

# Public health annual report

2015

## The first 1,000 days



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## Finding out more about the health of Southampton

If Southampton is to become a healthier City, we need to know what our current health outcomes are, trends over time, how we compare with similar cities and what the evidence suggests will make the biggest difference if we want to improve.

There is a wide range of information in our Joint Strategic Needs Assessment (JSNA) that helps us understand the health of people in Southampton. This resource is regularly updated and paints a picture of what life is like in Southampton and what the health challenges are. The full JSNA is a web-based resource and can be found at [www.publichealth.southampton.gov.uk/jsna](http://www.publichealth.southampton.gov.uk/jsna). As well as data and analyses, there are mapping tools and summaries which enable a detailed picture to be built up on a wide range of topics.

The back catalogue of annual reports is available on our website; these give an in-depth analysis of a range of topics that remain current in our City. As well as publishing an Annual Report and a Joint Strategic Needs Assessment (JSNA), we also produce a number of other resources that help build up a more detailed picture of health in Southampton. These include briefing notes which are a comprehensive look at topics such as child growth, inequalities and sexual health. We produce profiles of the sixteen electoral wards in the city; these are available as an interactive mapping tool on our website. Please visit our website to access any of these resources:

[www.publichealth.southampton.gov.uk](http://www.publichealth.southampton.gov.uk)

## Acknowledgements

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Special thanks also to guest contributors: Laura Brook, Hazel Inskip, Jeyanthi John, Patrick O'Shea and Sue Thompson.

## Preface

This is my third report since Public Health leadership and responsibilities transferred from the NHS back to local authorities on 1st April 2013. In it I report on the state of Southampton's health, underlying trends and some of the future challenges that we face, and make recommendations for how health can be improved.

“Start well, stay well” could sum up our approach to improving health and reducing inequalities. It is also where the evidence tells us we should go if we are serious about making a difference to the lives of Southampton people. While the health of people living in Southampton continues to improve and we are living longer, not all of these extra years of life are lived in good health or free from disability. Some health indicators in childhood show that we are not yet succeeding in our aim to give every young person the best possible start in life. There has also been limited progress in narrowing the health gap between the wealthy and those who are on low incomes, and many challenges remain or have increased in significance.

In this report I have chosen to focus on the first 1,000 days of life; the lead up to conception, pregnancy and the first two years of life. This period is critical to future health and wellbeing and is the time when there are huge opportunities to influence outcomes for the better.

The University of Southampton has contributed significantly to our improved understanding of what influences future health and what we can do about it. In a specially commissioned introduction this year, Professor Hazel Inskip from the University's MRC Lifecourse Epidemiology Unit sets out the rationale for focusing on fetal and infant development. There are clear pointers driving us to improve nutrition and lifestyles of young women and their children because of their far reaching implications for future health.

The series of briefings in this report set out in more detail how these and other influences impact on health. Social factors, including poverty, housing and language development, are associated with poorer health outcomes such as teenage pregnancy and childhood dental decay. Tackling the root causes of social disadvantage is essential, but much can be done to reduce the impact of these factors.

Emotional and mental health play an important role throughout life and attachment is a key factor in early positive childhood development. The 0-5 year Healthy Child Programme aims to strengthen protective factors around the mother and her child, identifying issues at an early stage, mobilising social support and building self-confidence.

The key role of diet and nutrition in laying the foundations for good health is explored in further detail; eating the right foods in pregnancy, the role of supplements, the importance of breast feeding, maintaining a healthy weight and making healthy food choices. Important

recommendations are set out that will support families to ensure that children enjoy the life-long benefits of being a healthy weight.

Smoking, drugs and alcohol cause harm to babies, both in the womb and after they are born. The most vulnerable should be protected from harmful substances if they are to have the best possible start in life. Two chapters in the report are devoted to setting out what these threats to future health are and what more we can do enable parents to avoid them.

Infections are a much lesser threat than they were even a decade ago, as vaccination programmes have expanded to protect against a wider range of infectious agents. However, new problems are emerging, including antibiotic resistance, and vigilance will always be needed to prevent, detect early and treat well.

Screening for infections and other health problems contributes to reducing preventable disease, disability and avoidable deaths. The final section of the report describes the screening programmes that are on offer. They remain an offer. It is vital that we communicate the risks and benefits clearly and consistently, enabling all families to make good choices encouraging as many parents as possible to opt in.

A set of 12 key indicators are given at the end of the report. These will help demonstrate over time whether what we do in the first 1,000 days is having an impact on improving the health and life-time chances of our city's children.

As with last year's Public Health Report, we are making the online version of the report a more useful resource; full technical briefings on the this year's selected topics are published along with links to further information in the JSNA and elsewhere, as well as topic summaries, city profiles and other resources.

My hope is that the Report and its recommendations not only stir debate but lead to much-needed action.



**Dr Andrew Mortimore**  
**Director of Public Health**  
**Southampton City Council**  
**March 2016**

## Introduction

The theme for this year's report is *the first 1,000 days of life.....*

Shakespeare got it seriously wrong - at least from a health perspective. His "seven ages of man" in *As You Like It* starts with the "infant mewling and puking in the nurse's arms". But by the time infants start mewling and puking, they have done a lot of growing and have already acquired many characteristics that will determine their health in later life. We need to start further back in time.

We have been slow to wake up to the importance of pregnancy, let alone pre-conception. Until relatively recently, pregnancy was something to be slightly embarrassed about. Queen Victoria, herself pregnant many times, despised it and wrote to her daughter saying "What you say of the pride of giving life to an immortal soul is very fine, dear, but I cannot enter into that; I think much more of our being like a cow or a dog at such moments." Fortunately, times have changed, pregnancy is celebrated and we try to support pregnant women and their families to ensure the health of the mother and child.

Think of a car. Which would you expect to last longer; the car made out of parts from a scrap yard, or a new car straight from a high-tech factory? Not a difficult question to answer. We have all absorbed the maxim that the better something is made, the longer it will last. Specifically, though, we've taken it on board in relation to technology. However, we've been extraordinarily slow in applying it to the way humans are made.

The first 1,000 days refers to the period from conception to age two years. The interest in this period largely arose in relation to low income countries where there was concern about children being stunted. Women's health and nutrition before and during pregnancy, and infant feeding and weaning were considered vital for healthy children; the first 1,000 days has become widely accepted as a time when action is needed to give children the best start in life. However, it is also important in high income countries, such as the UK, too. Here though, the major concern is not stunting and under-development but the opposite, namely, our obesity epidemic and the later risk of chronic diseases such as diabetes and cardiovascular disease.

Figure 1: Lifecourse model of disease risk

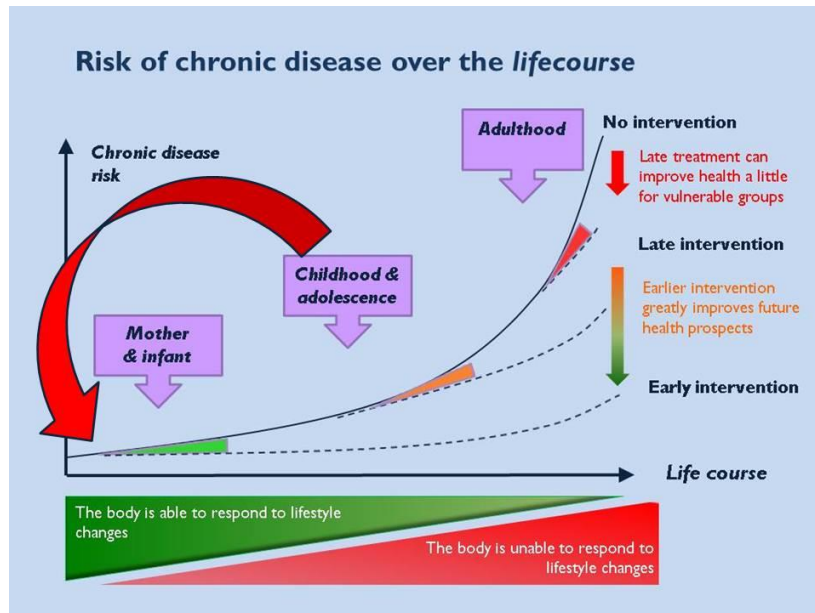


Figure 1 shows that our risk of chronic disease increases as we age, but early intervention can have a greater effect than leaving it till later. Improving the lives of children and adolescents has a double advantage as it improves the health of the children themselves but also prepares them better for having their own children so their pre-conception health is enhanced and their children benefit.

Studies in the last few years from around the world have shown that people who were born small have higher risks in adult life of coronary heart disease, raised blood pressure and cholesterol, obesity, osteoporosis and bone fractures. However, it's also true that there is an association between high birth weight and later obesity, diabetes and other chronic diseases. There are thought to be two routes to later obesity: via excess or restricted growth in the womb and early life.

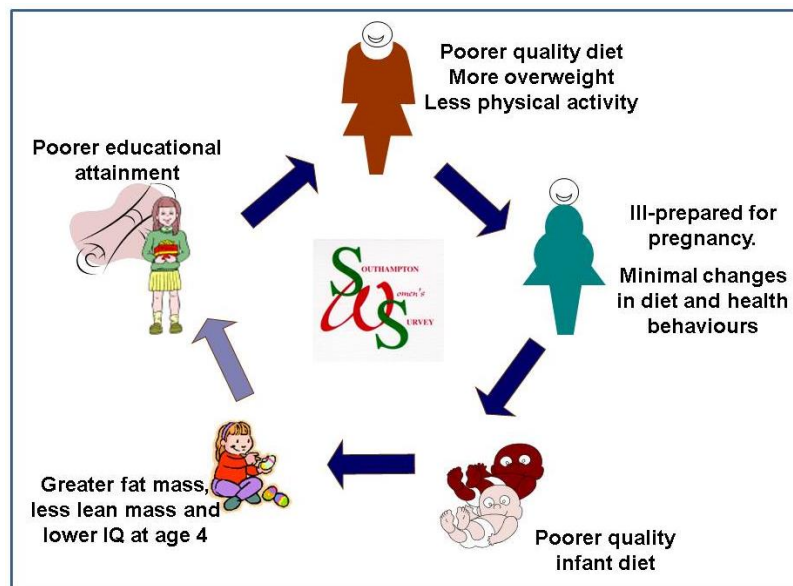
Clearly something about the way babies are formed before they are born has an impact much later in life. Size at birth is a crude measure that summarises the way the baby has grown in the womb, but despite the crudeness of the measure, we still see strong relationships with these major disorders. The list of diseases is dramatic. Heart disease is the commonest cause of death in this country and heart disease and diabetes rates are rising in many countries. Furthermore, rapid growth in early life seems to have a negative effect on health and development of the child. Rapid growth may however not be bad, as it could be due to the baby catching up after less-than-optimal growth in the womb. But failure to thrive after birth is not good either. Infant feeding is a complex issue, but infancy is a time of rapid growth, and infant diets provide the building blocks for physical development.

So how are babies made? We all think we know the answer to that! But what is the impact of the diet and health of the parents before conception? What happens around conception? And what happens in the womb during the subsequent nine months? What makes babies different from each

other when they emerge from the womb? What influences their health and development in the early years?

In Southampton, the Southampton Women’s Survey (SWS) was set up to examine these issues, among others. More than 12,500 women aged 20-34 years were recruited to the study when they were not pregnant and those who subsequently became pregnant were seen three times in pregnancy, with the babies measured at birth and then followed-up frequently through childhood. More than 3,000 babies were born to women in the study.

Figure 2: Southampton Women’s Survey findings



The SWS has given us some important insights into what is going on. Figure 2 shows some of the findings which are presented as a cycle that needs to be broken if we are to improve health. Educational attainment is strongly associated with the quality of a woman’s diet, her body composition and her levels of physical activity. Women do not modify their lifestyles to any great extent in the months leading up to pregnancy (many pregnancies being unplanned) and only make minimal changes to their dietary quality during pregnancy itself. The strongest predictor of the quality of diets of the infants and children is the quality of the diet of the mother before she even became pregnant. Poor quality of infant feeding, even adjusted for a wide range of socio-economic and maternal factors, is associated with greater fat mass and less lean mass (such as muscle) and lower IQ in the children at age four years. While the SWS children are not old enough to measure educational outcomes it would not be surprising if the circle were closed to provide the link in pale blue in figure 2.

Further work in the SWS has identified five key factors that are associated with obesity in the child at ages 4 and 6 years. The factors in question are: the mother being overweight before conception of the child, excessive weight gain in pregnancy, low levels of vitamin D in the mother during pregnancy, maternal smoking during pregnancy, and short duration of breastfeeding. Children with



four or five of these factors were around four times more likely to be overweight or obese at ages 4 and 6 years than those with none.

Work linked to the SWS has also demonstrated the importance of the role of fathers. While it is women who get pregnant, their lifestyles are inextricably linked with those of their partners and the men can have a strong influence on the family diet. Men's sperm quality is undoubtedly important too, so the importance of a healthy lifestyle before conception doesn't only apply to women.

We are gradually putting together the pieces of the jigsaw to give us a picture of the influences on fetal and infant development. For now, we have clear pointers driving us to improve the nutrition and lifestyles of young women and their children. The effects of these undoubtedly have far-reaching implications for health, and so optimising the influences during the first 1,000 days is crucial.

For anyone able to read this report, it's too late to alter what happened to us in the womb and in early life – our first 1,000 days are over. But we can maximise our health prospects and those of our children at any stage. Even the poorly made car can be kept going for longer if it is lovingly maintained and carefully driven. So, while adding an extra age to Shakespeare's "seven ages of man", we need to remember that at all eight ages there are opportunities for improving our health, but certainly a greater focus on the first 1,000 days would benefit future generations.



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**March 2016**

## 1. Social factors and the first 1,000 days

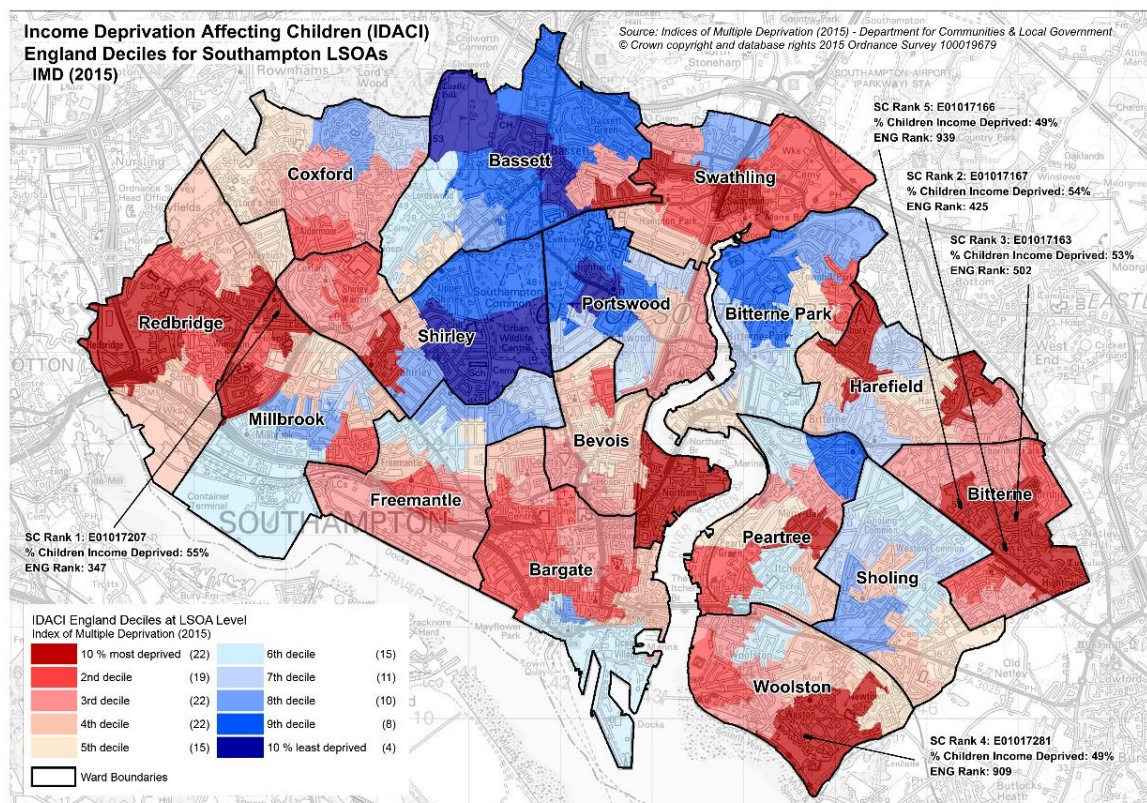
### 1.1 Why is this issue important?

Living in poverty has a serious impact on children’s lives, negatively affecting their educational attainment, health, and happiness as well as having long-term adverse consequences into adulthood.<sup>1</sup> In Southampton, there is a life expectancy difference of 8 years for males and 5 years for females between the most affluent and deprived areas. From highest to lowest levels of deprivation (poverty), children living in more deprived circumstances are:

- Nine times more likely to die of a sudden unexpected death in infancy
- Three times more likely to have a mental health problem
- Thirteen times more likely to suffer injury or poisoning
- More likely to have language delay and experience a much higher number of discouragements than encouragements<sup>2</sup>

Even a few years living in poverty can have negative consequences for a child’s development and is especially harmful from the ages of birth to five.<sup>1</sup> By the age of four, a development gap of more than a year and a half can be seen between the most disadvantaged and the most advantaged children.<sup>2</sup>

Figure 1: Map of Income Deprivation Affecting Children by Southampton LSOAs (IMD 2015)



The Marmot review (2010) highlighted that children who have low cognitive scores at 22 months of age, but who grow up in families of high socioeconomic position, improve their relative scores as they approach the age of 10. The relative position of children with high scores at 22 months, but who grow up in families of low socioeconomic position, worsens as they approach age 10.

About 12,000 children and young people (aged under 19 years) in Southampton live in poverty (with over 6,000 children under 5 years of age). Figure 1 shows the level of income deprivation affecting children by Lower Super Output Area (LSOA). As can be seen, there is wide disparity in income deprivation across our City. For five of our LSOAs, marked on the map below, half or more children live in poverty.

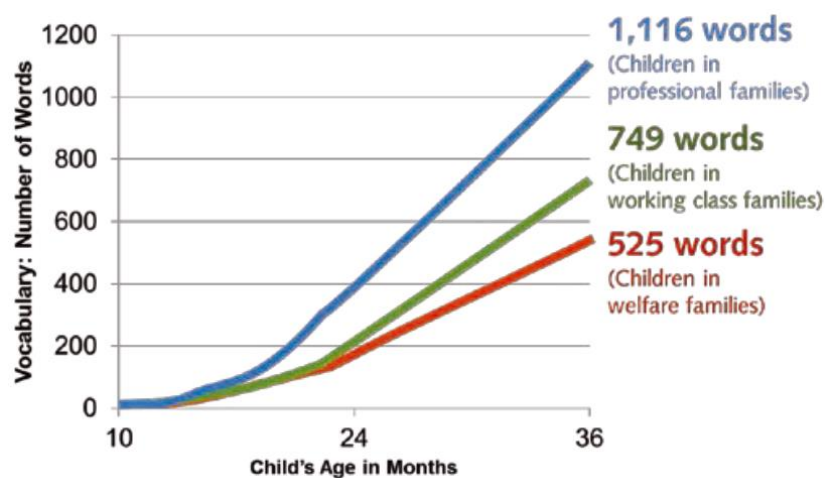
**Housing**

Children living in poverty by definition tend to grow up in poor housing conditions (including cold living conditions). Children living in cold and damp homes are more likely to experience mental health problems, such as depression and anxiety; more likely to experience slower physical growth and cognitive development and higher risks of respiratory problems, long term ill-health and disability. Furthermore, children living in cold, damp and mouldy homes are between 1.5 and 3 times more likely to develop symptoms of asthma than children living in warm and dry homes.<sup>5</sup>

**Language development**

A child’s physical, social and cognitive development strongly influences how ready they are to start school.<sup>3</sup> Most striking is language development at 36 months (see figure 2) and language proficiency is a key predictor of school success. Coupled to this is recognition that 61% of low income children have no books at home. It has been estimated that if all children were reading well by age 11, Gross Domestic Product in England in 2020 could be an extra £23 billion.<sup>4</sup>

Figure 2: Language development at 36 months by socio-economic status<sup>2</sup>



Recent research shows that household chaos and in particular household disorganisation account for a significantly lower level of language development at 36 months (after controlling for maternal education and poverty).<sup>1</sup>

### **Poverty and associated risk factors**

A caregiver's prolonged experience of 'toxic stresses' such as poverty, mental health problems, domestic violence and substance misuse has a significant impact on the young child's rapidly developing nervous system, development, health and wellbeing across the life span.<sup>2</sup> Sadly, these 'toxic stresses' tend to cluster together alongside other risk factors such as a poor diet and smoking in the household. All of which impact on a child's life chances.

The most vulnerable children in our population are children in need, particularly those with child protection plans and looked after children. The majority are children in need as a result of experiencing abuse and/or neglect in their childhood. In April 2015 there were 615 looked after children and 387 on child protection plans in Southampton. Southampton's looked after children rates are 75% higher compared to England (and 37% higher than our statistical neighbours). Indicators of health and well-being and learning development for these children suggest that their experience is much worse than the average for our overall child population.

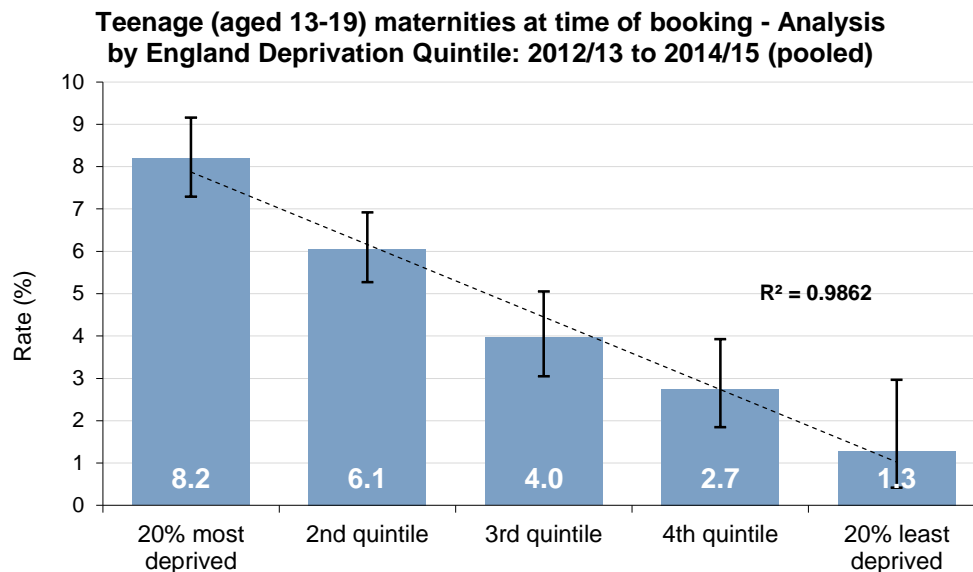
Pregnancy is an important 'teachable moment'; most women want the best for their baby and consequently want to make healthy choices during this time. However, social circumstances and unplanned pregnancy can constrain an expectant mother's healthy choices, particularly if the pregnancy occurs at a young age in life.

### **Teenage pregnancy**

Teenage conceptions have long been regarded as a proxy indicator for wider evidence of low aspirations, and social and educational disengagement. Evidence shows that teenagers with a history of poverty and have experienced child abuse or neglect have a 66% increased risk of teenage pregnancy.<sup>6</sup> Having a caregiver who completed their education decreases the risk of teenage pregnancy by about 25%.<sup>6</sup>

In 2013 there were 129 under 18 conceptions in Southampton; a significantly conception rate compared with other similar areas in England for both teenage pregnancy overall and in particular for conceptions among girls under the age of consent. Figure 3 shows the direct relationship between teenage pregnancy at time of booking with the maternity service and deprivation within our City for the period 2012/13 to 2014/15 (pooled).

Figure 3:

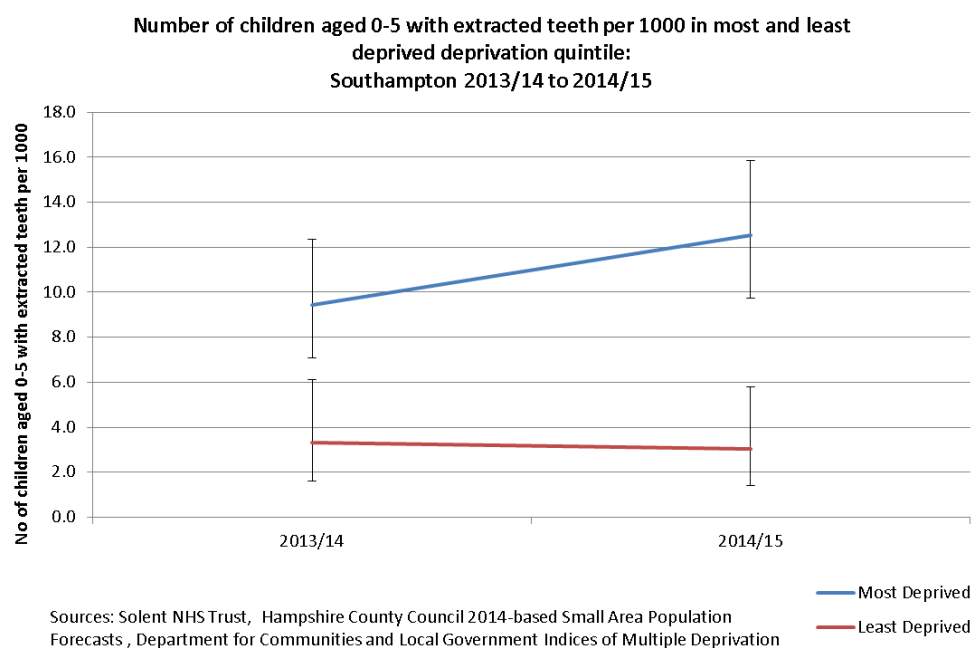


Source: UHS midwifery database: Southampton CCG

### Dental health

Keeping children healthy and free from dental disease is important as they are learning to speak and socialise. Furthermore, dental decay is the main reason for children to be admitted to hospital. General Anaesthetic (GA) in a hospital may be needed to either fill or extract teeth in young children as they are often unable to cooperate, particularly if they are in pain. In Southampton, around 500 children were admitted to hospital in 2014-15, of which around 180 were aged under 5 years.

Figure 4:



Sources: Solent NHS Trust, Hampshire County Council 2014-based Small Area Population Forecasts, Department for Communities and Local Government Indices of Multiple Deprivation 2010

The inequalities in oral health are stark with the highest levels of disease experienced by the most deprived groups. This means that the impacts of the disease, including the proportion of children undergoing GA for dental extractions, are highest in these groups. As can be seen in figure 4, children aged 0-5 years within the most deprived deprivation quintile are significantly more likely to have teeth extracted than those in the least deprived quintile, and this preventable disparity has increased between 2013/14 and 2014/15.

## 1.2 What can be done?

### National Government Policy

The Government's national child poverty strategy was published in 2011 with targets up to 2020. The focus of this first child poverty strategy was on the causes of intergenerational cycles of poverty. Government commitments have included; free early years childcare for all 3 and 4 year olds, introduction of free places for disadvantaged 2 year olds and a call to action to increase health visitors and expansion of the Family Nurse Partnership Programme.<sup>1</sup>

Prior to this, the SureStart Children's Centres were established from 1999 to bring together health, education, employment and specialist support for the most disadvantaged pre-school children and their families. Moving forwards, the focus of the latest child poverty strategy (2014) is on ensuring that all poor children enter school ready to learn.<sup>1</sup>

A recent national report 'Poor beginnings' showed anticipated variation in health and readiness for school outcomes between affluent and deprived areas across England.<sup>3</sup> What is striking is the variation in outcomes between deprived local authorities, suggesting that there is capacity to make positive changes even in adverse circumstances.

### Return on investment

Evidence has shown that the early caregiving environment, and in particular parenting, mediates around 50% of the impact of many of the contextual factors (e.g. poverty) that influence children's early development, in addition to having direct effects on children's wellbeing.<sup>2,7</sup> For instance:

- Every £1 invested in quality early care and education saves the taxpayer up to £13 in future costs.
- For every £1 spent on early year's education, £7 has to be spent to have the same impact in adolescence.
- Targeted parenting programmes to prevent conduct disorders pay back £8 over 6 years for every £1 invested with savings to the NHS, education and criminal justice system.<sup>8</sup>

## Parenting programmes

Parenting has a greater influence on a child's life in the early years than education, wealth or class. Effective, warm, authoritative parenting gives children confidence, stimulates brain development and the capacity to learn. Supporting parents with parenting programmes has a positive impact on both parents' and children's wellbeing and mental health.<sup>10</sup>

### Family Nurse Partnership Programme

The Family Nurse Partnership (FNP) Programme offers intensive support for first time younger pregnant women. Young parents, under the age of 20 years, are more vulnerable, more likely to smoke and have a poor diet and are subject to being judged. Furthermore, it has been estimated that over 30% have been abused by someone close in the past 12 months. Benefits of FNP include better language development, vocabulary and mental processing, emotional development, attention and behaviour.

A recently published randomised trial of FNP suggested no additional short term benefit of the programme compared to usual care. The research assessed outcomes like incidence of second pregnancies within the first two years, smoking late in pregnancy, hospital admission, and low birth weight. Impact on attachment and longer term educational outcomes are awaited.

### Antenatal programmes

Antenatal programmes that focus on the transition to parenthood in high-risk couples and aim to alleviate pressures on the couple's relationship are effective in reducing relationship deterioration and strengthening parenting roles after the birth of a first child. The strongest effect is for home-based interventions for couples with multiple difficulties. As this type of intervention is expensive, it is recommended as part of a stepped care approach (i.e. moving from practice-based assessment and advice to more intensive support).<sup>10</sup>

### Early years education

High quality early years education significantly improves child health and educational outcomes, particularly for disadvantaged children. The average economic benefit of early education programmes for low income 3 and 4 year olds is nearly 2.5 times the investment.<sup>4</sup>

### Support in the early years – children's centres

Integrated activities via Southampton's children's centre network provide opportunities to raise health and development at an early stage and reduce inequalities between families in greatest need and their peers.

There are 14 children’s centres within Southampton. Of the 3,200 births in Southampton in 2014/15, 77% were registered with a children’s centre. Over 14,900 children under 5 years (89% of all children under 5) had registered contact with children’s centres in 2014/15, with 37% using the centres on a monthly basis. Of note:

- Just 6% of fathers/male carers, 31% of lone parents and 35% of parents under 20 years have monthly contact with the children’s centres.
- 95% of all Families Matter families had at least one contact during the year and 89% of children who are or have been children in need.
- 21% of registered contacts are with under 5s who are BME.

Services on offer within Southampton’s children’s centres are shown in table 1 below:

Table 1: Southampton’s Children’s Centres offer on registration

Universal	Targeted	Partnership with specialist services
Open access stay and play	Activities based on population risk factors e.g. young parents support group, fathers, BME, gypsy & traveller, areas of deprivation,	Plan step up and step down family support
Multi-media signposting and publicity of services		Work with named social worker to enable children in need to access services
Healthy Child Programme (HCP) Universal	Funded early education	Support to specialist child and adult disability and mental health services
Support to child care settings	Activities on assessment of need e.g. multiagency support plan, workless parents, family learning activities, parenting programmes, speech and language development	
Early education and childcare		
Parental involvement and volunteering opportunities	HCP Partnership and partnership plus – more intensive support for families, multi-agency assessments, healthy lifestyles activities, support to access specialist services e.g. debt advice, domestic violence, substance misuse and referral	Promotion of children’s centres as a location for specialist services
Identification and assessment of additional needs		

Children’s centres focus their delivery in areas of highest deprivation. In 2014/15, 65% of children under 5 living in the 30% most deprived areas had at least 5 contacts during the year. 64% of parents registered within these areas were attending an evidence based parenting programme (this is a reduction from 69% of parents the previous year and 72% in 2012/13). 63% of parents completed a parenting programme in 2014/15 (again a drop from previous years; 64% in 2013/14 and 77% in 2012/13). Over 1,200 parents attended adult learning courses in 2014/15, with 75% completing their courses.



### Early years' service and child development

In August 2014, Southampton City Council's children's service team assessed the impact of pre-birth to 5 services in Southampton against a child's achievement at the end of the early years foundation stage (EYFS). They found that those children who accessed at least 3 terms (540 hours) of early years' service provision from 2009-2014 were almost 17% more likely to achieve a good level at EYFSP compared to those with 0 hours. For those children in the 10% most deprived areas, this difference was 23.5%. Children living in the 10% most deprived areas were 16% more likely to achieve a good level at EYFSP if they had 25 or more contacts with under 5 services and 540 or more hours of early years funding.

### Dental health

Prevention of dental disease needs to start early in life to lay the foundation for a lifetime of good oral habits and health. Evidence indicates that to achieve good dental health, the following are needed:

- Healthy diet, particularly reducing sugary foods and drinks.
- Tooth brushing with a fluoride toothpaste twice a day as soon as the first tooth erupts.
- Visiting a dentist regularly starting from when the first tooth erupts, for preventive care and advice.

The oral health promotion programme in Southampton prioritises young children. A locally-developed programme *Saving Smiles* is being rolled out in Early Years settings across the City. The programme promotes healthy eating and healthy food policies at the setting, working with parents and carers to provide good home care for children and signposting families to local dentists. Currently 25 settings are participating in the programme and a member of staff in each of these is being trained as an oral health "champion".

The oral health promotion team are working collaboratively with staff involved with caring for children, including health visitors, school nursing teams, looked-after children leads and safeguarding teams. This is aimed at ensuring that everyone understands the key oral health messages and is able to impart them during their day-to-day activity. The team link with Children's Centres to ensure that they are all delivering consistent messages based on the best available evidence, and provide any additional support to help them create an environment that promotes good dental health.

Implementing the city's water fluoridation scheme would protect and improve the dental health of children living in the area.

### **Future infrastructure - Integrated health and children's centre provision**

In Southampton, children's centre staff work in partnership with health visitors and midwives. With the new local authority commissioning responsibility for health visiting and family nurse partnership, there is an opportunity to formally integrate health and children centre provision for 0-5 year olds ensuring shared ownership of outcomes.

There is also the opportunity to link it to the better care agenda, providing child and family centred locally integrated services. The first phase of this approach is the establishment of enhanced early childhood leadership teams comprising maternity, health visiting and children's centres. Key to the proposed approach is the need to build community capacity to support prevention and early intervention. This will include working in partnership to identify and develop new opportunities to bring funding into the City to meet shared outcomes. Key areas are:

- Initiatives that promote parent-child bonding and speech, language and communication skills in the first 2 years of life.
- Initiatives that reduce isolation and promote confidence such as parent and toddler groups, befriending and mentoring schemes and evidence based parenting courses; a parenting offer has been developed for the City.
- Sufficient accessible play schemes.
- Support for parents with low aspirations for themselves and their children.
- Support for parents to learn English, embrace citizenship and contribute to services in the city.
- Effective support for children and families to adopt healthy lifestyles and maintain a healthy weight.

### **1.3 Recommendations**

1. The Health and Wellbeing Board should promote the development of a child poverty strategy for Southampton (as recommended by the Children's Commissioner).
2. Service providers should identify new ways of engaging with disadvantaged groups of women pre-conceptually and during pregnancy to support them to make healthy choices in recognition of their social circumstances.
3. Locality based children's health and social care teams should be formally integrated to deliver shared outcomes, and seek opportunities to "make every contact count".
4. Reducing health and developmental inequalities must be a priority for those young children identified as vulnerable, ensuring the approach supports "proportionate universalism".
5. The Health and Wellbeing Board should consider the poor dental health in children that has persisted for over two decades and make a recommendation on the implementation of Southampton's water fluoridation scheme.

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## 2. Emotional and mental health and the first 1,000 days

### 2.1 Why is this issue important?

The first 1,000 days of life are a crucial stage in the development of the emotional and mental health of a child. Infant mental health is not only influenced by parental social and emotional wellbeing prior to conception but also by the mother during pregnancy and the nature of parenting in the early years. The foundation years (up to five years) are the time that children develop their emotional intelligence, their resilience and the ability to empathise. Secure attachment (or bonding) through early parenting plays a key role in the development of emotional regulation, the benefits of which are not just during the early years, but throughout the life span.

The significance of maternal mental health and the subsequent impact upon infant mental health cannot be overstated. Evidence suggests that early adversities such as maltreatment, trauma or stress and / or exposure to high levels of maternal stress hormones in the womb can interfere with neuro-development and 'hard-wire' the baby's brain's response to stressful stimuli.<sup>1</sup> These parental factors may lead to problems throughout the life course of the baby, such as lower educational attainment, adoption of risky health-related behaviours, social, emotional and mental health problems.<sup>2</sup>

It is estimated that postnatal depression affects 10-15% of women and many others experience other mental health problems such as post-traumatic stress disorder (PTSD), anxiety and adjustment disorders. Five to eight in every 100 women have a severe depressive illness during pregnancy and two mothers in every 1,000 experience puerperal psychosis. Many individuals have pre-existing chronic mental health conditions which can be exacerbated by pregnancy or which may require additional support during pregnancy and the early years of parenting.

Of approximately 6,000 births at Southampton University Hospital Trust each year, around 2,000 mothers responded 'yes' when asked whether they have a mental health problem (this includes previous and / or current problems which range from mild to severe, and may include postnatal depression). Health visitors undertake an assessment of post-natal depression 6-8 weeks after birth. Locally, about 10% of the 70% of women known to the health visiting service at this time were identified as having low mood. This is similar to the national average.

Children of mothers with mental ill-health are five times more likely to have mental health problems themselves. Between one and two-thirds of children whose parents have mental health problems may experience difficulties themselves.<sup>3</sup> Parental mental health is also a factor for children entering the care system. Childcare social workers estimate that 50–90% of parents on their caseload have mental health problems, including alcohol or substance misuse issues.<sup>3</sup> Maternal depression also has an impact on school readiness, resulting in an increased likelihood of behaviour and emotional problems, language development delay, impaired parent child attachment, conduct disorders and learning difficulties.<sup>4</sup>

Maternal depression in the perinatal period, together with anxiety and psychosis, carry a long term cost to society of about £8.1 billion for each one-year cohort of births in the UK. This is equivalent to the long-term cost of just under £10,000 for every single birth in the country.<sup>5</sup> 72% of cost is due to adverse effects on the child rather than the mother. £1.2 billion of long term costs are borne by the NHS.<sup>5</sup> This cost could be reduced through identification of early issues and appropriate management. It has been estimated that around 50% of women with perinatal mental health problems are not identified or treated, and around 40% of health systems in the UK have no specialist perinatal mental health provision.<sup>6</sup>

Attachment is a key factor in early positive childhood development. The way parents interact with their children influences how children regulate their own behaviour and emotions. Research shows that as babies grow into toddlers they need their parents to be a 'safe base' from which they can explore the world.<sup>7</sup> Positive and attuned interactions from parents and family stimulate a physiological response in infants which contributes to normal neurodevelopment and promotion of a secure attachment. Evidence from a number of longitudinal studies has demonstrated that securely attached children function better across a range of domains including emotional, social and behavioural adjustment, as well as peer-rated social status and school achievement in addition to having better physical outcomes. This is compelling evidence to support the delivery of positive parenting interventions and to support families in the transition to parenthood.<sup>1</sup>

## 2.2 What can be done?

The Department of Health has identified 'Transition to Parenthood and the Early Weeks' and 'Maternal Mental Health (Perinatal Depression)' as high impact areas to guide local authorities in the commissioning of the 0-5 year Healthy Child Programme.

The 0-5 year Healthy Child Programme covers both the antenatal and postnatal period and incorporates the recommendations made by NICE in their Clinical Guideline 192: clinical management and service guidance for antenatal and postnatal mental health.<sup>8</sup> These are summarised in the box over the page.

In Southampton, all mothers known to the health visiting service and identified as having low mood are offered evidence based interventions. Access to interventions are used as a proxy indicator for outcomes of improved attachment, breast feeding and child development at age 2-2.5 years. Integrated working between health visiting, the Individual Access to Psychological Therapy (IAPT) service and children's centres enables delivery of cognitive behavioural therapy group sessions for mothers with postnatal depression. Actions to reduce maternal depression include effective screening and referral to services, development of a shared vision and plan, family strengthening and support and increased public awareness.

### **Assessing antenatal and postnatal mental health**

NICE 2014a, guideline CG192 recommends asking the two “Whooley” depression identification questions and the GAD-2 as part of a general discussion about mental health and wellbeing at first contact with primary care or booking visit, and all contacts thereafter.

### **Prevention**

There is no evidence to suggest that antenatal education impacts on the onset of depression or parental health behaviours. There is some evidence that group-based social support, including antenatal preparation for parenthood classes, can be effective in supporting women with sub-threshold symptoms of depression and anxiety (HCP 0-5 evidence review).

### **Anxiety and mild to moderate depression**

NICE (2014a) recommends that a woman with persistent subthreshold symptoms of anxiety in pregnancy or the postnatal period should be offered Cognitive Behaviour Therapy (CBT) based self-help. Women with anxiety disorders in pregnancy or the postnatal period should be offered a low-intensity psychological intervention (for example, facilitated self-help) or a high-intensity psychological intervention (for example, CBT) as initial treatment.

NICE (2014a) recommends that women with persistent subthreshold depressive symptoms, or mild to moderate depression, in pregnancy or the postnatal period, should be offered facilitated self-help, and that where women with a history of severe depression initially present with mild depression in pregnancy or the postnatal period, an antidepressant such as TCA, SSRI or (S)NRI should be considered.

### **Moderate to severe depression**

For a woman with moderate or severe depression in pregnancy or the postnatal period, options should include a high-intensity psychological intervention, for example, cognitive behaviour therapy (CBT); or an antidepressant, TCA, SSRI or (S)NRI; or a high-intensity psychological intervention in combination with medication.

### **The mother-baby relationship**

NICE (2014a) recommends that the nature of the mother-baby relationship should be assessed, including verbal interaction, emotional sensitivity and physical care, at all postnatal contacts. Practitioners should discuss any concerns that the woman has about her relationship with her baby and provide information and treatment for identified mental health problems. Practitioners are recommended to consider further intervention to improve the mother-baby relationship if any problems in the relationship have not resolved.

### **Attachment**

Evidence suggests that the most effective programmes for promoting attachment are shorter in duration, provide direct services to the parent-child dyad, use interveners with professional qualifications, and assess parent-child interactions with free-play tasks.

Recent reviews on the promotion of attachment security in preterm infants recommend routine inclusion of psychosocial support for the infants’ mother. One study found different effects among families of higher and lower educational groups, and recommended additional reinforcement sessions for mothers in lower educational groups.

Infant massage programmes are most effective with parents in the middle tier of need, and should not be used on their own with parents who are high risk. A total of 14 mechanisms need to be present to promote the likelihood of massage programmes being effective, including consistency of facilitator, small groups that are provided in appropriate settings, the teaching of infant cues, and opportunities for parental socialisation.

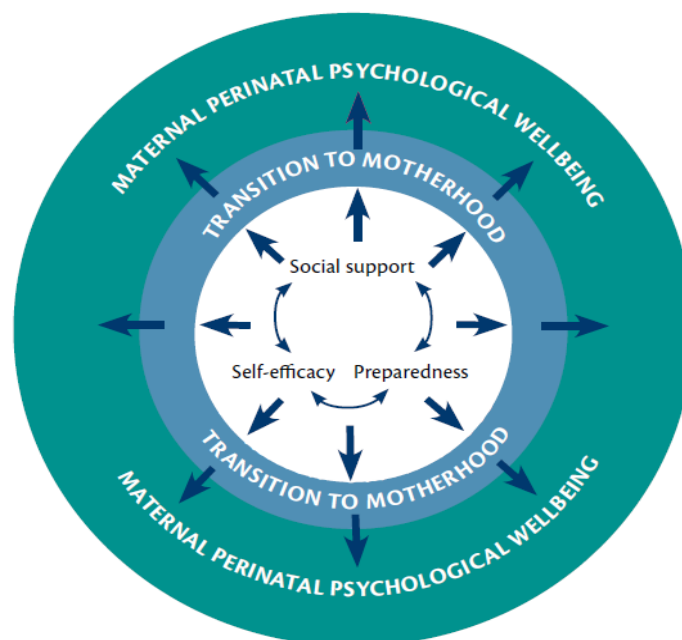
Pregnant women living in Southampton have access to a specialist perinatal team. The specialist facility provides 10 beds and receives admissions from across England. Referral criteria include moderate to severe depression, anxiety disorders, bipolar disorder, complex presentations and puerperal psychosis.

A City wide mental health anti-sigma campaign was held in October 2015, Launched on World Mental Health Day and delivered in partnership with the national ‘time to change’ campaign team. The campaign provided an opportunity to raise awareness of mental health issues and reduce the debilitating isolation that can result from suffering a mental health problem. Southampton’s campaign focused on adult mental health, recognising the impact across the life course.

A central component of the approach taken by health visitors is to strengthen protective factors around the mother and her child. They do this by an emphasis on social support, self-efficacy and preparedness.<sup>9</sup> Mothers with inadequate social support tend to experience more upheaval and perceived life change and feel more vulnerable during the transition to motherhood. Maternal-grandmother support and the company of other pregnant women and mothers is particularly important in providing social support. Evidence suggests that group activities are beneficial, but where this is not possible online resources are promoted.<sup>9</sup>

Self-efficacy is the accumulated beliefs held by an individual (mother/parent) regarding her/his capability to undertake a task. Mothers with higher levels of self-efficacy are more likely to seek out social support; this increases their self-confidence and self-belief, which are protective against postnatal depression. Evidence suggests a link between infant temperament and self-efficacy, with parents of infants who were difficult to settle experiencing reduced confidence in their ability to meet their child’s needs.<sup>9</sup>

Figure 1: Schematic – promotion of maternal perinatal psychological wellbeing



Sufficient preparedness promotes confidence and self-efficacy in new mothers, which increases the amount of social support sought, enabling increased emotional capacity to cope with the transition.<sup>9</sup> Figure 1 suggests the relationship between these three factors and the impact they have on transition to motherhood and psychological wellbeing.

There is a tendency to focus on the mother and child in both raising mental health and strengthening attachment. Evidence is emerging of the impact on fathers. A recent survey undertaken by the National Childbirth Trust 2013-2014 found that amongst 296 new fathers, 38% were concerned about their mental health.<sup>6</sup> In 2008, an English longitudinal study of 13,228 fathers found that severe postnatal depression in fathers was associated with emotional and behavioural problems in their children.<sup>6</sup>

### 2.3 Recommendations:

1. Evidence based approaches should be embedded within services (and innovative approaches assessed) to improve mental health during pregnancy.
2. Health professionals should take every opportunity to prevent and identify mental health issues at the earliest stage, pre-pregnancy, during pregnancy and in the early years of life.
3. The Health and Wellbeing Board should ensure that community resourcefulness is promoted and is a key principle in future strategies.
4. All pregnant mothers and their partners should be able to access antenatal and postnatal support with a strong focus on the quality of the interaction between the parent/s and the child.
5. Recording of mental health and attachment should be included as indicators of the quality of maternity and health visiting services.

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### 3. Diet and nutrition in the first 1,000 days

#### 3.1 Why is this issue important?

A healthy diet provides the body with energy, protein, essential fats and a range of vitamins and minerals (all known as nutrients) that are important for healthy growth and development. The nutrients that are available to a developing baby in the uterus are dependent on a mother's nutritional stores which in turn depend on her diet. A mother's health, influenced by her diet, can have long term effects on her future child's health. This begins before conception, during pregnancy and in early feeding, and continues through weaning and beyond when healthy eating habits become established for the long term.

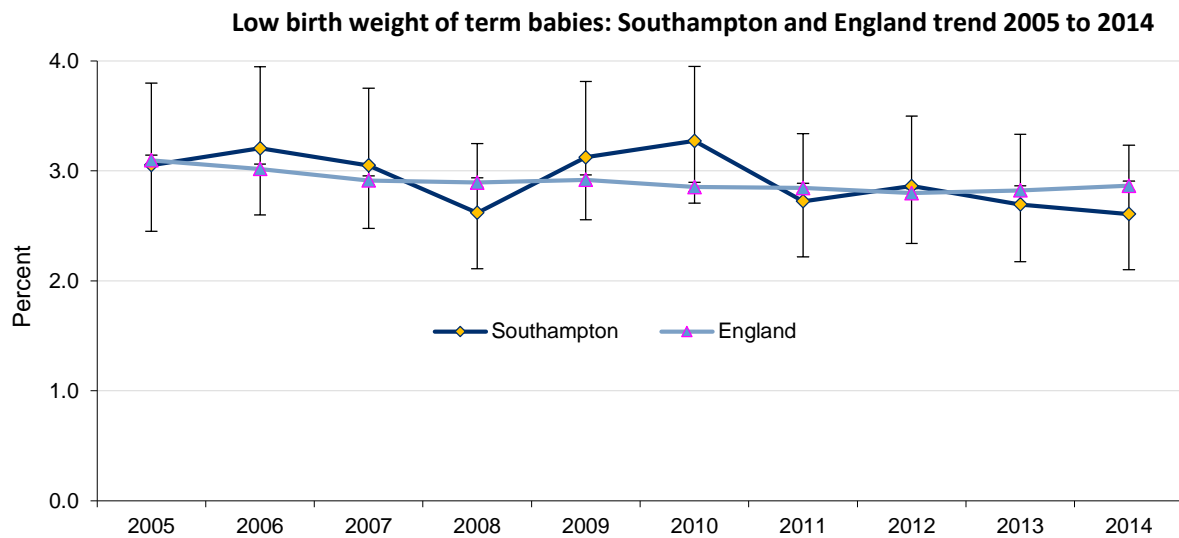
During pregnancy the fetus undergoes critical periods of development, and at these times the quality of the mother's diet has an enduring 'programming effect' which may have long lasting effects on the child.<sup>1</sup> Various studies on people exposed to famine in Europe showed that malnutrition during fetal development and early childhood can lead to permanent changes in the functioning of organ systems. These changes increase the risk of chronic disease (such as cardiovascular disease and type 2 diabetes) in adulthood.<sup>2</sup>

All nutrients are important for a child's development, and there is still much to learn; however the role of certain nutrients in early development are well known. Perhaps the best example is the protective effect of folic acid before pregnancy and up to the first 12 weeks. This B vitamin reduces the risk of developing neural tube defects.<sup>3</sup> Also important is the iron status of a mother, as iron deficiency anaemia has been linked to low birth weight babies which in turn increases the risk of cardiovascular disease, hypertension and diabetes in adult life.<sup>4</sup>

The rate of low birth weight babies in Southampton is 2.6% of births; similar to the England average of 2.9%. This has remained relatively stable since 2005 (see figure 1). Low birth weight tends to be higher among some black and minority ethnic groups and may contribute towards the higher rates of heart disease and type 2 diabetes in these populations.<sup>5</sup>

Vitamin D is another key nutrient important in pregnancy and the early years. It is absorbed from the diet (found in oily fish, eggs and fortified breakfast cereals) or made in the skin when exposed to sunlight during April to mid-October when the appropriate wavelength is available. Vitamin D is most well-known for its influence on bone health. Severe deficiency causes rickets in children and osteomalacia (painful, soft bones) in adults. A mother's vitamin D status in pregnancy is linked to both her child's bone development and birth weight.<sup>6, 7</sup> Current guidance from the Chief Medical Officer recommends that groups at risk of having a low vitamin D status, including all pregnant and breastfeeding women, (particularly teenagers and young women), those who have darker skin (as their bodies are not able to make as much vitamin D), those who cover their skin for cultural reasons and infants and children under five should take a vitamin D supplement. More information can be found at <https://www.gov.uk/government/publications/vitamin-d-advice-on-supplements-for-at-risk-groups>.

Figure 1:



Sources: Vital Statistics Office for National Statistics

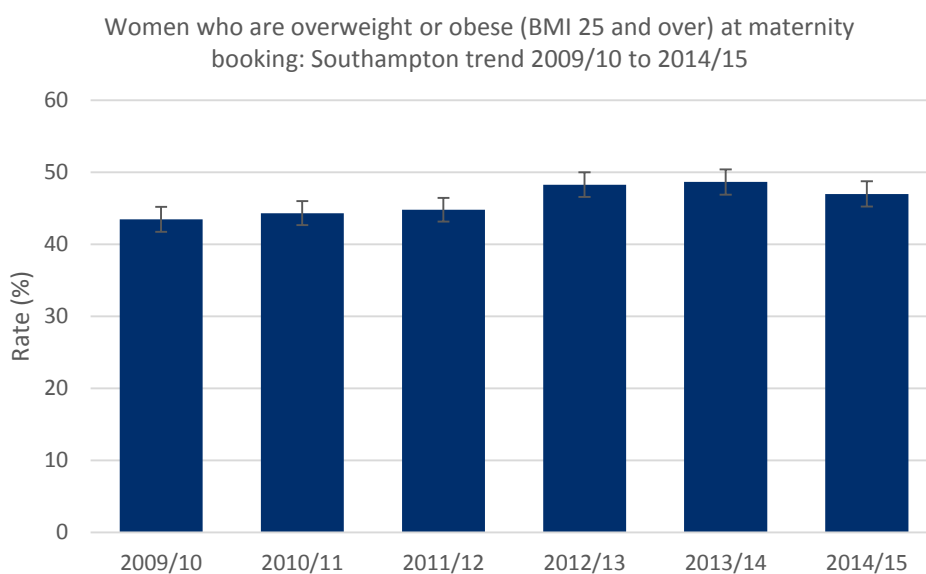
A mother’s diet during pregnancy can also influence the IQ (intelligence) of her child. The brain develops rapidly in early life from the third trimester and by the age of two years the brain will be about 80-90% of its final weight, whereas the body is nearer 20% of adult weight.<sup>8</sup> All nutrients are important for brain development but some nutrients have been identified as having greater effects in the last trimester and the early post-natal period (protein, iron, zinc, selenium, iodine, folate, vitamin A, choline, and long-chain polyunsaturated fatty acids) and due to the rapid development during this period it cannot be repaired by improved availability of nutrients later.<sup>9</sup> Studies in preterm infants have shown a link between early diet and IQ. The link appears to be where fatty acids found in breast milk may have important benefits in terms of IQ and memory scores in children.<sup>10</sup>

Eating the rights foods during pregnancy is important and can be achieved by eating a healthy diet and taking a folic acid and vitamin D supplement. In pregnancy there are also certain foods which should not be eaten to avoid infections harming the baby. These include soft cheeses and unpasteurised dairy products, pâté, raw and partially cooked eggs and raw and undercooked meat. More information about food safety in pregnancy can be found here <http://www.nhs.uk/conditions/pregnancy-and-baby/pages/foods-to-avoid-pregnant.aspx>.

There is no evidence that avoiding foods associated with allergies during pregnancy and breastfeeding affects the likelihood of a child developing allergies. There is some emerging evidence to suggest that providing an infant with a diet consisting of high levels of fruits, vegetables, and home-prepared foods is associated with less food allergies by the age of 2 years.<sup>11</sup>

Around two thirds of the adult population in the UK is either overweight or obese, which increases the risk of a range of health problems in the long term such as type 2 diabetes, cardiovascular disease and certain cancers. In pregnancy, obese women are more likely to suffer from problems such as gestational diabetes, hypertensive disorders, induction of labour, post-partum haemorrhage and are more likely to have a caesarean section. The risk of these complications increases with increasing BMI (Body Mass Index). Also women who are very obese (BMI of  $\geq 40\text{kg/m}^2$ ) have a greater risk of having larger babies and higher admission to the neonatal unit and stillbirth.<sup>12</sup> Guidance from the national Institute of Clinical Excellence (NICE) on Weight Management Before, During and After Pregnancy, recommends a pre-pregnancy BMI of a healthy weight range 18.5-24.9 kg/m<sup>2</sup>. In Southampton in 2009/10, 43.4% of women were classified as overweight or obese at their booking appointment (their first appointment with the midwife), and of these 25.0% of women were overweight and 18.4% were obese. In 2014/15, 47.0% of women were classified as overweight or obese at booking, (27.1% were overweight and 19.9% were obese). Figure 2 shows the trend in the proportion of women measured as overweight and obese at booking since 2010/2009 and shows there has been an increase over this period.

Figure 2:



Sources: UHS midwifery database: Southampton CCG

### 3.2 What can be done?

It is clear that the importance of a healthy diet before and during pregnancy and in the early years cannot be emphasised strongly enough, as it can lay the foundations for good health in the long term. However, as highlighted above, there are certain points where growth and development occurs rapidly such as pregnancy, infancy and early childhood, when supplementation is beneficial.

### Healthy Start

The national Healthy Start Scheme is a means tested scheme which aims to improve the health of pregnant women and families on a low income or receiving benefits. The scheme provides a nutritional safety net for families and provides ‘money off’ vouchers which can be used to buy cow’s milk, infant formula or fruit and vegetables and vitamin coupons to swap for Healthy Start maternal supplements. Healthy Start maternal tablets are available for pregnant and breastfeeding women and Healthy Start vitamins drops for babies and young children up to four years old (see figure 3).

Figure 3: Healthy Start vitamins

Healthy Start maternal tablets (pregnancy and breast feeding)	Healthy Start children’s vitamin drops (one month and up to 4 years old)
<ul style="list-style-type: none"> <li>• Folic Acid: prevention of neural tube defects</li> <li>• Vitamin D: healthy development of bones and teeth</li> <li>• Vitamin C: Keeps tissues healthy and supports the immune system</li> </ul>	<ul style="list-style-type: none"> <li>• Vitamin D: development of healthy bones</li> <li>• Vitamin A: healthy immune system and vision in dim light</li> <li>• Vitamin C: Keeps tissues healthy and supports the immune system</li> </ul>

*Note: large amounts of vitamin A could harm an unborn baby and therefore vitamin A supplements should **not** be taken during pregnancy.*

In Southampton uptake of the vouchers in 2014/15 was 73%, however uptake of the Healthy Start maternal vitamin tablets and the children’s drops remained very low at only 1%. More targeted initiatives are required to engage families to promote awareness and uptake of the Healthy Start vouchers and vitamins. In addition, families eligible for Healthy Start should be supported to develop the skills and understanding to make the best use of their vouchers in order to provide their family with tasty, healthy and nutritious meals.

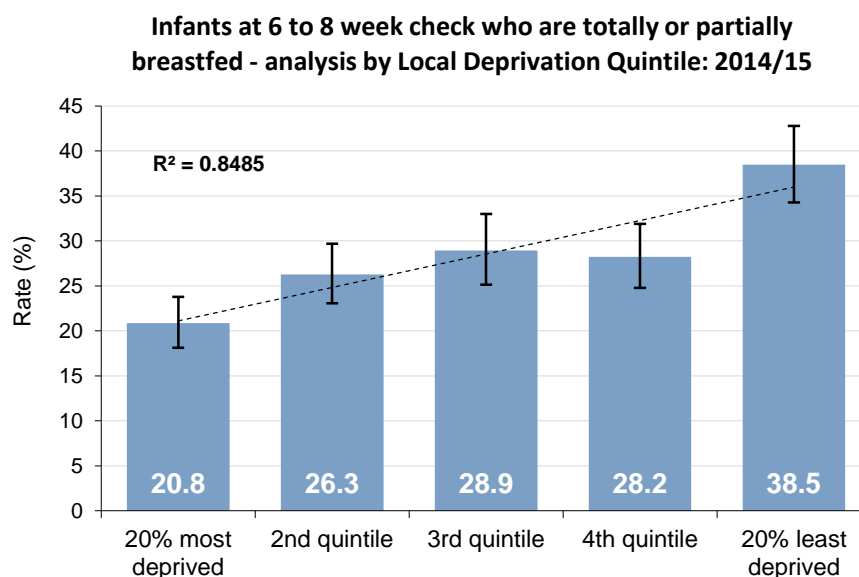
### Breastfeeding

Recommendations for breastfeeding in the UK align with those from the World Health Organisation (WHO). They recommend infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Breastfeeding is linked to many health benefits for both the mother and baby. For the infant, breast feeding reduces the risk of a number of conditions, including infections acute otitis media (middle ear infection), gastroenteritis, respiratory tract infections, and allergic conditions like atopic dermatitis and asthma, type 1 and 2 diabetes, infant mortality, sudden infant death syndrome and reduces the mothers’ risk of type 2 diabetes and breast and ovarian cancer.<sup>13</sup> Breast feeding has also been shown to contribute improved cognitive function and lower cholesterol levels.<sup>14</sup>

In Southampton 73.2% of mothers in 2014/15 initiated breastfeeding; this is similar to the England average of 74.3%. In 2013/14, 44.3% of women still breastfed at 6-8weeks (in England this reaches 45.8%). In Southampton a local target has been set to reach 50% of new mothers breastfeeding at 6-8weeks by March 2016.

Mothers living in areas of higher deprivation are less likely to initiate breastfeeding and are likely to breastfeed for a shorter duration compared to mothers living in areas of low deprivation.<sup>15</sup> This is clearly illustrated by local data which shows that 20.8% of mothers in the most deprived areas breastfed their babies at 6-8 weeks compared to 38.5% of mothers in the least deprived areas (figure 4).

Figure 4:



Sources: RIO (Child Health Information System)

Barriers to breastfeeding include the attitudes of society and family, women being conscious of breastfeeding in front of others, lack of knowledge of the benefits of breastfeeding, or not convinced of the benefits, lack of support, concerns about being able to sleep through the night, perception of breast feeding being difficult, fear of pain and worry about the producing enough milk.<sup>15, 16</sup> Mothers who are confident in their ability to breast feed are aware of the benefits and often have a cultural background supportive of breastfeeding.<sup>17</sup> Pregnant women who intend to breastfeed have a higher level of knowledge of breastfeeding as well as a higher level of self-efficacy.<sup>18</sup>

NICE guidance on Maternal and Child Nutrition (2008) recommends that, as well as the provision of support for breastfeeding after birth, it is important to provide support and information to encourage breastfeeding during pregnancy. Those delivering breastfeeding support programmes should also be provided with training as they are well placed to provide advice and information about Healthy Start for new mothers.

## Weaning

Once a baby reaches six months, many mothers choose to start their baby on solids using the baby led weaning approach. Babies are offered solid foods when they demonstrate the necessary gross motor skills and oral functioning to feed themselves, the signs that a baby is ready are when a baby:

- Can stay in a sitting position and able to hold their head
- Can co-ordinate their hands, eyes and mouth and be able to grab food and put it in their mouth
- Can swallow their food rather than pushing it out

Babies are normally ready to try solids at six months and using the baby led weaning approach are only offered appropriate finger foods not pureed foods. From 8-9 months the diet should consist of a variety of soft finger foods, mashed or chopped. Weaning is an important time to try new flavours and lay a foundation for healthy food choices. More information can be found at <http://www.nhs.uk/start4life/solid-foods>

## Healthy Food choices

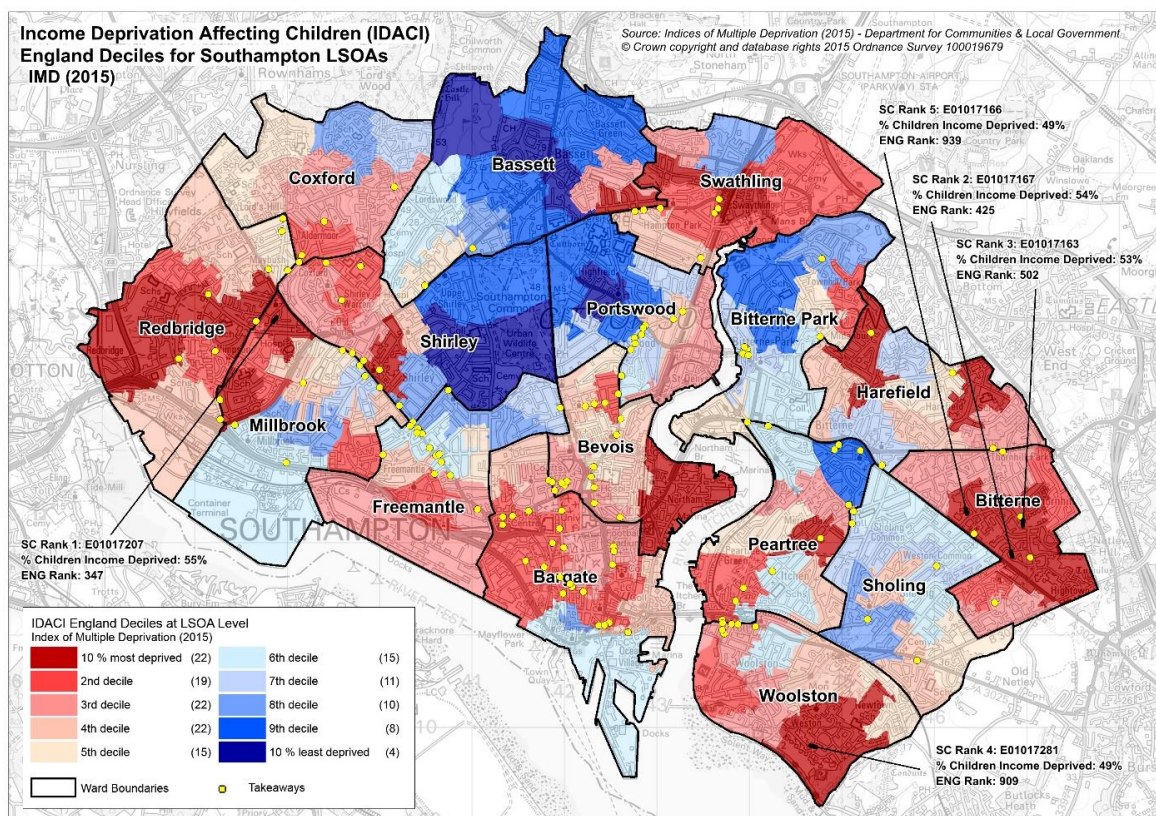
There are some population segments that are less likely to have healthy diets. Women living in the most deprived areas are less likely to take folic acid before pregnancy and have a lower level of nutrient intake characterised by a diet low in fruit and vegetables. Research looking at the diet of families with young children in Southampton shows that the quality of a mother's diet influences the quality of the diet of young children, and if a mother has a poor quality diet then her children's diet is also likely to be of a poorer quality.<sup>19</sup> Deprivation is also linked to food poverty or food insecurity which can be described as having limited or uncertain access to nutritious food. Children living in food insecure households were more likely to have poorer quality diets that were low in vitamins and minerals but high in energy such as soft drinks and crisps and a lower consumption of fresh vegetables and wholemeal bread and a similar consumption of fruit.<sup>20</sup>

The all-party parliamentary inquiry into Hunger and Food Poverty in Britain looked at household expenditure and found that in 2011 households in the lowest income deciles spent 39% of their income on housing, food and fuel (an increase of a third over a decade between 2002 and 2012). Those in the highest income decile spent 16% of their income on housing, food and fuel. However, for the poorest households the proportion spent on housing and fuel increased, and the proportion spent on food remained stable. This indicates that cuts were made in the quality or quantity of food or both which may be why these households rely on food aid. During the period between 2007 - 2013 food prices rose and the lowest income group purchased less butter, fruit and vegetables and soft drinks but bought more pork, bacon and cheese.<sup>6</sup> A poor quality diet, low in fruit and vegetables, high in fat, saturated fat, sugar and salt is linked to a number of diseases including diabetes, cardiovascular disease, and certain cancers. Current welfare reforms have been associated with an increase in the use of food banks both locally and nationally. Food bank use is often a last resort for families in crisis, and families will have tried various means to cut back before reaching this

point. Ensuring the appropriate input and support is available to families before the crisis point, will enable the development of basic healthy cooking skills to prepare healthy meals on a tight budget and help food go further.

There is an association between increasing levels of deprivation and density of fast food outlets.<sup>22</sup> In Southampton fast food outlets are co-located around some of the main roads in the city and appear to be concentrated in the most deprived areas (see figure 5). Local research has explored associations between exposure to healthy and less healthy food outlets and child body composition measures at birth, four and six years using data from the Southampton Women’s Survey. The results showed that greater access to fast food outlets related to poor bone health in infants, and that greater access to healthy specialty stores such as greengrocers was associated with better bone health at four and six years of age.<sup>23</sup>

Figure 5: Map of hot food takeaways by Income Deprivation Affecting Children (IMD 2015)



Another local study surveyed the price, variety and quality of a selection of healthy and less healthy foods in 195 grocery stores in Southampton including large supermarkets, small supermarkets and convenience stores. The results showed that poor variety and quality of healthy foods was more common in shops in the most deprived neighbourhoods where residents had up to 76% higher risk of poor quality fruit and vegetables than wealthier areas of Southampton.<sup>24</sup> Public Health England in its 2014 *Healthy People, Healthy Places* briefing suggested that “improving access to healthier foods in deprived communities may contribute to reducing health inequalities”. Consideration needs to be



given to the importance of the environment that people live in and question if they encourage healthy behaviours and lifestyles, including healthy food choices.

Public Health England's report on Sugar Reduction highlighted the risks of eating too many sugary foods and drinks. This increased the risk of weight gain (leading to chronic diseases in the long term) and tooth decay. Both these health issues affect most deprived communities more than the least deprived. National recommendations from the report aim to reduce marketing and promotion of high sugar food and drinks, increase training for individuals in a position to influence food choice, and raise awareness of issues around sugar among the public and health professionals. It also tasks employers and the food industry to encourage people to take steps to reduce sugar intake.

A healthy diet can be described as one that is high in fruit, vegetables, and whole grain foods, while being low in processed foods which contain large amounts of fat, saturated fat, sugar and salt. Individual food choice is complex. It is influenced by a range of factors from family/cultural/social influences, income/resources, skills/knowledge, and decisions made on ethical or environmental grounds. Food choices can also change over time and at key turning points in life such as marriage, retirement and illness.<sup>21</sup> Food choice may also be influenced by factors such as how long it takes to walk/travel to the shops, what food is available and freshness of the food. Therefore approaches to change behaviour and food choices need to be multifaceted, to include targeted work with individuals and families, and development of capacity and capability amongst staff and volunteers working with the most at risk groups. We also need to support different settings to achieve high quality healthy food provision, while designing local campaigns to improve food choices with messages that both engage and resonate with at risk groups.

### **What is happening locally?**

Pregnancy and the early years is the most crucial time to lay the foundations of good health through healthy dietary choices. However with access to almost limitless and often conflicting information, choosing a healthy diet can be challenging. Having the right information alone does not lead to behaviour change as food choices are influenced by complex and interrelated factors such as education, upbringing, beliefs, peers, skills and budget. In Southampton there are a range of targeted interventions aimed at supporting families most in need to improve food and dietary choices.

Women thinking about starting a family can access a range of community based services to support weight management prior to pregnancy. This includes sign posting to local groups and opportunities to become more active and improve diet, including one-to one advice for behaviour change as well as group support. This is in addition to support that can be accessed through GPs.

The Healthy Start Scheme combined with the national scheme locally offers free Healthy Start maternal vitamins to all pregnant women and Healthy Start children's vitamin drops for children up to 12 months old. This has enabled increased access to Healthy Start vitamins which are distributed all over the city at Sure Start Children's Centres and Child Health clinics. This is designed to enable

easier access for key target groups. “Healthy cook and eat on a budget” programmes are running in local Sure Start Centres for families affected by the welfare reforms and facing food poverty. Health visiting and midwifery services have a crucial role not only in providing advice and support to enable expectant mothers and families with infants to eat healthily on a limited budget, but also in raising awareness of Healthy Start and encouraging uptake among target groups. This has been delivered alongside training for staff and volunteers in health and social care to ensure they are able to promote Healthy Start, and remain confident in providing the correct and up-to-date nutrition messages to families with infants and young children.

In addition, experts have worked with local food banks to help ensure the food parcels supplied to families in need are nutritionally balanced and contain healthy meal ideas and recipes. Parent champions are being developed from staff and volunteer parents at local Sure Start Centres to provide on-going support for healthy eating activities at their local community. Local childcare settings locally are offered HEYA (Healthy Early Years Award) training and award scheme. Settings achieving the award meet a high standard for nutrition and physical activity. The nutrition standard not only includes standards for all meals, snacks and drinks provided to infants and children, but also includes information about Healthy Start and emphasises the wider role of staff as role models and a source of information for parents and carers.

The *Breast Feeding Welcome* scheme was launched in Southampton in May 2015. 112 venues across the city have joined the scheme showing their support for breastfeeding mothers. These venues include cafes, restaurants, community centres, churches, health centres and West Quay shopping centre. The local Health Visitors service have achieved the UNICEF Baby Friendly award demonstrating a commitment to support breastfeeding. In addition, the National Childbirth Trust (NCT) have been commissioned locally to provide a breastfeeding peer support service targeting the 30% most deprived areas in Southampton. Breast feeding cafés have been set up in Townhill Park and Lordshill and a number of volunteers have been trained and are active in promoting breastfeeding in community settings.

### **3.3 Recommendations:**

1. More settings should be supported to achieve quality standards in terms of food and nutrition provision, with training provided for staff and volunteers in these settings on nutrition in the early years.
2. Targeted promotion, and opportunities for practical skills development is required for at risk families, especially those affected by the welfare reforms, through both health and community services. This should include promotion of breastfeeding, Healthy Start, and weaning and practical skills development for healthy eating on a budget.
3. To make healthier food choices easier for people in Southampton, the public health impact should feature in decisions by various sectors which shape and influence food choices including planning, licencing, economic development, transport and leisure.

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## 4. Smoking and the first 1,000 days

### 4.1 Why is this issue important?

Despite the continuing progress that has been achieved to reduce the burden of smoking, tobacco use continues to be one of the most significant modifiable risk factors in pregnancy<sup>1</sup>, and younger pregnant smokers and pregnant teenagers are six times more likely to smoke before or during their pregnancy.<sup>2</sup> While data shows that nationally 11.4% of women are still smoking at the time of delivery, the rate in Southampton, despite movement in the right direction, is considerably higher than this at 14.7%.<sup>3</sup>

The World Health Organisation (WHO) acknowledges smoking is the single largest preventable cause of death and disability in the developed world<sup>4</sup>, and smoking in pregnancy puts both mothers and their babies at continued risk. In addition to the known health risks to adults, smoking is also the main preventable cause of poor outcomes in pregnancy.<sup>5</sup> It is associated with additional health risks to both the mother and her unborn fetus, being a major cause of poor health outcomes including, but not limited to, low birth weight, pre-term birth, and perinatal death.

#### Preconception

There is evidence that smoking has a negative impact on female fertility making it harder for women who smoke to conceive than women who are non-smokers, taking longer and with an increased risk of ectopic pregnancy.<sup>6, 7</sup> Even comparatively low levels of smoking can have an impact on female fertility.<sup>8, 9</sup> One study has shown a 50% reduction in success with implantation rates among smokers compared to those women who had never smoked.<sup>10</sup> Smoking also effects male fertility causing a lower sperm count and a higher proportion of malformed sperm.<sup>11</sup> Traces of nicotine can be found in the semen of smokers which reduces motility of sperm and capacity to fertilise.<sup>12</sup> There is a correlation between the number of cigarettes smoked and the damage to sperm; researchers have found that there is no “safe” level of smoking, and any smoking is associated with reduced male fertility.<sup>13</sup>

#### Health risks associated with smoking during pregnancy

There is evidence of many significant risks from smoking during pregnancy both to the pregnant woman and to her unborn fetus. These include an increased incidence of miscarriage, ectopic pregnancy, premature rupture of membrane, placenta praevia, abruption placenta, pre-term delivery, pre-eclampsia, low birth weight, respiratory distress, perinatal mortality and Sudden Infant Death Syndrome.<sup>14</sup>

Smoking during pregnancy damages fetal airways and damages lung development.<sup>15</sup> It also increases the risk of respiratory problems after birth and increases the risk of childhood asthma.<sup>16</sup> Smoking is a major risk factor for low birth weight and babies who are small for their gestational age. Babies born to women who smoke throughout their pregnancy are on average 162-226 grams lighter than babies

born to non-smoking mothers.<sup>17, 18</sup> Approximately 30% of growth-restricted neonates may be the result of maternal smoking.<sup>19</sup> Maternal smoking is associated with slower growth of the fetus' head and smaller head circumference at birth.<sup>20</sup> There is also an increased risk of learning difficulties in babies born to mothers who smoked during pregnancy.<sup>21</sup>

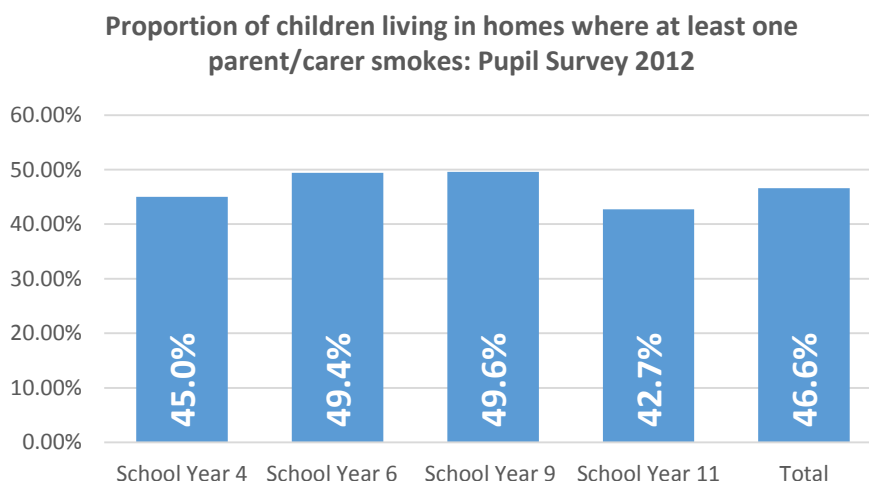
**Perinatal mortality and Sudden Infant Death Syndrome (SIDS)**

Smoking in pregnancy is the main modifiable risk factor for stillbirth. A systematic review of evidence in 2015 found a clear link between the number of cigarettes smoked, and increased risk of still birth, and meta-analysis of the data identified smoking as having a 47% increase in the odds of stillbirth.<sup>22</sup> Smoking has been linked with an increased risk of Sudden Infant Death Syndrome (SIDS). Since the introduction of smoke free legislation was introduced in 2007, there has been a drop in the number of stillbirths of almost 8% in England, and a fall by the same percentage of the number of babies dying shortly after birth. The risk of having a baby who dies from SIDS trebles in mothers who smoke during and after pregnancy,<sup>23</sup> and this risk increases with the number of cigarettes smoked.<sup>24</sup> One way to help reduce the risk of cot death is to maintain a smoke-free home and vehicle at all times.<sup>25</sup>

**Second Hand Smoke (SHS)**

Inhaling smoke second-hand from someone else's burnt tobacco, known as passive smoking, can increase a non-smoker's risk of developing lung cancer and cancers of the larynx and pharynx. Second hand smoke (SHS) is particularly dangerous for children with smaller lungs and higher respiratory rates, putting them at increased risk of respiratory infections, asthma, bacterial meningitis as well as SIDS as mentioned above.<sup>26</sup>

Figure 1:



For children, the majority of exposure to SHS happens in the home, and over one in five children in the UK live in a household where at least one person smokes.<sup>27</sup> This may be considerably higher in Southampton; a pupil survey conducted in Southampton in 2012 found that 46.6% of young people lived in a home with at least one parent/carer smoking (see figure1).

There is no safe level of exposure to tobacco smoke for children, and even low levels of exposure have been shown to have a detrimental effect.<sup>28</sup> Children exposed to passive smoking before birth have an increased incidence of respiratory illness in childhood.<sup>29</sup> Evidence also suggests that exposure before birth is associated with psychological problems in childhood. For babies and children who live in households where adults smoke there is a greater incidence of serious respiratory infections such as bronchitis and pneumonia, asthma and problems of the ear, nose and throat.<sup>30</sup>

Smoking in cars is particularly hazardous as levels of SHS have been found to be dangerously high due to the enclosed space, even when the vehicle is well ventilated. Under the Children and Families Act 2014, legislation has been introduced from October 1st 2015 requiring all private vehicles to be smoke free where they are enclosed, contain more than one person and a person under the age of 18 is present in the vehicle. Failure to comply now incurs a £50 fixed penalty notice. The Smoke-free (Private Vehicles) Regulations 2015 make it an offence to smoke in a private vehicle with someone under the age of 18 present; and for a driver not to stop someone smoking. Electronic cigarettes and all forms nicotine vaporisers are not included within the definition of smoking under this regulation.

An overall reduction in SHS exposure in children has been reported since the introduction of the smoke free legislation, and an increasing proportion of parents are now making their homes smoke free. However, there have been only modest reductions in exposure for children living in smoking households.<sup>31</sup> Work to promote smoke free homes continues to be a priority for the city.

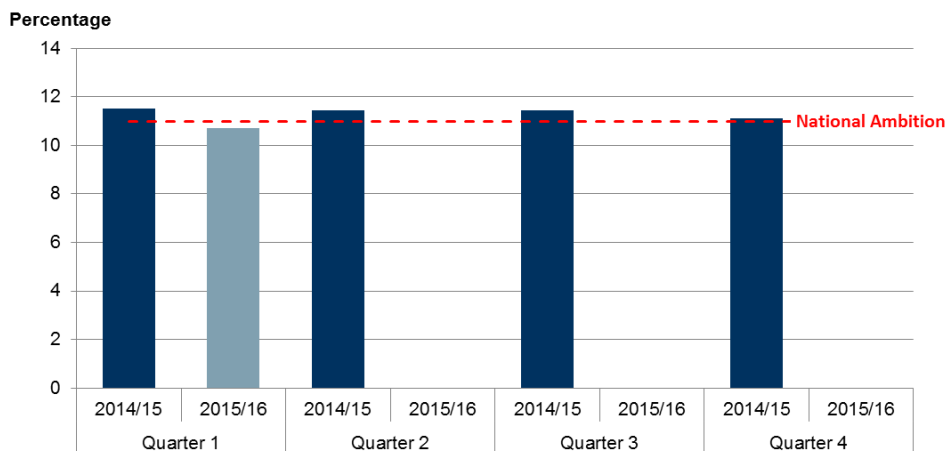
### **Incidence of smoking in pregnancy**

Data on mothers smoking at the time of delivery (SATOD) is self-reported and all CCGs report quarterly SATOD to the Health and Social Care Information Centre (HSCIC). Data for 2014/15 showed 11.4% of mothers in England were recorded as smokers at the time of delivery, compared to 12% in 2013/14 but there is wide regional variation.<sup>32</sup> This improving trend has continued in the first quarter of 2015/16, falling to 10.7%, which is the first time the figure has fallen below the national ambition of 11% (figure 2).<sup>33</sup>

Overall, 14.7% of mothers reported SATOD in Southampton for 2014/15. There is a slow but steady improvement in the city's SATOD, but much more work needs to be done to attain the national ambition of 11% (see figure 3). There are recognised national concerns about the reliability of how data is recorded and reported, so SATOD should be interpreted with caution.<sup>34</sup>

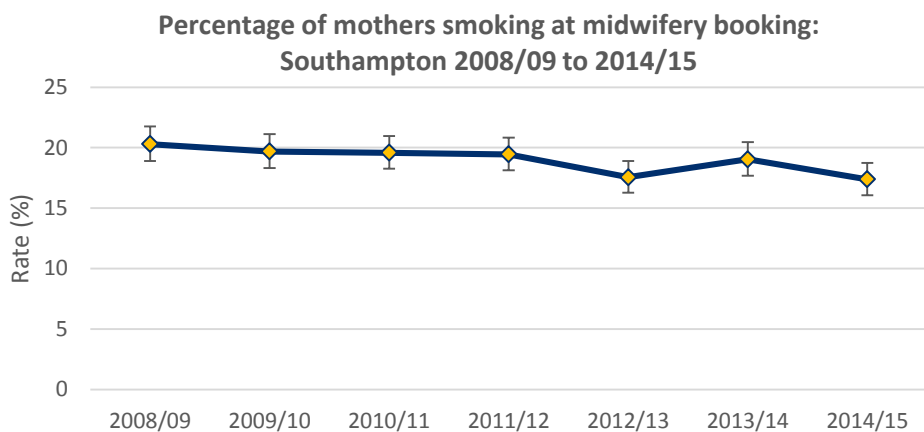
While the number of women recorded as smoking at the time of the first booking is falling, in line with a decline in national prevalence, rates of SATOD in the city are among the highest in the region (see figure 4).

Figure 2: Prevalence of women who report being a smoker at birth: England 2014/15 to 2015/16



Source: Health and Social Care Information Centre, Lifestyles Statistics.  
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Figure 3:



Sources: UHS Midwifery database: Southampton CCG

Figure 4: Regional comparison of SATOD data: 2014/15

Area	Value	Lower CI	Upper CI
England	11.4*	11.3	11.5
South East region	10.3*	10.1	10.4
Medway	17.9	16.7	19.2
Portsmouth	14.7	13.4	16.1
Southampton	14.7	13.5	15.9
Isle of Wight	14.5	12.7	16.5
East Sussex	13.7*	12.8	14.7
Kent	12.6	12.1	13.1
Milton Keynes	10.6	9.6	11.7
Hampshire	10.3	9.8	10.8
West Sussex	9.6	8.9	10.2
West Berkshire	9.2	8.0	10.6
Slough	8.7	7.6	9.9
Oxfordshire	8.6	7.9	9.2
Buckinghamshire	8.1	7.4	8.9
Reading	7.4	6.4	8.5
Windsor and Maidenhead	6.9	5.8	8.3
Bracknell Forest	6.7	5.5	8.1
Surrey	6.5	6.0	6.9
Brighton and Hove	6.4	5.6	7.4
Wokingham	6.3	5.2	7.6

Source: Calculated by KIT East from the Health and Social Care Information Centre's return on Smoking Status At Time of delivery (SSATOD)



As well as being more likely to smoke in the first place, younger mothers are less likely to quit before or during pregnancy. In 2010, 38% of mothers in England aged under 20 quit, compared with 58% of mothers aged 35 or above, making them almost six times as likely as those aged 35 or over to have smoked throughout pregnancy (35% and 6% respectively).<sup>35</sup>

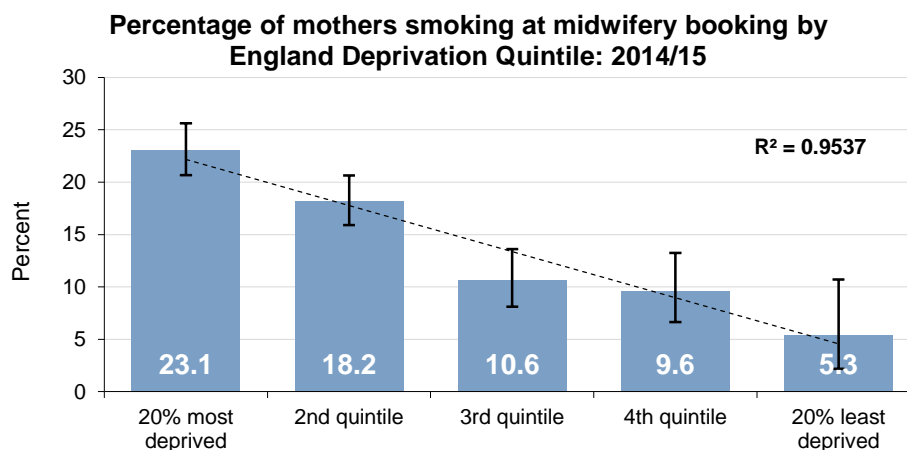
Between 2008 and 2014, the proportion of mothers who smoked before or during pregnancy fell, but 30% of mothers under 20 were still smoking at the time of delivery, compared to 17.1% for all mothers for 2013-14. Trends are moving in the right direction, but there is still a considerable way to go to bring smoking rates in the city down to the national average or below, to limit the harmful effects of smoking on future generations in Southampton, particularly with young women. Targeted work to reduce smoking in this age group is described further on in this chapter.

### Health inequalities

The poorer you are and the more disadvantaged, the more likely you are to smoke and consequently suffer smoking-related disease and premature death. The poorer a woman is, the more likely she is to continue to smoke during her pregnancy, exposing herself and her unborn baby to risks identified above. There is a significant difference in smoking rates according to occupation, and data from the 2012 Opinions and Lifestyles survey found 33% of adults in routine and manual occupations smoked compared to 14% of those in managerial and professional occupations.<sup>36</sup>

Latest national data shows 28% of adults in routine and manual occupations smoke, but in Southampton this figure is higher at 32.3%, with an overall smoking prevalence in the city of 21.5% compared to the national figure of 18%.<sup>37</sup> Pregnant women are more likely to smoke if they are young, less educated, single, living in rented accommodation, or have a partner who smokes.<sup>38</sup> Mothers aged 20 or under are also five times more likely to smoke throughout their pregnancy (45%) than those aged 35 and over (9%).<sup>39</sup> Mothers in routine and manual occupations are more than four times as likely to smoke throughout pregnancy compared to those in managerial and professional occupations (29% and 7% respectively).<sup>40</sup>

Figure 5:



Sources: UHS Midwifery database: Southampton CCG

Figure 5 demonstrates the wide disparity across the city with significantly higher rates of smoking at midwifery booking in the most deprived areas of the city compared to the least deprived. Therefore, focused work is still needed to reduce the burden of smoking in these key areas.

### **The financial burden of smoking**

Rates of smoking are highest in the poorest communities, and every penny spent on tobacco literally goes up in smoke, increasing pressure on family budgets. Children whose parents smoke are four times more likely to grow up to be smokers themselves, creating an inter-generational cycle of smoking, deprivation and increased child poverty. Tobacco has a disproportionate effect on living standards of Britain's poorest households, for whom expenditure on tobacco is a large proportion of disposable income. A low-income family earning £21,000 a year, where both parents smoke 20 cigarettes a day, will spend almost one quarter of their total income on tobacco, and even if illicit tobacco is purchased, this will still take 15% of the total family income.<sup>41</sup>

### **Financial cost to the National Health Service (NHS)**

Smoking poses a considerable burden on health economies, and estimates of the cost to the NHS to treat mothers and their babies (0-12 months) with problems caused by smoking during pregnancy are between £20 million and £87.5 million each year.<sup>42</sup> Costs associated with complicated deliveries are estimated to be 66% higher for a woman who smokes than for a woman who does not smoke. Smoking in pregnancy also has a longer-term impact on health, with longer term cost implications to society.<sup>43</sup>

### **Electronic cigarette use in pregnancy**

There has been a significant increase in recent years in the number of people using Electronic Nicotine Delivery Devices (ENDS) – more commonly known as e-cigarettes. These are now cited as the number one quitting aid used by smokers.<sup>44</sup> However, a lack of evidence on their safety and current lack of regulation has led to considerable controversy over their use, and a confusion among the general public about the relative risks of nicotine, e-cigarettes and smoked tobacco. In September 2015 PHE published an expert independent evidence review which concluded that e-cigarettes are significantly less harmful to health than tobacco and have the potential to help smokers quit smoking.<sup>45</sup> This has been followed in the BMJ and other journals by considerable debate which to date remains ongoing.<sup>46</sup> Regardless of this, none of the current guidance has been updated with regard to the use of ENDS in pregnancy, so it continues at present to be the case that pregnant women who want to stop smoking should be advised to use licensed nicotine replacement therapy to help them quit, and not advised to use ENDS.

## 4.2 What can be done?

The Government included an ambition in the 2011 Tobacco Control Plan for England to achieve a reduction in adult smoking prevalence to 18.5% or less by the end of 2015, and to reduce smoking throughout pregnancy to 11% or less.<sup>47</sup> The first target has been achieved with current prevalence recorded as 18% in 2014,<sup>48</sup> and the target for smoking in pregnancy has almost been met, with current rates at 11.4% as reported by PHE (14.7% locally).<sup>49</sup> In 2011, the Chief Medical Officer made a challenge to key stakeholders to identify ways to help reduce smoking in pregnancy rates, and the “Smoking in Pregnancy Challenge Group” was established to make key evidence-based recommendations to reduce smoking in pregnancy. Their first report identified key recommendations to be implemented across the country, complementing guidance from NICE regarding interventions to support women wishing to stop smoking.<sup>50, 51</sup> The Challenge Group has published a further report highlighting the regional disparities apparent across the country and the need to tackle the significant health inequalities.<sup>52</sup>

### What is being done in Southampton?

Southampton Public Health commissions a range of services in line with national guidance to help people to stop smoking, to discourage young people from starting to smoke, and to limit the supply of illegal and under-age sales of tobacco. In addition to this, reducing smoking in pregnancy has been identified as a key priority in the city’s Tobacco Control Plan, in particular among young women. Through the commissioning process in partnership with key stakeholders, focussed work to implement the key recommendations from the Smoking in Pregnancy Challenge Group has largely been achieved. This is ongoing and requires continuing resource in order that reducing smoking in pregnancy remains a key priority. The key work achieved to date is outlined below.

#### *Antenatal carbon monoxide screening*

Routine carbon monoxide (CO) screening in pregnancy was introduced locally during 2014-15. This has been recognised as one of the key ways to identify smokers as it provides a ‘teachable moment’ that might otherwise be missed, thereby prompting midwives to start a conversation about smoking. It generates more accurate data by replacing the inaccuracy of self-reported records. It can also identify exposure to environmental pollution and gas leaks. All women in the city are now offered a routine CO screen as part of their antenatal care at their first booking appointment with the midwife. Further work is needed now to extend this work to all health professionals working with pregnant women, in particular with health visitors to support women after the birth to promote smoke free homes. This has been achieved through:

- Working with commissioners of maternity services to develop and implement a robust smoking cessation pathway for pregnant women and families with 0-5 year olds.
- Mandatory training for all midwives about giving Very Brief Advice on quitting smoking, and the use of CO monitors.
- Provision of CO monitors for every midwife in the city.

- Introduction of Nicotine Replacement Therapy prescribing at UHS and PAH, available through the hospital formulary.
- Development of an electronic referral system to enhance the process of referrals to the Stop Smoking Service.

*Developing local insight into smoking in pregnancy*

In 2014-15, two focus groups were commissioned to gain insight into current knowledge, attitudes and perceptions of smoking in pregnancy. Women living in two of the most deprived areas of Southampton were asked about their knowledge, attitudes and beliefs about smoking during pregnancy, and experience of accessing services, to identify key themes and explore views on tested strategies to help women to quit. Although response numbers were low and it was difficult to recruit to the interviews, findings revealed a number of insights which have proved useful in planning future services tailored to the needs of pregnant women. Key findings included:

- Participants generally had very low knowledge of the effects of smoking in pregnancy, in most cases not extending beyond the risks of developing asthma.
- Women had received information about smoking in pregnancy from doctors, midwives and health visitors, but this information was sometimes treated with mistrust or over shadowed by the experience of friends and relatives who had smoked during pregnancy and had a child without problems.
- Some women had a poor experience of either being referred or using local quit smoking services.
- The experience of morning sickness seemed to offer a window of opportunity for some women where they would have found it easier to quit.
- Women who had an unplanned pregnancy described the first trimester of their pregnancy as a stressful time and that they were emotionally unable to consider quitting at this time.
- Public 'drop-in' sessions for pregnant smokers were generally viewed as inaccessible by the women who felt too embarrassed to be seen as smoking by the public.

Whilst the small number of participants should not be considered as representative of the Southampton population in general, it does offer some insight into the thought process of women who smoke during pregnancy, and the findings have been used to inform future commissioning plans to help to tailor services more effectively to support pregnant women to quit smoking.

*Reducing smoking in young mothers*

In order to reduce smoking in young mothers, a joint project has been developed between Southampton City Council and the Family Nurse Partnership which aims to reduce rates of smoking in pregnancy in young parents in the city, targeting parents aged under 20. This will involve using CO screening and intensive support to help the mother to quit and stay smoke free for the duration of

her pregnancy. A dedicated stop smoking group for young pregnant women will be trialled as part of this to determine need and uptake.

*Promotion of smoke free environments*

In order to raise awareness with families of the dangers associated with second hand smoke, work has been undertaken with staff in Southampton Children’s Centres to provide training and a named champion in each cluster to lead on smoke free homes initiatives. A range of activities have been delivered to promote smoke free environments including:

- Joint commissioning of a bespoke Smoke free homes training package delivered to Health Visitors and Children’s Centre staff to cascade to colleagues.
- A mandatory training requirement for all Children’s Centre staff to complete on-line training about smoke free homes.
- Provision of “Chemical Soup” resource packs to each Children Centre cluster, with delivery of regular sessions to families about the risks of smoking and second hand smoke.
- Promotion of national campaigns in all Children Centres.

Through the introduction of a smoke free play parks initiative in the city, in line with many other Local Authorities, smoke free environments are now promoted. A competition was held in the spring term of 2014 with local primary schools to design a sign, and the winning entry was used to create signage which is now in place across all enclosed play areas in the city, asking people not to smoke. This signage was subsequently extended to Children Centres where buildings are owned by the local authority, and has now been offered to schools.



### 4.3 Recommendations:

In line with national guidance including the recommendations of the latest report from the Smoking in Pregnancy Challenge Group published in October 2015, the key recommendations for action from the Director of Public Health are:

1. Commissioners and maternity services should support the extension of CO screening across the whole antenatal pathway including health visitors, and all agencies working with young families, to ensure this is systematically and sustainably implemented across the system in a joined up approach by end of 2016.
2. Commissioners and maternity services should review the outcomes of the FNP work to consider longer term investment to reduce smoking in young pregnant women, with particular focus on areas of deprivation.
3. Local agencies should work together to support the delivery of a Smoke Free Homes campaign by Children's Centres/FNPs and Health visitors during 2016.

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## 5. Substance misuse in pregnancy

### 5.1 Why is this issue important?

Experimentation with drugs and drink usually starts in teenage years and may continue through the period when men and women are at their most fertile. Alcohol use in pregnancy can be as harmful as exposure to certain drugs, and may cause a range of problems with the unborn child, including fetal death, or it can result in longer term harm to the emotional and intellectual development of the child. Nationally, about a third of adults have misused substances at some point during their lifetime, and there are between 250,000 and 350,000 children of problem drug users.<sup>1</sup>

About a quarter of those presenting to substance misuse agencies are women of child-bearing age, so a significant number of women misusing substances are likely to get pregnant. The development of a fetus is affected by a number of important factors, such as its genes, mother's general health, nutrition during pregnancy, exposure to infection, trauma, toxins and drugs.

Over 800 prescribable drugs should be avoided or used with caution during pregnancy. This is a recommendation made by the British National Formulary because drugs can damage the fetus at any time during pregnancy.<sup>2</sup> The use of illicit drugs, both during the preconception and pregnancy periods, has negative effects on the developing brain of the unborn child and results in adverse health consequences for them after birth. There are harmful long term effects on infant growth, behaviour, attention, cognition, language, achievement and delinquent behaviour,<sup>3, 4</sup> which can extend into adolescence.

Children born to mothers who drink alcohol during pregnancy are at risk of a number of birth defects. Alcohol exposure can cause a range of different problems including growth restriction, abnormal facial features and central nervous system damage. Different people are affected in different ways, therefore a range of clinical syndromes have been described called fetal alcohol spectrum disorders (FASD). These disorders include fetal alcohol syndrome (FAS) in which people have all of the defects mentioned above, but also other syndromes in which there may be more subtle central nervous system damage or structural problems.

Damage to the central nervous system can cause difficulties with learning, concentration, decision making, planning and memory.<sup>5</sup> Because of this, people born with FASD may go on to develop secondary problems including education difficulties, mental health problems and substance abuse.

It is not clear if there is a safe level of alcohol to drink during pregnancy. Not all women who drink alcohol during pregnancy are at risk of having a child with FASD. The risk is higher in women who 'binge' drink large quantities of alcohol frequently, particularly if they have a smaller body mass index. The numbers of children with FASD are particularly high in rural parts of South Africa and Australia where binge drinking is more common. The current advice from the Chief Medical Officer in England is that women should abstain from drinking alcohol when pregnant or trying to conceive, with no level of alcohol consumption considered safe during pregnancy.

### Fetal Alcohol Spectrum Disorders (FASD)

One of the problems with getting an accurate estimate for the number of people with FASD locally is that diagnosis can be difficult. The behavioural and psychological problems may not become apparent until children are older. It may also not be clear how much damage alcohol has caused compared to other developmental problems. There is no cure for FASD and the effects are lifelong. Several treatments have been trialled. Some of the psychological or behavioural therapies have been shown to be helpful. A diagnosis of FASD is important because it may enable people to get access to the support that they need. It may also help families and wider support structures to understand why people might behave in a particular way.

In Italian women with FASD the degree of maternal binge drinking during pregnancy correlates significantly with the degree of child dysmorphology (facial abnormalities) as well as the degree of negative cognitive or behavioural outcomes. Women drinking during the first trimester were twelve times as likely to have children with FASD, if the drinking continued during all three trimesters the risks were increased by 65 times.<sup>6,7</sup>

There is no data on FASD collected in England, so it is impossible to say how many people are affected locally. If the global estimates are right, in Southampton between 1-7 children are born with FAS (the most severe syndrome) each year and around 33 children each year are born with FASD. Although no studies have been carried out in England, several studies internationally have shown that FASD is more common in looked after children.

FASD prevention involves reducing the risk of alcohol exposed pregnancies in general by educating women about risky alcohol consumption and effective contraception, screening for alcohol use during antenatal visits, and offering targeted interventions for people most at risk. This can be challenging; women may not want to mention drinking during pregnancy for fear of being stigmatised.

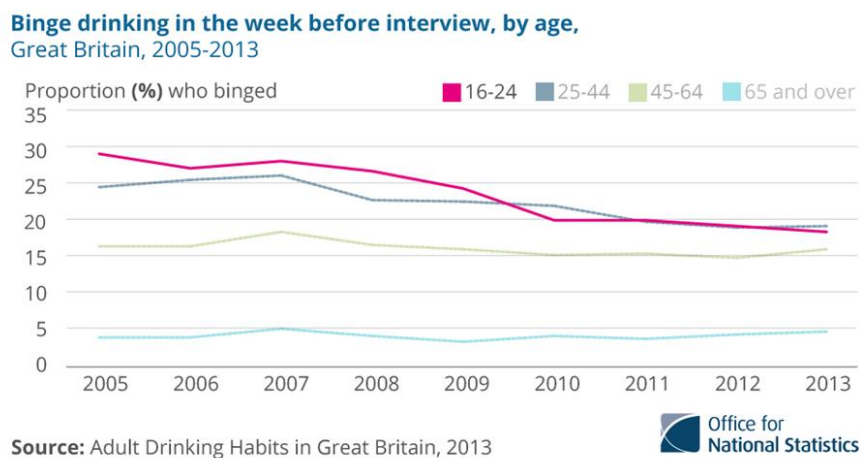
Figure 1: Maternal risk factors for FASD

Host	Agent Exposure	Environment
<ul style="list-style-type: none"> <li>• Mother's age <math>\geq</math> 25</li> <li>• Gravidity <math>\geq</math> 3</li> <li>• Parity <math>\geq</math> 3</li> <li>• Higher rates of stillbirth and miscarriage</li> <li>• Infrequent practice of religion/spirituality</li> <li>• Low maternal education</li> <li>• Smokes cigarettes</li> <li>• Depression/psychological distress</li> <li>• Short stature</li> <li>• Low weight</li> <li>• Low BMI</li> <li>• Nutritional deficiency</li> <li>• Particular alcohol dehydrogenase polymorphisms</li> </ul>	<ul style="list-style-type: none"> <li>• High BAC from large quantities of EtOH</li> <li>• Binge drinking (3+ per occasion)</li> <li>• Length of drinking career</li> <li>• Frequent smoker (lower birth weight)</li> <li>• Beer is beverage of choice of a majority of FASD mothers in most populations</li> <li>• Drinking outside of meals</li> <li>• Polysubstance abuse in urban studies</li> <li>• Change in gastric ADH activity</li> <li>• Change in nutritional status during pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>• Low SES</li> <li>• Not married, but living with partner</li> <li>• Culture accepting of heavy drinking</li> <li>• Family of origin of heavy drinkers</li> <li>• Partner is a heavy &amp; frequent drinker</li> <li>• Alcohol-centered recreation popular</li> <li>• Social isolation from mainstream economy &amp; society</li> <li>• Little or no knowledge or awareness of FASD</li> </ul>

A review of children referred to clinical genetics in the UK with suspected FASD highlights some of the complexities of diagnosis. The mean age of referral was 5.5 years, and over 73% were under a care order or attended with adoptive parents.<sup>8</sup> Even where a maternal alcohol history can be obtained, biomarker studies suggest that women often underreport alcohol use during pregnancy.<sup>9</sup> Where alcohol exposure is confirmed, there may be multiple confounding factors that could impact on development including exposure to cigarette smoke, drug use and postnatal environmental factors.<sup>10</sup>

FASD is irreversible and there is no evidence based treatment for people with the condition. Management is supportive. Benefits associated with an accurate diagnosis of FASD include the opportunity to educate children and families about specific patterns of behaviour, potentially reducing some of the associated secondary disability e.g. substance misuse, unemployment and mental health problems.<sup>11</sup> The prevalence of FAS in children with an affected sibling is 771 in 1,000, therefore a diagnosis may result in diagnosis of other siblings. There may be the potential to offer treatment and support for the mother who may have an alcohol dependency syndrome, thereby potentially mitigating against the risk of further alcohol exposed pregnancies.<sup>12</sup>

Figure 2:



There is much ongoing debate about safe levels of alcohol consumption during pregnancy. Although there is limited evidence to suggest that low to moderate levels of alcohol consumption are harmful, there is insufficient evidence to rule out harm entirely.<sup>13</sup> The current recommendation from the Chief Medical Officer is that women who are pregnant or trying to conceive should avoid alcohol entirely. The National Institute for Health and Clinical Excellence (NICE) particularly emphasises that women should avoid alcohol during the first trimester due to the increased risk of miscarriage.<sup>17</sup>

National data suggests that around 9.37% of pregnant women continue to drink alcohol.<sup>18</sup> In the Screening for Pregnancy Endpoints (SCOPE) study, 33% of the 651 UK participants described at least one episode of binge drinking during pregnancy, the majority of which had occurred during the first trimester.<sup>19</sup> This is of concern as binge drinking has been shown to be a risk factor for developing

FASD. Several trials have been carried out looking at how to best identify and manage women who are drinking harmful levels of alcohol during pregnancy, as well as how to reduce the risk of alcohol exposed pregnancies (AEP) in women who are not currently pregnant but have risky alcohol consumption and unreliable contraception. These studies have had varying amounts of success.

### **Cannabis**

Cannabis is the most widely used illegal drug in England, used in the last year by 6.7% of 16-59 year olds according to the 2014/15 Crime Survey for England and Wales.<sup>14</sup> Using cannabis can affect the ability to drive, can damage lungs, increase the risk of developing mental health conditions, and can affect the fertility of both men and women.<sup>15</sup> Fetuses exposed to cannabis during pregnancy are more like to have low birth weight, which can result in serious lung problems and other medical issues later in life.

### **Cocaine and amphetamines**

Cocaine is a powerfully addictive stimulant drug that can dangerously raise heart rate and blood pressure. Powdered cocaine is the second most commonly used illicit drug in England, used in the last year by 2.3% of 16-59 year olds according to the 2014/15 Crime Survey for England and Wales.<sup>15</sup> Pregnant women who use cocaine may find it very hard to stop using it. Cocaine quickly crosses the placenta and can cause placental abruption (bleeding), which may be fatal. It can also cause premature rupture of the placental membrane, resulting in premature birth. Fetuses exposed to cocaine during pregnancy may be more likely to have low birth weight, show delay in cognitive development and have difficulty in concentrating as they grow older.<sup>16</sup> Permanent changes in brain chemistry and function have also been found.

### **Heroin and other opiates**

Heroin is a highly addictive drug processed from morphine. Babies exposed to heroin will almost always develop neonatal abstinence syndrome, where the baby becomes heroin-dependent along with the mother. This directly causes distress to the baby by making it irritable, cry constantly, have tremors, disturbed vision, disturbed sleep patterns and slow weight gain. It also has knock on effects to the mother, who may become anxious, stressed and depressed, finding it hard to form an emotional attachment the baby. Babies suffering from neonatal abstinence syndrome often spend a prolonged time in hospital, which is costly to the NHS. Fetuses exposed to heroin and other opiates may also be at risk of having low birth weight and being premature. The evidence to date shows that fetuses exposed to methadone, the treatment for opiate dependence, are not at any increased risk of health problems.<sup>1</sup>

Other health problems related to using drugs during pregnancy include:

- Pregnant women who use shared needles to inject drugs are at risk of developing HIV, hepatitis B and hepatitis C, and this can be passed onto their child during pregnancy, childbirth or whilst breastfeeding. The risk of transmission of these conditions can be reduced, but not eliminated, with appropriate clinical management.
- People who use drugs often have poor diets. Diets low in green vegetables, therefore potentially resulting in folate deficiency, can increase the risk of neural tube defects in the fetus.
- Women who use drugs are also at higher risk of physical abuse and violence, which may result in injury to the fetus and a considerable emotional impact on the state of the mother.
- Women who use drugs generally present late to antenatal services, so it may be more difficult to address problems encountered earlier in the pregnancy.

### **What is the current status in Southampton?**

All pregnant women who book for maternity care in Southampton are asked about current and previous substance misuse. Those who disclose a positive substance misuse history are given educational leaflets and are informed about the risks of continuing use on their baby. Except for cannabis users, all pregnant women with current or previous substance misuse are referred to a consultant obstetrician for care, and current users are referred to substance misuse services if they consent to do so. In Southampton, all methadone prescribing occurs through the substance misuse services and not by maternal services or general practitioners.

Understanding the scale of the substance misuse in pregnancy in Southampton is difficult due to the lack of available data. Between January and August 2015, the Southampton Drug and Alcohol Recovery Service (SDARS) reported treating four women for substance misuse in pregnancy. Between December 2014 and June 2015, the substance misuse service for young people, DASH, treated two women for substance use in pregnancy. While this may indicate that the number of women using substances while pregnant is low in Southampton, we envisage there is a discrepancy between the number of pregnant women presenting to substance misuse services and the number of pregnant women recorded on the substance misuse service's data collection system.

Data from maternity services suggests that there were 33 pregnant women who used substances while pregnant between May 2014 and April 2015: 19 used crack/cocaine, 12 used opiates, and two used amphetamines. Of these 33 women, 26 engaged with local substance misuse services (including those outside Southampton city). Those who did not engage with local substance misuse services also did not engage with maternity services until birth. It should be noted that the most commonly used drug during pregnancy in Southampton is cannabis. However, data on cannabis users is not reported because, in line with service guidelines, women using cannabis during pregnancy are not referred to substance misuse services.

All midwives in Southampton currently receive yearly mandatory training on substance misuse in pregnancy, including the referral pathways available and the possible adverse health outcomes. All student midwives also receive training in each of their three years of training.

## 5.2 What can be done?

There are a wide range of interventions that could minimise the harm caused by alcohol or drug abuse during the first 1,000 days of a child's life. Local intelligence suggests that a high proportion of mothers who have a high risk of substance misuse in pregnancy are not identified or managed in a proactive way. Better engagement could improve the outcomes of pregnancy, but how to achieve this requires a multifaceted approach. The interventions could include:

- Education on the risks of substance misuse in the pre-conception period for all potential parents (designed to achieve conception and pregnancy entirely free of harm from alcohol or drug misuse). A focus on alcohol free pregnancy and emphasis on avoiding binge drinking is especially important, given the unquantified risk of FAS, and should be part of sexual health promotion and targeted advice given at GUM services and by GPs.
- Active case finding and management at the antenatal booking and throughout pregnancy to reduce harm from substance misuse is needed. Ongoing concerns relate to under-reporting of substance use and abuse, and the prevalence of cannabis use during pregnancy.
- Proactive support and referral of women who use drugs to ensure earlier engagement with antenatal care, targeting interventions at parents who are most at risk.
- Ensure robust shared protocols agreed by specialist substance misuse services and antenatal services to manage substance misuse throughout pregnancy and minimise harm to the mother and child.
- Review policies and protocols to safeguard infants born to mothers and their partners struggling with addiction to avoid the most serious risk.
- Parenting support to target families where substance misuse presents increased risk to the infant and any future pregnancies.

## 5.3 Recommendations:

1. The data collection methods and referral pathway for maternity and substance misuse services should be reviewed to understand the scale of the problem posed by substance misuse in pregnancy and identify ways to improve outcomes.
2. The training of healthcare staff involved in the clinical management of women who misuse substances during pregnancy should be reviewed to ensure appropriate health knowledge is available for prevention and management.
3. Midwives should extend questions about alcohol use in pregnancy to a modified version of the AUDIT tool and be trained in brief advice or extended brief interventions.
4. Alcohol's harmful effects in pregnancy should be emphasised more in schools delivering sexual health education.

5. Women of reproductive age who are consuming risky levels of alcohol should be signposted to contraceptive services by drug and alcohol services.
6. Women using GUM services who are found to be consuming high levels of alcohol are warned about the risks of FASD and should be signposted to the appropriate drug and alcohol services.
7. The new guidance on alcohol should be widely promoted, emphasising the important change to advice during pregnancy.

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## 6. Infections in the first 1,000 days

### 6.1 Why is this issue important?

#### Introduction

Infections impact on the first 1,000 days of life in very different ways. This chapter explores a number of the diseases that cause problems before, during and after delivery, shaping the outcome of the first 1,000 days. The topic is complex and cannot be comprehensively covered in a brief chapter, so a small number of examples are highlighted that have public health implications.

Some infections may be life threatening to both the mother and baby (for example puerperal sepsis) while other infections may affect them separately. There are many common problems like urine tract infection, or vaginal infection with thrush or an over-growth of bacteria that occur throughout the reproductive years and pregnancy. However, some infections take on a special significance during or shortly after pregnancy. These may initially impact on maternal health, but they can also affect the baby's outcome. Maternal deaths in the UK are now rare, but infection and serious sepsis (invasive and potentially overwhelming infection) can develop quickly and can be missed in the early stages. Healthcare professionals need to act quickly and remain vigilant to keep sepsis rates down. Among the maternal deaths that do occur, infection plays a part in 25%, so this remains a key challenge.

Infants and neonates are vulnerable to a wide range of infections, and maternal health, universal access to obstetric and perinatal care, and good infant nutrition in the womb and first few months of life all play a crucial part in reducing this risk. Breastfeeding protects against infections during and after lactation, as well as providing some protection against immunologic diseases, including allergies. This is why breast feeding is such an important part of the first 1,000 days. Gastro-enteritis remains the most common reported infectious disease in children and adults, and the gut protection from breast milk provides protection. More basic public health conditions and seasonal factors (such as circulating levels of influenza, or other respiratory viruses for example) also have a profound impact on shaping the first 1,000 days.

The immune system behaves differently during pregnancy. An increased risk of certain infections occurs at different stages of gestation. There may also be a tendency for infection to be more severe when it does occur. Previous theories about why this should occur are beginning to be challenged.<sup>1,2</sup> The placenta mounts an immune response of its own, and its response to viruses and pathogens may alter the pregnant woman's susceptibility to certain infectious diseases. There is a need to evaluate the interaction of each specific infection with the fetal/placental unit. This may help to prevent, or treat infections when they occur. The presence of maternal viral infections prenatally has also to be taken into account. Calls are being made to develop biomarkers for viral infections during pregnancy, to strengthen early detection and prevention of fetal damage and maternal mortality. Immune changes during pregnancy can impair pathogen clearance, resulting in increased severity of

disease. Other physiological changes in pregnancy (e.g. decreased lung capacity, urinary stasis, and changes in blood flow) may also increase risk. Hormone shifts during pregnancy can boost components of the immune system (e.g. alterations in certain cytokines and in regulatory T-cell subsets) and these mechanisms could provide new prophylactic and therapeutic pathways.

Vaccination before and during pregnancy, which has proved safe and effective for a number of infectious agents, could one day be expanded to include vaccines against other relevant pathogens, such as Herpes Simplex, Hepatitis E, and malaria parasites.

The beneficial effects of maternal vaccination may not be limited to the mother but, by reducing fetal and placental inflammation, may also provide long-term benefits for the child. The education of pregnant women about prevention of infections and the early identification and appropriate treatment of infectious diseases during pregnancy remain important strategies for protecting maternal and infant health.

### **Why is this an issue?**

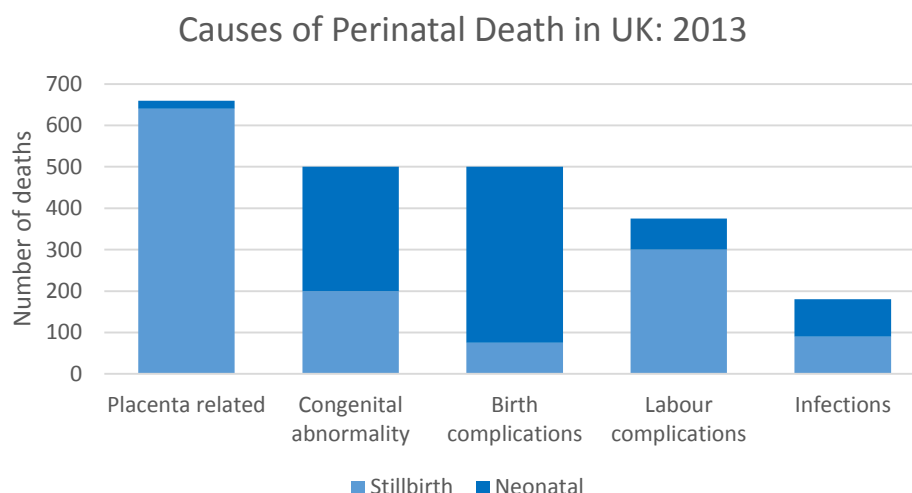
Significant improvements in perinatal care and the health of infants have come about as a result of general improvements in the determinants of health (education, nutrition, housing for example) as well as major changes in the way pregnancy and early years are managed in modern health systems. Despite progress in more developed countries, high levels of infant and maternal mortality and morbidity still persist in many developing countries. The UK position is improving, but still lies behind some European countries. Improvements to the health of the population and life expectancy occurred throughout the last 100 years, and still continue to improve. A substantial component of this positive change is down to the fall in maternal and infant mortality. The changes were seen across most industrialised countries, and improvements in maternal health have been attributed to a decrease in virulence of pathogens causing puerperal sepsis<sup>3</sup>, improved surgical techniques in the obstetric theatre, and universal access to obstetric care.<sup>1</sup> This undoubtedly has helped to improve the outcomes of pregnancy, and the health of women more generally, and this has also driven improvements in child health.

By 1960, many industrialised countries had reduced maternal mortality ratios to 20 to 30 deaths per 100,000 livebirths and the health of mothers and young children was improving steadily. Comparison of the UK outcomes from 2006-08 with 2009-12 shows a further fall in the maternal death rate from 11 out of every 100,000 women to 10 out of every 100,000 women in UK. Another recent study by Oxford University investigated 357 maternal deaths during pregnancy and the six weeks after it ended (between 2010 and 2012). Surprisingly, a quarter of these deaths were down to sepsis; severe infections causing widespread inflammation throughout the body. While there are several well-established risk factors for maternal sepsis including caesarean section and anaemia, there has been no national-level study of the incidence or risk factors for this complication in the UK. New insights from studies conducted between 2003 and 2005, suggest 71% of mothers who died of sepsis in the UK were found to have had substandard care (mainly delay in diagnosis), 33% were obese, and 48% has caesarean sections, all of whom were either overweight or obese. Given the

increasing population prevalence of obesity and overweight among women, and a persistently high caesarean section rate, the risk of sepsis may well increase in future. Delay in diagnosis requires a higher index of suspicion and more proactive treatment during pregnancy and delivery.

If we look at the latest perinatal statistics from the UK (see figure 1), we find the majority of neonatal and still births are caused by placental problems, congenital abnormalities, and birth/labour complications. Infections as a primary cause of death come next (alongside complications before labour and extreme prematurity, for example). These causes are not mutually exclusive, and a baby who dies of an infection, for example, may also have a congenital abnormality which makes that baby more vulnerable to infection. Clearly, infections are not the dominant cause of mortality in babies during the perinatal period, and unlike the maternal statistic, cause well below a quarter of the deaths overall. Aside from death, infections give rise to significant illness and morbidity among this age group, and especially in the intensive care and high dependency setting in hospital. As neonates do not show overt signs of sepsis, a high index of suspicion is needed to diagnose and treat infection proactively.

Figure 1:



Source: This data is extracted from the MBRRACE-UK study programme (Ref 1)

Puerperal sepsis<sup>1</sup> or fever is defined by the World Health Organization as a genital tract infection occurring between the rupture of membranes and the 42nd day postpartum, coinciding with fever. One of pelvic pain, abnormal vaginal discharge, abnormal odour or discharge, or a delay in the reduction of uterine size must also be present. Most cases are caused by bacterial infection, especially the streptococcus bacteria. The area of the uterus exposed by the detached placenta, combined with the reduced immune status of women during pregnancy, underlies the risk of puerperal sepsis.

High rates of puerperal fever only came under control when health care providers realised they could transmit infection from person to person, and by sterilising equipment, ensuring clean clinical

environments, and most importantly insisting on systematic hand-washing between patient contacts. Rates of illness and death were radically reduced by introducing these measures.<sup>2</sup> This discovery began the transformation in health care and infection control that took many decades to spread across health systems in the late 19th and 20th centuries.

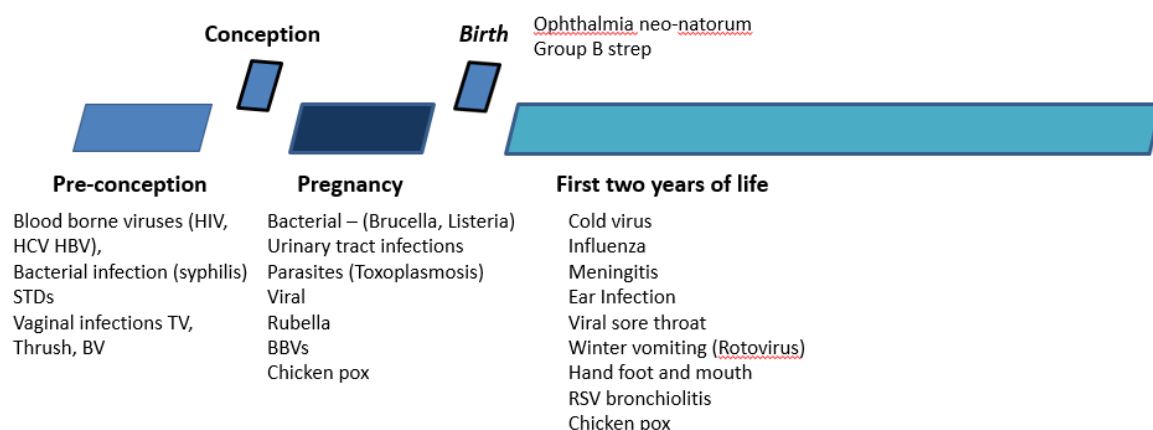
Viral and parasitic infection may cause major problems during the first 1,000 days. These infectious agents have many different effects, do not respond to antibiotics like bacteria, and they cause a wide range of serious or chronic health problems that can impact the embryo and fetus in utero, and after pregnancy. The onset of infection may antedate or occur during pregnancy, and in many instances the timing can determine the impact on the infant.

Globally, and specifically in developing countries, where HIV and AIDS (blood borne viral illnesses), and malaria (a parasitic infection) are prevalent, the impact on women of child bearing years can be devastating, more than doubling the risk of maternal or perinatal death, and damaging the health of nursing mothers and infants irreversibly. Both malaria and HIV infection may be present before pregnancy occurs, and by damaging the immune system of the mother, can cause complications that result in loss of the pregnancy or “vertical transmission” of the infection from mother to baby (in the case of HIV). Some mothers may spread their infection to the baby during labour or while breast feeding, while some pregnant women who are at increased risk of HIV infection due to changes in their immune system, acquire the infection during pregnancy. When HIV infection is prevalent in the population, both maternal and infant mortality is significantly increased.

**Effects on health**

Figure 2 presents a conceptual framework which provides a summary of the different types of infection and when they tend to occur in the first 1,000 days.

*Figure 2: Conceptual framework of infections in the first 1,000 days*



The preconception period tends to be later in the UK, as the mean age of women at their first pregnancy has risen toward 30 years. This may increase the cumulative risk of genital tract infection,

which in turn may reduce fertility. This combines with the age related fall in fertility in women to create a rising number of couples who are seeking treatment for infertility, and consequently a rise in the number of IVF or “test tube” babies.

Chlamydia infection can cause a genital infection that may damage the reproductive tract. It is a common STD (sexually transmitted disease), is frequently asymptomatic, or may cause minor or non-specific symptoms. The infection can cause pelvic inflammatory disease in women which in turn may cause ectopic pregnancy or infertility. In men it may cause narrowing of the urethra and lower the sperm count. The infection may be present for months or years without an individual being aware, so screening tests have been introduced and targeted at higher risk individuals. Once scarring has occurred in the delicate tissues of the reproductive tract, it can be irreversible, so early detection and eradication is the best strategy. Safer sexual behaviors, reduced number of partners, and use of condoms is the best strategy to minimise risks of chlamydia. If present at birth, this organism can cause an eye infection called Neonatal Conjunctivitis. The baby's eyes are contaminated during passage through the birth canal from a mother infected with chlamydia. A similar chain of infection can occur with the STD caused by *Neisseria gonorrhoeae*. Obstetric and paediatric teams need to maintain vigilance to diagnose and eradicate these infections.

Syphilis is a chronic form of sexually transmitted bacterial infection that can have devastating effects on the infected mother and child. Like chlamydia, this can be asymptomatic, and go undiagnosed. Primary infection causes localised but painless genital, anal, or oral ulceration, and this may progress into secondary and tertiary phases of disease (which may spread through the body and nervous system). The problem in an infected mother is the risk of the fetus becoming infected during the pregnancy and being born with congenital syphilis, a serious condition with multi-organ involvement. This is a less common infection these days in heterosexual adults, and antenatal screening actively looks for syphilis. Penicillin injection is still an effective treatment. Congenital syphilis is now a very rare occurrence.

### **Pregnancy**

Viral infections may cause major problems during pregnancy. Many of these infections cause only minor problems in later childhood or adults, but if the infection is acquired at critical points during pregnancy, the prognosis for both the mother and baby may be serious. The exception comes with blood borne viruses (BBVs) that have serious consequences all round.

German measles (Rubella) is perhaps the best known of the viral infections because of the syndrome it may cause in pregnancy. Rubella is most dangerous if caught during the first 20 weeks of pregnancy, when it can cause miscarriage, stillbirth or birth defects in unborn babies. The defects include hearing loss or brain damage. During antenatal checks, women are offered a rubella immunity blood test as part of routine antenatal screening. The majority have immunity and no further action is required. If no immunity is present for rubella, the mother is advised to avoid anyone who has the rubella virus and to inform the GP or midwife if they contact anyone who has rubella. MMR (measles mumps and rubella) vaccination is given after birth to protect against rubella

in the future. The MMR vaccine can be given to breastfeeding mothers without any risk to the baby. The MMR vaccination is routinely offered to children before becoming sexually active and are protected against this risk. Severity of this infection during pregnancy contrasts with the relatively benign course it takes in young people and adults.

Chicken pox (and Varicella infection of the new-born). Most pregnant women in the UK (9 out of 10) are already immune to chickenpox. This is why it is uncommon in pregnancy, affecting only 3 in every 1,000 pregnant women. If you grew up in a tropical or subtropical area, you're less likely to have had chickenpox in childhood, so migration to the UK confers a greater risk of catching chickenpox than women who were born and grew up in the UK. Immunity can be assessed while pregnant. Varicella infection is much less common in adults than in children, and is associated with a greater morbidity, causing pneumonia, hepatitis and encephalitis. As recently as the 1990s, chickenpox resulted in the deaths of 25 people per year in England and Wales; 80% of these deaths occurred in adults. The incidence of pneumonia complicating varicella in pregnancy was quoted at 10–14%, but in a more recent evaluation of 347 cases of varicella infection in pregnancy, only 5% developed pneumonia. The mortality rate in pregnancy in the pre-antiviral era was 36%, but recent case series report lower mortality between 0 and 14%. The improvement is attributed to antiviral therapy and improved intensive care. Pneumonia may be more severe at later gestational ages due to the effects of the gravid uterus on respiratory function.

Prenatal diagnosis is possible by ultrasound when findings such as limb deformity, microcephaly, hydrocephalus, soft tissue calcification and fetal growth restriction can be detected. Magnetic resonance imaging (MRI) may provide additional information in cases where ultrasound has identified abnormalities. Varicella infection of the new-born (previously called congenital varicella) is a result of infection in early neonatal life near the time of delivery or immediately postpartum, or from contact with a person other than the mother with chickenpox or shingles. The route of infection could be trans placental, ascending vaginal or result from direct contact with lesions during or after delivery. If maternal infection occurs 1–4 weeks before delivery, up to 50% of babies are infected and approximately 23% develop clinical varicella, despite high titres of passively acquired maternal antibody. Severe chickenpox is most likely to occur if the infant is born within 7 days of onset of the mother's rash or if the mother develops the rash up to 7 days after delivery. For babies born to mothers who have had chickenpox within the period 7 days before to 7 days after delivery, it is vital that the neonate receives prophylaxis as soon as possible with VZIG with or without acyclovir.

## Influenza

The flu pandemic in 2009 enabled researchers to investigate the effect on pregnant women. The national study followed 256 pregnant women admitted to hospital with the 2009 strain of the swine flu virus, called H1N1. Women with swine flu were found to have a significantly higher rate of adverse events than uninfected pregnant women. This included a fourfold higher rate of stillbirth and fivefold higher rate of neonatal death (when the baby dies within 28 days of life). The authors used this to raise awareness of the importance of pregnant women having the seasonal flu vaccine, which now also protects against swine flu. Pregnant women are classified among high-risk groups

advised to have an annual flu vaccination. The study reported on 256 women with swine flu, and 10 had stillbirth or perinatal deaths. This translated into a mortality rate of 39 out of 1,000 total births (95% confidence interval [CI] 19 to 71), compared to 7 out of 1,000 (95% CI 3 to 13) among babies of uninfected women. The higher perinatal mortality rate among babies of infected women was due to a higher rate of stillbirth.

### **The first two years**

A wide range of mild and potentially very serious infections may affect children in the first few years of life. In addition, some of the earliest infection risks following birth result from our ability to resuscitate premature babies and neonates who are cared for in a centralised intensive care system.

Childhood mortality has decreased enormously due to the prevention and treatment of infectious diseases, but infection still remains a major cause of mortality in children aged up to 5 years. Some European countries now have childhood mortality rates 30% to 40% lower than that of the United Kingdom, so more can be done to reduce childhood mortality. A national study of deaths from meningococcal disease (the leading cause of death from infectious diseases in children) showed mortality is often associated with late identification, suboptimal treatment, and other deficiencies in health care. There is also concern that the provision of care for children with feverish illnesses varies considerably across the UK. Differences in childhood mortality due to health inequality also need to be addressed. Child mortality from meningococcal disease in the most deprived areas of the UK is three times that in the most affluent areas.

NICE guidelines have been released recently to address the management of febrile illnesses in young children in order to tackle these short-comings. This has been translated into local care pathways by the regional children's network and local CCG in recent months.

The complications of intensive and high dependency care for neonates present a challenge for infection control in hospital. Rates of Health Care Acquired Infection (HCAI) are lower now than previously, but avoidable cross infections still occur. Reports from neonatal and paediatric intensive care units identify problems with intravenous line infections (antibiotic resistant Staphylococci – (usually from skin bacteria) or resistant Enterobacteriae (source gut bacteria)). An unusual cluster of neonate deaths were reported this year following bacterial contamination of intravenous feed manufactured in the UK. This impacted on several different neonatal intensive care units. Regulators of healthcare and clinical governance systems focus on HCAI today as a key safety measure.

Babies born infected with HIV have a poor prognosis and cannot clear the virus. In the UK setting, blood borne viruses (BBVs) are much less common than in Sub-Saharan Africa, but numbers continue to rise slowly, in part as a result of globalisation and in-migration from endemic areas, and partly as a result of person to person spread in the UK. HIV infection during pregnancy is screened for alongside other BBVs (hepatitis B for example), especially in mothers giving birth in the UK from high risk BBV areas (such as sub Saharan Africa, China, SE Asia).



Especially high risk individuals such as mothers with a history of injecting drug use are at high risk of hepatitis C infection and should be tested proactively. Screening by the local obstetric unit in Southampton regularly identifies cases of BBVs in antenatal mothers, usually contracted by vertical transmission. Antenatal screening and post-partum intervention can reduce maternal to child transmission significantly, and break the chain of “vertical transmission”.

### **Neonatal tuberculosis**

Neonatal TB is a risk in babies born in England who have regular visits by relatives from areas where TB is endemic, or who travel to these areas. A targeted programme in the UK aims to immunise at-risk neonates with the BCG vaccine shortly after birth. The vaccine, originally developed many years ago to prevent TB meningitis, is also used in older children and adults who are in a high risk target group. Reported cases of adult and younger persons with TB have increased in recent years in Southampton, and parts of the country, for example London, now have levels of TB that are classed as high risk areas. This together with a recent shortage of BCG supply, has interrupted the usual immunisation schedule for neonates at risk, and a catch-up programme is under way as the supply chain recovers.

### **Common viral and bacterial infections in babies**

NHS Choices provides advice on a long list of viral and bacterial infections that may affect babies and infants over the first two years. Most will be common infections like the cold virus, sore throats, gastroenteritis, and ear infections. NICE guidance on the febrile child provides GPs and paediatricians with advice on how best to manage the febrile child, and this takes account of the reported health service deficiencies in managing infections in young children. The breadth and range of these infections goes beyond the scope of this chapter, but the websites provided by NICE and NHS Choices provide professionals and the public with ample information and advice.

### **Meningococcus – new immunisation protocols**

Given the importance of meningococcus (septicaemia and meningitis presentations), it is encouraging to see further developments in vaccines to prevent infection in children and adults. In 2013, a new meningitis B vaccine called Bexsero was approved for use by the European Medicines Agency (EMA). In March 2014, the government's Joint Committee on Vaccination and Immunisation (JCVI), recommended routine use of the meningitis B vaccine in the UK. The vaccine should be offered to babies at two, four and 12 months of age.

### **Pertussis (whooping cough)**

Despite a sustained period of high vaccine coverage since the early 1990s, pertussis has continued to display 3-4 yearly increases in activity. Each year in the five years prior to 2012, there were on average in England nearly 800 confirmed cases of whooping cough, 270 babies admitted to hospital and four deaths in babies.

The highest disease incidence occurs in infants under three months of age who are too young to have completed the primary vaccine course and have the greatest risk of complications and death. This age group is considered a key indicator of pertussis activity and the primary aim of the pertussis vaccination programme is to minimise disease, hospitalisation and deaths in young infants.

The Department of Health announced that pertussis immunisation would be offered to pregnant women from 1 October 2012 to protect infants from birth whilst disease levels remain high. This programme aims to passively protect infants from birth, through intra-uterine transfer of maternal antibodies, until they can be actively protected by the routine immunisation infant programme with the first dose of pertussis vaccine scheduled at eight weeks of age.

Nationally between 1 October 2012 and 30 June 2015, 12 deaths have been reported in young babies with confirmed pertussis. Eleven of these 12 babies were born to mothers who had not been vaccinated against pertussis.

### **6.2 What can be done?**

Mortality due to infections in pregnant mothers, and death from serious infection in infancy is uncommon, but avoidable deaths still occur in the UK. Using comparisons with other European countries, the UK could reduce deaths by as much as 30%.

The dissemination of the NICE guidelines on management of the febrile child should be encouraged to reduce the delays in diagnosis and management.

New meningococcal vaccines should be adopted as soon as possible, ensuring a high uptake among the target group. Flu immunisation for pregnant women should be encouraged, with greater awareness of the risk of influenza during pregnancy.

The risk of life threatening infection is significantly higher in more socioeconomically deprived areas. Clinicians in primary and secondary care should include this in their clinical assessment of febrile children, when deciding to investigate or refer to hospital.

A safe and sustainable supply chain for BCG is needed to avoid delay in immunising high risk neonates.

### 6.3 Recommendations:

1. The awareness by clinical staff of the risk factors for serious infection, including maternal obesity and following caesarean section, should be increased to improve recognition.
2. The local translation of the NICE “febrile” guideline into care pathways across the Wessex area should be supported and widely promoted by service providers.
3. The risk of chicken pox infection during pregnancy is higher in women from other countries, and local obstetric protocols need to raise awareness of this greater risk and encourage proactive diagnosis and advice.
4. BCG “catch-up” immunisation must be ensured locally, especially given the recent increase in TB notifications in the Southampton area.
5. New schedules of immunisation need to be promoted actively to ensure the highest level of protection for mothers and babies, as immunisation among pregnant mothers remains the most important strategy to reduce harm to mother and baby.

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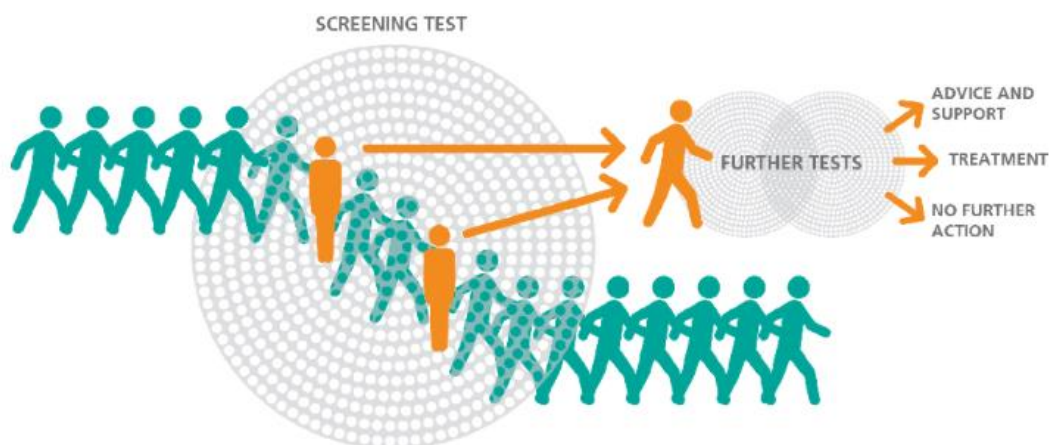
## 7. Screening

### 7.1 Why is this issue important?

#### Background to screening

Population screening aims to identify risk factors or cases of disease in an apparently healthy population. Generally speaking, when a disease is targeted by a screening programme, evidence should confirm that early identification can lead to earlier treatment and a better long-term outcome. Any population screening process must also be acceptable to those receiving it and by those performing it. Everyone who meets eligibility criteria should be invited for screening. This does not mean individuals have to accept screening, nor should screening be seen as the only definitive way of finding risk factors or cases of disease. Screening tests and programmes are not always perfect. Sometimes screening can incorrectly identify someone as having a problem when they don't (this is known as a false positive), and sometimes screening can incorrectly identify someone as not having a problem when they do (a false negative result). The predictive value of a positive test identifying a condition is also affected by how many people in the population are likely to be affected by that condition (prevalence). As a general rule, the lower the prevalence of a condition, the more this can lower positive predictive value. Following a positive screening test, people may be offered further tests leading to treatment, advice and support, or no further action. The screening process is depicted in figure 1 below.

Figure 1: Conceptual diagram of screening principle



#### The ethics of screening

All healthcare activity must be grounded in the normative ethical framework of respect, beneficence, non-maleficence and justice. This is vital in screening which is a health system endeavour to reduce harm to the individual by early identification of disease or risk factors for which the individual may have no symptoms. Screening must therefore be conducted only after informed

consent, ensuring adequate information and voluntary choice to participate or not. The risks of harm created by false-positive results and false-negative results must be taken into account; the overall benefits must outweigh the risks. There must be fair distribution of benefits, burdens and financial resources. In prenatal screening there is a further tier of consideration; screening does not lead simply to the choice of treatment or prevention of a disease, but potentially provides information that parents use to make a decision whether to continue the pregnancy or not. This enabling of meaningful reproductive choice with regard to parenting a child with a serious disorder or disability should be the aim of prenatal screening. The decisions on how to respond to screening results should remain personal and not become societal aims of reducing costly health and social care associated with these conditions. Emerging technologies to increase the reach of prenatal screening such as non-invasive prenatal screening, a technology which may allow whole genome sequencing, challenges the traditional ethical framework due to the blurring of boundaries between prenatal diagnosis and predictive testing.

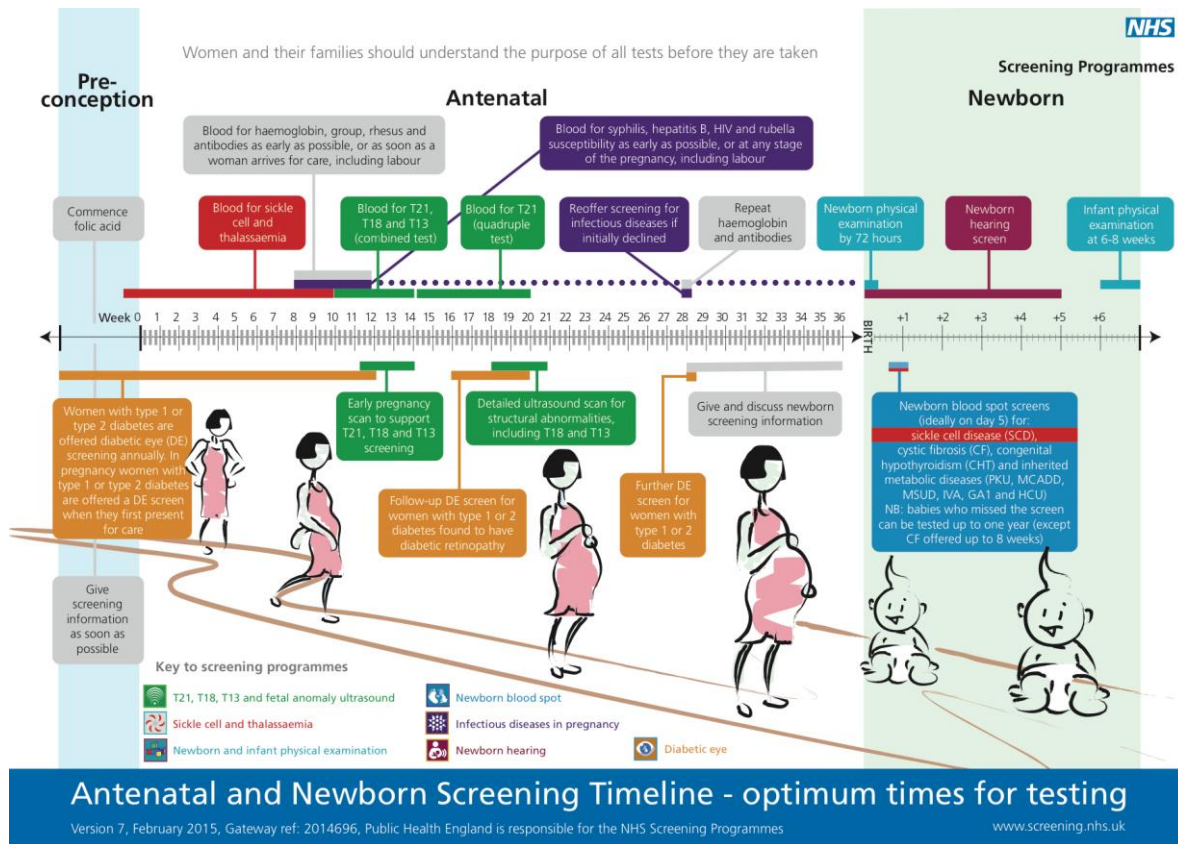
### **The first 1,000 days**

Screening in the first 1,000 days of life includes actively targeting the pregnant woman in the antenatal period, and follows through the infant's first two years. Antenatal mothers are offered screening for a number of infectious diseases detailed elsewhere in this report. Mothers are also 'screened' for the use of alcohol, drugs and smoking by their GPs or midwives at the antenatal booking. The use of alcohol or drugs is ascertained simply by asking the patient and relies on the question being asked in the right way, and the engagement of the patient in giving an accurate response. Carbon monoxide monitors can be used to screen those who have smoked within a few days of the appointment (see the smoking chapter of this annual report). Mothers and their partners may be offered screening for sickle cell disease or thalassaemia as described below. Any mother known to have diabetes has extra sessions of diabetic retinopathy screening during the pregnancy (because there is an increased risk of retinal damage during the pregnancy). Ultrasound scanning of the baby is performed at about 10 weeks as part of a combined test to screen for a risk of Down's Syndrome in conjunction with a blood test, and a further scan towards the midpoint of the pregnancy screens for a number of other conditions. Following the birth of the infant, a number of tests or physical examinations are conducted to screen for a range of other abnormalities.

Figure 2 summarises a number of national population screening programmes that cover the first 1,000 days of life. The list includes:

1. Fetal Anomaly Screening Programme (FASP)
2. Newborn and Infant Physical Examination Screening Programme (NIPE)
3. Newborn Blood Spot Screening Programme (NBS)
4. Newborn Hearing Screening Programme (NHSP)
5. Sickle Cell and Thalassaemia Screening Programme (SCT)

Figure 2: Antenatal and newborn screening timeline



### 1. The Fetal Anomaly Screening Programme (FASP)

The fetal anomaly screening programme focuses on the use of routine antenatal ultrasound scans that can screen for a number of different structural abnormalities. There are usually two routine ultrasound scans in pregnancy. The first is done between eight and 14 weeks and the second between 18 and 21 weeks. The later scan is sometimes called the fetal anomaly scan and is timed to screen for the majority of the structural conditions which can occur in a developing fetus. Figure 3 briefly describes the main conditions which are screened for by the 18-21 week scan.

The first scan is sometimes called the dating scan as it is used to predict the estimated date of delivery. For many of the conditions shown in figure 3, this scan would be too early to identify them. However, the dating scan can include a nuchal translucency (NT) scan, which is part of the combined screening test for Down's syndrome (Trisomy<sup>i</sup> 21). It is called the combined test because in addition to the ultrasound scan a blood test is taken. This combined test is also being offered to screen for a further two other conditions which are also caused by three chromosomes occurring where there should be only two – Edward's Syndrome (Trisomy 18) and Patau's Syndrome (Trisomy 13). If a mother presents at a later stage of pregnancy (14 to 20 weeks) then a different blood test can be taken to screen for Down's syndrome, the 'quadruple blood test', which tests four different markers which in conjunction with maternal age offer a prediction of risk for the condition.

<sup>i</sup> Trisomy means three copies of a particular chromosome rather than the usual two

Figure 3: Conditions screened in the fetal anomaly programme



The combined test or quadruple test returns a normal risk or higher risk prediction. Higher risk results trigger the offer of diagnostic tests (chorionic villous sampling and amniocentesis) which can detect whether any of the three trisomy conditions exist. The diagnostic tests target only high risk pregnancies because they cause a small but significant risk (1-2%) of miscarriage. This risk may persuade some women not to be screened at all, while others are happy to proceed with the tests, despite the risk of miscarriage.

### ***New diagnostic blood test for Down's syndrome, Edward's Syndrome and Patau's Syndrome***

A new non-invasive diagnostic prenatal test has been developed which measures cell-free DNA in mother's blood and different levels of each chromosome can be identified. Increased levels of chromosome 13, 18 or 21 could indicate the corresponding condition. In the research study that was used to test this new test, all 38 babies with Down's Syndrome were accurately identified compared to standard screening which only identified 30 out of the 38. Additionally the new test was falsely positive in 9 pregnancies that did not have Down's syndrome compared to 854 using the standard test. This means that the power of the new blood test to correctly predict Down's syndrome when the test gave a positive result was extremely good at approximately 80%, compared to 3% for the standard test. There is no indication as yet whether this test will become routinely available on the NHS. The test was not so good at accurately predicting Edward's and Patau's Syndrome.

## **2. Newborn and Infant Physical Examination Screening Programme (NIPE)**

In the NIPE screening programme, parents are given the opportunity for a healthcare professional to examine their baby within 72 hours of birth and again between six and eight weeks of age. The later examination is necessary because some conditions will not be immediately apparent. The examination is a top-to-toe examination looking for any significant physical abnormality. It is an opportunity to screen specifically for the following conditions shown in table 1 below:

*Table 1: Conditions screened in the newborn and infant physical examination programme*

<b>Examination</b>	<b>Condition Scientific Name</b>	<b>Plain English Description</b>
Heart	Congenital heart disease	Inherited heart problem
Hips	Developmental dysplasia of the hip	Hip that fails to develop properly
Eyes	Congenital cataracts	Inherited eye problem
Testes	Cryptorchidism	Undescended testicles

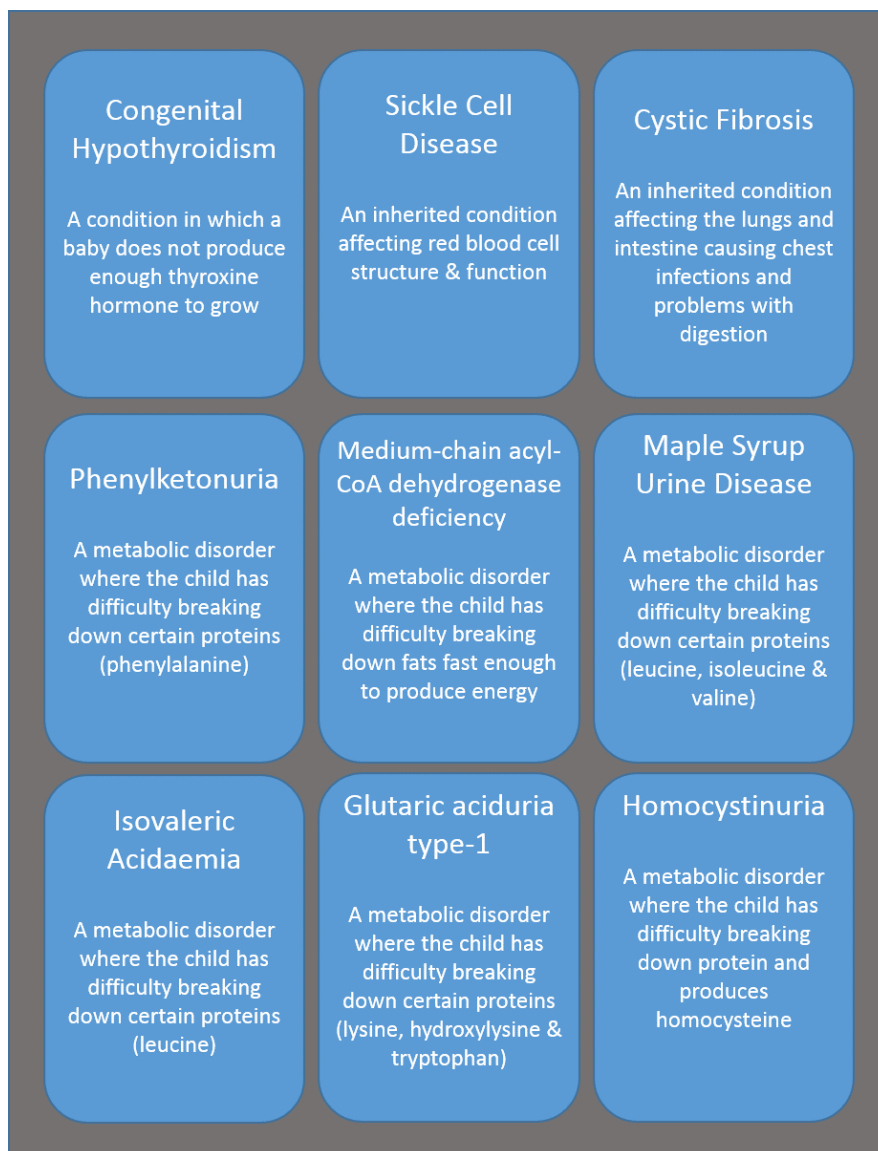
## **3. Newborn Blood Spot Screening Programme (NBS)**

The NBS screening is offered to all babies born in the UK on, or shortly after, the fifth day of life. A health professional pricks the baby's heel and collects a drop of blood on a special card which is sent to a regional newborn screening laboratory and tested for the presence of nine conditions as shown in figure 4, which contains a very brief description of the condition.

Early identification of many of these conditions can prevent serious consequences including illness and severe developmental problems. For many of the metabolic diseases, careful manipulation of the infant's diet is the main method of management. However, for cystic fibrosis and sickle cell disease, early identification does not so much prevent periods of illness but can improve the health of individuals.



Figure 4: Conditions screened in the blood spot programme



#### 4. Newborn Hearing Screening Programme (NHSP)

Identifying hearing impairment early can optimise the development of speech and language skills and enhance the benefits of social and emotional interaction. In England, there are clear care pathways for the screening and referral process for NHSP. The parents of all babies should be offered hearing screening for their baby within four to five weeks of birth or as soon as possible thereafter up to three months of age. A different pathway exists for any babies who spend the first two days of life on a special care baby unit. If babies are known to have a risk of hearing impairment or deafness, from another condition, they bypass the screening process and are referred for full audiological assessment. The test can take place in hospitals or in the community.

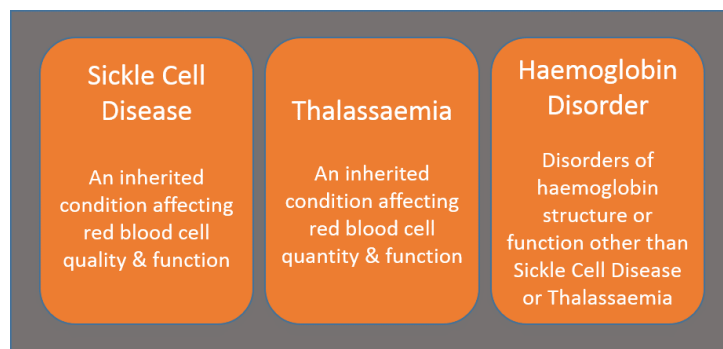
## 5. Sickle Cell and Thalassaemia Screening Programme (SCT)

The NHS Sickle Cell and Thalassaemia (SCT) screening programme is a genetic screening programme. This means that as well as identifying those with a condition, it also identifies people who are genetic carriers. If two people are carrying genes for a condition (but do not have any symptoms themselves) it increases the risk that their baby could inherit the full version. The SCT screening programme attempts to identify the following:

- Genetic carriers for sickle cell, thalassaemia and other haemoglobin disorders
- Sickle cell disease
- Thalassaemia
- Haemoglobin disorders

Sickle cell disease, thalassaemia and haemoglobin disorders can affect the structure and function of red blood cells. Red blood cells main function is to carry oxygen around the body. Brief definitions of the conditions can be found in figure 5 below:

*Figure 5: Conditions screened in the sickle cell and thalassaemia screening programme*



There are currently estimated to be approximately 240,000 healthy sickle cell carriers and more than 12,500 people with a sickle cell disease in England where it is the most common and fastest growing genetic disorder. Newborn screening is identifying more than 300 babies with sickle cell disease each year.<sup>1</sup> The highest prevalence of sickle cell disorders is amongst Black Caribbean, Black Africans and Black British.

There are approximately 214,000 healthy carriers and more than 700 people with beta thalassaemia disorders in the UK. The highest prevalence is amongst Cypriot, Italian, Greek, Indian, Pakistani, Bangladeshi, Chinese, other South East Asian and Middle Eastern populations. Screening is offered to:

- All pregnant women
- Fathers-to-be, where antenatal screening shows the mother is a genetic carrier
- All newborn babies, as part of the newborn blood spot screening programme

## 7.2 What can be done?

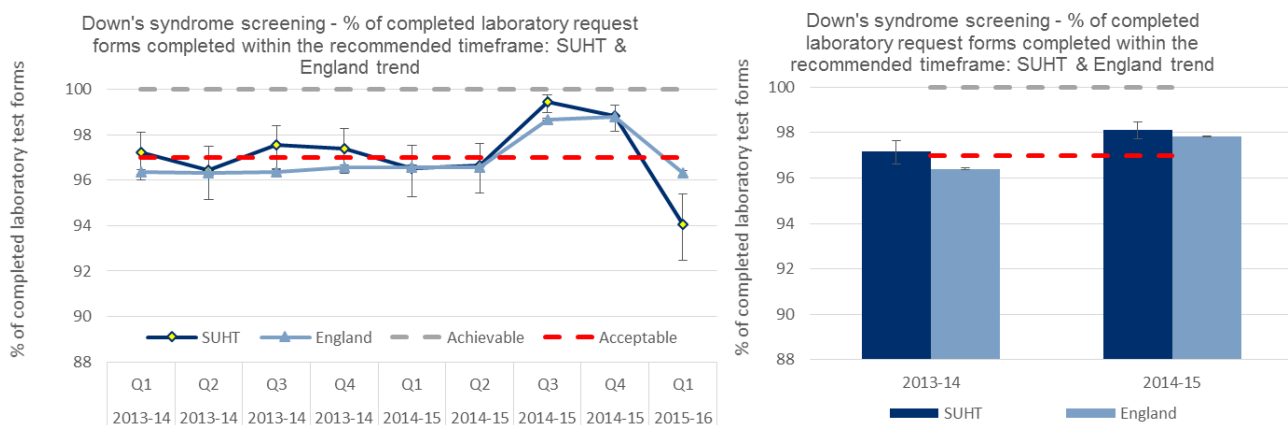
### What is the current state of antenatal and newborn screening in Southampton?

To ensure the quality of delivery of a screening programme, a number of key performance indicators (KPIs) are collected for each screening programme. These performance indicators are process measures and do not relate to final patient outcomes. In fact little data is collected locally to ascertain the proportion of positive tests and subsequent outcomes. Additionally there may be variation in how a screening test is performed. There is likely to be greater variation in subjective physical examinations such as in the newborn examination compared to the laboratory processing of the blood spot test. KPIs for the five programmes described above are discussed below.

#### 1. The Fetal Anomaly Screening Programme (FASP)

There is only a single KPI for the FASP (FA1). This is the proportion of laboratory request forms including complete data prior to screening analysis, submitted to the laboratory within the recommended timeframe of 10+0 to 20+0 weeks’ gestation. Targets are an acceptable level of  $\geq 97\%$  and an achievable level of 100%. The rationale for the acceptable target is that some women may not wish to disclose their family origin or smoking status. The charts below show both quarterly and annual data for FA1 for Southampton compared to England between 2013/14 and 2015/16.

Figure 6: The proportion of laboratory request forms including complete data prior to screening analysis, submitted to the laboratory within the recommended timeframe: 2013/14 to 2015/16



#### 2. Newborn and Infant Physical Examination Screening Programme (NIPE)

A new IT system is being rolled out in Wessex to enhance the collection of data on screening in the NIPE programme. There are some teething problems with the new system and so some providers have not been able to report. The aim is to have all relevant data reported from the first quarter of 2015/16. There are however two KPIs in the NIPE programme which will be reported in the future:

- NP1: The proportion of babies eligible for the newborn physical clinical examination who were tested within 72 hours of birth.
- NP2: The proportion of babies who, as a result of possible clinical abnormality of the hips being detected at the time of the newborn physical examination, undergo assessment by specialist hip ultrasound within two weeks of birth.

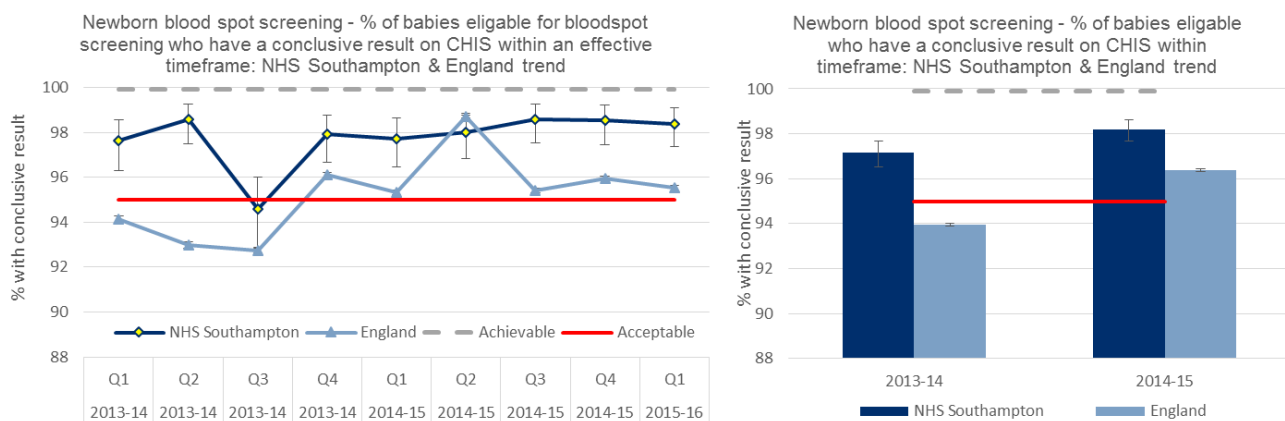
### 3. Newborn Blood Spot Screening Programme (NBS)

There are three KPIs in the NBS programme:

- NB1: Coverage (CCG responsibility at birth) - The proportion of babies registered within the CCG both at birth and on the last day of the reporting period who are eligible for newborn blood spot screening and have a conclusive result recorded on the Child Health Information System (CHIS) within an effective timeframe.
- NB2: The percentage of babies from whom it is necessary to take a repeat blood sample due to an avoidable failure in the sampling process.
- NB3: Coverage (Movers in) - The proportion of babies registered within the CCG (or equivalent) on the last day of the reporting period, who are eligible for newborn blood spot screening and have a conclusive result recorded on the child health information system (CHIS) within an effective timeframe.

For NB1, Southampton largely exceeds the level of acceptability as shown in figure 7 below:

Figure 7: NB1 - The proportion of babies eligible for newborn blood spot screening and who have a conclusive result recorded on the Child Health Information System (CHIS): 2013/14 to 2015/16



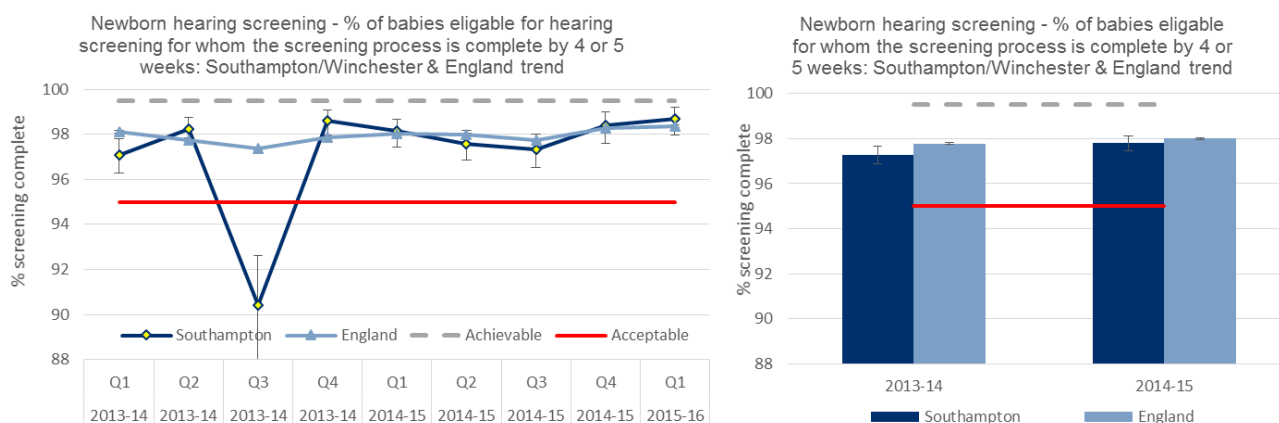
#### 4. Newborn Hearing Screening Programme (NHSP)

There are two KPIs in the NHSP

- NH1: The proportion of babies eligible for newborn hearing screening for whom the screening process is complete by four weeks corrected age (hospital programmes-well babies, NICU babies) or by five weeks corrected age (community programmes-well babies).
- NH2: The percentage of referred babies receiving audiological assessment within 4 weeks of the decision that referral for assessment is required or by 44 weeks gestational age.

For NH1, Southampton largely exceeds the level of acceptability as shown in figure 8 below. There was a dip in performance in the third quarter of 2013/14 but has since recovered to acceptable levels in line with the national average.

Figure 8: NH1 - The proportion of babies eligible for newborn hearing screening for whom the screening process is complete by four or five weeks: 2013/14 to 2014/15



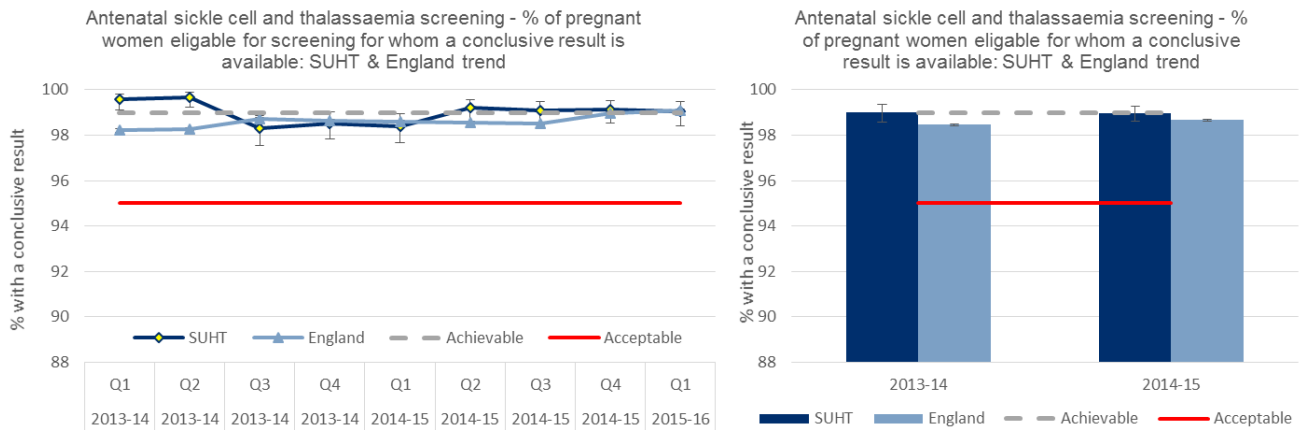
#### 5. Sickle Cell and Thalassaemia Screening Programme (SCT)

There are two KPIs in the SCT

- ST1: The proportion of pregnant women eligible for antenatal sickle cell and thalassaemia screening for whom a conclusive screening result is available at the day of report.
- ST2: The proportion of women having antenatal sickle cell and thalassaemia screening for whom a conclusive screening result is available by 10 weeks' gestation.
- ST3: The proportion of antenatal sickle cell and thalassaemia samples submitted to the laboratory with a completed FOQ (Family Origin Questionnaire).

For ST1, Southampton exceeds the level of acceptability and largely exceeds the achievable level of coverage as shown in figure 9 below.

Figure 9: ST1 – The proportion of pregnant women eligible for antenatal sickle cell and thalassaemia screening for whom a conclusive screening result is available: 2013/14 to 2015/16



Overall, the screening programmes in Southampton compare favourably with the performance nationally. The performance indicators focus more on process (getting the offer of screening) but that is essential if women and their partners are to be offered the choice to be screened or not, and to benefit from the additional information. From this dataset we appear to be achieving this to a good standard.

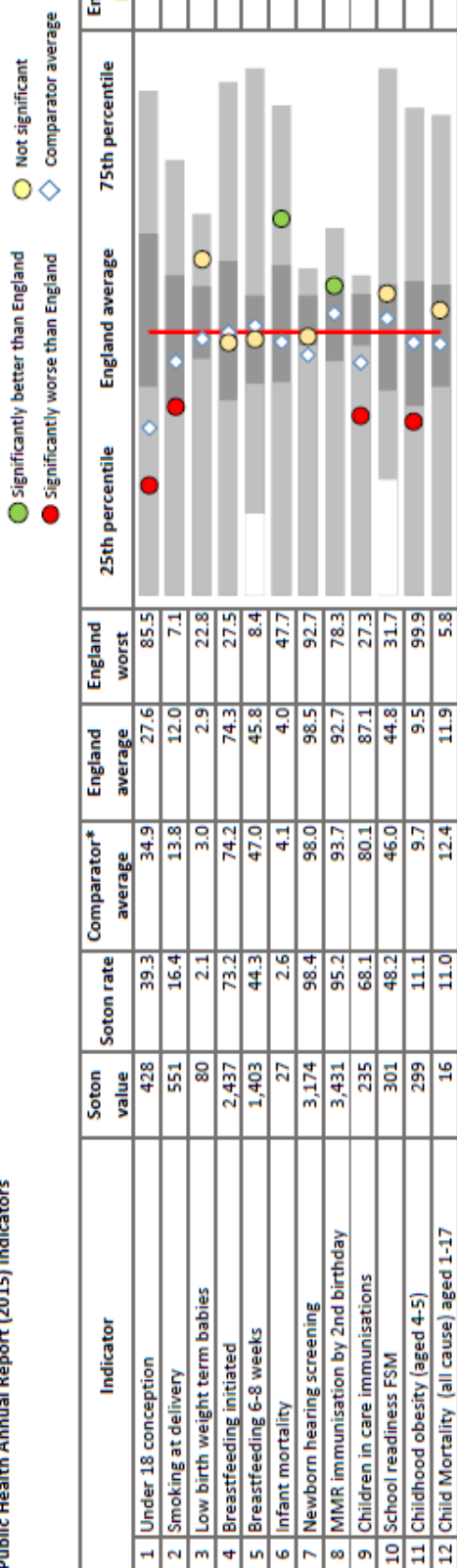
### 7.3 Recommendations:

1. Service providers should maintain the high coverage of antenatal and new-born screening in line with the targets of the five main national screening programmes.
2. The new-born and infant examination screening programme coverage should be reviewed by public health when the data becomes available in 2015/16.
3. The outcome data from the various programmes should be reviewed to better understand the burden of disease affecting Southampton and the relative benefits of the screening programmes.

### 7.4 References

1. NHS Screening Programmes (2015) *Screening for sickle cell and thalassaemia*. Public Health England. [Online] Available from: <http://cpd.screening.nhs.uk/induction-resource/sct>

Public Health Annual Report (2015) indicators



- 1 Conception rate per 1,000 females aged 15-17 (2011-13 pooled)
  - 2 % of mothers smoking at delivery (2013-14)
  - 3 % of live births with a recorded weight under 2,500g (2014)
  - 4 % of all mothers who breastfeed their babies in the first 48hrs after delivery (2014/15)
  - 5 % of infants breastfeeding at 6 to 8 week check (2013/14)
  - 6 Infant (under 1 year) mortality rate per 1,000 live births (2011-13 pooled)
  - 7 % of babies eligible for screening for whom the screening process is complete within 4 weeks corrected age (2013/14)
  - 8 % of children who received MMR immunisation course by 2nd birthday (2013/14)
  - 9 % of children in care whose immunisations were up to date according to their age (2014)
  - 10 % of children with FSM status achieving a good level of development at the end of reception (2013/14)
  - 11 % of obese children aged 4-5 years (2013/14)
  - 12 Rate, per 100,000 population aged 1 to 17 (2011-13 pooled)
- \*Comparator group  
 Bournemouth  
 Bristol  
 Coventry  
 Derby  
 Peterborough  
 Plymouth  
 Portsmouth  
 Sheffield  
 Southampton  
 Southend-on-Sea  
 Stoke-on-Trent





Healthy Southampton♥

