry MB and Susser E. 2001. Commentary: the impact of fetal and infant exposures along the life course. *International Journal of Epidemiology* 30: 95-6.
 - 11 van der Meulen J. 2001. Glucose tolerance in adults after prenatal exposure to famine. *Lancet*. 357[9270]: 1797-8.
- 2000:
- 1 Brown, AS, van Os J, Driessens C, Hoek HW, Susser ES. 2000. Further evidence of relation between prenatal famine and major affective disorder. *American Journal of Psychiatry*, 157(2): 190-5.
 - 2 Hulshoff Pol HE, Hoek HW, Susser E, Brown AS, Dingemans A, Schnack HG, van Haren NE, Pereira Ramos LM, Gispen-de Wied CC, Kahn RS. 2000. Prenatal exposure to famine and brain morphology in schizophrenia. *American Journal of Psychiatry*. 157(7): 1170-2.
 - 3 Lopuhaä CE, Roseboom TJ, Osmond C, Barker DJ, Ravelli AC, Bleker OP, *et al.* 2000. Atopy, lung function, and obstructive airways disease after prenatal exposure to famine *Thorax*, 55(7): 555-61.
 - 4 Lumey LH. 2000. Does prenatal famine cause later antisocial behaviors? *Journal of the American Medical Association* 283(7): 887-888.
 - 5 Roseboom TJ, van der Meulen JH, Osmond C, Barker DJ, Ravelli AC, Bleker OP. 2000. Plasma lipid profiles in adults after

prenatal exposure to the Dutch famine, *Am Journal of Clinical Nutrition* 72(5): 1101-6.

- 6 Roseboom TJ, JHP van der Meulen, ACJ Ravelli, C Osmond, DJP Barker, OP Bleker. 2000. Plasma fibrinogen and factor VII concentrations in adults after prenatal exposure to famine. *British Journal of Haematology* 111: 112-17.
 - 7 Roseboom TJ. 2000. Prenatal exposure to the Dutch famine and health in later life. Enschede: Ipskamp [available at: <http://www.hongerwinter.nl/documents/thesisroseboom.PDF>].
 - 8 Roseboom TJ, van der Meulen JH, Osmond C, Barker DJ, Ravelli AC, J. M. Schroeder-Tanka, et al. 2000. Coronary heart disease after prenatal exposure to the Dutch famine, 1944-45. *Heart* 84(6): 595-8.
 - 9 Roseboom TJ, van der Meulen JHP, Ravelli ACJ, Belker OP. 2000. 'De samenhang tussen prenatale blootstelling aan de Hongerwinter en medische bevindingen op lange termijn. *Nederlands Tijdschrift voor Geneeskunde* 144: 2488-91.
 - 10 Shiwach RS. 2000. Does Prenatal Famine Cause Later Antisocial Behaviors? *JAMA* 283(7): 887-88.
 - 11 Stein AD and Lumey LH. 2000. The relationship between maternal and offspring birth weights after maternal prenatal famine exposure: the Dutch Famine Birth Cohort Study. *Human Biology* 72(4): 641-54.
 - 12 Wit JM. 2000. Implicaties van de Barker-hypothese voor de medicus practicus. *Nederlands Tijdschrift voor Geneeskunde* 144: 2491-95.
- 1999:
- 1 Dirx MJ, van den Brandt PA, Goldbohm RA, Lumey LH. 1999. Diet in adolescence and the risk of breast cancer: results of the Netherlands Cohort Study *Cancer Causes and Control* 10: 189-99.
 - 2 Neugebauer R, Hoek HW, and Susser E. 1999. Prenatal exposure to wartime famine and development of antisocial personality disorder in early adulthood. *Journal of the American Medical Association* 282(5): 455-462.
 - 3 Ravelli AC. 1999. Prenatal exposure to the Dutch Famine and glucose tolerance and obesity at age 50, University of Amsterdam, Amsterdam.

- 4 Ravelli AC, van der Meulen JH, Osmond C, Barker DJ, and Bleker OP. 1999. Obesity at the age of 50 years in men and women exposed to famine prenatally. *American Journal of Clinical Nutrition* 70: 811-816.
 - 5 Roseboom TJ, J. H. van der Meulen, A. C. Ravelli, G. A. van Montfrans, C. Osmond, D. J. Barker, *et al.* 1999. Blood pressure in adults after prenatal exposure to famine, *Journal of Hypertension* 17(3): 325-30.
 - 6 van der Meulen JHP, Ravelli ACJ, Roseboom TJ, Osmond C, Bleker OP. 1999. Fetal Programming associated with the Dutch famine. In *Fetal Programming Influences on developments and disease in later life*. London: RCOG Press, pp. 45-56.
- 1998:
- 1 Hoek HW, Brown AS, and Susser E. 1998. The Dutch famine and schizophrenia spectrum disorders, *Social Psychiatry and Psychiatric Epidemiology* 33(8): 373-9.
 - 2 Lumey LH 1998a. Reproductive outcomes in women prenatally exposed to undernutrition: a review of findings from the Dutch famine birth cohort, *Proceedings of the Nutrition Society* 57(1): 129-135.
 - 3 Lumey LH. 1998b. Compensatory placental growth after restricted maternal nutrition in early pregnancy, *Placenta* 19(1): 105-111.
 - 4 Ravelli AC, van der Meulen JH, Michels RP, Osmond C, Barker DJ, Hales CN, *et al.* 1998. Glucose tolerance in adults after prenatal exposure to famine. *Lancet* 351(9097): 173-7.
 - 5 Susser E, Hoek HW, Brown A. 1998. Neurodevelopmental disorders after prenatal famine: the story of the Dutch famine study. *American Journal of Epidemiology* 147[3]: 213-6.
- 1997:
- 1 Brown, AS and ES Susser. 1997. Sex differences in prevalence of congenital neural defects after periconceptional famine exposure. *Epidemiology*, 8[1]: 55-58.
 - 2 Lumey LH and Stein AD. 1997a. In utero exposure to famine and subsequent fertility: The Dutch Famine Birth Cohort Study. *American Journal of Public Health*, 87(12): 1962-1966.

- 3 Lumey LH and Stein AD. 1997b. Offspring birth weights after maternal intrauterine undernutrition: a comparison within sibships. *American Journal of Epidemiology* 146(10): 810-819.
 - 4 van den Brandt PA, Dirx MJM, Ronckers CM, van den Hoogen P, Goldbohm RA. 1997. Height, Weight, Weight Change, and Postmenopausal Breast Cancer Risk: The Netherlands Cohort Study *Cancer Causes & Control* 8[1]: 39-47.
- 1996:
- 1 Brown AS, Susser ES, Butler PD, Richardson Andrews R, Kaufmann CA, Gorman JM. 1996. Neurobiological plausibility of prenatal nutritional deprivation as a risk factor for schizophrenia. *Journal of Nervous and Mental Disease* 184(2): 71-85.
 - 2 Hoek HW, Susser E, Buck KA, Lumey LH, Lin SP, and Gorman JM. 1996. Schizoid personality disorder after prenatal exposure to famine. *American Journal of Psychiatry*, 153(12): 1637-9.
 - 3 Susser E, Neugebauer R, Hoek HW, Brown AS, Lin S, Labovitz D, and Gorman JM. 1996. Schizophrenia after prenatal famine: further evidence. *Archives of General Psychiatry* 53: 25-31.
- 1995:
- 1 Van Noord PA and Arias-Careaga S. 1995. The Dutch famine 1944-45: lasting effects on adult height. *American Journal of Epidemiology* 141: S11-S44.
 - 2 Stein AD, Ravelli AC, Lumey LH. 1995. Famine, third-trimester pregnancy weight gain, and intrauterine growth: the Dutch Famine Birth Cohort Study. *Human Biology* 67(1): 135-50.
 - 3 Lumey LH, Stein AD, Ravelli AC. 1995a. Timing of prenatal starvation in women and offspring birth weight: an update. *European Journal of Obstetrics Gynecology and Reproductive Biology* 63(2): 197.
 - 4 Lumey LH., Stein AD, Ravelli AC. 1995b. Timing of prenatal starvation in women and birth weight in their first and second born offspring: the Dutch Famine Birth Cohort study. *European Journal of Obstetric Gynecology and Reproductive Biology* 61(1): 23-30.
 - 5 Brown, AS, Susser ES, Lin SP, Neugebauer R, Gorman JM. 1995. Increased risk of affective disorders in males after second

trimester prenatal exposure to the Dutch hunger winter of 1944-45. *British Journal of Psychiatry*, 166(5): 601-6.

1994:

- 1 Jones P. 1994. Schizophrenia after prenatal exposure to the Dutch Hunger Winter of 1944-1945. *Archives of General Psychiatry*. 51[4]: 331-4.
- 2 Lumey LH, Stein AD, Ravelli AC. 1994. Maternal recall of birthweights of adult children: validation by hospital and well baby clinic records. *International Journal of Epidemiology* 23: 1006-12.
- 3 Lumey LH and Van Poppel F. 1994. The Dutch famine of 1944-45: mortality and morbidity in past and present generations. *Social History of Medicine* 7: 229-46.
- 4 Susser M and Stein Z. 1994. Maternal nutrition and low birth-weight. *Lancet*, 306[7936]: 664.
- 5 Susser E, Lin SP, Brown AS, Lumey LH, Erlenmeyer-Kimling L. 1994. No relation between risk of schizophrenia and prenatal exposure to influenza in Holland. *American Journal of Psychiatry*. 151[6]: 922-4.
- 6 Susser M and Stein Z. 1994. Timing in prenatal nutrition: a reprise of the Dutch famine study. *Nutrition Reviews* 42[3]: 84-94.

1993:

- 1 Lumey LH, Ravelli AC, Wiessing LG, Koppe JG, Treffers PE, and Stein ZA. 1993. The Dutch famine birth cohort study: design, validation of exposure, and selected characteristics of subjects after 43 years follow-up. *Paediatric and Perinatal Epidemiology* 7(4): 354-367.

1992:

- 1 Lumey LH. 1992. Decreased birthweight in infants after maternal in utero exposure to the Dutch famine of 1944-1945. *Paediatric and Perinatal Epidemiology* 6: 240-53.
- 2 Susser ES, Lin SP. 1992. Schizophrenia after prenatal exposure to the Dutch Hunger Winter of 1944-1945. *Archives of General Psychiatry*. 49[12]: 983-8.

- 3 van Leer E, van Noord PA, and Seidell JC. 1992. Components of adult height and height loss: secular trend and effects of aging in women in the DOM project. *Annals of Epidemiology* 2: 611-615.
- 1991:
- 1 Van Noord PAH and Kaaks R. 1991. The effect of wartime conditions and the 1944-45 Dutch famine on recalled menarchal age in participants of the DOM breast cancer screening project. *Annals of Human Biology* 18[1]: 57-70.
 - 2 Susser M 1991. Maternal weight gain, infant birth weight, and diet: causal consequences. *American Journal of Clinical Nutrition* 53:1384-96.
- 1989:
- 1 Susser M. 1989. The challenge of causality: human nutrition, brain development and mental performance. *Bulletin of the New York Academy of Medicine* 65[10]: 1032-49.
- 1988:
- 1 Arias-Careaga, S. 1998. Consecuencias a largo plazo de la restriccion calorica temprana: valoracion en la mujer adulta. Thesis, in Spanish, Universidad Autonoma de Madrid Madrid, Spain.
 - 2 van Noord, PAH, Collette, HJA, de Waard F & Rombach JJ. 1988. Caloric restriction in early life; effects on breast cancer risk factors? (The DOM based famine study). In Riboli E, Saracci R. eds. *Diet, Hormones and Cancer: Methodological Issues for Prospective Studies* IARC Technical Report #4, pp. 112-119, Lyon, France.
- 1985:
- 1 Stein Z and Susser M. 1985. Effects of early nutrition on neurological and mental competence in human beings. *Psychological Medicine* 15: 717-726.
- 1982:
- 1 Susser M and Stein Z. 1982. Third variable analysis: Application to causal sequences among nutrient intake, maternal weight, birthweight, placental weight, and gestation. *Statistics in Medicine* 1[2]: 93-189.

1979

- 1 Ravelli GP, Belmont L. 1979. Obesity in 19-year old men: family size and birth-order associations. *American Journal of Epidemiology* 109(1): 66-70.

1978:

- 1 Susser M, Stein Z, Kline J. 1978. Ethics in epidemiology. *Annals of the American Academy of Political and Social Science* 437: 128-59.
- 2 Stein Z and Susser MW. 1978. Famine and fertility. In HW Mosley ed. *Nutrition and Human Reproduction*, NYC: Plenum Press, pp. 123-45.

1976:

- 1 Stein, Zena, Mervyn Susser, and Gerhart Saenger. 1976. Mental retardation in a national population of young men in the Netherlands. 1. Prevalence of severe mental retardation. *American Journal of Epidemiology* 103[5]: 477-485.
- 2 Ravelli AC, Stein ZA, and Susser MW. 1976. Obesity in young men after famine exposure in utero and early infancy. *New England Journal of Medicine* 295[7]: 349-353.

1975:

- 1 Stein Z and M. Susser. 1975b. Fertility, fecundity, famine: food rations in the Dutch famine 1944/5 have a causal relation to fertility, and probably to fecundity. *Human Biology* 47: 131-54.
- 2 Stein ZA, Susser M, Saenger G, and Marolla F. 1975. *Famine and Human Development: the Dutch Hunger Winter of 1944-1945*. New York: Oxford University Press.
- 3 Stein Z and Susser M. 1975. The Dutch famine, 1944-1945, and the reproductive process. I. Effects on six indices at birth. *Pediatrics Research* 9: 70-76.
- 4 Stein Z and Susser M. 1975. The Dutch famine, 1944-1945, and the reproductive process. II. Interrelations of caloric rations and six indices at birth. *Pediatrics Research* 9:76-83.

1973:

- 1 Bradley MN, Stein Z, Susser M. 1973. Pregnancy and famine: an exchange. *Science* 180[4082]: 136-7.

1972:

- 1 Stein ZA, Susser M, Saenger G, and Marolla F. 1972. Nutrition and mental performance. *Science* 178[4062]: 708-713.
- 2 Stein ZA, Susser M, Saenger G, and Marolla F. 1972. Intelligence test results of individuals exposed during gestation to World War II famine in the Netherlands. *Tijdschrift voor Sociale Geneeskunde* 50: 766-74.

C. Studies Based on Finnish Male Birth Cohort (by year of publication):

2011:

Barker DJP, Kajantie E, Osmond C, Thornburg KL, Eriksson JG. 2011. How boys grow determines how long they live. *American Journal of Human Biology* 23(3): 412-6.

Eriksson JG, Kajantie E, Thornburg KL, Osmond C, Barker DJ. 2011. Mothers body size and placental size predict coronary heart disease in men. *European Heart Journal* Jun 1.

Eriksson JG. 2011. Early growth and coronary heart disease and type 2 diabetes: findings from the Helsinki Birth Cohort Study (HBCS). *American Journal of Clinical Nutrition*. May 25.

Lahti J, Räikkönen K, Bruce S, Heinonen K, Pesonen AK, Rautanen A, Wahlbeck K, Kere J, Kajantie E, Eriksson JG. 2011. Glucocorticoid receptor gene haplotype predicts increased risk of hospital admission for depressive disorders in the Helsinki birth cohort study. *Journal of Psychiatric Research* Apr 6.

Perälä MM, Moltchanova E, Kaartinen NE, Männistö S, Kajantie E, Osmond C, Barker DJ, Valsta LM, Eriksson JG. 2011. The association between salt intake and adult systolic blood pressure is modified by birth weight. *American Journal of Clinical Nutrition* 93(2): 422-6.

Pesonen AK, Raikkonen K, Kajantie E, Heinonen K, Osmond C, Barker DJP, Forsen T, Eriksson JG. 2011. Inter-generational social mobility following early life stress *Annals of Medicine* 43(4): 320-328.

Räikkönen K, Lahti M, Heinonen K, Pesonen AK, Wahlbeck K, Kajantie E, Osmond C, Barker DJ, Eriksson JG. 2011. Risk of severe

mental disorders in adults separated temporarily from their parents in childhood: the Helsinki birth cohort study. *Journal of Psychiatric Research* 45(3): 332-8.

Tuovinen S, Räikkönen K, Kajantie E, Leskinen JT, Henriksson M, Pesonen AK, Heinonen K, Osmond C, Barker D, Eriksson JG. 2011. Hypertensive disorders in pregnancy and intellectual abilities in the offspring in young adulthood: The Helsinki Birth Cohort Study. *Annals of Medicine* April 15.

2010:

Barker DJ, Gelow J, Thornburg K, Osmond C, Kajantie E, Eriksson JG. 2010.

The early origins of chronic heart failure: impaired placental growth and initiation of insulin resistance in childhood. *Eur J Heart Fail.* 12(8): 819-25.

Barker DJ, Thornburg KL, Osmond C, Kajantie E, Eriksson JG. 2010. The prenatal origins of lung cancer. II. The placenta. *Am J Human Biology* 22(4): 512-6.

Barker DJ, Thornburg KL, Osmond C, Kajantie E, Eriksson JG. 2010. The surface area of the placenta and hypertension in the offspring in later life. *International Journal of Developmental Biology* 54(2-3): 525-30.

Eriksson JG, Thornburg KL, Osmond C, Kajantie E, Barker DJ. 2010. The prenatal origins of lung cancer. I. The fetus. *Am J Hum Biol.* 22(4): 508-11.

Javaid MK, Eriksson JG, Kajantie E, Forsén T, Osmond C, Barker DJ, Cooper C. 2010. Growth in childhood predicts hip fracture risk in later life. *Osteoporosis International* April 9.

Kajantie E, Thornburg KL, Eriksson JG, Osmond C, Barker DJ. 2010. In preeclampsia, the placenta grows slowly along its minor axis. *International Journal of Developmental Biology* 54(2-3): 469-73.

Kajantie E, Räikkönen K, Henriksson M, Forsén T, Heinonen K, Pesonen AK, Leskinen JT, Laaksonen I, Paile-Hyvärinen M, Osmond C, Barker DJ, Eriksson JG. 2010. Childhood socio-economic status modifies the association between intellectual abilities at age 20 and mortality in later life. *Journal of Epidemiology and Community Health.* July 30.

Kajantie E, Osmond C, Barker DJ, Eriksson JG. 2010. Preterm birth--a risk factor for type 2 diabetes? The Helsinki birth cohort study. *Diabetes Care*. 33(12): 2623-5.

Lahti J, Räikkönen K, Pesonen AK, Heinonen K, Kajantie E, Forsén T, Osmond C, Barker DJ, Eriksson JG. 2010. Prenatal growth, postnatal growth and trait anxiety in late adulthood - the Helsinki Birth Cohort Study. *Acta Psychiatr Scand*. 121(3):227-35.

Lahti M, Räikkönen K, Wahlbeck K, Heinonen K, Forsén T, Kajantie E, Pesonen AK, Osmond C, Barker DJ, Eriksson JG. 2010. Prenatal origins of hospitalization for personality disorders: The Helsinki Birth Cohort Study. *Psychiatry Research* May 19.

Pesonen AK, Räikkönen K, Feldt K, Heinonen K, Osmond C, Phillips DI, Barker DJ, Eriksson JG, Kajantie E. 2010. Childhood separation experience predicts HPA axis hormonal responses in late adulthood: a natural experiment of World War II. *Psychoneuroendocrinology*. 35(5): 758-67.

Räikkönen K, Lahti M, Heinonen K, Pesonen AK, Wahlbeck K, Kajantie E, Osmond C, Barker DJ, Eriksson JG. 2010. Risk of severe mental disorders in adults separated temporarily from their parents in childhood: The Helsinki birth cohort study. *Journal of Psychiatric Research* July 24.

Schreier NK, Moltchanova EV, Blomstedt PA, Kajantie E, Eriksson JG. 2010. Prenatal exposure to wartime stress - long-term effect on coronary heart disease in later life. *Annals of Medicine*. Oct 26.

Tuovinen S, Räikkönen K, Kajantie E, Pesonen AK, Heinonen K, Osmond C, Barker DJ, Eriksson JG. 2010. Depressive symptoms in adulthood and intrauterine exposure to pre-eclampsia: the Helsinki Birth Cohort Study. *British Journal of Obstetrics and Gynaecology*. 117(10):1236-42.

2009:

Alastalo H, Raikkonen K, Pesonen AK, Osmond C, Barker DJ, Kajantie E, Heinonen K, Forsen TJ, Eriksson JG. 2009. Cardiovascular health of Finnish war evacuees 60 years later. *Annals of Medicine* 41(1): 66-72.

Barker DJ, Osmond C, Thornburg KL, Kajantie E, Eriksson JG. 2009. A possible link between the pubertal growth of girls and ovarian cancer in their daughters. *American Journal of Human Biology* 20(6): 659-62.

- Barker DJ, Osmond C, Kajantie E, Eriksson JG. 2009. Growth and chronic disease: findings in the Helsinki Birth Cohort. *Annals of Human Biology* 36(5): 445-58.
- Eriksson JG, Kajantie E, Osmond C, Thornburg K, and Barker DJP. 2009. Boys live dangerously in the womb. *American Journal of Human Biology*, 22[3]: 330-335.
- Kajantie E, Eriksson JG, Osmond C, Thornburg K, Barker DJ. 2009. Pre-eclampsia is associated with increased risk of stroke in the adult offspring: the Helsinki birth cohort study. *Stroke*. 40(4): 1176-80.
- O'Tierney PF, Barker DJ, Osmond C, Kajantie E, Eriksson JG. 2009. Duration of breast-feeding and adiposity in adult life. *Journal of Nutrition* 139(2): 422S-5S.
- Paile-Hyvärinen M, Räikkönen K, Kajantie E, Darby D, Ylihärsilä H, Salonen MK, Osmond C, Eriksson JG. 2009. Impact of glucose metabolism and birth size on cognitive performance in elderly subjects. *Diabetes Research Clinical Practice*. 83(3): 379-86.
- Paile-Hyvärinen M, Kajantie E, Räikkönen K, Henriksson M, Leskinen JT, Laaksonen I, Forsén T, Eriksson JG. 2009. Intellectual ability in early adulthood and type 2 diabetes in later life. *Acta Diabetol*. 2009 Mar 7.
- Pulizzi N, Lyssenko V, Jonsson A, Osmond C, Laakso M, Kajantie E, Barker DJ, Groop LC, Eriksson JG. 2009. Interaction between prenatal growth and high-risk genotypes in the development of type 2 diabetes. *Diabetologia*. 52(5):825-9. Erratum in: *Diabetologia*. 2009 52(12): 2671-2.
- Räikkönen K, Forsén T, Henriksson M, Kajantie E, Heinonen K, Pesonen AK, Leskinen JT, Laaksonen I, Osmond C, Barker DJ, Eriksson JG. 2009. Growth trajectories and intellectual abilities in young adulthood: The Helsinki Birth Cohort study. *American Journal of Epidemiology* 170(4): 447-55.
- Salonen MK, Kajantie E, Osmond C, Forsén T, Ylihärsilä H, Paile-Hyvärinen M, Barker DJ, Eriksson JG. 2009. Role of childhood growth on the risk of metabolic syndrome in obese men and women. *Diabetes and Metabolism* 35(2): 94-100.
- Salonen MK, Kajantie E, Osmond C, Forsén T, Ylihärsilä H, Paile-Hyvärinen M, Barker DJ, Eriksson JG. 2009. Childhood growth and future risk of the metabolic syndrome in normal-weight men and women. *Diabetes and Metabolism* 35(2): 143-50.

2008:

Eriksson, JG. 2008. The role of genes in growth and later health. *Nestle Nutrition Workshop Series Pediatrics Programme* 61: 69-77.

Feldt K, Räikkönen K, Eriksson JG, Andersson S, Osmond C, Barker DJ, Phillips DI, Kajantie E. 2008. Childhood growth and cardiovascular reactivity to psychological stressors in late adulthood. *Journal of Internal Medicine* 264(1): 72-82.

Kajantie E, Barker DJ, Osmond C, Forsén T, Eriksson JG. 2008. Growth before 2 years of age and serum lipids 60 years later: the Helsinki Birth Cohort study. *International Journal of Epidemiology* 37(2): 280-9.

Lahti J, Räikkönen K, Heinonen K, Pesonen AK, Kajantie E, Forsén T, Osmond C, Barker DJ, Eriksson JG. 2008. Body size at birth and socio-economic status in childhood: Implications for Cloninger's psychobiological model of temperament at age 60. *Psychiatry Research* 160(2): 167-74.

Pesonen AK, Räikkönen K, Heinonen K, Kajantie E, Forsén T, Eriksson JG. 2008. Reproductive traits following a parent-child separation trauma during childhood: a natural experiment during World War II. *American Journal of Human Biology* 20(3):345-51.

Räikkönen K, Pesonen AK, Heinonen K, Lahti J, Kajantie E, Forsén T, Osmond C, Barker DJ, Eriksson JG. 2008. Infant growth and hostility in adult life. *Psychosomatic Medicine* 70(3): 306-13.

Ylihärsilä H, Kajantie E, Osmond C, Forsén T, Barker DJ, Eriksson JG. 2008. Body mass index during childhood and adult body composition in men and women aged 56-70 y. *American Journal of Clinical Nutrition* 87(6): 1769-75.

2007:

Barker DJ, Osmond C, Forsen TJ, Kajantie E, Eriksson JG. 2007. Maternal and social origins of hypertension. *Hypertension* 50: 565-571.

Barker DJ, Osmond C, Thornburg KL, Kajantie E, Forsen TJ, Eriksson JG. 2007. A possible link between the pubertal growth of girls and

breast cancer in their daughters. *American Journal of Human Biology* Oct5.

Eriksson JG, Forsén TJ, Kajantie E, et al. 2007. Childhood growth and hypertension in later life. *Hypertension* 49(6): 1415–21.

Eriksson JG. 2007. Epidemiology, genes and the environment: lessons learned from the Helsinki Birth Cohort Study. *Journal of Internal Medicine* 261: 418-425.

Eriksson JG. 2007. Gene polymorphisms, size at birth, and the development of hypertension and type 2 diabetes. *Journal of Nutrition* 137: 1063-1065.

Eriksson JG, Forsén TJ, Kajantie E, Osmond C, Barker DJ. 2007. Childhood growth and hypertension in later life. *Hypertension* 49: 1415-1421.

Feldt K, Räikkönen K, Eriksson JG, Andersson S, Osmond C, Barker DJ, Phillips DI, Kajantie E. 2007. Cardiovascular reactivity to psychological stressors in late adulthood is predicted by gestational age at birth. *Journal of Human Hypertension* 21: 401-410.

Gamborg M, Byberg L, Rasmussen F, Andersen PK, Baker JL, Bengtsson C, Canoy D, Drøyvold W, Eriksson JG, Forsén T, Gunnarsdottir I, Järvelin MR, Koupil I, Lapidus L, Nilsen TI, Olsen SF, Schack-Nielsen L, Thorsdottir I, Tuomainen TP, Sørensen TI; NordNet Study Group. 2007. Birth weight and systolic blood pressure in adolescence and adulthood: meta-regression analysis of sex- and age-specific results from 20 Nordic studies. *American Journal of Epidemiology* 166: 634-645.

Kajantie E, Feldt K, Räikkönen K, Phillips DI, Osmond C, Heinonen K, Pesonen AK, Andersson S, Barker DJ, Eriksson JG. 2007. Body size at birth predicts hypothalamic-pituitary-adrenal axis response to psychosocial stress at age 60 to 70 years. *Journal of Clinical Endocrinology and Metabolism* 92: 4094-4100.

Osmond C, Kajantie E, Forsén TJ, Eriksson JG, Barker DJ. 2007. Infant growth and stroke in adult life: the Helsinki birth cohort study. *Stroke* 38(2): 264-70.

Paile-Hyvärinen M, Räikkönen K, Forsén T, Kajantie E, Ylihärsilä H, Salonen MK, Osmond C, Eriksson JG. 2007. Depression and its association with diabetes, cardiovascular disease, and birth weight. *BMC Family Practice*, June.

Pesonen AK, Räikkönen K, Heinonen K, Kajantie E, Forsén T, Eriksson JG. 2007. Depressive symptoms in adults separated from their parents as children: a natural experiment during World War II. *American Journal of Epidemiology* 166: 1126-33.

Räikkönen K, Pesonen AK, Kajantie E, Heinonen K, Forsén T, Phillips DI, Osmond C, Barker DJ, Eriksson JG. 2007. Length of gestation and depressive symptoms at age 60 years. *British Journal of Psychiatry* 190: 469-74.

Ylihärsilä H, Kajantie E, Osmond C, Forsén T, Barker DJ, Eriksson JG. 2007. Birth size, adult body composition and muscle strength in later life. *International Journal of Obesity* 31: 1392-99.

2006:

Eriksson JG, Osmond C, Kajantie E, Forsén TJ, Barker DJ. 2006. Patterns of growth among children who later develop type 2 diabetes or its risk factors. *Diabetologia* 49: 2853-2858.

Kajantie E, Phillips DI, Osmond C, Barker DJ, Forsén T, Eriksson JG. 2006. Spontaneous hypothyroidism in adult women is predicted by small body size at birth and during childhood. *Journal of Clinical Endocrinology and Metabolism* 91: 4953-56.

Rautanen A, Eriksson JG, Kere J, Andersson S, Osmond C, Tienari P, Sairanen H, Barker DJ, Phillips DI, Forsén T, Kajantie E. 2006. Associations of body size at birth with late-life cortisol concentrations and glucose tolerance are modified by haplotypes of the glucocorticoid receptor gene. *Journal of Clinical Endocrinology and Metabolism* 91: 4544-51.

2005:

Barker DJ, Eriksson JG, Forsén T, Osmond C. 2005. Infant growth and income 50 years later. *Archives of Disease in Childhood* 90: 272-3.

Barker DJ, Osmond C, Forsén TJ, Kajantie E, Eriksson JG. 2005. Trajectories of growth among children who have coronary events as adults. *New England Journal of Medicine* 353(17): 1802-9.

Eriksson JG. 2005. The fetal origins hypothesis--10 years on. *British Medical Journal* 330: 1096-1097.

Eriksson JG. 2005. Early growth and adult health outcomes: lessons learned from the Helsinki Birth Cohort Study. *Maternal and Child Nutrition* 1[3]: 149-54.

Kajantie E, Osmond C, Barker DJ, Forsén T, Phillips DI, Eriksson JG et al. 2005. Size at birth predictor of mortality in adulthood: a follow-up of 35000 person years. *International Journal of Epidemiology* 34[3]: 655-63.

2004:

Angell-Andersen E, Tretli S, Bjerknes R, Forsén T, Sørensen TI, Eriksson JG, Räsänen L, Grotmol T. 2004. The association between nutritional conditions during World War II and childhood anthropometric variables in the Nordic countries. *Annals of Human Biology* 31:342-55.

Eriksson, JG, Ylihärsilä H, Forsén T, Osmond C, Barker DJ. 2004. Exercise protects against glucose intolerance in individuals with a small body size at birth. *Preventive Medicine* 39[1]: 164-7.

Forsén TJ, Eriksson JG, Osmond C, Barker DJ. 2004. The infant growth of boys who later develop coronary heart disease. *Annals of Medicine* 36(5): 389-92.

Forsén T, Osmond C, Eriksson JG, Barker DJ. 2004. Growth of girls who later develop coronary heart disease. *Heart* 90(1): 20-4.

Kajantie E, Eriksson JG, Osmond C, Barker DJ et al. 2004. Size at birth, the metabolic syndrome and 24-h salivary cortisol profile. *Clinical Endocrinology* 60[2]: 201-207.

Kajantie E, Rautanen A, Kere J, Barker DJ, Phillips DI. 2004. Effects of ACE gene insertion/deletion polymorphism on glucose tolerance and insulin secretion in elderly people are modified by birthweight. *Journal of Clinical Endocrinology and Metabolism* 89[11]: 5738-41.

Kubaszek A, Markkanen A, Eriksson JG, Forsen T, Osmond C, Barker DJ, Laakso M 2004. The association of the K121Q polymorphism of the plasma cell glycoprotein-1 gene with type 2 diabetes and hypertension depends on size at birth. *Journal of Clinical Endocrinology and Metabolism* 89: 2044-47.

Ylihärsilä H, Eriksson JG, Forsén T, Laakso M, Uusitupa M, Osmond C, Barker DJ. 2004. Interactions between peroxisome proliferator-activated receptor-gamma 2 gene polymorphisms and size at birth on blood pressure and the use of antihypertensive medication. *Journal of Hypertension* 22: 1283-87.

2003:

Eriksson J, Lindi V, Uusitupa M, Forsén T, Laakso M, Osmond C, Barker D. 2003. The effects of the Pro12Ala polymorphism of the PPARgamma-2 gene on lipid metabolism interact with body size at birth. *Clinical Genetics* 64: 366-70.

Eriksson JG, Forsen TJ, Osmond C, Barker DJ. 2003. Pathways of infant and childhood growth that lead to type 2 diabetes. *Diabetes Care* 26(11): 3006-10.

Eriksson JG, Forsen TJ, Osmond C, Barker DJ. 2003. Obesity from cradle to grave. *International Journal of Obesity* 27: 722-7.

Eriksson JG, Forsén T, Tuomilehto J, Osmond C, Barker DJ. 2003. Early adiposity rebound and risk of type 2 diabetes in adult life. *Diabetologia* 46[2]: 190-4.

Eriksson JG, Osmond C, Lindi V, Uusitupa M, Forsen T, Laakso M, Barker DJ. 2003. Interactions between peroxisome proliferator-activated receptor gene polymorphism and birth length influence risk for type 2 diabetes. *Diabetes Care* 26:2476-77.

Yiharsila H, Eriksson JG, Forsén TJ, Kajantie E, Osmond C, Barker DJ. 2003. Self-perpetuating effects of birth size on blood pressure levels in elderly people. *Hypertension* 41: 446-50.

Kajantie E, Fall CH, Seppälä M, Koistinen R, Dunkel L, Ylihärsilä H, Osmond C, Andersson S, Barker DJ, Forsén T, Holt RI, Phillips DI, Eriksson J. 2003. Serum insulin-like growth factor (IGF)-I and IGF-binding protein-1 in elderly people: relationships with cardiovascular risk factors, body composition, size at birth, and childhood growth. *Journal of Clinical Endocrinology and Metabolism* 88(3): 1059-65.

Kajantie E, Eriksson J, Barker DJ, Forsén T, Osmond C, Wood PJ, Andersson S, Dunkel L, Phillips DI. 2003. Birthsize, gestational age and adrenal function in adult life: studies of dexamethasone suppression and ACTH1-24 stimulation. *European Journal of Endocrinology* 149: 569-75.

2002:

Barker DJ, Forsén TJ, Eriksson JG, Osmond C. 2002. Growth and living conditions in childhood and hypertension in adult life: a longitudinal study. *Journal of Hypertension* 20[10]: 1951-6.

Barker DJ, Eriksson JG, Forsén T, Osmond C. 2002. Fetal origins of adult disease: strength of effects and biological basis. *International Journal of Epidemiology* 31(6): 1235-9.

Eriksson JG, Forsén TJ. 2002. Childhood growth and coronary heart disease in later life. *Annals of Medicine* 34: 157-161.

Eriksson J, Forsén T, Tuomilehto J, Osmond C, Barker D. 2002. Size at birth, fat-free mass and resting metabolic rate in adult life. *Hormone and Metabolic Research* 34(2): 72-6.

Eriksson JG, Forsén T, Tuomilehto J, Jaddoe V, Osmond C, Barker DJ. 2002. Effects of size at birth and childhood growth on the insulin resistance syndrome in elderly individuals. *Diabetologia* 45: 342-8.

Eriksson JG, Lindi V, Uusitupa M, Forsén TJ, Laakso M, Osmond C, Barker DJ. 2002. The effects of the Pro12Ala polymorphism of the peroxisome proliferator-activated receptor-gamma2 gene on insulin sensitivity and insulin metabolism interact with size at birth. *Diabetes* 51: 2321-4.

Eriksson JG, Forsén T. 2002. Unravelling the fetal origins hypothesis. *Lancet* 360:2072; author reply 2074-5.

Kajantie E, Phillips DI, Andersson S, Barker DJ, Dunkel L, Forsén T, Osmond C, Tuominen J, Wood PJ, Eriksson J. 2002. Size at birth, gestational age and cortisol secretion in adult life: fetal programming in both hyper and hypercortisolism. *Clinical Endocrinology* 57: 635-41.

2001:

Barker DJ, Forsén T, Uutela A, Osmond C, Eriksson JG. 2001. Size at birth and resilience to effects of poor living conditions in adult life: longitudinal study. *British Medical Journal* 323: 1-5.

Barker DJ, Forsén T, Uutela A, Osmond C, Eriksson JG. 2001. Size at birth and resilience to effects of poor living conditions in adult life: longitudinal study. *British Medical Journal* 323(7324): 1273-6.

Cooper C, Eriksson JG, Forsén T, Osmond C, Tuomilehto J, Barker DJ. 2001. Maternal height, childhood growth and risk of hip fracture in later life: a longitudinal study. *Osteoporosis International* 12(8): 623-9.

Eriksson J, Forsén T, Tuomilehto J, Osmond C, Barker D. 2001. Size at birth, childhood growth and obesity in adult life. *International Journal of Obesity and Related Metabolic Disorders* 25(5): 735-40.

Eriksson JG, Forsén T, Tuomilehto J, Osmond C, Barker DJ. 2001. Early growth and coronary heart disease in later life: longitudinal study. *British Medical Journal* 322(7292): 949-53.

Hilakivi-Clarke L, Forsén T, Eriksson JG, Luoto R, Tuomilehto J, Osmond C, Barker DJ. 2001. Tallness and overweight during childhood have opposing effects on breast cancer risk. *British Journal of Cancer* 85: 1680-84.

Phillips DI, Handelsman DJ, Eriksson JG, Forsén T, Osmond C, Barker DJ. 2001. Prenatal growth and subsequent marital status: longitudinal study. *British Medical Journal* 322:771.

Wahlbeck K, Forsén TJ, Osmond C, Barker DJ, Eriksson JG. 2001. Association of schizophrenia with low maternal body mass index, small size at birth and thinness during childhood. *Archives of General Psychiatry* 58:48-52.

Wahlbeck K, Osmond C, Forsén T, Barker DJP, Eriksson JG. 2001. Associations between childhood living circumstances and schizophrenia: a population-based cohort study. *Acta Psychiatrica Scandinavica* 104: 356–360.

2000:

Forsén T, Eriksson J, Tuomilehto J, Reunanen A, Osmond C, Barker D. 2000. The fetal and childhood growth of persons who develop type 2 diabetes. *Annals of Internal Medicine* 133(3): 176-82.

Eriksson JG, Forsén TJ, Tuomilehto J, Osmond C, Barker DJ. 2000. Fetal growth and childhood growth and hypertension in adult life. *Hypertension* 36: 790-94.

Eriksson JG, Forsén T, Tuomilehto J, Osmond C, Barker DJ. 2000. Early growth adult income and risk of stroke. *Stroke* 31: 869-74.

1999:

Eriksson JG, Forsén T, Tuomilehto J, Winter PD, Osmond C, Barker DJ. 1999. Catch-up growth in childhood and death from coronary heart disease: longitudinal study. *British Medical Journal* 318(7181): 427-31.

Eriksson JG, Forsen T, Tuomilehto J, Osmond C, Barker DJP. 1999. Modification of intrauterine programming by childhood growth. Chapter 6 in O'Brien PMS, Wheeler T, Barker DJP, eds. *Fetal programming influences on development and disease in later life* (London: Royal College of Obstetrics and Gynaecology Press).

Forsén T, Eriksson JG, Tuomilehto J, Osmond C, Barker DJ. 1999. Growth in utero and during childhood among women who develop coronary heart disease: longitudinal study. *British Medical Journal* 319(7222): 1403-7.

1997:

Forsén T, Eriksson JG, Tuomilehto J, Teramo K, Osmond C, Barker DJ. 1997. Mothers weight in pregnancy and coronary heart disease in a cohort of Finnish men: follow up study. *British Medical Journal* 315(7112): 837-40.

D. Studies Based on the Swedish Överkalix Study:

Bygren LO, Edvinsson S, Broström G. 2000. Change in food availability during pregnancy: is it related to adult sudden death from cerebro- and cardiovascular disease in offspring? *American Journal of Human Biology* 12: 447-453.

Bygren LO, Kaati G, Edvinsson S. 2001. Longevity determined by ancestors' overnutrition during their slow growth period. *Acta Biotheoretica* 49: 53-59.

Kaati G, Bygren LO, and Edvinsson S. 2006. Cardiovascular and diabetes mortality determined by nutrition during parents and grandparents slow growth period. *European Journal of Human Genetics* 10[11]: 682-688.

Bygren LO, Kaati G, Edvinsson S and E Pembrey. 2006. Reply to Senn. *European Journal of Human Genetics*. 14: 1149-50.

Kaati G, Bygren LO, Pembrey M, Sjöström M. 2007. Transgenerational response to nutrition, early life circumstances and longevity. *European Journal of Human Genetics* 15(7):784-90.

Pembrey ME, Bygren LO, Kaati G, *et al.* 2006. Sex-specific, male-line transgenerational responses in humans. *European Journal of Human Genetics* 14: 159-66.

Senn S. 2006. Epigenetics or ephemeral genetics? *European Journal of Human Genetics* 14: 1419.

Whitelaw, Emma. 2006. Epigenetics: sins of the fathers, and their fathers. *European Journal of Human Genetics* 14: 131-132.



Figure 1. Map of the Netherlands highlighting the famine zone.

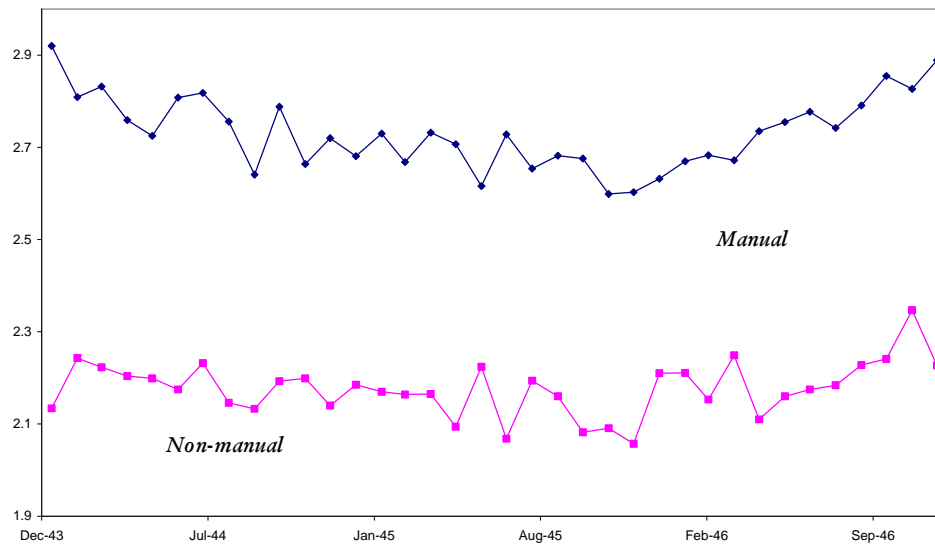


Figure 2a. Raven Test Scores by Monthly Birth Cohort in the Western Netherlands, 1944-46

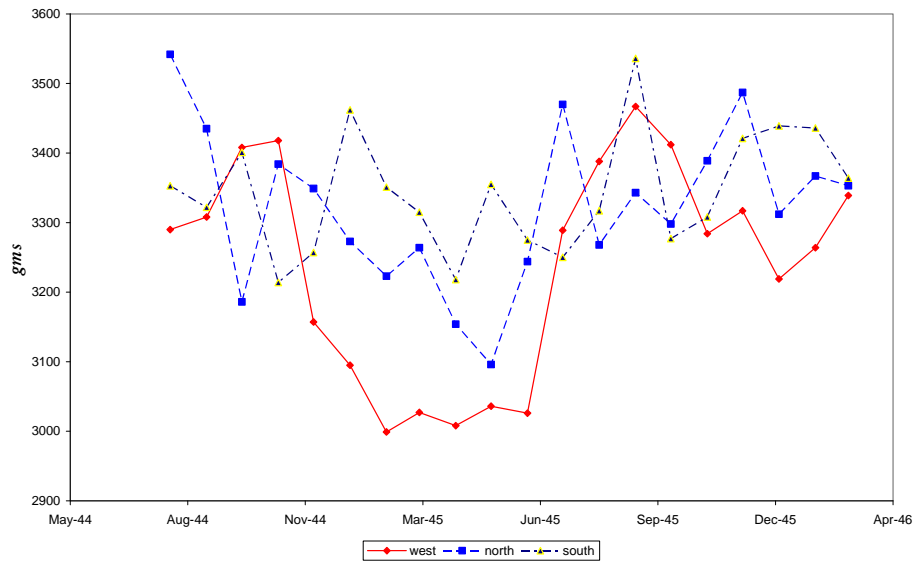


Figure 2b. Birth Weight by Month, 1944-46

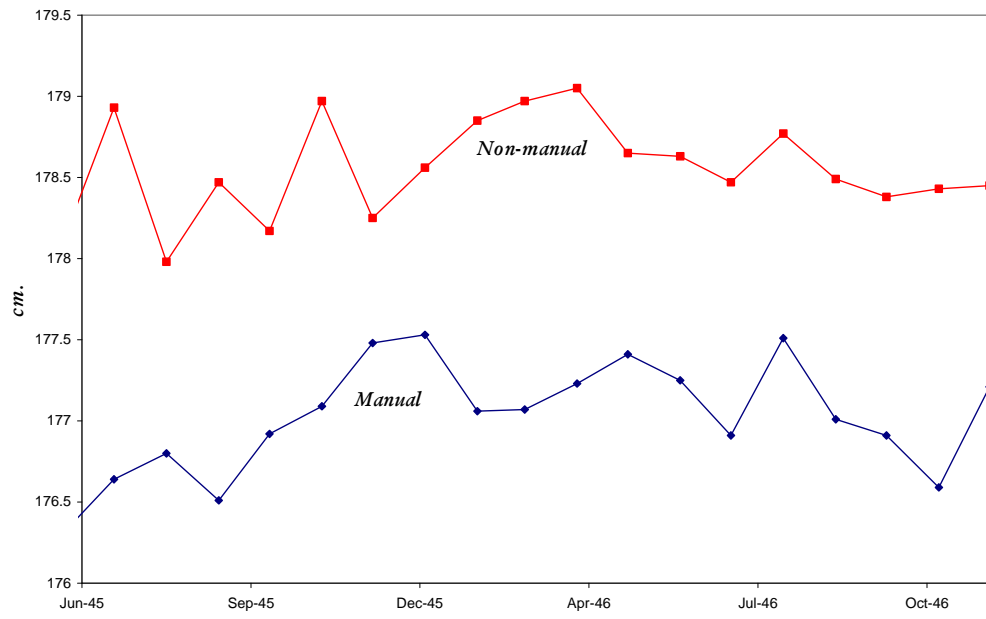
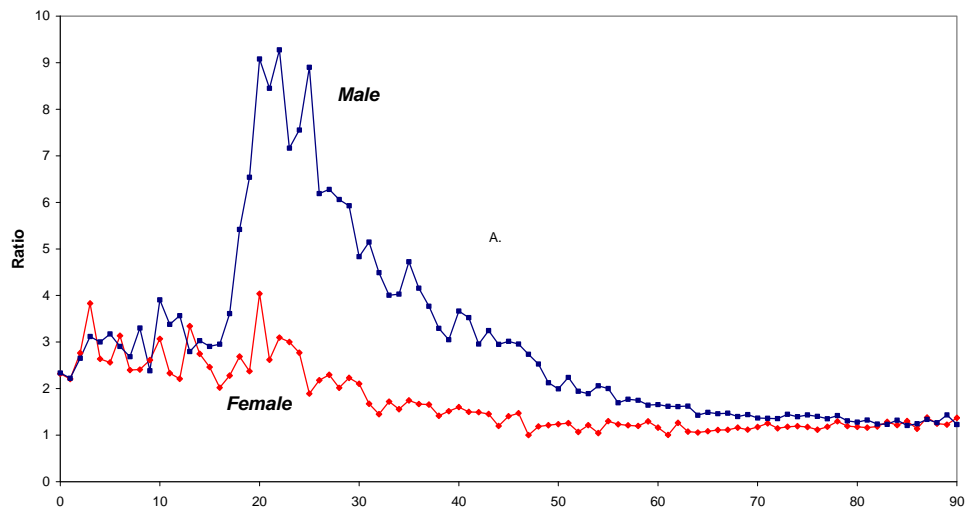


Figure 2c. Adult Height by Month of Birth, 1945-46

A. 1945 Relative to 1939



B. 1945 Relative to 1943

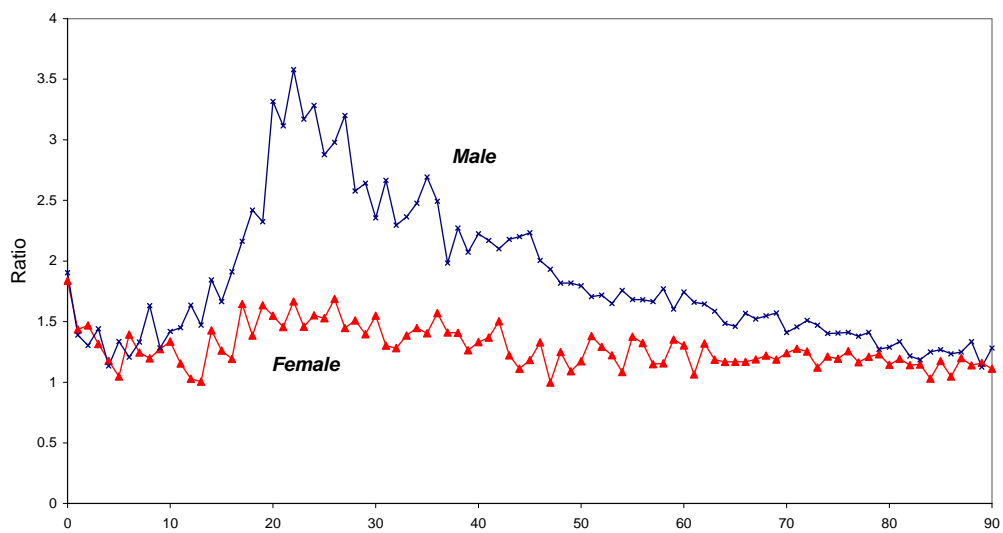
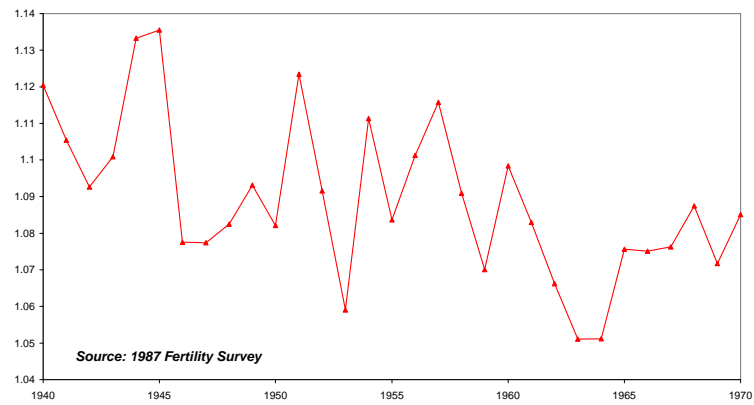


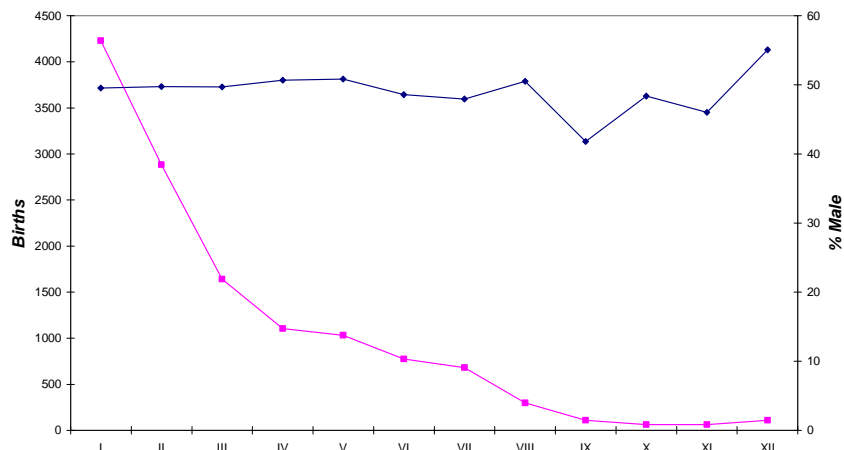
Figure 3. Mortality by Age in the Netherlands before and during the Hunger Winter

Source: Human Mortality Database

M/F Ratio in China, 1940-70: All Births



Leningrad 1942: Total Births and Percentage Male



Finland: Percentage Male Births 1860-1875

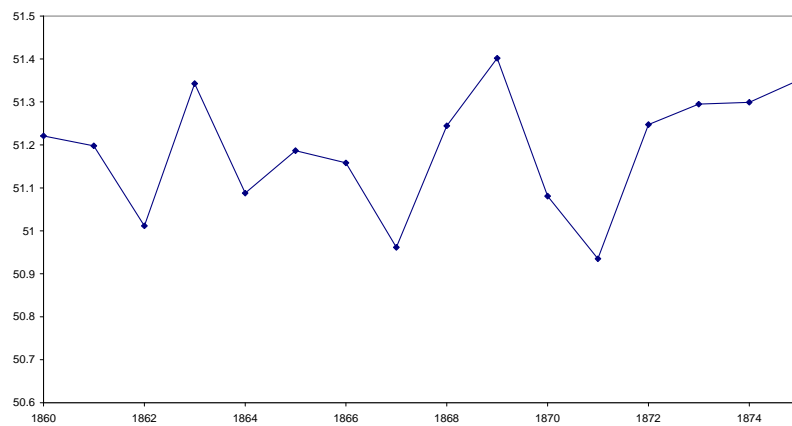


Figure 4. Births, Gender, and Famine

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