GROWING UP IN SCOTLAND:
Sweep 3 Food and Activity Report

GUS
GROWING UP IN SCOTLAND

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Sweep 3 Food and Activity Report

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GROWING UP IN SCOTLAND: Sweep 3 Food and Activity Report

Louise Marryat*, Valeria Skafida^ and Catriona Webster*

*Scottish Centre for Social Research
^Centre for Research on Families and Relationships

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Introduction

This report uses data from the *Growing Up in Scotland* (GUS) study to explore issues related to food and activity in Scotland specifically in relation to young children. Findings are based on data from the older cohort involved in the study which was collected over the first three years of GUS. These data therefore refer to a period when the cohort children were aged between 2 years and 10 months (sweep 1), and 4 years and 10 months (sweep 3). Interviews were carried out annually between April 2005 and May 2008. Further information on GUS can be found at: www.growingupinscotland.org.uk

Diet and eating

Although more limited in scope than dedicated diet and nutrition studies, GUS is able to provide useful information on the range of food types – both healthy and unhealthy – eaten by pre-school children on a typical day. Moreover, the study has the additional benefit of including a suite of questions designed to examine parental views and experiences in relation to their children's eating. In combination, these allow for the exploration of choice, behaviour and experiences in early years provision and consumption of food across socio-economic groups.

- Children in the lowest income group and those living in deprived areas were much less likely to eat four or more types of fruit and vegetables per day, and more likely to eat sugary snacks and drinks, than were children from affluent backgrounds.
- Half of mothers in the highest income bracket knew 'a great deal' about healthy eating, compared to less than a third (30%) in the lowest income bracket.
- A significant minority (16%) said they found it fairly or very difficult to control the amount of sweets, sugary snacks and drinks their child eats or drinks.
- The cost of food had an effect on what food parents provided for their child for 41% of the lowest income group and 34% of those in deprived areas, compared to only 11% of those in the top income group and 19% of those in the least deprived areas.
- Four in ten (41%) children in the most deprived areas had eaten a takeaway in the last week, compared to only 23% of children in affluent areas.
- Whilst 55% of mothers in the least deprived areas said mealtimes were mostly enjoyable and 60% said the family mostly had time to talk, the corresponding figures for the most deprived areas were 36% and 38%.
- Twice as many parents in the highest income category said mealtimes were 'never' rushed (42% compared to only 20% in the lowest income group).
- Fifteen percent of children in managerial and professional households were classified as having a relatively poor diet, in contrast to 34% of children in Semi-routine and routine households.

Physical and sedentary activity

The report also explores whether children are participating in physical and sedentary activities; the types of activities that they do and whether this varies by socio-economic and neighbourhood characteristics. It also examines the impact which parental attitudes and aspirations have on children's activity levels.

- The vast majority of children had done some form of physical activity in the previous week, with two-thirds of children participating in five or more types of activity.
- Eighty-five percent of children were reported to have watched TV every day in the past week, with just 1% having watched no TV.
- Not all children who had high physical activity levels had low sedentary activity levels and vice versa.
- There appeared to be a considerable socio-economic divide between highly active and highly inactive children: highly active children were more likely to be in households in the highest income quartile and in managerial and professional households.
- Neighbourhood also had an effect: 29% of children with low activity levels lived in the most deprived areas, in contrast to 14% who lived in the least deprived areas.
- Highly active children were more likely to live in areas where their parent reported there being 'very good' or 'good' facilities for young children, and where social and leisure facilities for parents themselves were good.
- Parents of highly active children tended to report being active themselves with their child and were also more likely to participate in activities such as playing outside with their child than were parents of less active children. Three-quarters of children in the lowest activity group had not run around or played outside with their mother in the week prior to the interview.
- Parental beliefs had an impact on levels of child activity, with parents who thought exercise was important having more active children. Those who thought cultural and social activities were important were also more likely to have active children.

The relationship between nutrition, activity, and BMI

- There appeared to be a relationship between diet and activity: among children with a relatively poor diet, 42% were in the low activity and 22% in the high activity group.
- Less active children appear more likely to consume unhealthier foods, however, there was relatively little variation in the proportions of children snacking on fruit across children of all three activity levels.
- Less active children are less likely to eat a variety of vegetables on a typical day than their more active counterparts.
- More active children are more likely to eat more types of fruit than children who are less active.
- The data shows an association between sedentary activities and eating unhealthy foods. For example, among those who watched TV for more than 2.5 hours on weekdays, 53% ate crisps, and 45% ate chocolates and sweets between meals, in contrast to children who watched up to 30 minutes of TV on weekdays, of whom 32% ate crisps, and 33% ate chocolates and sweets between meals.
- There was a very small difference in BMI and in the relative quality of children's diets in sweep 3: among obese toddlers, 9% were in the relatively good diet category, and 29% in the relatively poor diet category, while the respective figures for normal weight children are 13% and 24%.
- Children who were of normal weight, overweight and obese in sweep 2 had a very similar activity score in sweep 3, and were roughly evenly spread among the low, medium and high activity category.

Breastfeeding and nutrition in childhood

- Children who had been breastfed had a healthier diet in childhood than those who had not been breastfed.
- Children who were breastfed were more likely to snack on fruit (a difference of 11% between those who were breastfed and those who were not), and more likely to snack on savoury snacks like cheese than children who were never breastfed (again, a difference of 11%).
- Children who were breastfed were also less likely to snack on crisps between meals.
- Children who had not been breastfed were more likely to eat sweets (a 7% difference) and more likely to consume sugary drinks more than once a day than breastfed children (14% difference).
- There was a socio-economic effect related to children's breastfeeding history. Children of wealthier households, born to mothers with more qualifications and more advantaged socio-economic backgrounds were more likely to be breastfed.
- A child's breastfeeding history seems to have a significant, yet small, effect on the child's BMI in later childhood. Children who had been breastfed were marginally more likely (by 3%) to have a 'normal' weight, and marginally less likely (by 3%) to be obese.

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1
INTRODUCTION

1.1 Scottish Health Policy

In June 2008, the Ministerial Task Force on Health Inequalities published its report regarding the priorities for government action in addressing the problem of health inequalities. It emphasised that early intervention was paramount to a successful strategy and intervening during children's very early years is critical to ensure a healthier future particularly for more vulnerable children in disadvantaged circumstances (Scottish Government, 2008a).

In 2007, the Government launched the *Better Health, Better Care Action Plan* which explained the measures which the Government will take to improve Scotland's health, address health inequalities and improve healthcare access. An additional £11.5 million has been allocated which, over the next three years, will be used to help, particularly children, tackle obesity through diet and physical activity initiatives. The *Better Health, Better Care* document announced the upcoming launch of a Food and Health Delivery Plan in 2008 which will complement the ongoing development of a national Food and Health Policy (Scottish Government, 2007).

Proposals in the *Better Health, Better Care* document have been developed further in the *Healthy Eating Active Living Action Plan* in 2008. The latter Plan aims to address the growing problem of obesity, tackle Scotland's poor diet and promote physical activity. It announced that a total of £56 million, of which £40 million is new funding, has been allocated for the following three-year period to promote good health and address health inequalities primarily through healthy living initiatives (Scottish Government, 2008b).

Initiatives aimed at dealing with obesity, poor nutrition and low levels of physical activity have been a permanent element on the Scottish policy agenda for many years. In 2006, in the *Delivering a Healthy Future* action framework (Scottish Executive, 2006), the previous government administration outlined the development of a new strategic, evidence-based approach to addressing obesity in Scotland. The *Health Scotland Delivery Plan for 2007-2008* highlighted how NHSScotland would aim to meet the outlined government targets, so as to reduce health inequalities and the life expectancy gap (NHSScotland, 2006). Key areas of action included nutrition, physical activity and obesity. There is a clear recognition of the importance of early intervention in this document, with maternal nutrition (including nutrition before and during pregnancy), and infant nutrition (from birth to two years) being two of the areas of focus.

Social policy on nutrition and health has developed considerably following the publication of the influential *Scottish Diet Report* in 1993 (Scottish Office, 1993). This was followed by the announcement of the *Scottish Diet Action Plan in 1996 in the Eating for Health: A Healthier Scotland* document (Scottish Office, 1999a). The importance of promoting good health and healthy diets was thereafter highlighted in numerous policy publications, of which the most important are listed below:

- *Towards a Healthier Scotland* (Scottish Office, 1999b)
- *Our National Health: A plan for Action, a plan for Change* (Scottish Executive, 2000)
- *Social Justice: A Scotland where everyone matters* (Scottish Executive, 1999)
- *Building a Better Scotland* (Scottish Executive, 2004a)
- *Improving Health in Scotland: The Challenge* (Scottish Executive, 2003b)
- *Eating for Health: Meeting the Challenge* (Scottish Executive, 2004b)
- *Delivering for Health* (Scottish Executive, 2005)

1.2 Policy on Nutrition for Children

Breastfeeding

In Scotland, breastfeeding promotion first arrived on the policy agenda with the launch of the Scottish Joint Breastfeeding Initiative in 1990. In the 1994 Scottish Dietary Targets it was hoped breastfeeding take-up in the 6 weeks following birth would rise from 30% to 50% by 2005. In 1995, an appointed National Breastfeeding Adviser was to work with Local Breastfeeding Initiatives in raising awareness regarding breastfeeding benefits. The *Integrated Strategy for Early Years* in 2003 aimed to improve children's health, and increase the proportion of breastfeeding women (Scottish Executive, 2003). Indeed, Scotland became the first nation to make breastfeeding a legal right in 2005 with the Breastfeeding etc. (Scotland) Act 2005.

Recent Government policy has paid extensive attention to the importance of good nutrition in infancy and continues to stress the importance of promoting breastfeeding. The *Better Health, Better Care Action Plan* outlines how NHS boards will be expected to support breastfeeding so that one third of all infants are being exclusively breastfed at 6-8 weeks by 2010-2011 (Scottish Government, 2007). To support this goal, a national Infant Nutrition Co-ordinator was appointed in May 2008. The main role of the co-ordinator is to lead the development and the implementation of an Infant Nutrition Strategy. Consultation on a draft of the *Infant Nutrition Strategy* has already been sought (Scottish Executive, 2006b), and the strategy will be aimed at improving nutrition in infancy and improving children's chances for a healthy future.

Early years

The *Better Health, Better Care Action Plan* stated that nutrition in the early years is a key field of policy focus for the developing Food and Health Delivery Plan and for Scottish food policy. *The Food and Health Delivery Plan* is to include measures aimed at promoting good nutrition in pregnant women and those of childbearing age, as well as measures to support breastfeeding and optimal weaning in infants. (Scottish Government, 2007).

The *Healthy Eating, Active Living Action Plan,* specifies that £19 million, half of the newly allocated budget of £40 million, will be spent over the next three years on initiatives aiming to improve nutrition among women of childbearing age, pregnant women and children under 5 in disadvantaged areas (Scottish Government, 2008b).

The Hungry for Success initiative, originally only for school children, has been extended to pre-school and child care centres as outlined in *Nutritional Guidance for Early Years: Food choices for children aged 1-5 years* (Scottish Executive, 2006). Previous to this, the *Integrated Strategy for Early Years (2003)* focused on improving service provision particularly for the vulnerable children from pre-birth to 5 years of age and their families (Scottish Executive, 2003:2). The strategy aimed to improve children's health by improving their diets. The foundations for these policy initiatives were laid out in the Sure Start Scotland initiative introduced in 1999-2000 (Scottish Office, 1998). Sure Start is a more comprehensive approach in promoting young children's health and well-being and is part of a broader framework to promote social inclusion of children 0-3 years old and their families, with one of the four main objectives being to improve children's health. It focuses primarily on improving the accessibility and quality of childcare for less privileged families with very young children.

School-aged children

Scotland has worked on a series of initiatives aimed at children of school age. In October, following the evaluation of a free-school meal trial for children in P1 to P3 (MacLardie *et al.,* 2008), the Government announced a Scotland-wide roll out of the scheme making school meals free to all P1 to P3 pupils.

As outlined in the *Better Health, Better Care Action Plan,* an additional £11.5 million will be invested over the next three years to address primarily the problem of obesity among children (Scottish Government, 2007). The *Healthy Eating Active Living Plan,* launched in 2008, has part of its £40 million budget allocated to promoting sports, dance, walking and healthy cooking projects to children and young adults at school to encourage more healthy living among these particular age groups (Scottish Government, 2008b).

The recent policy attention on school-aged children has been epitomised by the passing of the Schools (Health Promotion and Nutrition) (Scotland) Act 2007, which enforces Scottish Ministers and local authorities to see to that food and drink provided in all local authority and grant-aided schools complies to the government set nutritional requirements. The Act was based on the *Hungry for Success* document, which set out a whole school approach to school meals in primary and secondary schools in Scotland (Final Report of the Expert Panel on School Meals, 2003). A central element of the strategy was to set out nutritional standards for school meals which would encourage healthy eating. Other government publications focusing on this age group include the *Health for all Children* (Scottish Executive, 2004) document which consulted on methods for the implementation of health promoting strategies targeted towards children in their early years and children of school age.

1.3 Policy on Physical Activity for Children

A National Physical Activity Strategy was outlined by the Scottish Government in the Physical Activity Task Force report *Let's Make Scotland More Active: A strategy for physical activity* (Physical Activity Task Force, 2003). The strategy addresses adults and children living in Scotland and outlines specific targets regarding children's physical activity. By 2022, the Scottish Government aims to have 80% of all children aged 16 or younger meeting the minimum recommended levels of physical activity, currently set at one hour of physical activity on each day.

More recent policy support for physical activity was announced in the *Healthy Eating, Active Living Action Plan, 2008,* which stated that the national budget for physical activity projects will increase from £6 million to £12 million.

There have been a number of recent ongoing initiatives targeted particularly at school-aged children through the Active Schools programme, which aims to incorporate sport and physical activity in a whole school approach (Scottish Government, 2008b). A successful initiative targeting pre-school children is the Play@home scheme which is currently being rolled out across Scotland (Scottish Government, 2008b). Play@home encourages parents to understand the importance of movement and exercise in babies, and entails a three-stage physical activity programme for parents and children from birth to 5 years of age.

Progress towards the different government targets over time is to be monitored and reviewed via the *Scottish Health Survey (SHS),* which will run annually from 2008 to 2011 but was also conducted in 1995, 1998 and 2003. The survey is a key tool for monitoring Scotland's health, and includes questions on children's physical activity, as well as on adult smoking, drinking and eating behaviours. In 2003 children aged 0 to 16 were surveyed for the first time (Bromley *et al.,* 2005). The *Health Behaviour in School-Aged Children* (HBSC) study is another important cross-national survey of the health of school aged children (ages 11, 13, and 15) in different countries, which provides comparative data on Scotland and other countries (Alexander *et al.,* 2004).

The *National Physical Activity Strategy* is underpinned by a wider framework for action laid out in the aforementioned Improving Health in Scotland – the Challenge (Scottish Executive, 2003). To support this challenge, the Scottish Executive appointed a National Physical Activity Co-ordinator in 2002, and committed an extra £20 million over the period 2004-2007 to the development of Active Primary Schools and School Sport development officers. Current policy on physical activity dates back to 1997, when the Health Education Board produced a policy framework which provided the current government recommendations and guidelines for physical activity for young people (Health Education Board for Scotland, 1997).

1.4 The Report

This report uses data from the *Growing Up in Scotland* study to explore the prevalence of, and many issues related to, food and activity in Scotland specifically in relation to young children. Findings are based on data taken specifically from the older cohort involved in the study and which was collected over the first 3 years of GUS. The data therefore refer to a period when the cohort children were aged between 2 years and 10 months (sweep 1), and 4 years and 10 months (sweep 3). Interviews were carried out annually between April 2005 and May 2008. In the main, data in this report comes from interviews with the child's main carer (usually the mother), but also draws on data from partner interviews (usually the father) at sweep 2 and information from child height and weight measurements collected at sweep 2. However, all data is from the main carer interview unless otherwise stated.

The report is divided into four sections which address the following broad questions:

1. What are children eating? What eating behaviours are we seeing? And what factors and beliefs influence these?
2. Are children participating in physical and sedentary activities? What types of activities do children do? How does this vary by socio-demographic and neighbourhood factors? Do parental behaviours and attitudes have an impact on children's activity levels?
3. Is there a relationship between diet and activity for young children? Are children who eat less healthy foods also doing less physical activity and/or more sedentary activity? What is the relationship between activity, diet and BMI in young children?
4. The children who were breastfed more likely to be having a healthier diet at age 4? Is there a relationship between breastfeeding and BMI?

chapter

2 DIET AND EATING

2.1 Introduction

Improving the eating habits and nutrition of children remains a key policy priority as part of the Scottish Government's wider strategic objective for a healthier Scotland. The challenge facing policy makers remains considerable in the context of rising levels of childhood overweight and obesity and socio-economic health inequalities. Data from the Scottish Health Survey indicated that in 2003 almost a third (32%) of children aged 2-15 had a Body Mass Index outside a healthy range, with the prevalence of obesity running at 18% of boys and 14% of girls (Scottish Executive, 2005). In 2006 a review of the Scottish Diet Action Plan concluded that overall dietary patterns were moving in the opposite direction to the Scottish Dietary Targets introduced in 1996 (Food Standards Agency, 2006). In particular, consumption of added sugars has increased, with children in Scotland now eating almost double the recommended level (17% of total food energy compared to the Scottish Dietary Target of 10%) (Food Standards Agency, 2008).

Whilst school based health interventions such as *Hungry for Success* have made substantial progress in promoting healthy eating and food provision in schools, there is growing evidence of the importance of positive changes in diet in early pre-school childhood in bringing about a lasting impact on health and well being in adult life. As discussed in section 1.1, the Scottish Government has recently devoted £56 million over the next 3 years to tackle the joint problems of diet, physical activity and obesity in Scotland. A substantial amount of this funding will be directed towards improving nutrition in the early years, with the specific aim of supporting parents and children outside of school to achieve the necessary step change in children's dietary habits across all sectors of the population, particularly among disadvantaged sections of society. This includes child healthy weight interventions as well as increasing access to healthier food choices for low income families, and providing the education and skills to allow people 'to break through barriers of food affordability and availability and the negative impact of culture and lack of food skills' (Scottish Government, 2008b). Understanding the factors that influence what food parents choose to provide for their children is essential if such interventions to support healthy eating are to be effective.

Although more limited in scope than dedicated diet and nutrition studies, GUS is nevertheless able to provide useful information on the range of food types – both healthy and unhealthy – eaten by pre-school children on a typical day. Moreover, the study has the additional benefit of including a suite of questions designed to examine parental views and experiences in relation to their children's eating. In combination, these allow for the exploration of choice, behaviour and experiences in early years provision and consumption of food across socio-economic groups. Results shown in this chapter focus on data collected from the child cohort at sweep 3 of the survey when the children in the child cohort were aged just under 5 years old.

2.2 Eating habits

2.2.1 Fruit and vegetables

Doubling the average intake of fruit and vegetables per day remains a key objective of the Scottish Dietary Targets for children. The 'five-a-day' message of public information campaigns has played a key role in promoting healthier food choices as part of the wider drive to achieve dietary change across all sectors of Scottish society.[1] Overall, the consumption of fruit and vegetables by children in the survey was encouragingly high:

- Almost all children (96%) ate at least one type of fruit a day, with 60% having two or three types a day and 24% eating four or more.
- Over half (52%) of children ate two or three types of vegetables a day and 7% ate four or more.
- However, 27% of children ate only one type of vegetables and 14% ate none in a typical day.

2.3 Sugary snacks and drinks

Parents were also asked about their child's consumption of less healthy foodstuffs such as sweets, chocolates, crisps and non-diet soft drinks.[2] Recent evidence suggests that children in Scotland get most of their sugar intake from these types of unhealthy foods (Food Standards Agency, 2008). Overall, regular consumption of unhealthy sugary and salty food was high:

- Almost half of all children (49%) ate sweets or chocolates once a day or more, and 43% drank non-diet soft drinks.
- Crisps or savoury snacks were slightly less popular – a quarter (25%) of children in the survey ate crisps once a day or more.

1 The Food Standards Agency Scotland recommends that by the time children are aged 2, they should be introduced to a variety of foods, including fruit and vegetables, with the aim of building up to five portions of fruit and vegetables a day by the age of five. For this reason, at this stage, GUS asks only about variety of different fruits and vegetables eaten, and not the number of portions (http://www.eatwell.gov.uk/asksam/agesandstages/childrenandbabies/#A219823).

2 Recent research has linked consumption of soft drinks and weight gain. See Malik *et al.,* (2006).

2.3.1 Socio-economic differences in diet

It is well established that disadvantaged groups in society are more likely to eat less fruit and vegetables and more unhealthy foods than others. These patterns of inequality are clearly reflected when the diet of children in the survey is examined in relation to the socio-economic position of their mother.

- Twenty-seven percent of children whose mother had Higher grades or above ate four or more types of fruit per day, compared to 12% of children whose mother had no qualifications.
- Children in semi-routine and routine households, in the lowest income group and in deprived areas were much less likely to eat four or more types of fruit per day.
- Forty-two percent of children from semi-routine or routine households ate crisps or savoury snacks once a day or more, compared to only 17% of children from managerial or professional backgrounds.
- Well over half (56%) of children from low income households drank non-diet soft drinks once a day or more, in contrast to only 30% of children from households in the highest income bracket.
- Over a third (34%) of children from households in the most deprived areas ate crisps and savoury snacks compared to 13% of children from the most affluent areas.

2.4 Diet scale

In order to build up more of a relative picture of children's overall diets in GUS, the information on children's consumption of different foods was used to produce a diet scale. The scale is based on five questions regarding children's diet:

- How many different types of fresh/frozen/tinned vegetables does the child eat on a typical day?
- How many different types of fresh/frozen/tinned/dried fruit does the child eat on a typical day?
- How often does the child usually eat crisps?
- How often does the child usually eat chocolates or sweets?
- How often does the child usually drink non-diet soft drinks?

The dietary scale had a range of 5 to 31. A low score indicates that a child eats a small variety or no vegetables or fruit, but consumes crisps, sweets and soft drinks often. A high score indicates that a child eats a large variety of fruits and vegetables, and hardly ever consumes crisps, sweets and soft drinks. A child would therefore have a score of 5 if they never ate fruit or vegetables but consumed crisps, chocolate and sweets and soft-drinks more than once a day. The average score for all toddlers was 17 with a minimum of 5 and a maximum of 31. The diet scale was divided into 'poor', 'average' and 'good' diet categories, for children who had a low, average and high score. It is important to remember that due to the nature of the score, the terms poor, average and good diet are *relative* terms which refer to the overall eating patterns of all the children taking part in GUS and not an objective assesment of the quality of children's diets.

Table 2.1 Descriptive results on dietary scale

	N	Minimum	Maximum	Mean	Std. Deviation
Diet score	2329	5.00	31.00	17.2	4.6

As would be expected, similar socio-economic patterns to those within specific foods and variety of foods eaten, could be seen in relation to the diet score. In particular:

- Fifteen percent of children in managerial and professional households were classified as having a relatively poor diet, in contrast to 34% of children in Semi-routine and routine households.
- Thirteen percent of children in the highest income group were also in the poorest diet group, in contrast to 39% of those in the lowest income group.
- Nineteen percent of children of mothers with Higher Grades or above had a poor diet, compared with 40% of children whose mothers had no qualifications.

These findings illustrate the considerable socio-economic gap in eating habits between different groups of people in Scotland. The question remains why it is those children from households in deprived areas, and with mothers on low incomes and with least education that are least likely to meet government targets on healthy eating and nutrition. GUS included a number of questions asking respondents about a range of issues and the extent to which they influence what children eat.

2.5 What influences parental food choices?

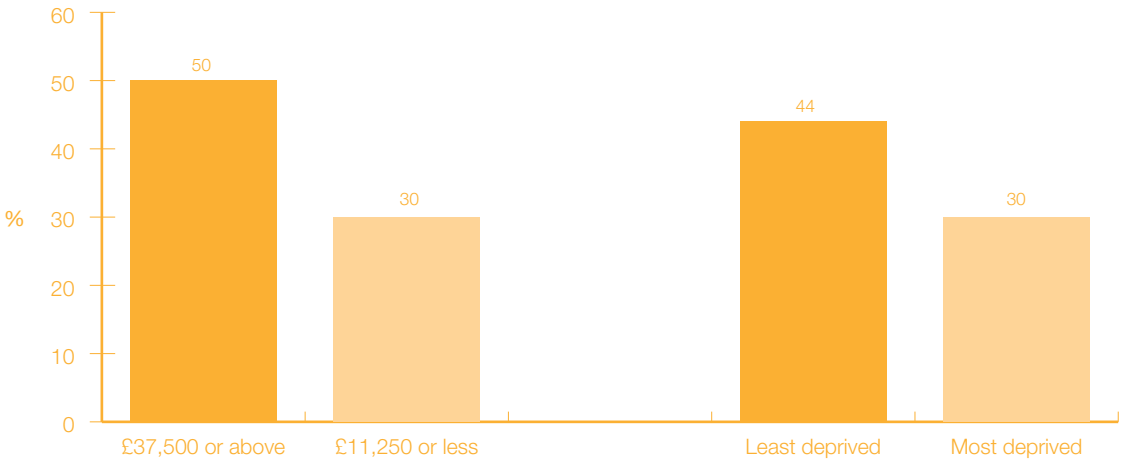
2.5.1 A knowledge gap?

One possible explanation for finding a significant socio-economic distinction in eating habits is that it represents a gap in knowledge, i.e. that the healthy eating message is simply not being heard in those communities most at risk, or that certain groups are unable to act upon it due to a lack of necessary food skills. GUS included several measures to explore this theory in more depth.

The first measure asked respondents how much their knowledge of cooking influenced what they gave their children to eat. Over one in ten (13%) said this affected what they gave their child 'a lot'. However, on closer inspection this appears to have been a largely positive effect, due to the respondent knowing a lot about cooking (78%) rather than lacking knowledge (22%).

The second measure asked parents to rate how much they knew about healthy eating, on a scale from 'nothing' to 'quite a lot'. Encouragingly, the vast majority of mothers said they knew either a great deal (38%) or quite a lot (58%) about healthy eating, with only 4% saying they knew not very much or nothing. Those who knew a lot about healthy eating were also far more likely to say their child ate four or more types of fruit a day (27% compared to 8% of those who knew not very much). However, those mothers on low incomes and from deprived areas were much less likely to report knowing 'a great deal' about healthy eating. Half of mothers in the highest income bracket knew 'a great deal' about healthy eating, compared to less than a third (30%) in the lowest income bracket (Figure 2 A).

Figure 2 A Knows 'a great deal' about healthy eating, by annual household income and area deprivation



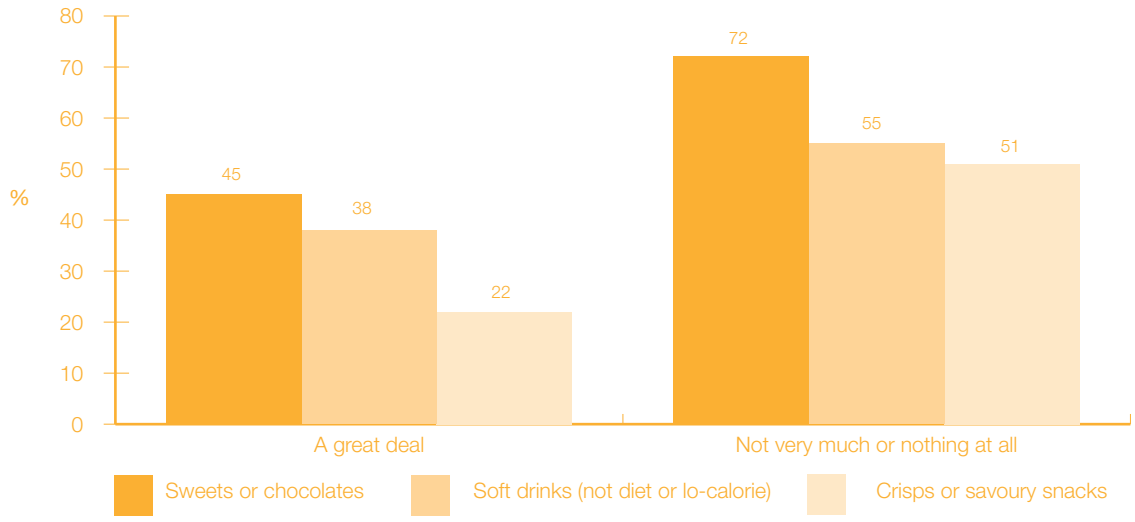
Base: All child cohort: weighted – 2332, unweighted – 2280.

2.5.2 A lack of control?

Those mothers who were teenagers at the time their child was born and those with no qualifications were also much less likely to know 'a great deal' about healthy eating. Only 22% of mothers who were aged under 20 at the time of their child's birth knew 'a great deal' about healthy eating, compared to 58% of those who were aged 40 or older. It would seem that, to a certain extent, the healthy eating message is not getting through to some groups as much as might be hoped, suggesting that a different approach may be needed to raise awareness in those groups of the population identified as most at risk.

Level of knowledge of healthy eating, however, is not necessarily the key determinant of what food parents provide their children. As Figure 2 B demonstrates there was a clear drop in those consuming sweets, crisps and soft drinks once a day or more between those who knew not very much or nothing about healthy eating and those who knew a great deal (72% to 45% for sweets and chocolates for example). It is striking that even in those households where the mother knew 'a great deal' about healthy eating, almost half (45%) of children ate sweets once a day or more and 38% drank soft drinks.

Figure 2 B Daily consumption of unhealthy foods by knowledge of healthy eating

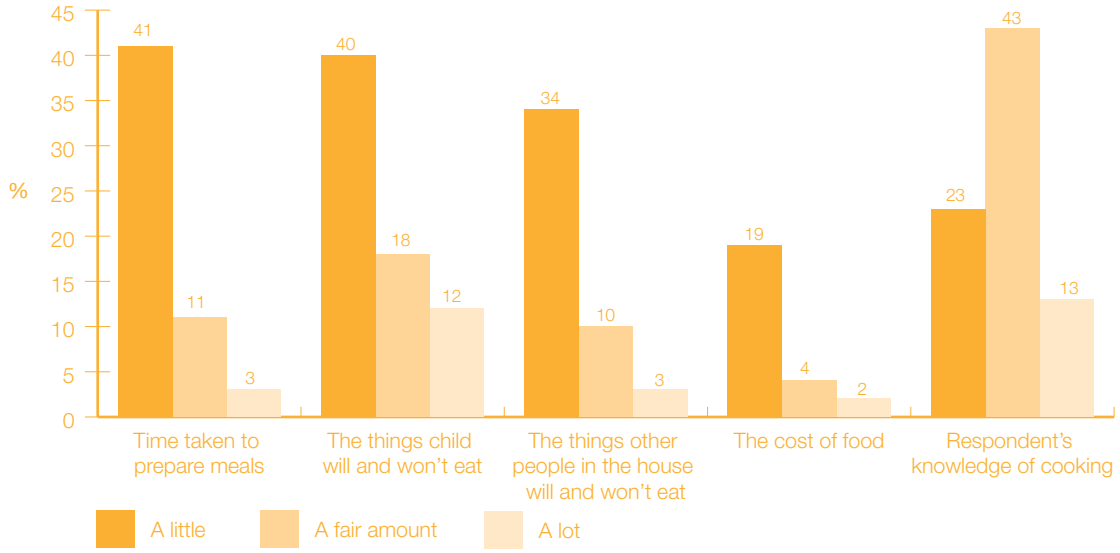


Base: All child cohort: weighted – 2332, unweighted – 2280.

There is evidence to suggest that many parents feel unable to fully control what their child eats, particularly when it comes to unhealthy snacks. When asked how easy or difficult it was to control the amount of sweets, sugary snacks and drinks their child eats or drinks, a significant minority of mothers (16%) said they found it fairly or very difficult. By far the most common reason, mentioned by 66% of those who had difficulty, was grandparents 'spoiling' children by giving them sweets and sugary snacks. A further third (33%) mentioned that other relatives made it difficult to control their child's unhealthy snacking. External influences therefore play a part in shaping the diet of pre-school children, with parents feeling unable to fully control the amount of unhealthy food their child eats.

Parents also reported that often the child's willingness or otherwise to eat certain types of food also had a notable impact, with 12% saying this affected what they gave their child 'a lot' (Figure 2 C). Around a third (34%) also had difficulty controlling their child's unhealthy snacking due to the child wanting what they saw in a shop, whilst another 27% wanted what other children had.

Figure 2 C Factors influencing what children eat



Base: All child cohort: weighted – 2332, unweighted – 2280.

2.5.3 The cost of food?

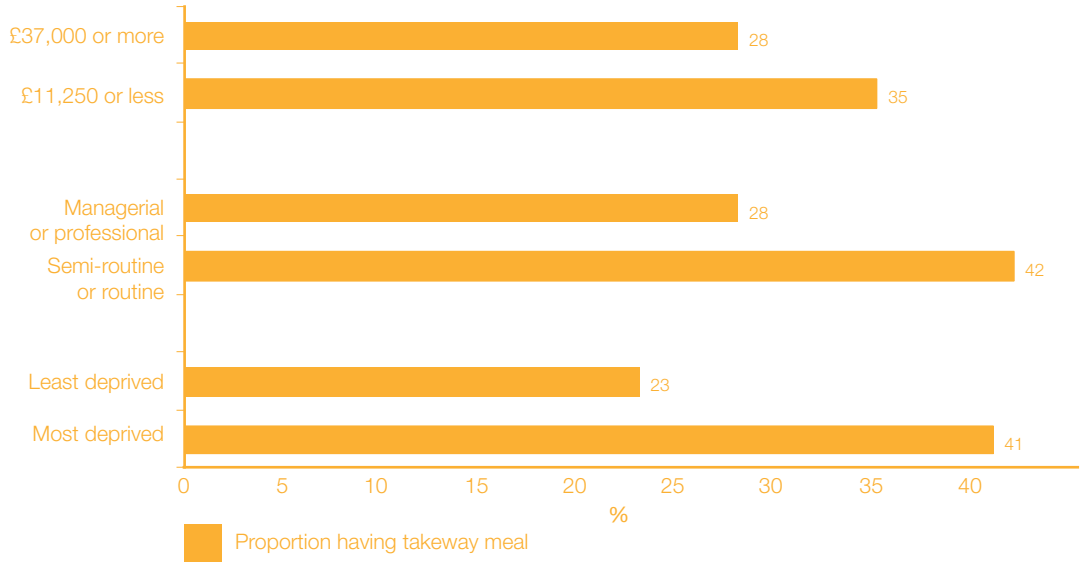
On initial glance it might appear that the cost of food does not have much impact on what food parents provide for their child (Figure 2 C). However, it is worth noting that the cost of food had some effect for 41% of the lowest income group and 34% of those in deprived areas, compared to only 11% of those in the top income group and 19% of those in the least deprived areas.

There is some argument over whether the cost of healthy food might prohibit those in lower income groups and deprived areas from making healthier food choices given the common perception that healthier foods are often more expensive. Indeed, a recent report by the National Consumer Council criticised several leading supermarkets for cut price promotions of cheap sugary and fatty foods. The report found that 54% of promotions on related to foods high in fat and sugar, despite Food Standard Agency (FSA) advice that these make up only 7% of our diet. Only one in eight promotions featured fruit and vegetables (Yates, 2008). It therefore seems likely that cost, or at least perceptions of cost, is a major factor in the choice between the provision of healthy and unhealthy foods for many parents in low income and deprived households.

However examination of the types of meals eaten by children in the last week suggests that again, cost is just one factor affecting the provision of food for children. While almost all children (97%) had a meal prepared with fresh ingredients in the last week, a further 32% had a takeaway meal and 26% ate a fast food meal such as McDonald's. Unsurprisingly, given its low cost, easy availability and convenience, children in deprived areas and on low incomes were most likely to have eaten a fast food meal in the past week. Almost twice as many (36%) children in the most deprived areas had done so, compared to only 20% of children in the least deprived areas.

Perhaps more surprising is the proportion of children from deprived, low income and semi routine or routine households who ate a takeaway, such as that from a fish and chip shop or an Indian or Chinese meal, in the last week. Four in ten (41%) children in the most deprived areas had eaten a takeaway in the last week, compared to only 23% of children in affluent areas (Figure 2 D). Given the relatively high cost of takeaway meals it is interesting that those who are most likely to struggle financially and say that cost is an issue in what their children eat are also most likely to opt for this type of meal. Indeed, almost a third (32%) of children whose mothers said the price of food affected what they gave their child had eaten a takeaway meal in the last week. In similarity to other research, (Dobson *et al.*, 1994), GUS suggests that there is an additional cultural element affecting the type of food provided for children, possibly reflecting a reliance in low income households on prepared or convenience foods to fulfil the obligation to provide a family meal.

Figure 2 D Proportion of children having a takeaway meal in the past week by deprivation, income and NS-SEC



Base: All child cohort: weighted – 2332, unweighted – 2280.

Clearly there are a range of different social and economic factors affecting what food parents in different socio-economic groups provide for their children. GUS also introduced a series of questions exploring the structure and experience of mealtimes for these different groups in light of recent debate surrounding the potential erosion of family life, family meals and family time as a result of longer working hours for parents and changes in the size and make up of the average family unit. The next section explores the experiences of family mealtimes between different groups in Scotland.

2.6 How do eating experiences differ between socio-economic groups?

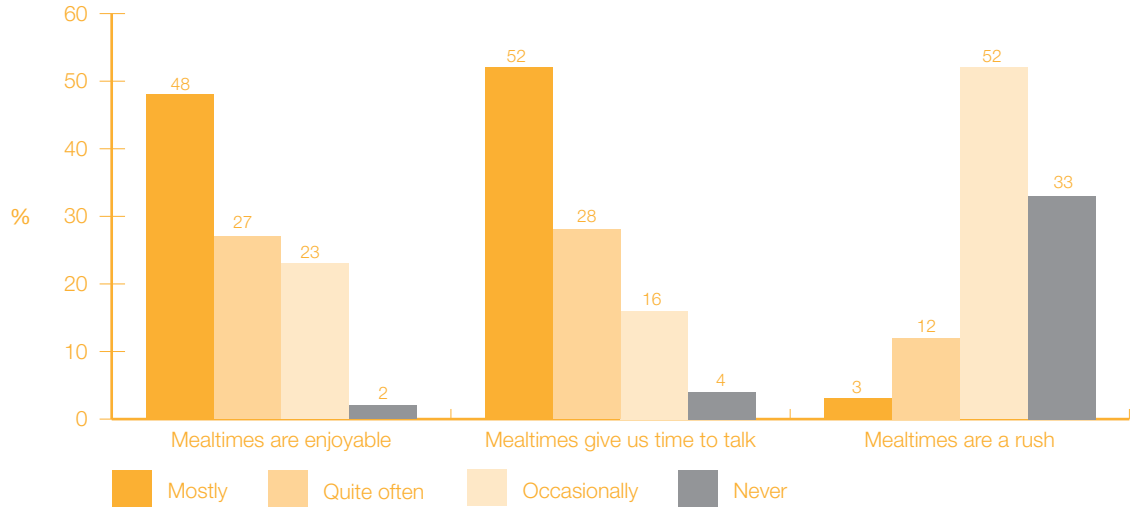
2.6.1 Where children eat

Overall, the majority of children (82%) 'mostly' ate their main meal at the same time as the rest of the family with just 5% only occasionally or never eating with the rest of the family. Whilst 62% of children ate in the kitchen or dining room, 32% ate in the living room. This varied considerably by a number of factors including age of mother at time of the child's birth, household income and area deprivation. Over two-thirds (67%) of children with a teenage mother at the time of their birth ate in the living room, compared to 24% of children with mothers over 40 at the time of the child's birth. Over half (53%) of children from households in the lowest income category ate in the living room, compared to just 13% of children in the highest income category. Children in the most deprived areas were over five times more likely to eat in the living room than those in the least deprived areas (57% and 11% respectively). These findings may of course reflect the size of property owned by different families, but they may also suggest a greater tendency towards less structured mealtimes in particular households.

2.6.2 The mealtime experience

Encouragingly, the majority of parents (52%) felt that mealtimes gave the family time to talk to each other and almost half (48%) said that mealtimes were mostly enjoyable (Figure 2 E). A third (33%) also said that mealtimes were 'never' rushed.

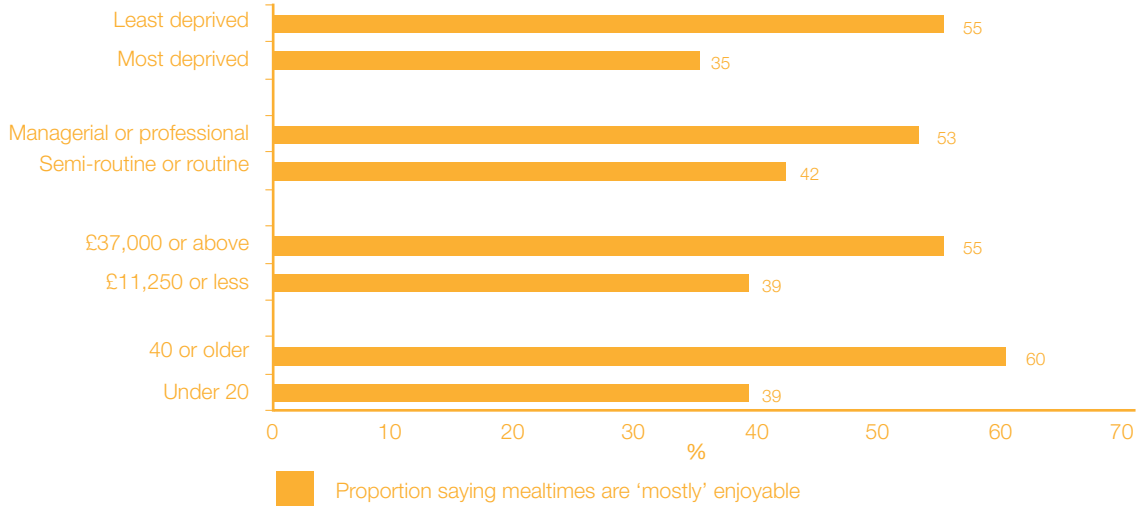
Figure 2 E Perceptions of mealtimes



Base: All child cohort: weighted – 2332, unweighted – 2280.

However, as Figure 2 F and Figure 2 G demonstrate, there is again a socio-economic pattern in the likelihood of the family meal being enjoyable when the family has time to talk to each other. Whilst 55% of mothers in the least deprived areas said mealtimes were mostly enjoyable and 60% said the family mostly had time to talk, the corresponding figures for the most deprived areas were 36% and 38%. Younger mothers were also more likely to struggle with mealtimes – only 39% of teenage mothers found mealtimes enjoyable, compared to 60% of mothers aged 40 or older.

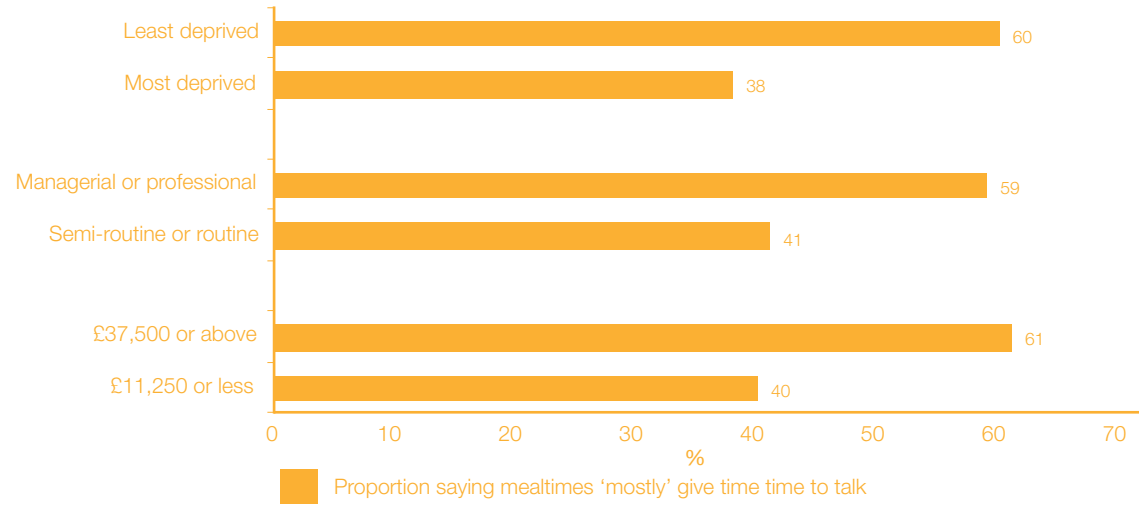
Figure 2 F Proportion saying mealtimes are 'mostly' enjoyable by maternal age, NS-SEC, income and deprivation



Base: All child cohort: weighted – 2332, unweighted – 2280.

The fragmentation of family life has at times been attributed to the growth of single parent households. Differences in attitudes to mealtimes were found between lone parent households and couple households, with mothers in lone parent households less likely to find mealtimes enjoyable and less likely to have time to talk. However, given that lone parents are more likely to be younger and on lower incomes, it is unclear which factor is most important in determining these responses.

Figure 2 G Proportion saying mealtimes 'mostly' give time to talk by NS-SEC, income and deprivation



Base: All child cohort: weighted – 2332, unweighted – 2280.

The same groups who struggled to find meals enjoyable and to find time to talk were also those most likely to find mealtimes rushed. Twice as many parents in the highest income category said mealtimes were 'never' rushed (42% compared to only 20% in the lowest income group), with a similar pattern apparent between the least deprived and most deprived areas of Scotland.

2.7 Summary

It has long been recognised that a two-tier Scotland exists in terms of diet and nutrition, with those in deprived and low income households falling far behind the more affluent in terms of healthy eating and health outcomes. Children from low income and deprived households are consistently shown to eat less fruit and vegetables and more fatty and sugary foods than children more affluent households. However, there is little in-depth evidence exploring the complex reasons behind these discrepancies and the decisions that parents make in providing food for their children. These findings begin to build up a picture of the many factors that influence the provision of food in the early years. They point to a stark divide in food cultures between affluent households and those less well off, not just in what type of food is provided but also in parental views and experiences and the structure and character of mealtimes.

Understanding why people behave the way they do is essential if healthy eating policy interventions are to be effective and targeted at those who need them most. The myriad factors influencing the choice of food that parents provide – including cost, availability, convenience and culture – suggests that healthy eating public information campaigns and school initiatives can only go so far towards achieving dietary change across Scotland and, in particular, within those groups most at risk. More needs to be done to support parents and children in the early years, especially those from vulnerable sections of society, in making healthier food choices.

chapter 3

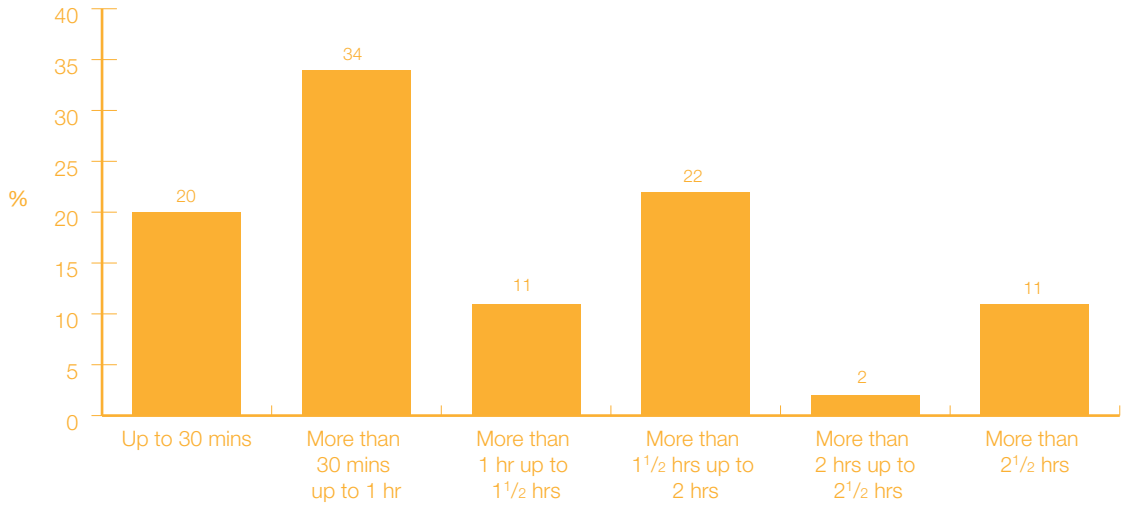
PHYSICAL AND SEDENTARY ACTIVITY

3.1 Participation in sedentary and physical activities

The vast majority of children had done some form of physical activity in the week prior to the interview, with two-thirds of children participating in five or more physical activities. These data compare favourably with the Scottish Health Survey results from 2003, which found that 93% of boys and 94% of girls aged 2-4 had done some form of active play on at least one day in the previous week, while 57% and 60%, respectively, had participated in sport and exercise on at least one day (Bromley *et al.,* 2005). The most popular activities were running and/or jumping (99%), throwing or kicking a ball (87%), dancing or gymnastics (64%), riding a bike (62%) and playing at a play/swing park (62%). A further 53% had played on a trampoline and 39% had been swimming in the previous week.

However, time spent engaged in sedentary activity, such as watching TV or playing on a computer or games console, was also high among children aged just under five. Eighty-five percent of children were reported to have watched TV everyday in the past week, with just 1% having watched no TV. This finding was perhaps not surprising. Perhaps more surprising was the amount of television that children of this age watched on the average weekday. Around half of children were watching under an hour on the average day and half watching over an hour. However, this included over a third who watched more than an hour and a half of TV a day, with one in ten children watching more than two and a half hours of TV a day (Figure 3 A).

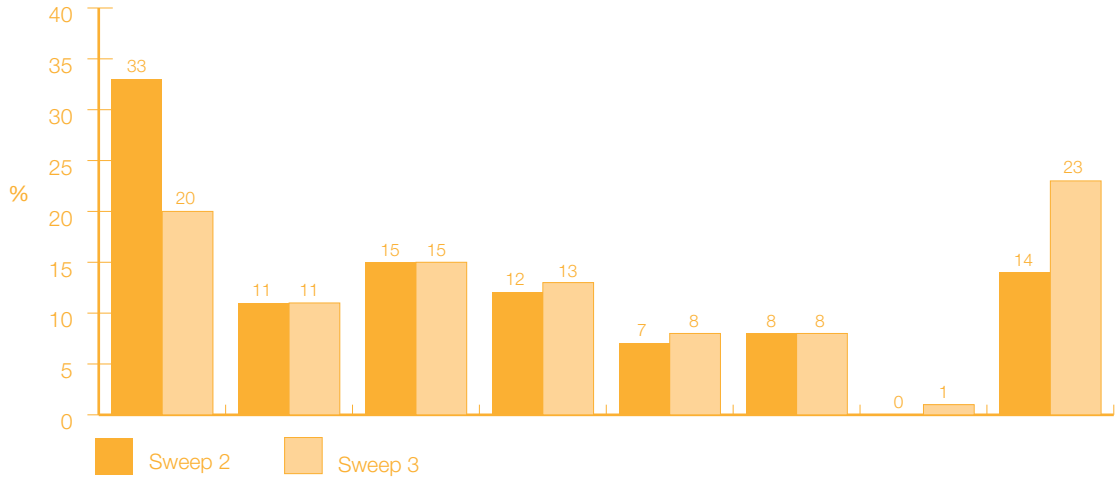
Figure 3 A Number of hours of television watched on the average weekday



Base: All children who had watched some TV: weighted – 2242, unweighted – 2295.

In addition, the proportion of children reported to have used a computer or games console in the previous week rose significantly between sweeps two and three (Figure 3-B). Almost a quarter of children were playing on a computer or games console everyday at sweep 3, in contrast to just 14% at sweep 2. The proportions of children who did not do this activity at all fell even more dramatically between sweeps, from 33% to 20%. The amount of time children spend sitting in front of a screen has been found to have a significant relationship with the risk of being overweight or obese in a number of studies. The *Survey of sugar intake among children in Scotland,* for example, found that for children aged 3-17, a higher proportion of children in the overweight or obese category spent 3 hours or more sitting in front of a screen than those not overweight or obese. Importantly, this study also found that levels of physical activity appeared to have no significant influence on the connection between sedentary activity and BMI (Food Standards Agency, 2008). Wardle *et al.,* (2001), also found that children at higher risk of becoming obese both preferred sedentary pastimes and spent more time engaged in these activities, than lower risk children. The potential relationship physical or sedentary activity and BMI, for children in the GUS cohort will be explored later in section 3.

Figure 3 B Number of days played on computer or games console in the past week



Base: All child cohort: weighted – 2332, unweighted – 2280.

Further investigation was carried out to explore whether the same children who were participating in higher levels of activity were also participating in higher levels of sedentary activity. Children were divided into high, medium and low participatory groups of physical and sedentary activities respectively. It was found that children who did a greater range of physical activities were less likely to have watched television or played on a computer or games console for a substantial amount of time, and the reverse was true of those with the lowest activity levels, as Table 3.1 demonstrates. However, a fifth of children with high physical activity levels also had high sedentary activity levels.

Table 3.1 Physical activity band by sedentary activity band

Sedentary Activity Band	Physical Activity Band (%)		
	Low	Medium	High
Low	24	37	44
Medium	28	29	36
High	48	24	21
Bases			
Weighted	*1072*	*487*	*762*
Unweighted	*1046*	*500*	*778*

Data from questions on sedentary and physical activities were used to form a combined physical activity score. More specifically, the questions used were:

- The number of days the child had played outside in the previous week
- The number of days the child had played on the computer in the previous week
- The number of hours of TV the child watched on the average weekday
- The amount of time in the previous week spent:
  - Riding a bike
  - Throwing or kicking a ball
  - Dancing or gymnastics
  - Running and/or jumping
  - Playing on a trampoline
  - Swimming
  - Playing at a soft play area or ball swamp
  - Playing at a swing/play park
  - Another physical activity

The scale had a range of 0 to 66, with 0 being no physical activity and a large amount of sedentary activity, and 66 being the reverse. The average score was 32, with a minimum score of 5 and a maximum of 58.

3.2 A socio-demographic effect?

As with the food and eating data, there appeared to be a considerable socio-economic divide between highly active and highly inactive children. Those with the lowest activity levels were more likely to be found in the bottom income quintile (28%), and less likely to be found in the highest quintile (12%), in contrast to those children with high activity levels, 16% of whom could be found in the lowest income group compared with 21% in the highest. Although around half of children overall are in managerial and professional households, those children with the highest physical activity levels were more likely to be found in this class (56%) than children in the lowest physical activity group (43%). Again, this was the opposite for those children in routine and semi-routine households. In the lowest activity group, 25% were found in this class, in contrast to 14% in the highest activity group. Family type was found to have no effect, neither did age of mother.

3.3 A neighbourhood effect?

Could the socio-demographic patterns seen above be down to the area these types of households live in and the facilities provided in these areas, rather than to household demographics themselves? Similar, but more extreme, patterns could certainly be seen by area deprivation, with 29% of children with low activity levels living in the most deprived areas, in contrast to 14% who lived in the least deprived areas (Table 3.2). Children with high activity scores were essentially the inverse of this.

Table 3.2 Area deprivation by level of activity

SIMD	Activity Band (%)		
	Low	Medium	High
Least deprived – 1	14	21	25
2	18	22	23
3	19	21	20
4	19	17	14
Most deprived – 5	29	20	17
Bases			
Weighted	*786*	*765*	*675*
Unweighted	*764*	*775*	*693*

Highly active children were more likely to live in areas where their parent reported there being 'very good' or 'good' facilities for young children up to the age of 12 (12% and 27%, respectively, of highly active children in contrast to 5% and 24% of inactive children) (Table 3.3). This difference was also reflected with parents' beliefs that their area was good to bring children up in: 21% of children in the high activity group had parents who strongly agreed with this, compared with 12% of children in the low activity group.

Table 3.3 Perception of facilities for young children by Activity Band

Rating of local facilities for young children	Activity Band (%)		
	Low	Medium	High
Very good	5	10	12
Good	24	26	27
Average	30	29	31
Poor	29	27	23
Very poor	12	8	7
Bases			
Weighted	*786*	*775*	*685*
Unweighted	*766*	*784*	*703*

Furthermore, highly active children were more likely to have parents who felt that social and leisure facilities in their area were 'very good' (for people like themselves): 15% of respondents with children in the highest activity band rated these facilities as 'very good', in contrast to just 8% of respondents with children in the lowest activity group. As will be explored in section 3.4, children who had parents who were active themselves, were also likely to fall into the high activity group.

Access to a car appeared to have an impact on the activity levels of the child, although not in the direction that may be expected. It was interesting to note that, at a time where there is a general concern about children being driven everywhere rather than walking, having continuous access to a car was related to increased activity levels. A quarter of children in the lowest activity group had no access to a car in comparison with 12% of children in the highest activity group.

3.4 An attitudinal effect?

If household demographics and the impact of the area are only having some influence, could it be that parental attitudes and example-setting complete the picture of why some children are more active than others? At sweep 2, parents were asked how happy they were with the range of activities their child had access to. Not surprisingly, those children who were very physically active at sweep 3, were more likely to have parents who reported being very happy with the range of activities that their child had access to (28%) than those children in the low physical activity group, where 17% had parents who were very happy with the range of activities the child had access to (Table 3.4).

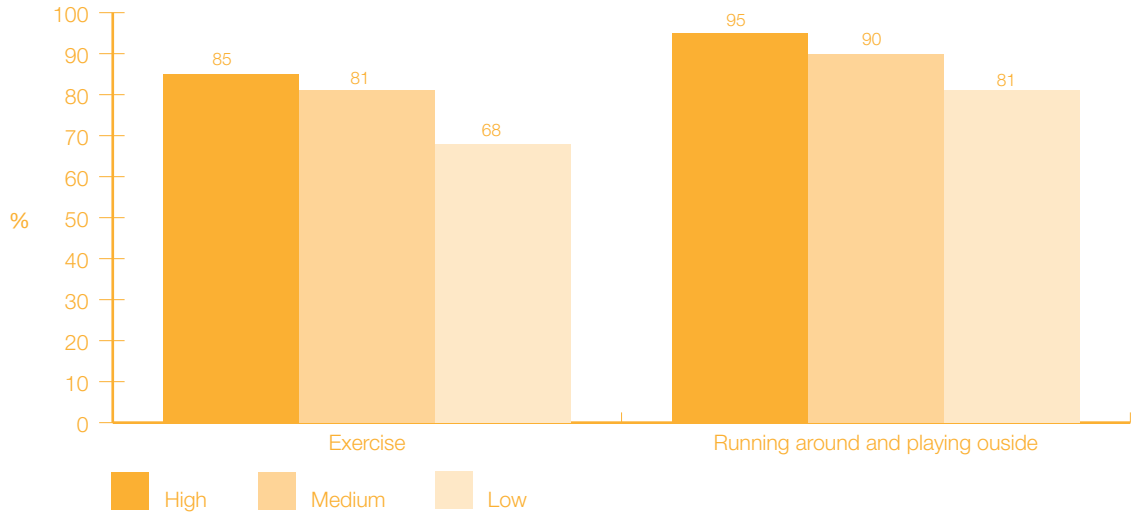
Perhaps unsurprisingly, it also appears that parental education, and beliefs about the importance of physical activity, also have an impact on the activity levels of the cohort child. Those in the highest physical activity group were far more likely to have a parent with Higher grades or above (81%) than those in the lowest physical activity group (67%).

Table 3.4 Respondent satisfaction with activities provided in area (at sweep 2) by child's activity band (sweep 3)

Satisfaction with range of activities	Activity Band (%)		
	Low	Medium	High
I am very happy with the range of activities that my child has access to	17	19	28
I am quite happy with the range of activities that my child has access to	35	36	33
I would like my child to have access to a slightly wider range of activities	29	29	25
I would like my child to have access to a much wider range of activities	18	16	15
Bases			
Weighted	*780*	*762*	*673*
Unweighted	*758*	*771*	*690*

Belief in the importance of physical activity for children was generally high amongst all parents, however, those children in the highest physical activity group were far more likely to have a parent who thought that taking part in exercise was very important (85% vs. 68% in the lowest physical activity group) and that it was very important that the child got to run around and play outside (95% vs. 81%), as Figure 3 C demonstrates. The very small percentage of parents who felt that either of these activities were unimportant all had children in the lowest physical activity group.

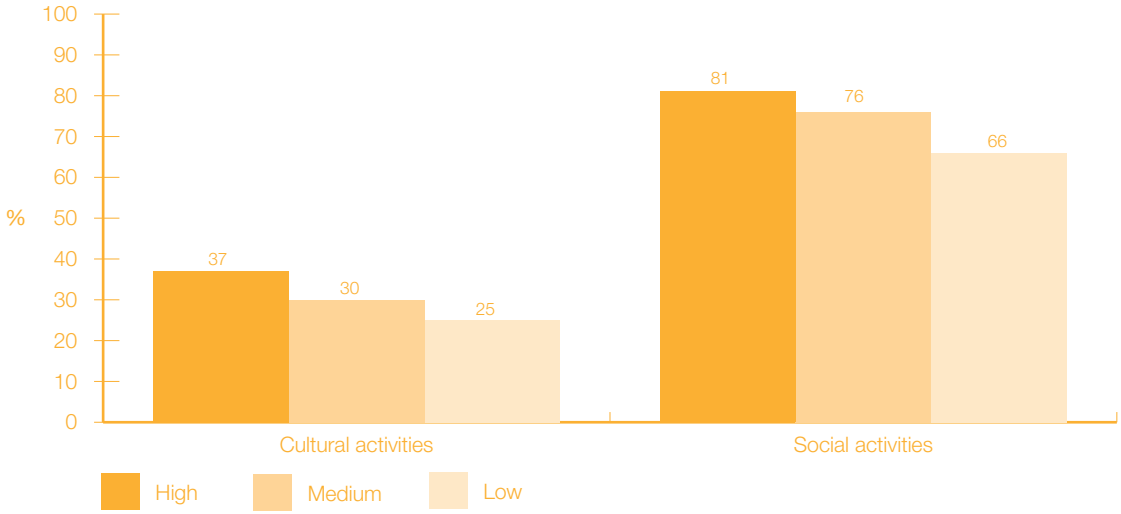
Figure 3 C Percentage of children in each activity band whose parents felt exercise or running around and playing outside was 'very important' for the child



Base: All child cohort: weighted – 2226, unweighted – 2231.

In addition, parents of children who were most physically active were also more likely to have reported believing that other experiences such as participating in cultural activities and social activities were very important, as can be seen in Figure 3 D.

Figure 3 D Percentage of children in each activity band whose parents felt cultural or social activities are 'very important'



Base: All child cohort: weighted – 2226, unweighted – 2231.

Parents of highly active children tended to report being socially active themselves with their child. Seventeen percent of those who had a child in the high activity group were active members of a local group set up for parents and children, in comparison with 10% of those with relatively inactive children.

Parents of more active children also reported more frequent participation in informal activities with their child. For example, around half of the children in the highest activity group who ran around and played outdoors during the previous week had done so with their mother (49%), in contrast to just a quarter in the lowest activity group (25%). It was particularly striking that three-quarters of children in the lowest activity group had not run around or played outside with their mother in the week prior to the interview.

These findings seem to point to of the emergence of a type of 'active family', whereby parents who support their child participating in physical activity, are socially active themselves with the child and dedicate time to spending time as a family. Indeed, the view that mealtimes give the family time to talk to each other was also related to the child's activity levels. Children in the highest activity group were more likely to have a parent who reported that mealtimes 'mostly' gave the family time to talk to each other (59%) than those children in the lowest activity group (47%). The frequency of the family eating together and activity level was not found to be significant, though this is likely to be due to the high levels of families eating together on a daily basis.

Table 3.5 Frequency of mealtimes giving family time to talk to each other by activity band

Frequency of which mealtimes give family time to talk to each other	Activity Band (%)		
	Low	Medium	High
Never	6	4	2
Occasionally	19	15	13
Quite often	27	30	26
Mostly	47	51	59
Bases			
Weighted	*805*	*782*	*690*
Unweighted	*783*	*791*	*708*

chapter

THE RELATIONSHIP BETWEEN NUTRITION, ACTIVITY, AND BODY MASS INDEX

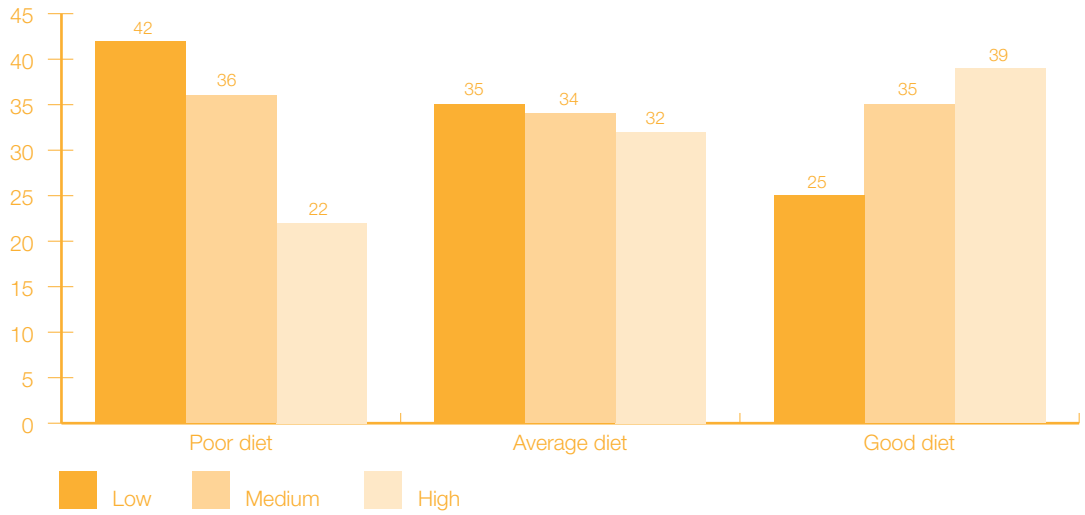
4

4.1 Food and activity

4.1.1 The relationship between food and activity

Research has shown that nutritional patterns are best understood when looked at in combination with habits of physical activity, and that exercise and diet are both essential components for children's healthy development (Reilly, 2006). Using the respective diet and activity scales (see sections 2.4 and 3.1), the relationship between diet and activity was explored to see how they are associated. Among children with a relatively poor diet, 42% were in the low activity and 22% in the high activity group (Figure 4 A). The proportions were reversed for those who have a relatively good diet, where 25% are less active and 39% are more active. Children with an average diet seem to be fairly evenly distributed in terms of activity, so it is only children with a relatively healthier diet and those with a relatively unhealthy diet who also differ very much in terms of physical activity.

Figure 4 A Diet score by activity score



Base: All child cohort: weighted – 2332, unweighted – 2280.

It is difficult to judge whether eating fruit and vegetables promotes children to be more active or if children's levels of physical activity determine their preferences for these foods, although the data show that some form of relationship exists between activity and diet. However, this should not be taken to mean that a certain diet may cause a child to be less or more active, or that a certain level of activity may cause a child to eat certain foods. While food and activity may influence each other in a cyclical effect to some extent, it is likely that *both* children's diets and their activity levels are influenced by other factors, such as the child's preferences, as well as the family's preferences, the priorities of, and options available to, parents, the child's home environment and neighbourhood and more.

In order to determine to what extent diet and activity were related, two linear regression models were modeled on the two scales. The first regression aimed to evaluate the extent to which diet explains activity, and whether the association between diet and activity is significant. The results[3] indicate that while there is a statistically significant association, in fact, changes in the diet score only explained a very small proportion (*c.*3%) of changes in the activity score.

The second regression[4] aimed to evaluate the extent to which activity explained diet, and whether the association between activity and diet is significant. The results are virtually identical to the first model. Although the association is again statistically significant, changes in the activity score only explained a very small proportion (*c.*5%) of changes in the diet score. While diet and exercise are clearly related, other underlying factors are likely to influence *both* what and how children eat and the types of activities they do, such as the socio-economic differences seen in both sections 2.3.1 and 3.2, for example in relation to income, NS-SEC[5] and the educational qualifications of the mother. To some extent, looking only at what children eat and at how they spend their time assumes that children develop these nutritional and lifestyle patterns in a social vacuum. Clearly this is not true, and a range of factors at a broader level beyond the child's immediate control will affect his or her nutritional habits and preference for activities.

4.1.2 The relationship between activity group and specific food types

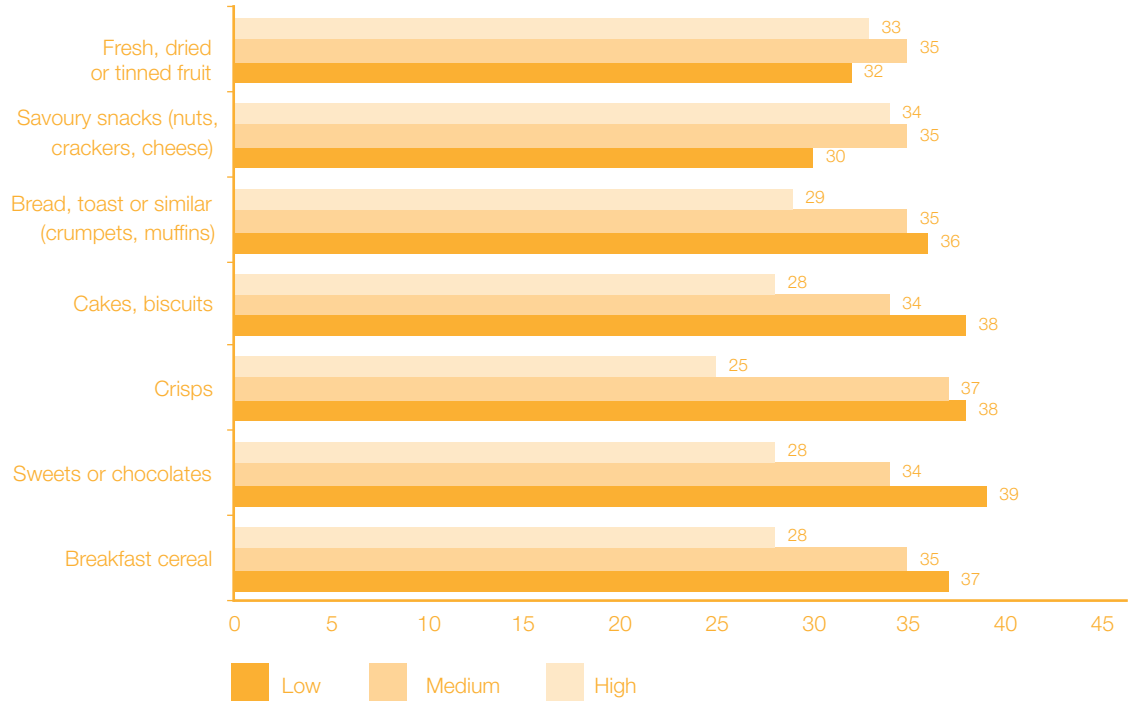
A study of children aged 5 to 7 based in Northwest Germany found that watching TV for more than one hour per day was linked to a higher consumption of unhealthy foods and a lower consumption of fruit and vegetables (Müller *et al.,* 1999). Looking more specifically at different foods eaten and their relationship to the child's activity level, we find that among children with a low activity score, 39% snacked on chocolate and sweets between meals, 38% on crisps and 38% snacked on cakes and biscuits, while the respective proportions for children with a high activity score were lower at 28%, 25% and 28%. However, interestingly, while less active children appear more likely to consume unhealthier foods, there was relatively little variation in the proportions of children snacking on fruit across children of all three activity levels.

3 See Appendix C, Table 6.1

4 See Appendix C, Table 6.2

5 NS-SEC (National Statistic Socio-Economic Classification)

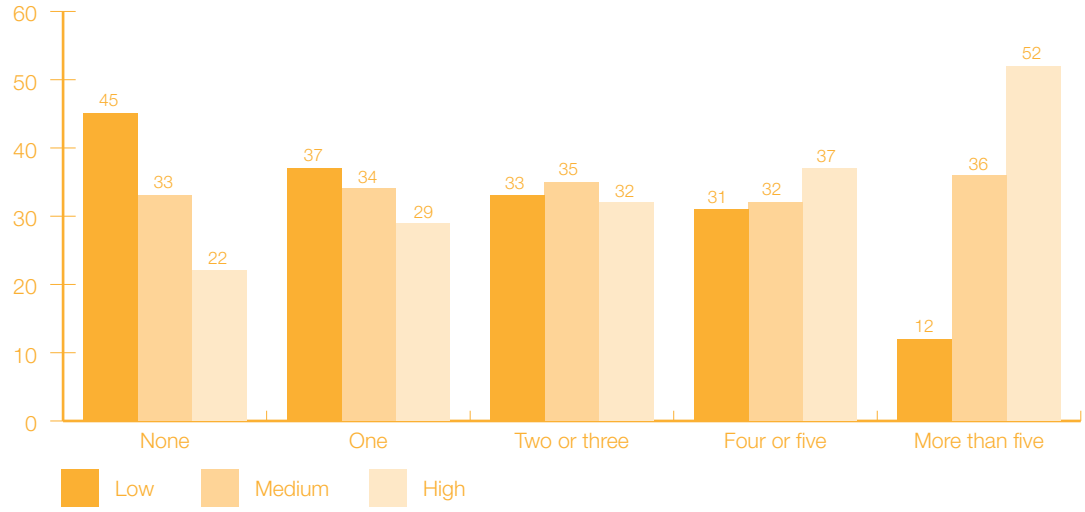
Figure 4 B Snacks eaten between meals by activity level



Base: All child cohort: weighted – 2332, unweighted – 2280.

However, Figure 4 C shows how less active children are less likely to eat a variety of vegetables on a typical day than their more active counterparts. Indeed, among children who did not eat vegetables on a typical day, 45% were in the low activity group compared to 22% who were in the high activity group, with the pattern essentially inversed for those who ate five or more types of vegetables. Furthermore, more active children are more likely to eat a greater range of fruit than children who are less active: 47% of children eating no fruit falling into the lowest activity group and 22% in the highest, in complete contrast to 22% of children who ate five or more types of fruit a day who were in the lowest activity group, with 50% in the highest activity group.

Figure 4 C Consumption of different vegetables by activity level



Base: All child cohort: weighted – 2332, unweighted – 2280.

As previous research on older children in Germany had indicated (Müller, 1999), GUS data shows that less active children are more likely to eat unhealthy foods more often than their more active counterparts. Forty-two percent of less active children ate sweets or chocolates once a day, and 29% ate them 2 to 3 times per week, compared with more active children, of whom 38% ate sweets daily, and 33% 2 to 3 times per week.

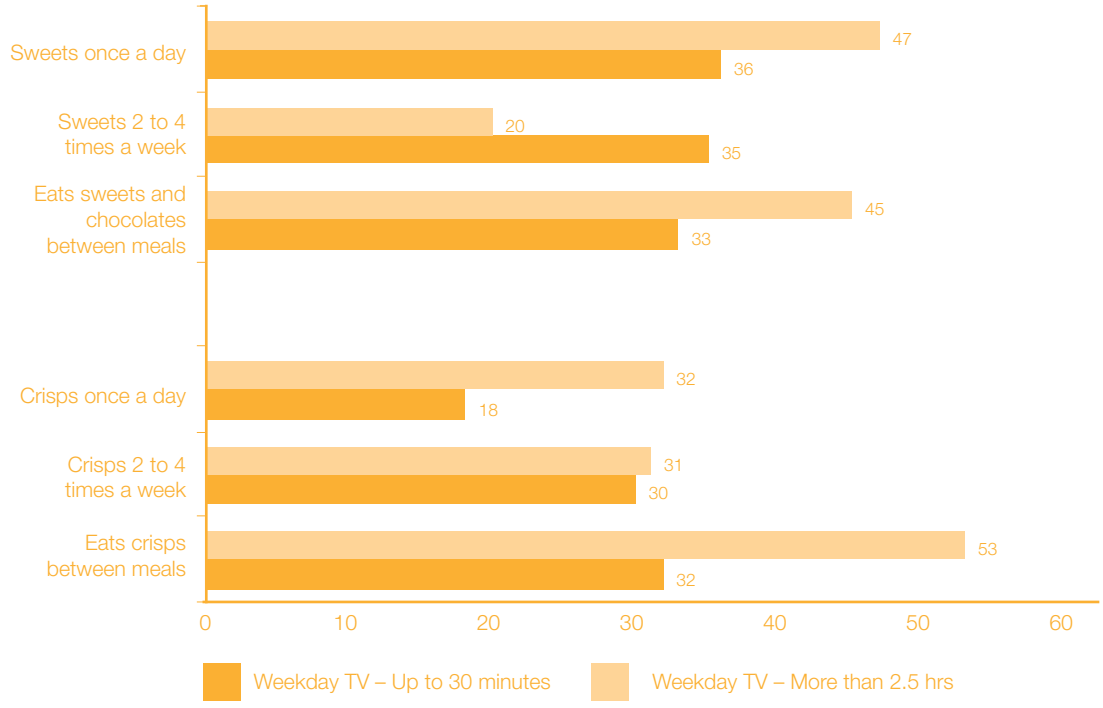
The pattern is similar when it comes to sugary soft drinks. There is almost a 10% difference between children in low (38%) and high (47%) activity groups when it comes to drinking soft drinks on a rare occasion. Conversely, less active children were more likely to drink soft drinks more than once a day (31%) than children in the high activity category (25%). Excessive consumption of sugar is often blamed for causing disorderly behaviour among children, and for making them hyperactive and moody. Perhaps it could have been assumed that excess sugar in a diet would at least prompt a more active lifestyle, but the data seem to suggest the opposite is true.

Furthermore, activity was found to be mildly associated with differences in the intake of salt from food such as crisps. Among children in the low and medium activity group, 24% eat crisps once a day, compared to 18% of those in the high activity category. In turn, children in the medium activity category were those most likely to eat crisps only once a week (19%).

4.1.3 Snacking and sedentary activity

Figure 4 D looks at how nutritional patterns vary among children who spend different amounts of time in sedentary activities like watching TV and playing computer/electronic games. It would be expected that children who spend a lot of time playing games on the computer or watching television are more likely to also snack during these activities on unhealthy foods. Research based on 4 to 5 year olds in England and Wales found that children who had a higher preference for energy-dense and fatty foods also had a stronger preference for sedentary activities, like watching TV and playing computer games (Wardle *et al.,* 2001).

Figure 4 D Consumption of unhealthy snacks by time spent watching TV on weekdays



Base: All child cohort: weighted – 2332, unweighted – 2280.

The data indicates that these findings also hold true for Scottish children. Among those who watched TV for more than 2.5 hours on weekdays 53% ate crisps, and 45% ate chocolates and sweets between meals. This contrasts greatly to children who watched up to 30 minutes of TV on weekdays of whom 32% ate crisps, and 33% ate chocolates and sweets between meals. In a similar way, of those children who play computer games on each day of the week 50% eat crisps and 39% eat chocolate and sweets between meals. The corresponding figures for children who do not play computer games are 32% (crisps) and 33% (chocolate and sweets).

The figures show an association between sedentary activities and eating unhealthy foods, but they cannot show if children eat unhealthy food during the time they spend in sedentary activities, or whether these foods are eaten at a different time during the day. More specific questions looking at children's eating habits during such sedentary activities would be useful in this respect.

4.2 Body Mass Index (BMI) – Measuring obesity

The primary reason for concern about children's diets and physical activity is the effect that these have on health, both in childhood and later life, in particular in relation to being overweight and obese. Overweight and obesity are terms that refer to an excess of body fat and they usually relate to an increased weight-for-height ratio. The two terms, however, denote different degrees of excess adiposity, and overweight can be thought of as a stage where an individual is at risk of developing obesity (Barlow and Dietz, 1998). The adverse health consequences associated with obesity are related to an increased adiposity rather than an increased weight *per se* (Taylor *et al.,* 2002) and it is therefore important that any indicator of obesity reflects this increased adiposity. Body mass index (BMI) takes into account weight and height: it is calculated as weight (kg) divided by squared height (m2) and it is the key overweight and obesity measure in this chapter. For further explanation of BMI and the use of UK and international cut-offs, please see Appendix A.

Height and weight measurements were taken of children in the child cohort at sweep 2 and therefore the analysis in this section is based on the results of measurements for children mostly aged 46 months.[6]

6 The majority of respondents in the child cohort who completed an interview at sweep 2 also gave permission for their child's height and weight to be measured. Overall, 89% of children provided valid measurements and from these the children's Body Mass Index (BMI) was calculated.

4.3 BMI and obesity – Key points from sweep 2

As the information on the children's height and weight was collected in sweep 2, most of the important findings related to children's BMI were already reported in the GUS sweep 2 report (Bradshaw *et al.,* 2008). The key points below summarise the main findings on BMI based on that report.

- Most children (77%) were of 'normal weight' (below the 85% percentile). By the international standards, 23% of children in GUS were overweight (including obese).
- Girls were more likely than boys to be overweight (19% compared with 16% of boys) and more likely to be obese (7% compared with 5% of boys).
- Children living in lone parent families were more likely to be overweight or obese (26%) than were children in couple families (23%). However, when looking only at girls, almost double the proportion of girls in lone parents households were obese.
- Children who were classified as white, were more likely to be overweight or obese (24%) than their non-white peers (14%).
- Children who were obese were slightly more likely to have a long-standing illness than overweight (not including obese) or normal weight children (18% of obese children compared with 15% of non-obese children).

4.4 BMI in relation to nutrition and activity

Several studies have looked at the relationship between eating, physical exercise and weight. Diets high in fibre-rich cereals, fruit, vegetables, fish, olive oil and nuts, and low in meat, processed meat foods and trans-fatty acids favour a healthier weight and reduce the likelihood of obesity (Bullo *et al.,* 2007; Reilly *et al.,* 2005). The relationship between sugar-sweetened drinks and weight gain has also been reported (Malik *et al.,* 2006), but research has also linked excessive consumption of natural fruit juice to obesity (Dennison *et al.,* 1997; Malik *et al.,* 2006). Exercise and diet form two sides of the same coin in terms of healthy development for children (Reilly, 2006). The association between sedentary activities, like watching TV, and excess weight gain in children has been discussed in various studies (Bogaert *et al.,* 2003; Gable & Lutz, 2000; Reilly, 2006).

With data collected through GUS in sweep 4, it will be possible to look at the relationship between nutrition, exercise and the change in children's BMI from sweep 2 to sweep 4. Currently, the data from sweep 3 can show us if children of different BMI ranges in sweep 2 have different nutritional and exercise patterns in sweep 3, but it cannot tell us the *effects* of these nutritional and exercise patterns on their future weight, until this has been measured in sweep 4.

Figure 4 E and Figure 4 F illustrate how normal weight, overweight and obese children as weighed and measured in sweep 2 compare in terms of their activity and diet score in sweep 3. There seems to be a very small difference in the level of activity and in the relative quality of children's diets in sweep 3, when comparing children who in sweep 2 were recorded as being of normal weight, overweight, or obese. Among obese toddlers, 9% were in the relatively good diet category, and 29% in the relatively poor diet category, while the respective figures for normal weight children are 13% and 24%. Children who were of normal weight, overweight and obese in sweep 2 had a very similar activity score in sweep 3, and were roughly evenly spread among the low, medium and high activity category.

Figure 4 E Diet scores by BMI

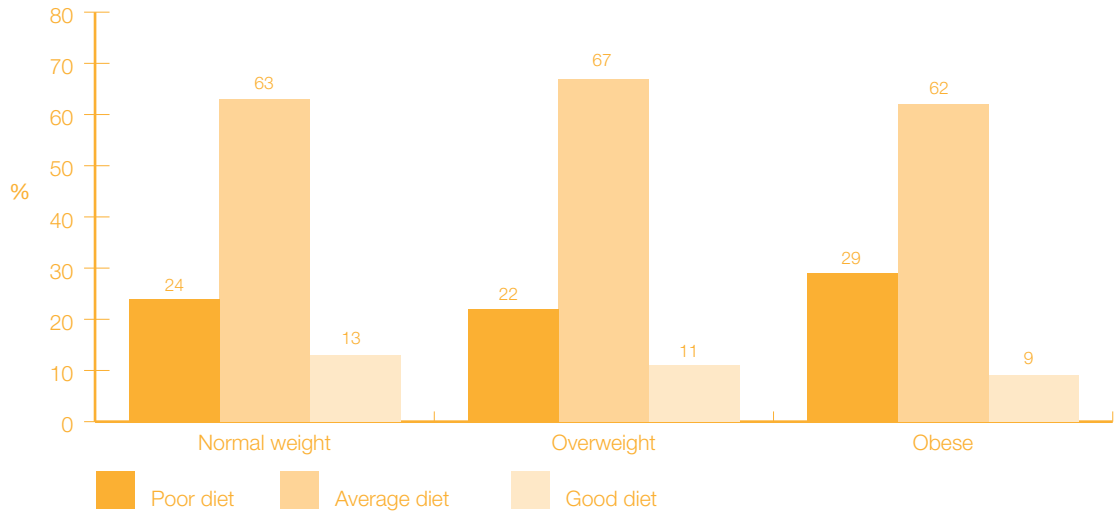
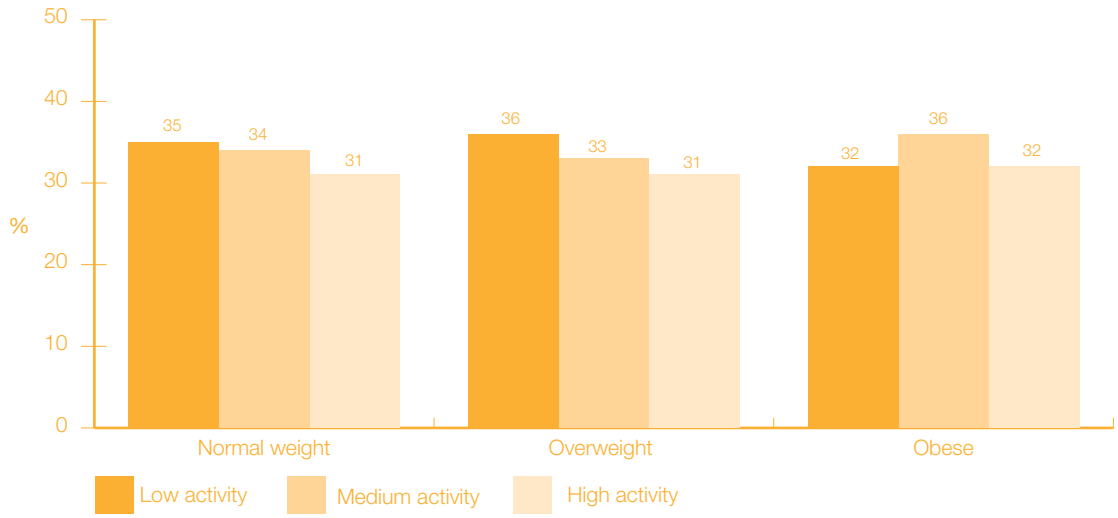


Figure 4 F Activity scores by BMI



Bases: All child cohort with valid height and weight measurements: weighted – 1979, unweighted – 1987.

Linear regression[7] was undertaken to explore if there was a statistically significant association between BMI in sweep 2 and activity score in sweep 3. The results (see Appendix C for detail) show that while the relationship is significant, the BMI score of children in sweep 2 only predicted about 1% of change in their activity score the following year. This means that children's BMI as measured in sweep 2 was not a very important factor in explaining the differences in activity levels in sweep 3. It will be interesting to see, however, if children's levels of physical activity in sweep 3 help to predict the BMI of children in sweep 4.

A second regression model aimed to see if there was a statistically significant association between BMI in sweep 2 and children's diet score in sweep 3. The results show that while the relationship was significant, the BMI score of children in sweep 2 only predicted about 1% of change in their diet score for sweep 3. This means that children's BMI as measured in sweep 2 was not a very important factor in explaining the differences in diet in sweep 3. Once again, only after the 4th sweep of data has been collected will it be possible to explore if children's diets in sweep 3 help to predict their BMI in sweep 4.

4.5 Observing change in BMI – sweep 4

It would appear that contrary to established evidence, children of different weight-ranges have very similar nutritional and exercise habits. This, however, would be a premature conclusion. It is important to remember that children's BMI is based on their weight and height at the second sweep of GUS, when the children were just approximately 3 years and 10 months old. This is still a critical age in development and the pace at which different children develop and grow varies greatly. Furthermore, the information on children's activity and diet is based on sweep 3 when the toddlers were approximately 4 years and 10 months old, and comes one year after the children's BMI was measured. We can therefore not be sure if children's nutrition and exercise patterns in sweep 3 are similar to those they had in sweep 2 when they were weighed, and we can also not know if children's BMI in sweep 2 will have remained the same through sweep 3.

7 See Appendix C, Table 6.3

Finally, research has shown that different nutritional patterns among infants and young children may take some time to manifest themselves in the form of excess weight or obesity in later childhood. A study by Ong *et al.,* (2000) based on the Avon Longitudinal Study of Pregnancy and Childhood (ASLPAC) found that 'catch-up growth', known as the process by which low or under-weight babies grow very rapidly during infancy and early childhood, was associated with higher BMI scores at age 5. This means that many babies, who were found to be underweight at birth and in infancy, grew very rapidly during their first five years of life so as to result as obese or overweight by the age of 5. Therefore, with respect to the GUS cohort of children, it is not necessarily the case that differences in BMI associated to diet and exercise would become immediately apparent. As the children were only 3 years and 10 months of age at the time of measurement, some changes in weight may take a longer time to emerge. It will be interesting to see how the children's diets and physical activity in sweep 3, when they were aged 4 years and 10 months, will relate to their weight in sweep 4, when they are aged 5 years and 10 months, when the physical outcomes of different diets and activity patterns may be more evident.

CHAPTER 4

The Relationship Between Nutrition, Activity, and Body Mass Index

chapter

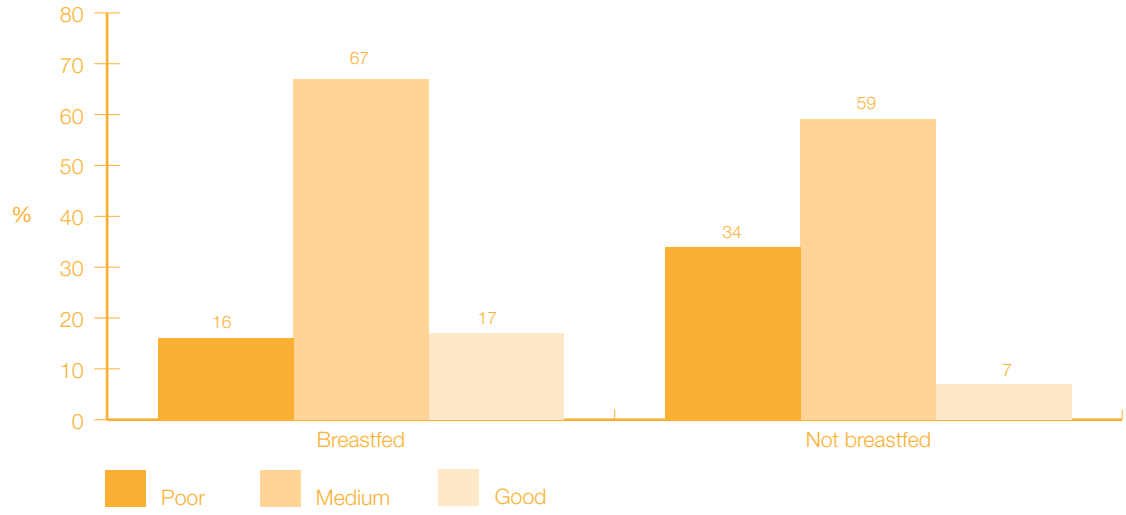
BREASTFEEDING AND NUTRITION IN CHILDHOOD

5

5.1 Breastfeeding and nutrition in childhood

Nutritional habits adopted in the early years of life often persist into adulthood. A number of studies have shown that breastfeeding is associated to weight in childhood (Fewtrell, 2004; Gilman *et al.,* 2001; Koletzko, 2004). Apart from having positive effects on weight, there is also evidence that breastfed babies are less likely to develop a range of different infections (Howie *et al.,* 1990; Wilson *et al.,* 1998) and also less likely to develop insulin dependent diabetes in childhood (Sadauskaite-Kuenhne *et al.,* 2004).

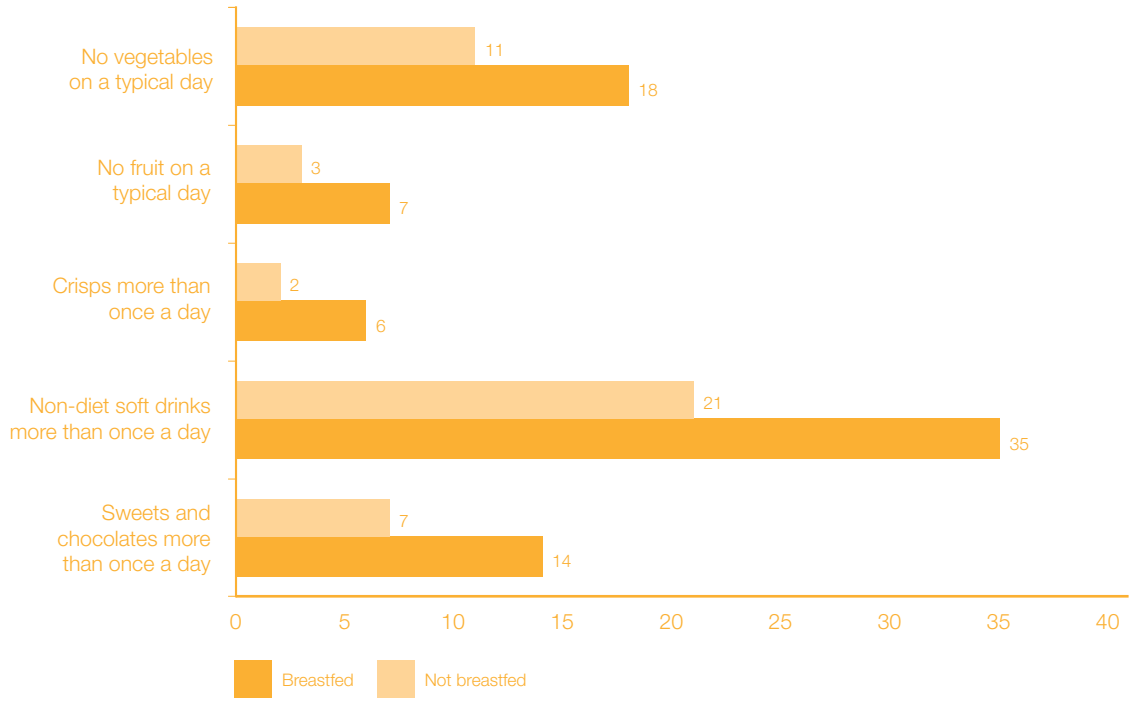
Figure 5 A Child's diet type by breastfeeding history



Base: All child cohort: weighted – 2332, unweighted – 2280.

Figure 5 A tells a similar story by comparing how breastfed and non-breastfed children differ on the diet scale. Most children had an average diet. However, 17% of breastfed children had a good diet compared to 7% of those not breastfed, and 16% had a poor diet compared to 34% of those not breastfed. Again, non-breastfed children seem to have relatively inferior nutritional patterns in childhood than their breastfed counterparts.

Figure 5 B Consumption of selected foods by breastfeeding history

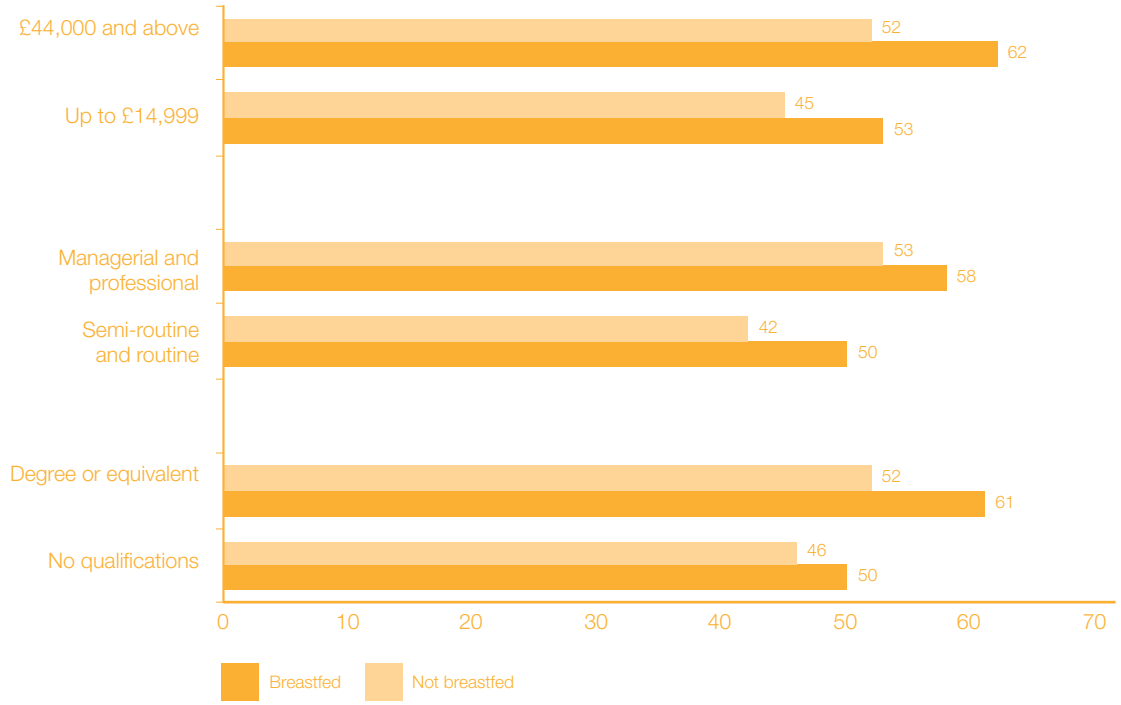


Base: All child cohort: weighted – 2332, unweighted – 2280.

Figure 5 B is a good illustration of the different proportions of breastfed compared to non-breastfed children who have unhealthy nutritional habits. For example, non-breastfed children were more likely to drink soft-drinks, and more likely to eat sweets and chocolates more than once a day than were breastfed children. Additionally, the proportion of breastfed children who had no vegetables on a typical day was 11% compared to 18% for those who had not been breastfed. Similar patterns could be seen in relation to healthy and unhealthy snacks.

The association between diet in childhood and breastfeeding history is clear. However, this does not explain if being breastfed is the sole cause of differences in diet or if there are other characteristics which make a mother both more likely to breastfeed and more likely to feed her child healthier foods. Section 2.3.1 showed how children of more educated mothers in managerial and professional occupations and children in better paid households are more likely to have a better diet. In turn, Figure 5 C indicates how the incidence of breastfeeding varies by these same characteristics of the mother and household. It is interesting to note that differences between breastfed and non-breastfed children persist, even when isolated by NS-SEC or income group.

Figure 5 C How many children eat two or three types of vegetables on a typical day by selected characteristics



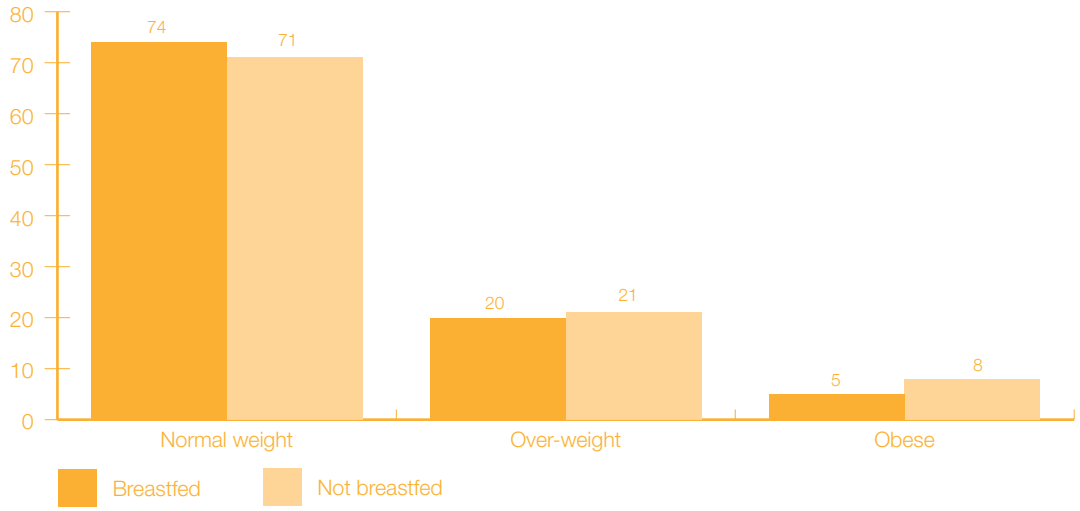
Base: All child cohort: weighted – 2332, unweighted – 2280.

5.2 Breastfeeding and BMI

Research has shown that children who are breastfed have a lower risk of obesity than those who have not been breastfed. Furthermore, the duration of breastfeeding also makes a significant difference on the risk a child had of becoming obese in later life, with longer breastfeeding lowering the risk (Owen *et al.,* 2005, Toschke *et al.,* 2007).

Figure 5 D shows how breastfed children compare to non-breastfed children in terms of BMI. There appears to be a very slight difference in proportions for those who are obese, with those who were not breastfed being 3% more likely to be obese than those who were breastfed. Although the results do not show a large difference in proportions, perhaps a follow-up study on this cohort at a later age would show if the differences in BMI become more marked as the children grow older (the results from the study by Toschke *et al.,* (2007), for example, looked at the impact of breastfeeding on children aged 9 to 10 years old).

Figure 5 D BMI by breastfeeding history



Base: All child cohort with valid height and weight measurements: weighted – 1979, unweighted – 1987.

Regression analysis was undertaken to test if the relationship observed in Figure 5 D is statistically significant,[8] that is, to test if a child's breastfeeding history can predict their BMI in the following years. The results (see Appendix C for detail) suggest that breastfeeding does have a significant effect on BMI in later childhood, but this effect is minimal, and there are other factors which influence a child's BMI to a much larger extent. However, it should be noted that results may have been different if we could test the effect of breastfeeding duration, that is, the effect of having been breastfed for a shorter or a longer period of time on a child's BMI. While this analysis is not possible with the data available in GUS for the older cohort of children, it will be possible with the younger cohort after the 4th sweep of data has been collected.

Further regression analysis tested the extent to which breastfeeding in infancy predicts a child's diet in later childhood by using the diet score constructed and explained earlier in the report.[9] The analysis suggests that the relationship is statistically significant. Thus, by knowing whether children were breastfed or not, we can explain *c.*6% of the differences in children's diets as measured by the diet score.

8 See Appendix C, Table 6.4

9 See Appendix C, Table 6.5

Figure 5 C showed that some differences in breastfeeding patterns could be explained by different socio-economic effects, whilst section 2 showed that the type of diet a child has is also related to these same socio-economic factors. Thus a further model aimed to test if there was an independent significant relationship between breastfeeding and the diet score which could not be explained by other characteristics of the mother and the household.[10] The results showed that breastfeeding significantly predicted diet score, and this effect was not caused by the other factors in the model. On the whole, breastfeeding and the additional four characteristics in the model explained *c.*15% of the variation in children's diet score.

The results indicate that increased policy emphasis behind promoting breastfeeding is justified, as breastfeeding seems to have an independent positive effect on children's diets, thus raising children's chances for better health outcomes in later life.

10 See Appendix C, Table 6.6. The additional factors controlled for were:

- The child's activity score
- The child's BMI score
- A binary variable indicating if children were living in one of the 15% most deprived datazones
- A binary variable indicating if children's mothers had degree or below degree educational qualifications

chapter
6
CONCLUSION

Improving the eating habits and nutrition of children, and increasing the amount of physical activity that children participate in, remain key policy priorities as part of the Scottish Government's wider strategic objective for a healthier Scotland. The challenge facing policy makers remains considerable in the context of rising levels of childhood overweight and obesity and socio-economic health inequalities. Although more limited in scope than dedicated diet and nutrition studies, GUS is nevertheless able to provide useful information on the range of food types – both healthy and unhealthy – eaten by young children on a typical day, and the reported physical and sedentary activity levels of these children. Moreover, the study has the additional benefit of being able to examine parental views and experiences in relation to their children's eating and activity. In combination, these allow for the exploration of choice, influence and culture in early years provision and consumption of food, and in access to and participation in activities, across socio-economic groups. The wide focus of data collection on GUS also allows for exploration of these topics in relation to breastfeeding and BMI.

It was encouraging to see that almost all children had at least one type of fruit a day (96%) and 86% had at least one type of vegetable a day. However, children from certain households were eating a wider variety of fruit and vegetable than others: those children whose mothers had higher educational qualifications and who knew a lot about healthy eating, as well as children in managerial and professional households, were more likely to be eating a wider variety of fruit and vegetable on the average day. A more worrying finding though, was that consumption of unhealthy sugary and salty foods was also high, with almost half of children eating sweets or chocolates once a day or more often and 43% drinking sugary soft drinks once a day or more often, and again this was heavily patterned by socio-demographic factors.

While almost all children had eaten a meal prepared with fresh ingredients in the last week, 32% had eaten a takeaway meal, such as Chinese food or fish and chips, and 26% had eaten a fast food meal, such as McDonald's. Again, this was seen to be socially patterned, with almost twice as many children in the most deprived areas having eaten a fast food meal in the previous week (36%), compared with 20% in the least deprived areas.

Another aspect of the food culture debate is the concern surrounding the potential erosion of family life, family meals and family time as a result of longer working hours for parents and changes in the size and make up of the average family unit. However, GUS found little basis for this concern. Overall, the majority of children (82%) 'mostly' ate their main meal at the same time as the rest of the family with only 5% only occasionally or never eating with the rest of the family. Whilst 62% of children ate in the kitchen or dining room, 32% ate in the living room, although these findings did vary considerably by a number of factors including age of mother at time of birth, income and deprivation. Encouragingly, the majority of parents (52%) felt that mealtimes gave the family time to talk to each other and almost half (48%) said that mealtimes are mostly enjoyable.

Again, it was encouraging to see that, although sedentary activity levels are high (85% watching TV every day and a quarter playing on a computer or games console every day), participation levels in physical activities were also high (the vast majority having participated in at least one physical activity in the past week, and two-thirds having participated in five or more). Once more, socio-demographic factors had an effect, with children in the highest activity group being more likely to be in households with higher incomes and in managerial and professional occupations. However, there also appeared to be a neighbourhood effect, which having a car only compensated for to some extent. One of the biggest impacts though seemed to be from both parents' example setting and beliefs about the importance of exercise.

There was a correlation between diet and activity, with less active children being less likely to eat a wide variety of vegetables and being more likely to consume unhealthy foods or drinks on a daily basis. Interestingly, the correlation was not seen with regards to fruit consumption. Furthermore, GUS data reinforced previous research findings that children who had a higher preference for energy-dense foods and fatty foods also had a stronger preference for sedentary activities, such as watching TV and playing computer games.

An exploration was carried out of the impact of breastfeeding on later eating habits, which found that, although there was little difference between the proportions of breastfed and non-breastfed children who snacked on breakfast cereal, sweets or chocolate, cakes or biscuits or bread, breastfed children were more likely to snack on fruit (75% vs. 64%) and savoury snacks (51% vs. 40%), and were less likely to eat crisps (38% vs. 51%). Breastfed children were also more likely to have an overall 'good' diet: 17% vs. 7% of non-breastfed children. This remained the case even when controlling for socio-demographic factors.

Interestingly, children of different BMI levels varied little in their diet and activity scores, probably due to the young age of the children.

Children's health, their diet and their physical activity is now a firm element on the Scottish policy agenda. The results from GUS suggest that while nutrition and activity are separately important elements in the healthy development of children, there is a close relationship between nutrition and activity, and future policy initiatives may want to focus on the very relationship between what and how children eat, and what activities children engage in.

Appendix A Explanation of BMI cut-offs

While the BMI measure has come under some scrutiny for not always being accurate, it remains the best non-invasive measure for obesity. Furthermore, a review of the measure by (Reilly *et al.,* 1999) in the *British Medical Journal* suggests that the BMI is more likely to understate, rather than overstate, the true levels of obesity, as has been discussed by Prentice (Prentice, 1998) and Barlow and Dietz (Barlow & Dietz, 1998).

The main child overweight and obesity prevalence estimates in this section have been produced using the International Obesity Taskforce cut-offs. These cut-offs are based on BMI reference data from six different countries around the world (over 190,000 subjects in total aged 0 to 25 from UK, Brazil, Hong Kong, the Netherlands, Singapore, and the United States). In summary, the BMI percentile curves that pass through the values of 25 and 30 kg/m^2 (standard adult cut-off points for overweight and obesity, respectively) at age 18 were smoothed for each national dataset and then averaged. The averaged curves were then used to provide age and sex-specific BMI cut-off points for children and adolescents aged 2 to 18. By averaging the distribution curves from each reference country, the international cut-offs for children purport to be representative of the countries but independent of the overweight or obesity level in each country. One of the benefits of using these international standards is the possibility of making international comparisons. However, the international classification is not without problems: international reference data differ from those for the UK population, and this is reflected in the sex-specific overweight and obesity estimates produced by the International classification.

In light of this lack of consensus on its use, key results have also been produced using the 85th (overweight cut-off)/95th (obesity cut-off) BMI percentiles of the UK reference curves (referred to as the National BMI percentiles classification). The National BMI percentiles classification has been used in the past to describe childhood overweight and obesity prevalence trends in the UK. However, the National BMI percentiles classification were not selected as the primary measure in this report as they are based on the arbitrary assumption that the prevalence of overweight and obesity at the point when the reference data was compiled was 15% and 5%, respectively. Furthermore, there seems to be no indication that these cut-off points relate directly or indirectly to any physiological outcomes or health or disease risks. It is worth noting that the UK component of the international classification used the same sample as that used to construct the UK reference BMI data.

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Appendix C Regression Tables

Table 6.1 Regression of the extent to which diet explains activity

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	25.000	41.000	20.787	0.000
(Intercept)	1.000	65.000	12868.845	0.000
DcFdietsco	25.000	41.000	20.787	0.000

Model Summary[a]

R Square	.029

a. Model: DcAsco01 = (Intercept) + DcFdietsco

Table 6.2 Regression of the extent to which activity explains diet

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	48.000	18.000	21.501	0.000
(Intercept)	1.000	65.000	12269.932	0.000
DcFdietsco	48.000	18.000	21.501	0.000

Model Summary[a]

R Square	.046

a. Model: DcFdietsco = (Intercept) + DcAsco01

Table 6.3 Regression exploring the association between BMI at sweep 2 and activity score at sweep 3

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	16.000	50.000	5.136E15	0.000
(Intercept)	1.000	65.000	4616.502	0.000
BMIval_S	16.000	50.000	5.136E15	0.000

Model Summary[a]

R Square	.013

a. Model: DcAsco01 = (Intercept) + bmival_S

Table 6.4 Regression exploring the effects of breastfeeding on BMI

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	1.000	65.000	4.784	0.032
(Intercept)	1.000	65.000	121787.37	0.000
MaBFDe01	1.000	65.000	4.784	0.032

Model Summary[a]

R Square	.003

a. Model: bmival = (Intercept) + MaBFDe01

Table 6.5 Regression exploring the effects of breastfeeding on diet score

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	1.000	65.000	107.281	0.000
(Intercept)	1.000	65.000	4071.804	0.000
MaBFDe01	1.000	65.000	107.281	0.000

Model Summary[a]

R Square	.063

a. Model: DcFdietsco = (Intercept) + MaBFDe01

Table 6.6 Regression exploring the effects of breastfeeding on diet score controlling for socio-demographic characteristics

Source	Df1	Df2	Wald F	Sig.
(Corrected model)	61.000	5.000	5.625	0.030
(Intercept)	1.000	65.000	2083.782	0.000
DcAsco01	51.000	15.000	9.185	0.000
Bmival_S	21.000	45.000	9.9123	0.000
MaBFDe01	1.000	65.000	60.249	0.000
DcADsco3	1.000	65.000	13.503	0.000
DcMedu04	1.000	65.000	54.669	0.000

Model Summary[a]

R Square	.147

a. Model: DcFdietsco = (Intercept) + DcAsco01 + bmival_S + MaBFDe01 + DcADsco3 + DcMedu04

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