

***Supplementary Written Evidence to the
Scottish Parliament Finance Committee's
Inquiry into Preventative Spending***

***The Earliest Intervention:
Improving birth outcomes and lowering costs
through preconception health and health care***

November 2010

The Background

Children in Scotland appreciated the opportunity to offer oral testimony as part of a round table discussion with the Finance Committee on 2 November 2010. It offered us a chance to expand on points made in our original written evidence (August 2010).ⁱ On 2 November, the Finance Committee requested Children in Scotland to provide supplementary written evidence about the *need for, and value of, giving priority to preventative spending on preconception (and early pregnancy) health and health care.*ⁱⁱ

This document summarises the key points and provides references to a brief sample of the scientific and medical evidence available within Scotland, the UK and internationally. *We encourage the Finance Committee to invite further written evidence and oral testimony on this topic from relevant experts in universities, agencies and the Royal Colleges.*

Assigning priority to the field of preconception health and health care of women of childbearing age would be an innovative and welcome new area of preventative spending in Scotland. Unlike other areas of equally worthwhile prevention work, positive results could be attained in the short-term, rather than requiring decades for the good outcomes and cost savings to become apparent.

This will not happen automatically. Please note that there is currently no division within the NHS or the Scottish Government that has been given the remit and the resources to improve birth outcomes – and thereby, to lower the human, social and financial costs of poor birth outcomes – *by improving preconception health and health care.*

There are reasonable explanations as to *why* preconception health remains a missing piece of the antenatal puzzle. The main one is that it took sustained work over the past two generations to make good maternity services and antenatal care the norm. They are now widely accessible and widely used throughout Scotland. This is a success story.

Because maternity service improvements are still necessary (and already underwayⁱⁱⁱ), the focus has single-mindedly remained on what happens from the time when pregnancy is *confirmed* -- usually at 8-12 weeks *after conception* -- until it ends. Many pregnancies in Scotland continue to be *unplanned, unintended* and/or *unwanted* (as reflected in the Scottish statistics showing relatively high rates of pregnancy terminations and teenage pregnancies).^{iv}

Given this reality, it is understandable that maternity services and antenatal care providers direct their energy on *reacting* as successfully as possible to whatever health status and medical conditions the expectant mother brings to that first booking session with a midwife, GP or other health professional.

Understandable, yes. But, the traditional view that all pregnancy-related matters should be the responsibility of maternity services is no longer sufficient or helpful. *Tapping the potential individual, social and financial benefits of preconception health requires not only the involvement of current antenatal care providers, but also a much more prominent role for GPs, women's and sexual health services, school-based educators, youth workers and the media.* It also would be advanced by better family support policies and practices.

The Headlines

- **The trajectory determining birth outcomes and lifelong health and well-being is established from the moment of conception – not from the first antenatal appointment. The myth that the womb offers all the protection a developing foetus requires needs to be replaced with the medical reality that harm can and does occur during the first days, weeks and months of pregnancy. For example, when a mother drinks alcohol, it crosses the placenta and the foetus is directly affected by alcohol, too.**
- **Despite excellent progress in recent decades, too many women, foetuses and babies still die or are significantly harmed during pregnancy across Scotland.^v Between the 3rd and 8th weeks, the foetus develops all of its organs and brain development already is well underway. It also is when the foetus is especially vulnerable to environmental 'insults' (e.g., toxins, infection and radiation).^{vi}**
- **Unsuccessful pregnancies and poor birth outcomes also result in negative social consequences and major financial costs to Scotland's public purse in the short, medium and long term.**
- **For example, Oxford's Health Economic Research Centre estimates in a 2009 article in *Pediatrics* that just one of many poor pregnancy outcomes – preterm birth – is costing the public sector in England and Wales nearly £3 billion extra by the time each preterm baby reaches the age of 18 (with significantly preterm children costing the public purse between £62,000 and £95,000 each during their childhoods).^{vii}**

- Much of this harm and cost is potentially preventable, but it is not being prevented in any systematic way across Scotland today.
- The gap between problems that are *potentially* preventable and those that are *actually* prevented is caused largely by the absence of coherent, coordinated regulations, policies and practices that take preconception health seriously. Overlooking preconception health is, in turn, a consequence of the traditional view that antenatal care begins at the first booking appointment of a pregnant woman with a midwife, GP or other health professional.
- This traditional view is outdated because of an ever-larger, solid body of international evidence about the critical importance to good birth outcomes of: a) the health of women at the time of conception; and, b) the development of the foetus in the weeks/months before each pregnancy is suspected and confirmed.
- Scotland is lagging behind other nations in recognising, acting upon and giving priority to the available UK, European and international evidence about the value of, and opportunities for, preconception health and health care.^{viii}
- Scotland will keep paying heavily for not closing the preconception health gap.
- Both preconception health and antenatal care are vital – and both merit greater public investment to achieve greater well-being for women, as well as for babies. They are complementary and mutually supportive opportunities for preventative spending throughout Scotland.
- Preconception health *care* is, of course, the responsibility of Scotland's health sector. However, preconception health *education* and health *promotion* also requires the active engagement of the children's sector workforce (e.g. childminders, play groups and early childhood educators), teachers/schools (through the Curriculum for Excellence), youth workers, the media and others who influence Scottish attitudes, knowledge and behaviour at the preconception stage.
- Preconception health is primarily, but not exclusively a women's issue. Men can be either part of the *problem* (e.g. through exposing the foetus to second hand smoke or by domestic abuse of the mother) or part of the *solution* (e.g. by encouraging healthier behaviours and being supportive of the mother). But, men should no longer be allowed to pretend that they are 'innocent bystanders' in affecting birth outcomes.

The Basics

As the American College of Obstetricians and Gynecologists noted in its 2005 Opinion: *The goal of preconception care is to reduce the risk of adverse health effects for the woman, fetus, or neonate by optimizing the woman's health and knowledge before planning and conceiving a pregnancy.*^{ix}

International evidence has long been clear that what happens to the foetus during those first days, weeks and months *before pregnancy is either suspected or confirmed* is crucial to the lifelong well-being, health and life chances of the person that foetus will become. By the time the home pregnancy test is taken and the first session with a midwife or other health professional occurs, many key aspects affecting that foetus' life course have already been set.

The point of preconception health and health care is to give every foetus the best possible chance of growing into a healthy baby . . . even before her/his existence is known and her/his development can be helped by maternity services and antenatal care. Only actions taken *before* a pregnancy is confirmed can provide that enhanced chance. *This is the earliest of early interventions and a primary form of primary prevention.*

Healthy mums are far more likely to end up with healthy babies. That is a widely shared personal experience, as well as an established medical fact. While some expectant mothers improve their health behaviours once they know they are pregnant, it remains the case that women who are unhealthy at the outset (e.g. heavy or binge drinkers, obese, drug-users, poorly-nourished, smokers and/or suffering from certain medical conditions) are dramatically less likely to deliver a very healthy baby nine months later.

And, it is increasingly recognised that 'poor birth outcomes' – defined as late miscarriages, stillbirths, premature and underweight births, or otherwise damaged or significantly unhealthy babies – bring with them much higher costs to the public purse, as well as significant problems and hardships for the families involved. In many cases, these costs have not been calculated. Still, not knowing the precise amount of public costs does not mean that an obvious reality can be ignored – i.e., *dealing after the fact with poor birth outcomes will cost the public purse much more for much longer than preventing poor birth outcomes in the first place.*

The National Scientific Council on the Developing Child (associated with Harvard University) recently stated that based upon a meta-analysis of good quality research: *The association between an expectant mother's preconception health and the subsequent well-being of her baby is well documented, but there are few policies or programs that connect these periods explicitly in the delivery of primary health services.*^x

In October 2010, the "1st European Congress on Preconception Care and Preconception Health" was held in Brussels under the sponsorship of the World Health Organisation (WHO) European Region and numerous other national bodies -- but none from Scotland or the UK. In the keynote address, Dr Hani Atrash noted that: *Today we have scientific evidence that an array of interventions before pregnancy can improve birth outcomes.*^{xi} He went on to share the results of a recent review of over 700 publications, which revealed a **good standard of scientific evidence has already been accumulated for 35 specific preconception health interventions.**

Such work is not unknown within the UK, but it remains largely *unimplemented*, including in Scotland. For example, in 2008, the Royal College of Obstetricians and Gynaecologists – in collaboration with the Royal College of Midwives, the Royal College of Paediatrics and Child Health and the Royal College of Anaesthetists – issued a set of *Standards for Maternity Services* that dealt explicitly with 'prepregnancy' (i.e. preconception) health promotion and health care.^{xii}

Indeed, the Royal Colleges' Standards 1 and 2 focus on the needs of women and fetuses before pregnancy is suspected or confirmed. Included here is the statement: *A multi-agency strategy should be in place to provide prepregnancy advice, including nutrition and exercise, benefits of breastfeeding, sexual health and avoidance of substance misuse and smoking, starting with school-aged young people.* This is followed by their point that: *Women with existing serious medical or mental health conditions should have prepregnancy counselling and support at every opportunity, even if they are not immediately seeking pregnancy.* [Emphasis added]

Children in Scotland strongly agrees with these recommendations about what *should* be true. The high proportion of unplanned and unintended pregnancies makes it especially important for health professionals – especially GPs and sexual health service providers – to consider all sexually active women of childbearing age as appropriate recipients of preconception health messages and advice. However, the reality is that even the relatively modest pre-pregnancy standards and recommendations of the Royal Colleges' have not yet become common practice across Scotland.

This gap presents the Finance Committee with a wonderful opportunity. Improving the preconception health and health care of women would be an excellent example of effective preventative spending (especially as there is no downside for women whose health improves, even if they never become pregnant).^{xiii}

The Examples

As with much prevention work, promoting preconception health and achieving the potential cost savings and other benefits involves women of childbearing age both *doing* some new things and *no longer doing* other things.

There are numerous examples that are described and documented in the references already cited in this document. On the one hand, these include getting missing immunisations -- e.g. for German Measles (rubella), which can cause birth defects – that are unsafe to have after a pregnancy is underway. On the other hand, there are a variety of prescription medications (not to mention street drugs) and exposure to workplace environmental toxins that should be stopped prior to conception (as they can cause damage in the first weeks/months).

Similarly, women who have relevant medical conditions or illnesses – such as diabetes or clinical depression – are far more likely to protect their own and their foetus' health and well-being by receiving medical advice and changing their treatment regimes *well in advance of actually becoming pregnant*. Family planning and genetic counselling for both men and women are other significant areas of preconception health care.

However, this paper will highlight five major preconception health challenges/opportunities that are particularly important in the Scottish context. These focus on greatly reducing the problems caused by, and the costs attributable to:

- ✓ Alcohol
- ✓ Smoking
- ✓ Obesity
- ✓ Stress, and
- ✓ Neural tube defects (e.g. Spina Bifida) during pregnancy.

Alcohol

In his recent testimony to the Finance Committee, George Hosking of the WAVE Trust cited preventing foetal alcohol harm as his first example of how to improve individual lives, benefit Scottish society and minimise preventable drains on public spending through prevention and early intervention.^{xiv}

He was right, just as Scotland's Chief Medical Officer (Dr Harry Burns) was right when he wrote recently that: *Prenatal exposure to alcohol is the leading cause of brain damage and developmental delay amongst children in industrialised countries.*^{xv}

All foetal alcohol harm – sometimes called Foetal Alcohol Spectrum Disorder (FASD) – includes some degree of irreversible damage to the brain and nervous system. This, in turn, eventually shows up in serious (and extraordinarily *expensive*) learning disabilities and behavioural problems, not only during childhood/adolescence, but also continuing throughout adulthood.^{xvi}

Foetal alcohol harm is *potentially 100% preventable* by abstaining from consuming any alcohol during the entire pregnancy. Nevertheless, it is only 'potentially' 100% preventable because many women who are heavy or binge drinkers will have great difficulty stopping drinking, even if they fully understand and agree with the value of doing so. For them, "prevention" may mean a greater emphasis on contraception (i.e. pregnancy prevention). The other reason it is not 100% preventable in practical terms arises from the fact that many women – even among those intending not to drink during pregnancy -- are still consuming alcohol in the weeks/months before they realise that they *are* pregnant.

Binge drinking (which is increasingly common among women in Scotland) during the first trimester is particularly harmful to the development and life chances of a foetus. Stopping drinking alcohol at any point during pregnancy is a good idea. However, abstaining during the second and third trimesters is not even remotely as advantageous -- for the individual parent and child, for society and for Scotland's public purse -- as not drinking alcohol at all before and during the entire pregnancy. Thus, the crucial *prevention* work is at the preconception phase and cannot be accomplished solely by existing maternity services.

Common sense and preliminary international evidence suggest it is very likely that people who suffer foetal alcohol harm are disproportionately (highly) represented among the learning disabled, convicted criminals, alcohol/substance abusers, the unemployed and others whose lives have not turned out to be healthy or productive.

The public costs of dealing with the thousands of people damaged before birth by alcohol exposure is a major, on-going burden within Scotland. Happily, it need not be a permanent drain on the budget and the economy. Encouraging women with a drinking problem not to become pregnant -- while encouraging women who are moderate or light drinkers to stop drinking while pregnancy is likely – is both possible and desirable.

And yet, **foetal alcohol harm remains largely 'below the radar' across Scotland – and thus, it is not being prevented.** It disproves the maxim that 'ignorance is bliss'. There is nothing blissful about: being someone whose life chances were compromised permanently before birth; raising a child who has been harmed and has become more than a handful for parents and teachers; or paying the high bills that will inevitably accrue to the public.^{xvii}

Smoking

The harm that tobacco causes to children – particularly the effects of passive smoking – are well known, as is Scotland's leadership in promoting public health through the smoking ban in public places. Recently, the Royal College of Physicians issued a new report reviewing the benefits to children, public health and the public purse of tobacco control.^{xviii}

The cost savings to public budgets are also reasonably well understood, as evidenced in the September 2010 report of Westminster's All Party Parliamentary Group on Smoking and Health (which argues for continued preventative spending on tobacco control).^{xix}

Less well-known – but backed by equally robust evidence in the UK and internationally – are the negative effects of smoking on pregnancy, birth outcomes and the subsequent health and well being of children born to mothers who smoked during pregnancy. Just this month, research in the Journal of Epidemiology and Community Health published long-term data showing a clear association between maternal smoking during pregnancy and adult criminal behaviour among their offspring.^{xx}

Action on Smoking and Health (ASH) produced a Fact Sheet earlier this month that collates and summarises the broad range of research data and studies on "Smoking and Reproduction".^{xxi} These include findings about the significant contributions of smoking during pregnancy to low birth weight, stillbirths, preterm babies, cot death and increased risks of long-term developmental and health problems. There is a major cost to public budgets that accompanies all of these problems.

Not surprisingly, heavier smoking (as with heavier drinking) greatly increases the risk of these problems occurring. And, as with alcohol, all of these ill effects can effectively be prevented by abstaining during the *entire* pregnancy.

Again, it is certainly better to stop smoking at any time during pregnancy than to continue. However, just as is true for alcohol, damage from smoking can be -- and is -- done to the foetus from the time of conception through the weeks (if not months) until pregnancy is confirmed and attempts at smoking cessation are started. It makes clinical and financial sense to do everything possible to promote smoke free pregnancies from Day 1 through delivery. **This means giving priority to *preconception* health and health care, so that the harm from smoking can be diminished/averted earlier, if not prevented entirely.**

Obesity

It is not news that there is a widespread and growing problem with obesity across Scotland. Women of childbearing age are certainly part of this unhealthy trend. There is a solid body of evidence that reveals the problems for both the mother and the foetus when already significantly overweight women become pregnant.^{xxii} Unlike with smoking and alcohol, the immediate health risks of being obese at the time of conception and during pregnancy can be especially profound for women themselves.

However, the research noted above also makes it plain that there are significantly higher risks of poor birth outcomes for the foetus when the mother is excessively overweight. In financial terms, the heightened risk of death is more tragic, but less costly to the public purse than such obesity-related problems as significantly overweight (or underweight) babies or the increased likelihood of preterm deliveries and developmental abnormalities associated with it (including cerebral palsy and blindness/deafness).

Pregnancy is not an optimal time to undertake a significant weight loss regime. The leading research centre in the UK on obesity and pregnancy is based at Edinburgh's Royal Infirmary (funded largely by Tommy's charity) and led by Edinburgh University Professor Jane Norman.^{xxiii} Very useful studies and clinical trials are underway to help prevent or mitigate the complications that obesity presents during pregnancy.

However, there is no doubt that the best way of avoiding the risks, damage and high costs of obesity during pregnancy is for women who are planning, contemplating or likely to become pregnant to have dealt successfully with their weight problem *before becoming pregnant*. This is yet another example of a serious and expensive problem that could, and should, be prevented as fully (and with as many women) as possible through a new effort across Scotland to promote preconception health and health care.

Stress

'Stress' is being used in this context as the proxy for a diverse set of concerns and circumstances that can increase stress levels, undermine the mental, emotional and physical health of pregnant women, adversely affect birth outcomes and have lasting negative consequences for the health and well-being of their children.^{xxiv} This important, but complex, topic can only be *raised* here. Further evidence and analysis are required.

However, there are a few basic points worth making.^{xxv} Domestic abuse often begins or becomes worse during pregnancy and there is evidence of its role in significantly compromising the well-being of both mother and foetus. Sometimes the damage caused by men is direct and physical – and sometimes, it is a contributing factor in other unhealthy behaviours among pregnant women (for example, drinking alcohol, smoking or taking street drugs).^{xxvi}

Hypertension is another cause, and manifestation, of stress among pregnant women. There is considerable evidence about its negative impacts upon birth outcomes (for instance, pre-eclampsia and preterm births) and public costs.^{xxvii} Poverty, inequality and social isolation are stress-producing factors for many people and these can become exacerbated during pregnancy.^{xxviii}

These and other types/sources of antenatal stress (such as clinical depression and mental health problems) all come with a high price tag attached.^{xxix} They all require effective maternity services and antenatal care. And, they are also areas in which *preconception* health promotion and care can make a positive contribution and lower public costs. Most of the problems described above are not caused by pregnancy; although they sometimes are heightened by it.

Rather, there usually are pre-existing, underlying causes that could, and should, be dealt with as fully and well as possible prior to pregnancy. Doing so would diminish the pressure on maternity services; better protect the well-being of both women and babies and reduce the need for, and costs of, 'cleaning up' messes that might have been averted at an earlier, less inherently stressful time.

Neural Tube Defects

This area offers a particularly clear example of the benefits of *preconception* health promotion and preconception health care. Happily, the incidence of neural tube defects – such as Spina Bifida and Hydrocephalus ('water on the brain') – in Scotland is much lower than the incidence of problems and costs caused by foetal alcohol harm, smoking, obesity and stress during pregnancy. However, providing adequate care and support for babies, children and adolescents born with neural tube defects can be difficult and expensive. Prevention is usually possible and desirable for all concerned.

For example, research in recent decades has revealed that approximately 70% of Spina Bifida cases (and other neural tube defects) can be prevented easily and cheaply by women getting a sufficient amount of naturally-occurring folate (found in some leafy green vegetables, legumes and liver) and taking a folic acid supplement for a few months *prior to becoming pregnant* and during the first trimester after conception.^{xxx} **However, beginning to eat more folate-rich foods and taking folic supplements after pregnancy is confirmed has no positive, preventative effect whatsoever.**

The case of folic acid is also worth considering because it underscores that while some prevention can best be accomplished through direct preventative spending by public bodies, other types of prevention are best accomplished by government interventions of a different kind. More than a decade ago, some countries (including the US) decided that education campaigns and low cost folic acid supplements were not proving sufficient as prevention initiatives for neural tube defects.

Consequently, they passed legislation mandating folic acid fortification of flour and bread.^{xxx} Despite support in recent years from the Royal College of Obstetricians and Gynaecologists, this proposal has not yet been implemented in the UK. However, recent evidence presented to the UK's Chief Medical Officers by the Food Standards Agency's Scientific Advisory Committee on Nutrition (SACN) offering reassurance about the safety of mandatory folic acid fortification may make the difference.^{xxxii}

The Conclusion and Next Steps

Scotland's public investment in maternity services and antenatal care has prevented many of the health problems and poor birth outcomes experienced in earlier generations. It is a long-term success story. And yet, antenatal care is not the same as *preconception* care. Preventative spending to improve the preconception health and health care of women of childbearing age (particularly those most likely to become pregnant) is a large – albeit largely untapped -- opportunity for Scotland.

Part of the problem behind the lack of effective action here appears to stem from confusion about when 'preconception health and health care' should begin (whereas the antenatal care period has a definite start and finish). There also seems to be a lack of clarity about the difference between more *general* public health promotion and *preconception* health promotion.

These concerns are understandable, as there can be areas of overlap. For example, it certainly is the case that decreasing the incidence of childhood obesity would have the salutary effect of reducing the need for obesity-related preconception and antenatal care.

Similarly, if Scotland's unhealthy relationship with alcohol is significantly improved, then that will have welcome impacts on the prevalence of foetal alcohol harm (and lower the now pressing need for preconception health promotion and care around alcohol). Scotland's Chief Medical Officer's efforts to promote "salutogenesis" (i.e., creating health and resilience, rather than solely avoiding disease) could – if taken forward -- also have a welcome impact on preconception health throughout Scotland.^{xxxiii}

However, for the moment and in practical terms, the key characteristic of preconception health and health care is that it involves *taking pre-pregnancy actions in the short-term that will improve the chances of good maternal health and positive birth outcomes*. Thus, while eating spinach and other folate-rich foods is a good idea for the general population, taking folic acid supplements in the months before becoming pregnant is an example of *preconception care* that is needed by sexually active women of childbearing age, but not by the general population. Similarly, while the nation's health would improve dramatically as a result of lifelong abstinence from tobacco, alcohol and street drugs, the *preconception* health challenge is to encourage such abstinence for the one year (that includes the months before and during pregnancy) by women who are likely to become pregnant.

Scotland is paying an unnecessarily high price for not having taken the step of giving preconception health and health care the priority that they deserve. The Finance Committee inquiry on preventative spending could be the needed catalyst for moving Scotland from the status quo into an exciting, high-yield realm of prevention work that has great short, medium and long-term benefits and cost savings.

A few next steps are obvious. In taking a preconception health and health care agenda forward, the Scottish Parliament and Scottish Government should:

- Engage with both males and females in promoting preconception health
- Link new preconception health care with existing health providers, especially GPs, maternity/antenatal services, women's health and sexual health services
- Combine both preventative spending and legislative/regulatory actions
- Ensure that 'preconception' is recognised and acted upon by all agencies as a crucial period for implementing effective public health interventions
- Support the active participation of key allies outwith the health sector (e.g., the children's sector workforce, educators and youth workers)
- Incorporate robust evaluation, including both qualitative research and comprehensive cost-benefit analyses, from the start of all preconception health and health care initiatives launched in Scotland

We encourage Finance Committee members to begin taking this opportunity to heart by inviting additional evidence and specific recommendations from other organisations and individuals having greater expertise in the relevant fields. We have supplied a sample of the relevant literature and references to particular areas of preconception health promotion and care that should be given priority. Children in Scotland's role is primarily one of bringing this whole realm of preventative spending to light and signposting paths the Committee could choose to explore further.

For additional information, please contact Dr Jonathan Sher, Director of Research, Policy and Programmes at jsher@childreninscotland.org.uk or on 0131 222 2418.

ⁱ Children in Scotland’s written evidence to the Finance Committee, August 2010: See: <http://www.scottish.parliament.uk/s3/committees/finance/inquiries/preventative/PS-ChildreninScotland.pdf>

ⁱⁱ In this document, ‘early pregnancy’ refers to the weeks/months between conception and the first booking appointment with a health professional to confirm pregnancy and to start maternity services and antenatal care. For ease of reading, only the term ‘preconception’ will be used, but the relevance of early pregnancy is implicit and undiminished. The key distinctions between the two will arise in the development of policies and clinical practices.

ⁱⁱⁱ For example, the Scottish Government is completing a “Refreshed Maternity Services Framework” – and the findings and recommendations of “Vulnerable Families Pathway” (NHS Quality Improvement Scotland) will be made public in the near future.

^{iv} ISD Scotland, *Statistical Publication Notice: Teenage Pregnancies*, Scottish Government 2010. See also: <http://www.scotland.gov.uk/Topics/Health/health/sexualhealth/publications>

^v ISD Scotland, *Scottish Perinatal and Infant Mortality and Morbidity Report (SPIMMR) 2008*. See: <http://www.isdscotland.org/isd/3113.html>

^{vi} For example, see: U Meyer, *et al.*, “The Neurodevelopmental Impact of Prenatal Infections at Different Times of Pregnancy: The Earlier the Worse?” — *Neuroscientist* Vol 13 No. 3, 2007 -- <http://nro.sagepub.com/content/13/3/241>

^{vii} Mangham, Petrou, *et al.*, “The Cost of Preterm Birth Throughout England and Wales”, *Pediatrics* Vol 123 No. 2, 2009

^{viii} See, for example, the diverse range of articles in two recent special issues of medical journals dealing with preconception health and health care: <http://www.mombaby.org/index.php?c=3&s=62&p=481>

^{ix} ACOG Committee on Gynecologic Practice, *Committee Opinion 313: The Importance of Preconception Care in the Continuum of Women’s Health Care*, September 2005 http://www.cfhc.org/assets/documents/SamplesFile/Preconception/ACOG_Importance_PCC.pdf
See also: <http://mail.ny.acog.org/website/PreconBooklet.pdf>

^x National Scientific Council on the Developing Child & National Forum on Early Childhood Policy and Programs, *The Foundations of Lifelong Health Are Built in Early Childhood*, Harvard University Center on the Developing Child, 2009. See also: <http://www.mombaby.org/index.php?c=3&s=62&p=481>

^{xi} For Dr Atrash’s evidence, please see both:

a) http://www.preconception2010.one.be/fileadmin/user_upload/temp/Brochure_preconceptional_care.pdf; and, b) <http://www.ibis-birthdefects.org/start/pdf/budapest/Plenary/1/Atrash.pdf>

^{xii} See: <http://www.rcog.org.uk/files/rcog-corp/uploaded-files/WPRMaternityStandards2008.pdf>

^{xiii} U.S. Centers for Disease Control and Prevention, *Recommendations to improve preconception health and health* (which includes research literature review). See: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5506a1.htm?s_cid=rr5506a1_e

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- ^{xiv} See the following for George Hosking’s testimony before the Finance Committee on 9 November 2010: <http://www.scottish.parliament.uk/s3/committees/finance/or-10/fi10-2402.htm#Col2654>
- ^{xv} J Sher, *10 Facts about Foetal Alcohol Harm: Summary of a conference speech*, Children in Scotland 2010.
- ^{xvi} B Stade, et al., “The burden of prenatal exposure to alcohol: revised measurement of cost”, *Canadian Journal of Clinical Pharmacology* 16 (1) Winter 2009. See: <http://www.ncbi.nlm.nih.gov/pubmed/19168935?ordinalpos=1&itool=PPMCLayout.PPMCAppController.PPMCArticlePage.PMCPubmedRA&linkpos=1> See also: D Fuchs, et al., *The Economic Impact of Children in Care with FASD and Parental Alcohol Issues: (Phase II) Costs and Service Utilization of Health Care, Special Education and Child Care, Manitoba, Canada (funded by Public Health Canada) September, 2009*. See: http://www.cecw-cepb.ca/sites/default/files/publications/en/FASD_Economic_Impact_Phase2.pdf. In addition, for US data, see: B Stade, et al., Substance Abuse and Mental Health Services Administration (FASD Center for Excellence), *The Financial Impact of Fetal Alcohol Syndrome*, US Department of Health and Human Services, 2003 -- <http://www.fasdcenter.samhsa.gov/publications/cost.cfm>
- ^{xvii} BMA Board of Science, *Fetal alcohol spectrum disorders – a guide for healthcare professionals*, British Medical Association 2007. See also evidence from: a) the Public Health Agency of Canada: http://www.phac-aspc.gc.ca/fasd-etcaf/pubs/fs-fi_01eng.phph; b) Health Evidence Network, World Health Organisation (WHO/Europe): <http://www.euro.who.int/en/what-we-do/data-and-evidence/health-evidence-network-hen/publications/evidence-summaries-of-network-members-reports/is-low-dose-alcohol-exposure-during-pregnancy-harmful>; and, c) US Centers for Disease Control and Prevention: <http://www.cdc.gov/ncbddd/fasd/index.html>
- ^{xviii} *Passive Smoking and Children*, Royal College of Physicians, 2010 – see: <http://www.rcplondon.ac.uk/professional-Issues/Public-Health/Documents/Preface-to-passive-smoking-and-children-March-2010.pdf>
- ^{xix} All Party Parliamentary Group on Smoking and Health, *Inquiry into the Effectiveness of Tobacco Control*, September 2010 – see: <http://www.ash.org.uk/current-policy-issues/all-party-parliamentary-group-on-smoking-and-health>
- ^{xx} A D Paradis, et al., “Maternal smoking during pregnancy and criminal offending among adult offspring”, *Journal of Epidemiology and Community Health*, 2010. See: <http://jech.bmj.com/content/early/2010/10/18/jech.2009.095802.abstract>
- ^{xxi} Action on Smoking and Health, *Fact Sheet: Smoking and Reproduction*, November 2010. See: http://www.ash.org.uk/files/documents/ASH_112.pdf
- ^{xxii} N E Stotland, “Practice: Obesity and Pregnancy”, *British Medical Journal* 337 2008. See: <http://www.bmj.com/content/337/bmj.a2450.full>. See also: a) Tommy’s *Obesity Management Guide*: <http://www.tommys.org/Page.aspx?pid=788>; and b) Centre for Maternal and Child Enquires (CMACE), *Obesity in Pregnancy*, Royal College of Obstetricians and Gynaecologists 2010 -- <http://www.rcog.org.uk/news/cmace-release-cmace-publishes-information-obesity-pregnancy>
- ^{xxiii} See: <http://www.tommys.org/Page.aspx?pid=367>

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