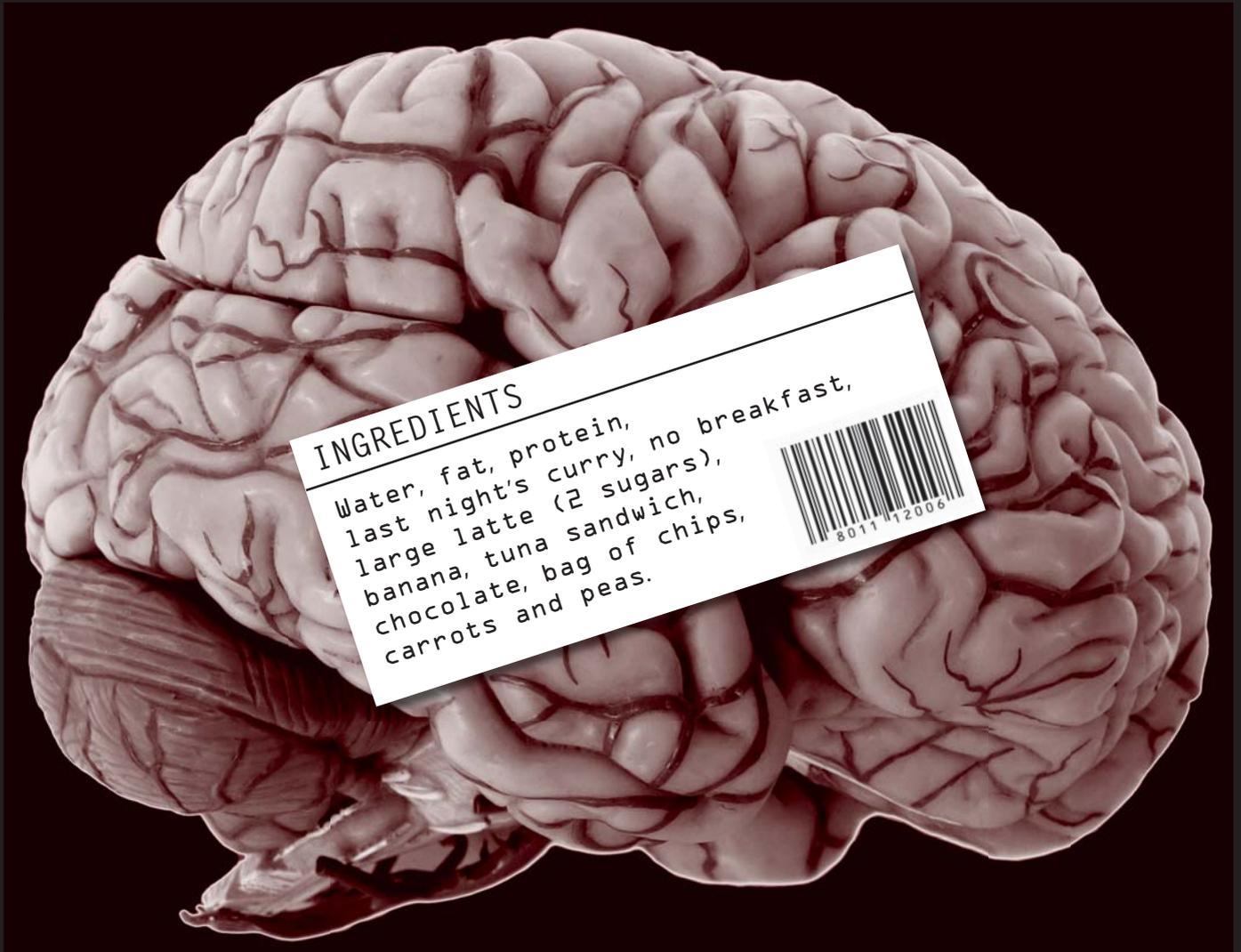


# Feeding Minds

The impact of food on mental health



Mental Health Foundation

The time is now right  
for **nutrition** to  
become a *mainstream,*  
*everyday* component  
of mental health care

## FOREWORD

The brain is the platform for the mind and therefore the platform for our mental health. While our understanding of how the brain works is less advanced than our understanding of the body's other organs, much of the practical knowledge we do have of the brain has yet to be embraced and put to good use. This represents a spectrum of wasted opportunities to promote mental health and prevent mental ill-health in our society.

One of the clearest examples is the role of nutrition in relation to mental health. We know that the brain is made up in large part of essential fatty acids, water and other nutrients. We know that food affects how we feel, think and behave. In fact, we know that dietary interventions may hold the key to a number of the mental health challenges our society is facing. Yet we rarely invest in developing this knowledge, and a relatively tiny - but growing - number of professionals are putting it to effective use.

But there is a growing body of evidence, and a number of significant voices are championing the role of diet in the care and treatment of people with mental health problems. The potential of dietary interventions in treating depression and Attention Deficit Hyperactivity Disorder, for example, are being increasingly recognised. We would be foolish to underestimate their importance.

An integrated approach, recognising the interplay of biological, psychological, social and environmental factors is key to challenging the growing burden of mental ill-health in western nations. Diet is a cornerstone of this integrated approach.

The time is now right for nutrition to become a mainstream, everyday component of mental health care, and a regular factor in mental health promotion. But this won't happen without the recognition and commitment of the major stakeholders outlined in this report.

The potential rewards, in economic terms, and in terms of alleviating human suffering, are enormous.



**Dr Andrew McCulloch**  
**Chief Executive**  
**The Mental Health Foundation**

## ACKNOWLEDGEMENTS

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- The services using diet and nutrition to promote mental health or to manage mental health problems, illustrated in our case studies
- Experts in the field who reviewed an earlier draft of this report.

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<sup>1</sup> There is a companion report to this volume, produced by the Foundation's partner in the Feeding Minds Campaign, Sustain: the alliance for better farming and food. "Changing Diets, Changing Minds: how food affects our mental well being and behaviour" is available at [www.sustainweb.org](http://www.sustainweb.org)

## SUMMARY

### Introduction

There appears to be no respite in the pace or impact of the growing burden of mental ill-health on us as individuals and as a nation. The UK costs of mental ill-health are now approaching £100 billion a year. Many explanations have been offered for this trend – from globalisation and changes in economic stability to changing social trends and diminishing interpersonal networks.

Mental health problems are believed to be the result of a combination of factors, including age, genetics and environmental factors. One of the most obvious, yet under-recognised factors in the development of major trends in mental health is the role of nutrition. The body of evidence linking diet and mental health is growing at a rapid pace. As well as its impact on short and long-term mental health, the evidence indicates that food plays an important contributing role in the development, management and prevention of specific mental health problems such as depression, schizophrenia, attention deficit hyperactivity disorder, and Alzheimer's disease.

Increasingly, the links between diet and mental health are gathering support from academic and clinical research communities. Studies have ranged from examining individual responses to diet changes in randomised controlled trials, to population-based cross-cultural comparisons of mental health and food intake.

But the role of diet in the nation's mental health has yet to be fully understood and embraced, and shifts in policy and practice have been slow to materialise. Possible reasons include a lack of awareness of the evidence, scepticism as to its quality and vested interests in other treatments and approaches.

For decades the prevailing treatment for mental health problems has been medication (and psychotherapy to a lesser extent), and mental health promotion methods have centred around information and education. The treatment implications of research into nutrition and mental health have rarely been acknowledged by mainstream medicine, yet the potential returns are enormous. The mental health promotion implications are also of the utmost importance, and deserve much greater attention.

### How food and food production are implicated in mental health

Most of the brain is derived directly from food. The last fifty years have witnessed remarkable alterations to what we eat, how we process and refine it, food additives, use of pesticides and the alteration of animal fats through intensive farming. Changes to our diet in recent years mean that what we consume daily is very different in its nutritional content from that of even our closest ancestors.

It has been estimated that the average person in the UK and other industrialised countries will eat more than 4 kilogrammes of additives every year. The impact of this situation is still controversial as Governments have appeared reluctant to fund, conduct or publish rigorously controlled studies examining the effects of additives.

Changing methods of farming have also introduced higher levels and different types of fat into our diet. For example, chickens now reach their slaughter weight twice as fast as they did thirty years ago, which has changed the nutritional profile of the meat. Whereas a chicken carcass used to be 2% fat, it is now 22%. Also, the diet fed to chickens has changed dramatically, which has reduced omega-3 fatty acids and increased omega-6 fatty acids in chicken meat. Similarly, the diet fed to farmed fish is changing the ratio of fatty acids in the fish we eat.

## How fats and amino acids work in our brains

Because the 'dry weight' of the brain is composed of about 60% fat, the fats we eat directly affect the structure and substance of the brain cell membranes. Saturated fats – those that are hard at room temperature, like lard – make the cell membranes in our brain and body tissue less flexible.

Twenty per cent of the fat in our brain is made from the essential fatty acids omega-3 and omega-6. They are termed 'essential' as they cannot be made within the body, so must be derived directly from the diet. Each fatty acid performs vital functions in the structuring of brain cells (or neurons), ensuring that smooth communication is possible within the brain. Both are found in equal amounts in the brain, and it is believed they should be eaten in equal amounts.

Unequal intakes of omega-3 and omega-6 fats are implicated in a number of mental health problems, including depression, and concentration and memory problems. Experts suggest that most people consuming Western diets eat far too much omega-6 and not enough omega-3.

The recent and widespread appearance of trans-fat in the diet raises great concern, primarily because these fats assume the same position as essential fatty acids (EFAs) in the brain, meaning vital nutrients are not able to assume their rightful position for the brain to function effectively. Trans-fats are prevalent and pervasive, found in processed foods like commercially-made cakes, crisps and ready meals.

Neurotransmitters are messengers passed back and forth within the brain. They allow neurons to communicate information amongst themselves. Neurotransmitters are made from amino acids, which often must be derived directly from the diet. For example, the neurotransmitter serotonin, which is associated with feelings of contentment, is made from the amino acid tryptophan. Adrenaline and dopamine, the 'motivating' neurotransmitters, are made from phenylalanine (see tables for further information about their sources).

## The role of diet in relation to mood and mental wellbeing

Just like the heart, stomach and liver, the brain is an organ that is acutely sensitive to what we eat and drink. To remain healthy, it needs different amounts of complex carbohydrates, essential fatty acids, amino acids, vitamins and minerals, and water.

Anyone who has ever smoked, drank alcohol, tea or coffee or eaten chocolate knows that such products can improve one's mood, at least a little and temporarily. What seems to be less common is an understanding that some foods can have a lasting influence on mood and mental wellbeing because of the impact they have on the structure and function of the brain.

A sufficient balance of neurotransmitters is essential for good mental health, as they are influential in the feelings of contentment and anxiety, memory function and cognitive function. Some foods are perfect at temporarily promoting the neurotransmitter that we lack and, as we crave and then consume them, they 'trick' us into feeling better, for a while.

By making the brain less sensitive to its own transmitters and less able to produce healthy patterns of brain activity, these substances encourage the brain to down-regulate. Down-regulation is the brain's instinctive mechanism for achieving homeostasis: when the brain is 'flooded' by an artificial influx of a neurotransmitter (for example, adrenaline triggered by a strong coffee), the brain's receptors respond by 'closing down' until the excess is metabolised away. This can create a vicious circle, where the brain down-regulates in response to certain substances, which in turn prompt the individual to increase their intake of those substances to get the release of the neurotransmitter that their brain is lacking. This is one reason why people sometimes crave certain products.

## The role of diet in relation to specific mental health problems

### Depression

A number of cross-country and population-based studies have linked the intake of certain nutrients with the reported prevalence of different types of depression. For example, correlations between low intakes of fish by country and high levels of depression among its citizens – and the reverse – have been shown for many types of depression.

Complex carbohydrates as well as certain food components such as folic acid, omega-3 fatty acids, selenium and tryptophan are thought to decrease the symptoms of depression. Those with low intakes of folate, or folic acid, have been found to be significantly more likely to be diagnosed with depression than those with higher intakes. Similar conclusions have been drawn from studies looking at the association of depression with low levels of zinc and vitamins B1, B2 and C. In other studies standard treatments have been supplemented with these micro-nutrients resulting in greater relief of symptoms in people with depression and bi-polar affective disorder, in some cases by as much as 50%.

One way that vitamins and minerals may improve mental health and cognitive function is through their role in the brain's conversion of amino acids. Much has been said in public fora about the importance of the neurotransmitter serotonin, and its presence in lower levels being linked to depression. Because of this, the precursor to serotonin – the amino acid tryptophan – has been the focus of much research. Some studies have found that combining tryptophan with selective serotonin reuptake inhibitor (SSRI) antidepressants gives better results than SSRIs alone. Other dietary alterations can ease or hinder the entry of tryptophan to the brain.

### Schizophrenia

Studies have looked at the impact of specific nutrients on the rates of schizophrenia in the general population, focusing on fats and antioxidants. Epidemiological evidence has shown that people with schizophrenia have lower levels of polyunsaturated fatty acids in their bodies than those with no experience of the illness. Other research has shown that antioxidant enzymes are lower in the brains of people with schizophrenia.

Further work is needed in this area to identify specific mechanisms through which diet can work alongside other care options to alleviate the symptoms of schizophrenia.

### Alzheimer's Disease

Specific connections have been found between the occurrence of Alzheimer's and different intakes of foods, including saturated fat, vitamins and minerals. Although there have been few controlled clinical trials testing the effects of nutritional treatments, most evidence points to the role of nutrition in the prevention of, rather than the treatment of Alzheimer's Disease. Many of the studies have shown a positive association between saturated fat intake and the incidence of dementia, and a negative relationship between the incidence of dementia and intake of polyunsaturated fatty acid. One study looking at the total fat intake of eleven countries found a correlation between higher levels of fat consumption and higher levels of Alzheimer's Disease amongst over 65's.

Other studies have explored the protection from Alzheimer's that has been linked with high vegetable consumption. One long term population-based study found that high intakes of vitamins C and E were linked to a lower risk of AD, particularly among smokers, and this finding has been replicated in other studies.

## **Attention Deficit Hyperactivity Disorder (ADHD)**

Many parents, teachers and others have reported great improvements when dietary changes are introduced to children with ADHD. Two food groups that have been implicated through clinical research are essential fatty acids (EFAs) and minerals. Studies have found some EFAs to be significantly low in hyperactive children. A similar relationship has been found with levels of iron in children with symptoms of ADHD.

## **Conclusion**

The body of evidence linking diet with mental health is growing at a rapid pace. As well as its impact on feelings of mood and general wellbeing, the evidence demonstrates its contribution to the development, prevention and management of specific mental health problems.

The implications are far-reaching for all those with a stake in the care, treatment and prevention of mental illness. They must be embraced by stakeholders if current and future generations are to ease the growing health, economic and social burden of mental ill-health.

There is an urgent need for policy-makers, practitioners, industry, service users and consumers to give proper credence to the role that nutrition plays in mental health.

## METHODS

A multi-methodological approach was adopted in the production of this report, in order to reflect the breadth and depth of evidence in the field. Methods included:

- A review of existing literature and evidence relating to nutrition and mental health. Although a full systematic review was beyond the scope and purpose of this report, evidence was collected from peer-reviewed journals in addition to non-reviewed literature, the internet, personal communications and conference proceedings
- A National Opinion Poll (NOP) survey was conducted with 2122 adults aged 15 years and over, throughout the UK. The sample was controlled for age, sex and employment status. Questions asked concerned food wastage, frequency of consumption of different foods and drinks, the perceived impact of different foods on mood, reasons for food consumption and experience of mental health problems (see Appendix A)
- Site visits/liaison with six innovative services that use diet and nutrition to promote mental health or to manage mental health problems
- Peer review of the report through a reference group of nutrition and mental health specialists

## KEY FINDINGS

### Food consumption

- What we are eating now is very different from that of our recent ancestors. Food production and manufacturing techniques, coupled with changing lifestyles and increasing access to processed foods, mean that our intake of fresh, nutritious, local produce is much lower, at the same time as our intake of fat, sugar, alcohol and additives is much higher.
- Up to 40% of food we produce is wasted directly because we buy it and then throw it away, or indirectly, because supermarkets reject produce that is the 'wrong' size or shape or past its 'sell-by' date.
- Over the last 60 years there has been a 34% decline in UK vegetable consumption with currently only 13% of men and 15% of women now eating at least five portions of fruit and vegetables per day.
- People in the UK eat 59% less fish than they did 60 years ago.

### Mental health

- Some nutrients trick the brain by triggering an over-release of neurotransmitters and some foods damage the brain by releasing toxins or oxidants that harm healthy brain cells. There are many more nutrients that serve the brain without deception or damage, which can improve mood and mental well being.
- A balanced mood and feelings of well being can be protected by ensuring that our diet provides adequate amounts of complex carbohydrates, essential fats, amino acids, vitamins and minerals and water.
- There is a plethora of anecdotal, clinical and controlled studies that point to the importance of diet as one part of the jigsaw in the prevention of poor mental health and the promotion of good mental health.
- Research indicates that good nutritional intake may be linked to academic success. A number of studies report that providing children with breakfast improves their daily and long-term academic performance.
- Among some young offenders, diets supplemented with vitamins, minerals and essential fatty acids have resulted in significant and remarkable reductions in anti-social behaviour.

### Mental health problems

- There is growing evidence that diet plays an important contributory role in specific mental health problems including Attention Deficit Hyperactivity Disorder (ADHD), depression, schizophrenia and Alzheimer's disease.
- The presentation of depression in the UK population has increased dramatically over recent decades and this has been accompanied by a decrease in the age of onset, with more cases being reported in children, adolescents and young adults.
- A correlation between low intakes of fish by a country and high levels of depression amongst its citizens, as well as the reverse, has been shown for major depression, post-natal depression, seasonal affective disorder and bipolar affective disorder.

- The incidence of schizophrenia is similar across the globe, although there are differences in outcomes between countries. This implies that environmental factors have some role in determining the duration and severity of symptoms, and the role that diet has to play is attracting increasing scientific interest.
- Alzheimer's disease has become more common in the past fifty years and is believed to be the result of a combination of factors, including the aging population, genetics and environmental factors.
- Growing epidemiological evidence suggests that diet may be one of those environmental factors with associations being reported between the occurrence of Alzheimer's and the amount of saturated fats, vitamins and minerals consumed.
- Complementary mental health care services that focus on diet and nutrition report promising results, particularly among those who experience ADHD and depression. On the whole however, they are poorly resourced and have received insufficient research attention to draw firm conclusions.

### **National opinion poll findings (NOP)**

- Women report eating healthy foods, including fresh vegetables, fruit or fruit juice and meals made from scratch, more often than men, who tend to eat more takeaways and ready meals.
- Younger people report eating less healthy foods (fresh fruit and vegetables, organic foods and meals made from scratch) and more unhealthy foods (chips and crisps, chocolate, ready meals and takeaways) than older people.
- 29% of 15-24 year olds report eating a meal made from scratch every day, compared with 50% of those aged over 65.
- Younger people are more likely than older people to report daily mental health problems, as are those in social class DE, those on a lower income, those who are not in paid employment and those who are not married.
- Nearly two thirds of those who do not report daily mental health problems eat fresh fruit or fruit juice every day, compared with less than half of those who do report daily mental health problems. This pattern is similar for fresh vegetables and salad.
- Those who report some level of mental health problem also eat fewer healthy foods (fresh fruit and vegetables, organic foods and meals made from scratch) and more unhealthy foods (chips and crisps, chocolate, ready meals and takeaways).

## RECOMMENDATIONS

The Government as a whole, and all relevant departments and agencies, should officially recognise the links between diet and mental health and incorporate this recognition into all food and mental health related policy and practice. For instance, general healthy eating campaigns such as five-a-day should always include a mental health component.

Because the diet that is good for the brain is also the same diet that is good for the body, Government should increase financial and political support for measures to ensure that sustainable\* supplies of a wide variety of nutrient-rich foods are available, affordable and attractive for people to obtain both now and in the future.

Specifically:

1.

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The UK population and particular groups who are at increased risk of mental health problems should be provided with information about foods that promote their mental, emotional and physical well-being

**Stakeholders:**

Department of Health   
NHS Health Scotland   
Health and Social Care Department   
Department of Health, Social Services and Public Safety   
Food Standards Agency 

2.

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United Kingdom Health Departments should review and improve food and nutrition standards for the mental health and social care sectors in light of the evidence that a range of nutrients contribute to mental health and well being

**Stakeholders:**

Department of Health   
NHS Health Scotland   
Health and Social Care Department   
Department of Health, Social Services and Public Safety 

3.

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Organisations that commission mental health services should include within commissioning criteria and service specifications food and nutrition standards for any services that provide food

**Stakeholders:**

Primary Care Trusts   
Local Authorities   
NHS Health Boards   
Local Health Boards   
Health and Social Services Boards/Trusts 

4.

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Annual monitoring of food and nutrition standards across the health and social care sector should be incorporated into current performance assessment mechanisms

**Stakeholders:**

Healthcare Commission   
Commission for Social Care Inspection   
Care Commission   
NHS Quality Improvement Scotland   
Mental Welfare Commission   
Health Inspectorate Wales   
Care Standards Inspectorate   
Northern Health and Social Services Council   
Department of Health, Social Services and Public Safety 

5.

Primary care should have ready access to information on the link between diet and mental health as well as a working knowledge of the information and expertise available to support people through dietary change

**Stakeholders:**

Primary Care Trusts   
NHS Health Boards   
Local Health Boards   
Health and Social Services Boards/Trusts 

6.

Secondary mental health service staff should have ready access to nutritional specialists for liaison and consultation

**Stakeholders:**

Mental Health Trusts   
NHS Health Boards   
Local Health Boards   
Health and Social Services Boards/Trusts 

7.

All existing NHS and social care facilities that provide meals to service users, including the independent and not for profit sector, should instigate sustainable food policies and practices, so that all service users and staff are encouraged to choose, or be provided with if unable to choose, diverse and culturally appropriate meals, snacks and drinks that promote their mental, emotional and physical well-being

**Stakeholders:**

Strategic Health Authorities (or their successor)   
Local Health Boards   
NHS Health Boards   
Health and Social Services Boards/Trusts   
Local Authorities 

8.

All prison facilities should instigate sustainable food policies and practices so that all residents and staff are encouraged to choose culturally diverse and appropriate meals, snacks and drinks that promote their mental, emotional and physical well-being

**Stakeholders:**

Home Office   
Scottish Executive   
Northern Ireland Office 

9.

Research funding bodies should co-ordinate their strategies and increase the grants available to investigate the relationship between diet and mental health, particularly the effectiveness of interventions

**Stakeholders:**

Department of Health through its Research Funders Group   
Scottish Executive Health Department and National Programme for Improving Mental Health and Well-being   
Health and Social Care Department   
Department of Health, Social Services and Public Safety   
Food Standards Agency 

10.

Regulations should be introduced to support the promotion of healthy food to children, and to protect them from all forms of broadcast and non-broadcast marketing of unhealthy food

**Stakeholders:**

Department for Culture Media and Sport   
Ofcom   
The Department of Health's Advertising Forum   
Department of Health   
NHS Health Scotland   
Scottish Executive   
Health and Social Care Department   
Department of Health, Social Services and Public Safety 

11.

Practical food skills, including cooking and growing, should be reintroduced as a compulsory part of the national curriculum

**Stakeholders:**

Department for Education and Skills   
Health Promoting Schools   
Scottish Executive Education Department   
Department of Education 

12.

The progressive approach to ensuring better food in school meals should be continued and in addition access to free water dispensers should be available to all children by 2007

**Stakeholders:**

The School Food Trust   
Department for Education and Skills   
Health Promoting Schools   
Scottish Executive Education Department   
Department of Education 

13.

Targets should be introduced to reduce unhealthy levels of fat, sugar and salt in processed food, and to remove damaging trans-fats from food ingredients and food products. As an interim measure, manufacturers should be encouraged to label clearly the nutritional quality of and ingredients in their products

**Stakeholders:**

Food Standards Agency 

14.

Agricultural policy development should be informed by what is known of its nutritional impact and its subsequent effect upon our mental as well as physical health. Specifically, support must be increased for organic farming, the production and promotion of fruit and vegetables, other micro-nutrient rich food and for alternative sources to oily fish of omega-3 fats. Moreover, Government policy on promoting fish consumption needs to change to promoting only sustainable sources of oily fish, with low levels of toxicity

**Stakeholders:**

Department for the Environment, Food and Rural Affairs   
Food Standards Agency   
Department of Environment and Rural Affairs   
Department of Agriculture and Rural Development 

# Mental Health Foundation

## About the Mental Health Foundation

Founded in 1949, the Mental Health Foundation is the leading UK charity working in mental health and learning disabilities.

We are unique in the way we work. We bring together teams that undertake research, develop services, design training, influence policy and raise public awareness within one organisation. We are keen to tackle difficult issues and try different approaches, many of them led by service users themselves. We use our findings to promote survival, recovery and prevention. We do this by working with statutory and voluntary organisations, from GP practices to primary schools. We enable them to provide better help for people with mental health problems or learning disabilities, and promote mental well-being.

We also work to influence policy, including Government at the highest levels. We use our knowledge to raise awareness and to help tackle stigma attached to mental illness and learning disabilities. We reach millions of people every year through our media work, information booklets and online services.

If you would like to find out more about our work, please contact us.

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Our partner in the Feeding Minds Campaign is



## About Sustain

**Sustain: The alliance for better food and farming** advocates food and agriculture policies and practices that enhance the health and welfare of people and animals, improve the working and living environment, enrich society and culture and promote equity. We represent over 100 national public interest organisations working at international, national, regional and local level.

If you would like to find out more about our work, please contact us.

### Sustain: The alliance for better farming and food

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