

A review and summary of the impact of malnutrition in older people and the reported costs and benefits of interventions

Lisa Wilson, PhD, RNutr (Public Health)
International Longevity Centre - UK
May 2013



Contents

The Financial Case for Prevention and Early Treatment of Malnutrition.....3
 Key Facts.....4
 Malnutrition among Older People in the UK: The Scale of the Challenge..... 5
 Key Recommendations..... 5
 Introduction.....6
 Defining Malnutrition.....7
 Understanding the Problem7
 The Economic Cost of Malnutrition in the UK.....8
 Research into Cost to Health and Social Care.....8
 Research into Malnutrition in General Practice.....10
 Discussion.....12
 The Impact of Population Growth.....13
 Further Considerations.....15
 Indirect Costs.....15
 Personal and Health Costs to Individuals.....16
 Evidence of Cost Savings.....17
 Interventions to Prevent and Treat Malnutrition..... 18
 Interventions in Clinical Settings.....19
 Oral Nutritional Supplements.....20
 Social / Personal Interventions.....22
 The Food Train Dumfries.....22
 AGE UK Oldham..... 25
 The Role of Community Meals.....26
 Conclusion.....27
 References.....28
 Note to Reader.....30

The Financial Case for Prevention and Early Treatment of Malnutrition

Costs

- Malnourished patients visiting their GP incur an additional health care cost of £1449 per patient in the year following diagnosis (Guest et al, 2011; Malnutrition Task Force, 2013).
- The estimated costs of malnutrition in the UK range from :
 - £5bn for direct health care costs (Guest et al, 2011; Malnutrition Task Force, 2013)
 - To £13bn for associated health and social care expenditure in 2007 (Elia & Russell for BAPEN, 2009).
- Dehydration is a significant problem among older people, but there are no reported studies which demonstrate the total cost.

Saving opportunities

- Investing in screening and early intervention could result in a net saving of £71,800 per 100,000 of the population for the average Primary Care Trust (National Institute for Health & Care Excellence, 2012).
- Regular screening and monitoring all people in care homes has been shown to cost half that of treating those who are malnourished (Meijers et al, 2011).
- Investing in community meal services has shown every £1 invested in community meals leads to a Social Return on Investment of between £3.00-£5.30 (Leicestershire Meals Service, 2012; Hertfordshire Community Meals, 2012).
- Appropriate use of Oral Nutritional Supplements (ONS) in hospitals has been found to save £849 per patient based on length of stay and reduce GP attendances (Elia & Stratton, 2009).
- Proper hydration alone has been identified as potentially leading to significant savings to the NHS (Campbell, 2011), but further research is needed to determine costs.

Note: The costs of treating malnutrition and the interventions do not explicitly differentiate between age groups.

Key Facts

1. It is estimated that 1 in 10 people over 65 living in the community are malnourished or at risk.
2. Research has shown that malnourished people;
 - a. saw their GP twice as often, had 3 times the number of hospital admissions and
 - b. stayed in hospital more than 3 days longer than those who were well nourished (Guest et al, 2011).
3. 30% of those identified as malnourished by their GP remained malnourished for a further 6 months after diagnosis (Guest et al, 2011).
4. The number of people aged 65 and over is projected to rise by nearly 50% in the next 20 years to over 16 million. (Office for National Statistics, 2011; Age UK, 2013). We cannot ignore the problem of malnutrition any longer; there is a 'cost' to doing nothing as the situation could get worse.
5. Malnutrition increases dependency on family, carers and support services (Carers UK, 2011).
6. ONS is associated with a reduction of overall hospital readmissions by 30% (Cawood et al, 2012) and NICE deems appropriate treatment with ONS to be cost effective (NICE, 2006).
7. Maintaining independence, preventing isolation, ensuring access to food and services, preventing poverty and ensuring quality of life are critical components in preventing malnutrition. Evaluated community meal services demonstrate a positive impact in achieving this.
8. Food, hydration and nutrition do not exist in isolation from other influences on health and wellbeing. Therefore, a holistic approach to the individual's needs is required, inclusive of teams and organisations providing integrated care, support and treatment.

Malnutrition Among Older People in the UK: The Scale of the Challenge

- The fact that over 10% of people over 65 suffer from malnutrition and dehydration in a modern western nation is a moral scandal and a huge financial burden.
- Untreated, the problem could get far worse as the proportion of older people increases.
- There is clear evidence that shows we can prevent malnutrition through screening and early intervention.
- There is evidence available that shows local communities can make significant savings through screening and early intervention (NICE 2012).
- There is evidence that the benefits of treating malnutrition far outweigh the costs.
- Due to gaps in evidence it is difficult to extrapolate the costs of treating malnutrition at a local community level from national estimates or reported direct costs.
- Due to gaps in evidence it is difficult to differentiate between preventable and non-preventable costs.

Key Recommendations

1. Local Health and Wellbeing Boards and Clinical Commissioning Groups should implement NICE recommendations for screening and early intervention as this is shown to be cost effective.
2. A reliable method should be developed to assist local communities (Local Health and Wellbeing Boards / Clinical Commissioning Groups (CCGs)) to ascertain the cost impact of malnutrition and incurred expenditure on treating malnutrition so there is a compelling business case for change.
3. Further research showing the benefits of food solutions and interventions would be helpful in managing malnutrition.
4. Pilot *implementation* of the NICE recommendations (screening) and implementing a range of interventions in a few local health communities so it clearly demonstrates the local business case for Local Health and Wellbeing Boards and Clinical Commissioning Groups and how it can be achieved.
5. Further research is needed into the cost of dehydration and the impact it has on the individual as well as health and social care services.

Introduction

The number of people aged 65 and over is projected to rise by nearly 50% in the next 20 years to over 16 million (Office for National Statistics, 2011; Age UK, 2013). The significant change in the demographic structure of the UK has given rise to much debate on the most appropriate way to support people as they get older.

Malnutrition is one of the key issues affecting the health of older people in the UK, yet it remains under-detected, under-treated and under-resourced and often over looked by those working with and for older people. For many older people malnutrition leads to further weight loss, increased infections and delay in recovery from illness as well as increased hospital admissions and length of stay. Resolving the issues linked to malnutrition and food access for older people is pivotal in the development of health and social care policy, given the huge impact nutritional status has on health, wellbeing, quality of life and independence.

For those caring for older people (whether at home or in hospitals or care homes) the challenge is to understand the causes of malnutrition, whether it is disease, poor health, social, medical or personal reasons. They should then provide both effective treatment and preventative measures to ensure that malnutrition does not reoccur. Malnutrition is both largely preventable and treatable; it is not a natural consequence of older age and is a significant cost to health and social care services in the UK as well as to the health, wellbeing and quality of life of the older people it affects.

We cannot afford to ignore malnutrition and its consequences any longer. This report considers the cost of malnutrition in the UK and the interventions which have been proven to work in tackling both the causes and consequences of malnutrition. It presents a case for investment in prevention and early intervention and demonstrates that, as the population of the UK continues to age, the situation for older people could get much worse if not addressed.

Defining Malnutrition

One of the challenges of addressing malnutrition is the lack of a consistent definition outside of clinical settings. Malnutrition literally means poor or bad nutrition and in the case of the majority of older people, refers directly to a lack of adequate nutrition leading to weight loss and ill health.

The causes of malnutrition are many and varied and whilst it is true that disease has a significant role to play there are many other causes in older people which could be preventable. The Malnutrition Task Force aims to increase awareness of these factors and has developed a definition of preventable malnutrition (i.e. malnutrition not directly resulting from disease) that takes into account the myriad of influences on a person's nutritional status.

Preventable malnutrition is a state of poor nutrition and/ or hydration which can be avoided if the right actions are taken to address the causes. *Preventable malnutrition is not specifically related to disease or illness, but these may often be a consequence or contributing factor linked to poor dietary intake and ill health.*

Preventable malnutrition includes that caused by physical disability, problems accessing or cooking food, poor appetite, low income, depression and the misconception that it is normal to become thinner as you get older.

However, the challenge with malnutrition is that it can be difficult to identify on an individual level where malnutrition results from disease versus lifestyle factors as the two become inextricably linked. As such, this report does not attempt to distinguish between the two, but instead considers malnutrition as a whole and its impact on the individual, health and social care.

Understanding the Problem

At any given time, more than three million people in the UK are either malnourished or at risk of malnutrition. The vast majority of these (approximately 93%) are living in the community, with a further 5% in care homes and 2% in hospital (Elia & Russell, 2009). It is estimated that 1 in 10 people over 65 living in the community are malnourished or at risk (ENHA, 2006), Currently, over 2 million people over 75 live alone (Hill et al, 2011) and with risk increasing in those over 75, malnutrition directly affects a significant proportion of the older population living alone in the UK.

Much of malnutrition taking place in the community can be linked to other experiences in a person's life. Whilst some of this might be the result of underlying ill health or disease, other influences include depression or anxiety, social exclusion, problems with dentition, transport or mobility difficulties, poverty, the influence of medication on appetite or the body's ability to absorb nutrients and access to food shops and other services.

Other research has found that individuals who are malnourished will experience: increased ill health, increased hospital admissions, increased risk of infection and greater antibiotic use, longer recovery time from surgery and illness and increased risk of mortality (Elia et al, 2005; Heismayr et al, 2009).

Malnutrition in care homes has also been linked to increased hospitalisation, readmission and long term ill health (Meijers et al, 2011). Those experiencing malnutrition are more likely to be admitted to a care home or to be readmitted to hospital in the future. Equally, if malnutrition is not resolved in hospital or care homes, those going back to their own home have increased risk of ill health and readmission. Tackling malnutrition effectively will break this cycle.

Malnutrition has many costs. It affects older people, their families and carers and has a significant burden on wider health and social care resources. Defining these costs involves considering not just how expensive malnutrition is, but also the personal and social costs to the individual. However, in order to make a case for tackling malnutrition across all care settings and for all older people, it is vital to fully understand the economic implications of malnutrition and the consequences of inaction.

It should be noted that this paper does not consider the costs associated with dehydration in the UK, awaiting instead the results of a pioneering study which are expected in 2013. A recommendation of this report is that further research is needed into the cost of dehydration and the impact it has on the individual as well as health and social care services. In the meantime, research has identified that proper hydration alone has been identified as potentially leading to significant savings to the NHS (Campbell, 2011) although further research is needed to quantify this impact. Water is inexpensive: a hospital patient could drink two litres of tap water a day for nearly five months and cost the NHS just the price of a first class stamp (Royal College of Nursing, 2007). However, until the absolute costs of dehydration are fully understood, the effect of these savings cannot be qualified.

The Economic Cost of Malnutrition in the UK

To date, few studies have effectively determined the large scale economic consequences of malnutrition (Elia & Bistran, 2009). One of the reasons is the difficulty in equating the adverse consequences of malnutrition with monetary values, particularly as a result of the wide variety of influences on nutritional status. Some authors have looked at specific outcome based costs, considering the impact of malnutrition and its associated treatment costs in hospital financing mechanisms such as Diagnostic Related Groups (Amarel et al, 2007). In fact, most studies have focused on hospital and care home settings to attempt to measure more definite or tangible costs as a starting point for looking at wider costs. Few have also estimated the costs in terms of the links between hospital stay, residential care and community care that result from malnutrition (Weekes et al, 2007, Elia et al, 2005) although some work exists outside of the UK (Freijer et al, 2012).

This report considers the two recent significant studies which have calculated the cost of malnutrition in the UK (Elia & Russell for BAPEN, 2009, Guest et al, 2011). The two methodologies differ in their aim and scope, but both provide valuable insights into the cost of malnutrition in the UK.

Research into Cost to Health and Social Care

In 2009, research by the British Association for Parenteral and Enteral Nutrition (BAPEN) calculated the wider associated cost of malnutrition in the UK (Elia & Russell, 2009).

This research was based on estimates of malnutrition prevalence and total health and social care costs for the UK proving that malnutrition is one of the most significant financial burdens to health and social

care in the UK. The study used the Malnutrition Universal Screening Tool (MUST) to identify those at medium and high risk of malnutrition. MUST uses a combination of BMI and unplanned weight loss to measure malnutrition and takes into account the effect of acute disease on nutritional intake (all steps recommended by the National Institute for Health and Care Excellence (NICE) to screen for malnutrition; NICE, 2006).

To calculate the cost of malnutrition the study estimated the total expenditure on health and social care in the UK.

Costs calculated by BAPEN to determine the total expenditure on health and social care

Public Expenditure on Health Care

- Cost of Hospital Inpatients
- Cost of Hospital Outpatients
- Cost of Prescriptions
- Cost of General Medical Services

Public Expenditure on Social Care

- Nursing and Residential Care
- Home Care
- Assessment and Management
- Other Adults and Children and Family Services

Private Expenditure on Health and Social Care

Using the data presented above, the prevalence rates of malnutrition were applied by setting to the expenditure estimates, giving a total figure of the cost attributable to malnutrition of **£13.1094 billion**, constituting 10% of public expenditure on health care (£139.7 billion in 2007). This figure was considered to be a minimum value as calculations took into account public expenditure only and costs associated with some services were not taken into account. Although the calculation includes all age groups, a greater proportion of older people have been found to be at risk. This elevated risk is effectively demonstrated by the prevalence of malnutrition in care homes; 1 in 3 adults on admission in 2010 (Russell & Elia, 2011).

Key facts – Elia & Russell (BAPEN) 2009

- Malnutrition identified using the Malnutrition Universal Screening Tool (MUST) – medium and high risk individuals (combination of BMI, unintentional weight loss and acute disease effect)
- Study aimed to determine costs of Disease Related Malnutrition
- Hospitals, care homes, primary care and social care
- Clinical practice screening tool, other clinician visits, hospital admissions, laboratory tests and prescriptions issued
- UK Nutrition Screening Survey 2007 and other prevalence data

Based on estimates of the prevalence of malnutrition and total health and social care costs for the UK in 2007, calculations indicated that the cost of disease-related malnutrition in 2007 in the UK was more than £13 billion.

Recent research in Ireland (Rice & Normand, 2012) used the methodology developed by BAPEN and the results of the BAPEN screening week survey in 2010 (which included Ireland) to determine the costs associated with health and social care use of malnourished patients. The study found that the annual public health and social care cost associated with adult malnourished patients in Ireland is estimated at over €1.4 billion, representing 10 % of the health care budget. Most of this cost arises in acute hospital or residential care settings (i.e. 70 %), meaning that much of the cost is associated with malnutrition in older people. This finding reflects that of BAPEN in the UK.

On an individual level, Elia & Russell (2009) also calculated that malnutrition costs an additional £231 per head of the population, providing a significant economic burden to society. However, given the national level of the data, sample size and calculations conducted, it is not possible to unpick this figure to provide a local level figure on the cost of malnutrition.

BAPEN are currently updating their model to determine the current impact of malnutrition and its associated health and social care costs in the UK. In addition, they aim to determine the local level impact and costs associated with malnutrition to support an economic business case for addressing malnutrition.

Research into Malnutrition in General Practice

The second key study under consideration as a part of this report was conducted by Guest et al (2011) to examine the effect of malnutrition on clinical outcomes and health care resource use in the community setting, through General Practice (GP). The aim was to establish the resource implications and corresponding health care costs following a GP diagnosis of malnutrition and the clinical outcomes following this diagnosis.

Confidential GP records were accessed via a national data base of UK patients and compared malnourished versus non-malnourished patients all living in their own homes. Community based and secondary care resource use was recorded for a period of six months following diagnosis. Whilst the study did not look at older people specifically, the average age of the group was 63, with 61% of participants over 60 years of age.

The study found that malnourished patients had an increased length of hospital stay by at least 3 days which has also been found in larger European studies looking at the impact of malnutrition on length of stay in hospitals (Pernicka et al, 2010).

The malnourished group were found to have more co-morbidities and poorer outcomes; significantly more of this group died during the six month follow up period. The key facts and findings from this study are presented in the box below.

Key Facts - Guest et al (2011)

- Malnutrition identified by BMI <18.5 (meaning very frail patients).
- 1000 records of malnourished patients against 996 non-malnourished patients out of 5 million patients in 300 general practices in the UK
Date: 2006-2007.
- GP consultations, specialist referrals, other clinician visits, hospital admissions, laboratory tests and prescriptions issued.

The malnourished group:

- saw their GP 2.1 times more often
- had three times the number of hospital admissions
- stayed in hospital more than 3 days longer than those who were well nourished
- More co-morbidities and poorer outcomes

Excludes:

- Hospital-based prescribing
- Home visits
- Residential/ Nursing Homes

The incremental cost of health care ranges from £689 to £1241 per patient (mean of £1,003 per patient over a 6 month period).

Additional costs of £1449 per malnourished person over 1 year (taking into account 30% still malnourished at 6 months).

Estimate: 30% of patients remain malnourished 6 months after diagnosis.

Guest et al's study concluded that the additional cost to the health care system for a six month period was £1003 per patient. 34% of this cost was on GP visits alone, the remaining costs being primarily attributable to hospital admissions and drug prescriptions. More recent research has also found significantly greater resource use among patients with low BMI in GP surgeries (Ashman et al, 2012) reflecting both the high level of malnutrition found in the community (Elia & Russell, 2009; McGurk et al 2012) and the increased costs to the health care system among malnourished individuals.

Of equal concern is that the study also found that, of the 1000 malnourished patients in the sample, only 37% were given any treatment. This figure highlights not only the lack of awareness of the problem of malnutrition, its causes and consequences, but also the lack of intervention and treatment generally available to people experiencing malnutrition in the community.

In contrast to the BAPEN study which looked at national figures, the study by Guest focused on the local situation for those living in the community through the medium of a GP surgery. As such, the opposite is true for this study in that it is not possible to extrapolate nationally without additional data, increased sample size and a clear estimate of the presence of malnutrition in the community, which GP records were unable to provide. Although excellent prevalence data (how many are currently malnourished) exists from BAPEN and its screening week data (Russell & Elia, 2011) and increasingly there is more data on the prevalence of malnutrition in GP surgeries, (McGurk et al, 2012), the Guest study looked at incidence (new cases of malnutrition) making the application of these figures inappropriate.

In addition, as Guest et al's calculation had a six month follow up of patient experiences, it is not appropriate to extrapolate the data to give an annual figure without access to records and continuing to follow patients. However, Guest did estimate a six monthly cost based on a series of potential incidence rates in the community as presented in his analysis and in the table below.

Total NHS cost (£ million, 2007/08 prices) of malnutrition in the first six months following diagnosis						
	Based on 61,399,100 people in the community, if incidence of malnutrition =					
	1%	2%	3%	4%	5%	6%
Lower cost estimate	423.0	846.1	1,269.1	1,692.2	2,115.2	2,538.2
Mean estimate	615.9	1,231.7	1,847.5	2,463.3	3,079.2	3,695.0
Higher cost estimate	762.0	1,523.9	2,285.9	3,047.9	3,809.8	4,571.8

Cost estimates of malnutrition in the community in first six months after diagnosis based on projected incidence rates – Guest et al, 2011.

Discussion

It is apparent from the analysis of the two cost studies presented above that whilst there is no consensus on the exact cost of malnutrition, it is certainly in the order of billions of pounds. The two studies presented both provide valuable insight into the impact of malnutrition in the UK and provide the opportunity to better understand the costs associated with malnutrition. However, the two studies give very different perspectives on the methods by which costs are calculated; using distinct methodologies to define malnutrition, different population groups and alternative definitions of cost. Guest et al (2011)

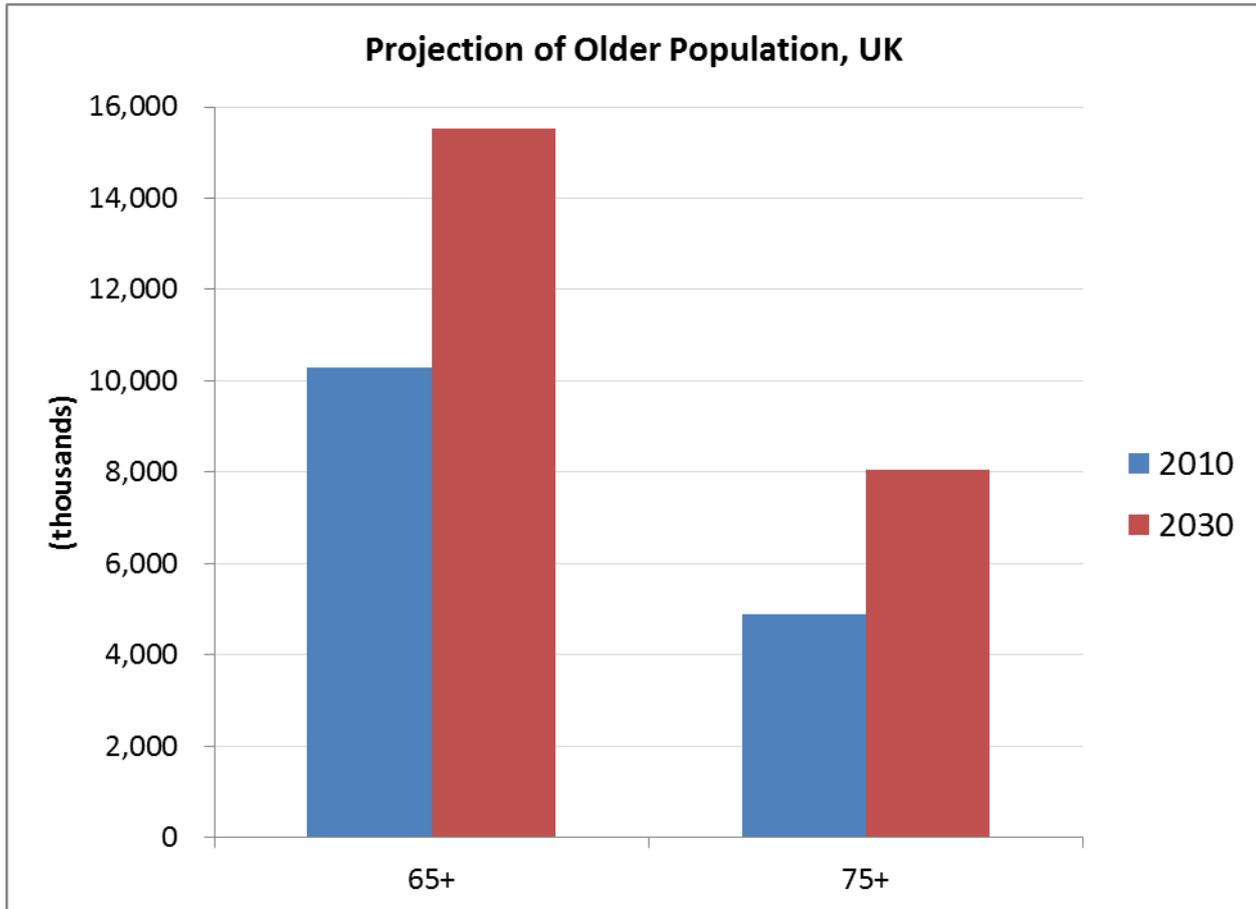
looked at the direct costs associated with GP visits resulting from a diagnosis of malnutrition, while Elia and Russell (2009) looked at the prevalence of malnutrition in the whole population and calculated its financial impact on health and social care expenditure. On examining the studies further, it is apparent that the group identified using GP diagnosis and BMI in Guest et al's work are very vulnerable people with severe malnutrition as their status needed to be this severe to be recognised by GPs. BAPEN, however, considered both medium and high risk groups as well as those already malnourished and focused on the hospital/clinical settings.

As such, these studies are not directly comparable, but the fact that both present significant costs for malnutrition makes a compelling case to address malnutrition. Indeed, NICE (2012) have demonstrated the savings that can be made from screening and early intervention alone at a local level, citing a saving of £71,800 per 100,000 of the population. Further research exploration can only further strengthen the economic case for screening, prevention and early treatment of malnutrition.

One outstanding question is how to effectively identify those in the community who are at risk of malnutrition but do not have a clinical diagnosis. The gaps in the information and evidence for the cost of malnutrition at a local level must also be addressed to support the development of a local business case for Local Health and Wellbeing Boards and Clinical Commissioning Groups. By demonstrating fully the extent of the problem of malnutrition, its impact on resource use and individual health and wellbeing, these bodies will be able to tackle malnutrition in their areas.

The Impact of Population Growth

Despite the need for further research to allow the application of an exact figure on the cost of malnutrition in the UK, it is clear that the problem will only become more significant in the future. Older people have been identified as experiencing the highest proportion of malnutrition in the UK (Malnutrition Task Force, 2013; Elia & Russell, 2009). The table below presents the current population projections for the older population in the UK according to the Office for National Statistics (2010).



Source: Office for National Statistics, 2010

The table above shows the huge increase in the older population predicted, especially in those over 75. An increased older population where malnutrition is left under-recognised and/or treated will lead to more older people experiencing malnutrition and a greater cost to society and the individual if the problem of malnutrition remains unchecked. This emphasises the need for urgent action through prevention, interventions and the appropriate treatment of malnutrition.

Further considerations

Indirect costs

Whilst malnutrition undoubtedly exerts a significant burden on health and social care resources, this is only part of the overall picture. Like many other health related factors, malnutrition does not work in isolation. It affects and is affected by other influences in a persons' life.

In financial terms, poverty risk and income can impact diet and food purchases and therefore increase malnutrition risk. It has long been established that for those living on lower incomes, the only flexible part of the budget, once rent and bills have been paid, is the food budget. Whilst some of this could be alleviated with better uptake of benefits, there are a number of significant indirect costs which can have an impact on malnutrition risk and the money available for food. With the current recession in the UK, these costs are exacerbated and, without the means to reduce personal costs, the cycle of malnutrition persists. As a result, changes or unexpected costs can strongly influence what food is purchased (Wilson, 2009). The box below outlines some of the key influencers on poverty and financial stability for older people.

Poverty and Financial Risk

- Approximately 16% of older people are currently living in poverty in the UK (Office for National Statistics, 2011).
- An estimated 1.8 million pensioners remain below the poverty level (>60% of average income after housing costs).
- Between 2004 and 2009, retail gas prices increased by 100% and electric by 60% (Age UK, 2012).
- In 2009, 42% of people 60+ (5.8 million) stated that they struggle to afford essential items e.g. food, gas or electricity. 22% reported skipping meals to cut back on food costs, the equivalent of 3 million people (Age UK, 2012b).
- In the winter of 2006/07, over 1 million older people (60+ GB) cut back on food shopping in order to pay for their home heating costs (Age UK, 2012b).
- Local Authority cut backs and the need to save resources have led to fewer Councils providing support to those assessed as having 'moderate needs' (18% of those assessed in 2011) (Age UK, 2012).
- Fewer hours of care were purchased and the cost of care for older people increased £360 per person between 2008-09 and 2009-10 making care at home less affordable.
- Less contact time with older people means carers may not observe risk factors for malnutrition (e.g. weight loss or loss of appetite).

Personal and Health Costs to the Individual

Research has found that a loss of independence is a direct consequence of malnutrition (Guest et al, 2011). Overall, malnutrition has been found to be associated with a decline in the body's ability to perform basic functions, such as muscle function and movement. In addition, those who are malnourished experience immune system problems, anaemia, reduced cognitive function (including confusion), poor wound healing and decreased bone mass (Weekes et al, 2009), all reducing a person's quality of life and ability to live independently. The box below outlines some of the key issues which impact on malnutrition and quality of life as well as highlighting the role of carers and the impact of malnutrition on a carer.

- Among those living in their own homes, lower perceived health has been found to predict risk for malnutrition (Johansson et al, 2009).
- Research has found that overall perception of quality of life was affected by poor nutrition (Johansson et al, 2009).
- Home carers are ideally placed to prevent malnutrition by identifying risk and ensuring both regular monitoring and early intervention where appropriate.
- The vast majority of care in the UK is provided by family, friends and relatives, who make up the UK's 6.4 million carers (Carers UK, 2012). The care they provide is worth an estimated £119bn per year – considerably more than total spending on the NHS.
- The number of carers over the age of 65 is increasing more rapidly than the general carer population. Research by Carers UK and the University of Leeds indicated that whilst the total number of carers increased by 9% from 2001 to 2011, the number of carers over 65 increased by 15% in this period.
- A survey by Carers UK found that the consequences of malnutrition are likely to increase the level of dependency someone has on their family or support services (Carers UK, 2011).
- The effects of malnutrition can also be devastating for the carer who feels worried, anxious and guilty. Carers may also experience higher levels of self-reported stress, a feeling that they cannot cope and have no control over their lives and dread around mealtimes, particularly when food is not eaten and carers are struggling on low incomes.
- In some cases the stress of caring for an individual can lead to the carer themselves becoming malnourished and increasing their risk of ill health.

Evidence of Cost Savings

Despite the difficulties in determining the exact cost of malnutrition in the UK, there have been several studies which considered the cost savings which could be achieved through prevention of malnutrition and the early intervention of treatment.

In 2006, the National Institute of Health and Care Excellence (NICE) used cost calculations conducted by previous BAPEN work (Elia et al, 2005) to inform the development of their guidance on Nutrition support in adults and produced a report which outlined the costs of screening, monitoring, training and treatment for malnutrition. This document remains the most recent set of figures and as the box below highlights, demonstrates clearly that the savings to the NHS in early identification and treatment of malnutrition in adults remain significant.

Potential cost savings as a result of early intervention and treatment for malnutrition

NICE (2006) calculated an estimated potential saving of £45.5 million per year using screening, monitoring, training and appropriate treatment for malnutrition.

The cost for England alone for fully implementing the guideline was estimated to be £32million per annum, a fraction of the costs currently associated with malnutrition (taking into account costs for training, additional staff, implementation of screening and monitoring practices).

More recently NICE (2012, 2012b) published Quality Standard 24 (as a part of its CG32 Quality Standard and Implementation Programme) which defined clinical best practice. It provides specific and concise quality statements and measures to provide the public, health and social care professionals, commissioners and service providers with examples of high quality care. The report updated the potential cost savings resulting from appropriate use of its guidance, taking into account potential savings which could not be quantified, e.g. improving patient care.

NICE stated that if the guidance was fully implemented, resulting in better nourished patients, then in turn this would lead to reduced complications for secondary chest infections such as pressure ulcers, wound abscesses and cardiac failure. The analysis of the guidance indicated significant savings are possible through reduced admissions and reduced length of stay for admitted patients, reduced demand for GP and outpatient appointments even when considering conservative estimates. The box below presents calculations on the expected cost of screening the older population most at risk of malnutrition and highlights the cost savings that NICE have calculated if appropriate screening and interventions take place.

Costs and savings related to screening the older population

- NICE calculated for their support for commissioners document, as part of the new quality standard (2012b) estimate, the overall resource impact of increased screening and appropriate intervention to be a net saving of **£71,800 per 100,000 people** for an average PCT; noting that earlier identification would free up capacity in secondary care and other settings that implement interventions.
- NICE (2012b) cost estimates put the highest unit cost of screening at £1.84 in GP practices. Therefore, if all those over 75 (5.2 million in 2013) (Office for National Statistics, 2010) were screened for malnutrition as a part of a GP visit then the total cost to the NHS would be approximately £9.5 million.
- Use of MUST (Malnutrition Universal Screening Tool) in care homes has been found to increase documentation of nutrition information and the use of nutrition care plans. Hospital admissions were reduced by 31% and hospital stay by 58% (Cawood et al, 2009).

Interventions to Prevent and Treat Malnutrition

Considering the cost of malnutrition and the burden that it places on health and social care resources, as well as to the individual and society, the question arises of how malnutrition is best prevented and treated.

Whilst the prevention of malnutrition must be the ultimate goal, the myriad causes and the impact of disease cannot be ignored. As such, interventions take on different forms depending on the risk of malnutrition and whether the older person requires support or treatment. Clinical interventions include screening, monitoring, dietary approaches through food and the provision of nutritional supplements where appropriate. Social interventions usually take a whole person approach, often addressing several of the causes of malnutrition including lack of access to food, difficulties cooking, isolation, ill health, poverty or depression to improve access to food and encourage increased food intake.

Screening (with early intervention) is perhaps the best known and most explored method of preventing and treating malnutrition and as presented above there is a strong case for conducting screening in all

care settings. Screening alone serves little purpose if we cannot act on the findings, treat those identified as malnourished and support those identified as at risk.

The following section presents interventions for which there is evidence of effectiveness. Where available, cost based figures are also provided. However, it should be noted that whilst gaps remain in estimating the cost of malnutrition, it is not possible to demonstrate cost effectiveness for all interventions. However, there are many demonstrable benefits to social interventions in particular, which also have a clear effect on the health and wellbeing of older people.

Interventions in Clinical Settings

Interventions in Care Homes

Results of the BAPEN screening week survey in 2010 (Russell & Elia, 2011) found that approximately 37% of older people admitted to care homes in the previous 6 months were at medium or high risk of malnutrition, with this figure rising to 45% in nursing homes.

Many of the issues previously discussed around prevention and treatment of malnutrition in hospitals and clinical settings are also relevant for care homes. Although the residents are effectively 'living in their own home', the reality of care is that nursing homes in particular more closely resemble a hospital setting. However, care homes are a unique environment and present an opportunity for regular screening, early treatment and prevention of malnutrition, particularly given the development of food policies and practices in many homes and the role nutrition has to play in ensuring dignity in care.

Recent work to examine the cost effectiveness of early intervention and treatment, as well as the costs associated with screening and monitoring in care homes, was conducted in the Netherlands (Meijers et al, 2011). The significant savings associated with regular screening and monitoring are presented in the box below.

Estimating the costs associated with malnutrition in Dutch care homes – Meijers et al 2011

- Once an individual is diagnosed with malnutrition the costs of treatment are twice those of the cost of regularly screening and monitoring to ensure malnutrition does not occur. £8891.81 (€10,497) per person compared to £4,514.05 (€5,329) in the general care home population.
- Early intervention to support the 30% identified as at risk before they became malnourished and prevent malnutrition cost £7076.22 (€8287, 12) per person, including the on-going cost of screening and monitoring, indicating early intervention is cost effective compared to treating malnutrition once established.
- The main cost associated with the general population was meal provision and distribution.
- Screening and monitoring accounted for only 4.2% of the total cost per person, a total of €223.86 (£189.62) per person per year.
- To support a malnourished person, additional costs included diagnostics, treatment, monitoring and multidisciplinary team intervention.
- Treating malnourished patients cost €10,497 (£8891.81) per person demonstrating the cost effectiveness of early intervention versus late treatment.

Oral Nutritional Supplements

The NICE (2012, 2012b) guidance highlighted the role improving patient care could have on reducing the cost of malnutrition. Ensuring good nutritional care in hospitals could provide better patient care through screening, greater support at meal times and appropriate food provision. In addition, NICE (2006) recommends the appropriate use of oral nutritional supplements (ONS). Currently ONS are the only direct intervention in the treatment of malnutrition for which there is evidence for cost effectiveness.

Research has established that if ONS are used as intended (in addition to food) to support people to regain weight and improve health, and that this use is reviewed regularly, then ONS can be a very cost effective method of treating malnutrition, particularly where appetite can be affected by medication or illness (NICE, 2006). The focus therefore must be in ensuring continuity of nutritional care from admission to discharge from hospital and maintaining care once people have returned home through regular screening and monitoring, thereby preventing readmission and reducing costs across the NHS. The malnutrition pathway (www.malnutritionpathway.co.uk) provides guidance for health care professionals on managing malnutrition in the community, including the appropriate use of ONS. The box below presents the evidence for using ONS as a part of patient care.

Evidence for cost effectiveness of ONS

- If nutritional needs are ignored health outcomes are worse; provision of nutritional supplements to malnourished patients reduces complications such as infections and wound breakdown by 70% and mortality by 40%.
- The current cost of ONS (plus specialist nutrition care through parenteral and enteral nutrition) only constitutes approximately 2% of all malnutrition related costs to the NHS (Brotherton et al, 2010, Rice & Normand, 2012).
- The use of ONS in the UK has been found to save £849 (€1000) per patient based on hospital length of stay (Elia & Stratton, 2009).
- A randomised control trial in care homes found that ONS was a cost effective method of improving Quality Adjusted Life Years in malnourished residents (Parsons et al, 2012).
- Appropriate use of ready-made ONS has been found to lead to a reduction in pressure ulcers, infections, antibiotic prescriptions and hospital admissions among older people living in the community (Cawood et al, 2010).
- In the community patients given ONS have fewer healthcare visits at home and older people have been shown to gain weight at home (NICE, 2006).
- Economic modeling undertaken by NICE (2006) showed ONS to be cost-effective as part of a screening programme, classifying ONS as 'a treatment deemed to be good value for money'.

Social/ Personal Interventions

Evidence suggests that 93% of malnutrition and malnutrition risk is in the community (Elia & Russell, 2009), meaning the focus on prevention and effective intervention should be with older people living in their own homes. Due to the many causes of malnutrition, the challenge is finding the appropriate interventions to ensure that older people are supported to access food and eat well, preventing isolation and economic and personal risk to health.

Wilson (2009) highlighted the significant impact community projects can have in preventing malnutrition, observing that food and nutrition do not exist in isolation from other influences on health and wellbeing and access to food and nutritional health needs to be fully integrated into care packages and risk management.

In the community setting, maintaining independence, quality of life and other personal or social benefits provide the evidence for prevention of ill health and malnutrition through a variety of innovative projects, often tailor made for the area and older people they work with. This can make it hard for projects to convince policy makers to provide funding in a difficult financial climate and to compete with other interventions where cost/ benefit may be clearer.

However, projects are increasingly working to develop analysis through such measures as Social Return on Investment (SROI) and the importance of prevention should not be underestimated both in terms of value to the individual and society at large. Programmes of prevention have been shown to work (Wilson, 2009). By ensuring older people have access to appropriate services, regular access to food and meals and information as well as tackling key issues such as social exclusion and isolation, projects are addressing some of the key risk factors for developing malnutrition and this is being recognised as a vital part of addressing malnutrition among older people (Scottish Government 2009 in Jones et al).

The following section presents two interventions which have been found to have demonstrable benefits to older people in preventing malnutrition risk. The role of community meals is also considered and the impact they have on ensuring the health and wellbeing of older people living in their own homes.

The Food Train - Dumfries

In 2010 Community Food and Health Scotland (CFHS) (an organisation established as a result of the Scottish Diet Action Plan which aims to ensure everyone in Scotland has the opportunity, ability and confidence to access a healthy and acceptable diet) conducted an evaluation into one of Scotland's most successful community projects for older people. The Food Train is a grocery shopping, befriending and household support service for older people in Dumfries & Galloway. Its mission is to support older people to live independently at home, with preventative services to address the difficulty older people face getting their weekly grocery shopping, doing jobs around the house and the growing isolation that comes with failing health.

The evaluation specifically considered the economic value of The Food Train in delivering a volunteer-led service to support older people in remaining independent in the comfort of their own homes within their own communities. Costs examined included the direct costs of staffing, overheads and fixed assets, costs avoided by employing volunteers and potential cost savings associated with supporting older people to live independently. The study explored the social impact as well as the economic value of The Food Train, the value of the services to customers, and the ways in which these services helped to sustain low cost packages of care with their consequent savings to the public sector. The boxes below outline the cost savings associated with The Food Train as identified by the CFHS study and the benefits of the service stated by users.

Costs associated with Food Train based on CFHS evaluation (2010)

Food Trains services in 08/09 were just over £211K and enabled 15,000 grocery deliveries

Annual net cost per grocery delivery and EXTRA visit of approximately £142.

Costs as follows:-

- Staff costs were £81.9K (includes management and administration)
- Central running costs of the company were £77.9K
- Costs related specifically to delivery of the shopping & EXTRA services e.g. volunteers and petrol were £51.5K
- In addition The Food Train has total tangible assets (such as vehicles) of £62K.

A total grocery spend of over £434K (an increase spend of 21% on the previous year)
Good business sense for retailers - equivalent to approximately £730 per customer per annum.

Completion of 1,000 EXTRA home support visits, generated £31K in service charges to customers.

Volunteers and building skills

The financial value of time invested by the volunteer work force was estimated to be in the region of £277K.

Grants and donations provided additional resources of over £193K.

The outcomes of the project indicated that it was successful on a number of levels, demonstrating cost effectiveness economically for investors and customers alike as well as tackling causes of malnutrition such as isolation, depression, lack of access to shops and services and increasing knowledge of health and wellbeing. By identifying sub-groups of customers and remaining adaptive to their needs, the evaluation concluded that The Food Train was making a significant contribution to delaying the need for intensive support.

From a policy perspective, the project contributes to the performance indicators of Dumfries & Galloway's local outcomes by improving employment and business opportunities, maximising household income,

caring for vulnerable people, reducing inequalities in health, improving community safety, supporting communities and encouraging people to be responsible citizens.

Benefits associated with Food Train based on evaluation	
Short term	<p>Customers can self-refer and can choose and get delivered fresh and other foodstuffs & household goods at a reasonable price.</p> <p>Customers receive support with small household jobs.</p> <p>Customers have regular social contact with volunteers.</p> <p>Volunteers are given opportunities for personal development; Agencies making volunteer referrals can access volunteering opportunities.</p> <p>Carers, family and neighbours benefit by the sharing of shopping, small household jobs and regular visits.</p> <p>Social and health care agencies, family and friends can make referrals.</p>
Medium term	<p>Retail outlets can retain customers and attract new customers.</p> <p>Customers are supported in living independently through retaining choice, are enjoying a healthier diet and are less likely to be admitted to hospital because they are malnourished.</p> <p>Customers are supported in living independently and are less likely to be admitted to hospital because they fall attempting odd jobs in the house.</p> <p>The Food Train is unobtrusively providing support and in cases of additional problems advice given on referral agencies.</p> <p>Volunteers are supported in alternatives to employment and in accessing employment.</p> <p>Increase in income to local supermarkets and local shops/garages.</p>
Long term	<p>Older people are supported in remaining in the comfort of their own home within their own community.</p>
Other benefits	<p>Customers are enabled to do a little light shopping themselves (if they are able) or to meet up with their friends.</p> <p>The Food Train contributes to social capital through social contacts provided by volunteers and also by freeing up time of family and friends for visits and outings.</p>

AGE UK Oldham

A report by Age Concern/ Help the Aged (2009) aimed to demonstrate the range of positive outcomes that are possible when there is investment into preventative services. One project run by Age UK Oldham within the local health and social care partnership demonstrated the benefits for both older people and the services in supporting older people to purchase food.

The scheme focused on providing a holistic approach, developing a unique project in partnership with the Co-operative supermarket, which provided an office, telephone and dedicated checkout in store. The project was commissioned for 3 years by the Health and Social Care Partnership on behalf of the Local Strategic Partnership. The box below outlines the scheme and its benefits. Whilst cost evaluation in terms of value of money is not available, this project takes a whole person approach and uses the regular contact with service users to develop relationships and monitor the older person's overall wellbeing, addressing many of the health and care indicators defined by the health and social care partnership.

Shopping support service – Age UK Oldham

- Scheme users are assessed at home, with referral or signposting to other services where appropriate.
- A delivery day is agreed and users are called the day before to obtain their order which is then 'shopped' by Age UK staff and put through the dedicated till, delivered and put away if required and take cash/cheque payments on the basis of the till receipt.

Benefits

- Food older people want when they want it, delivered to their home.
- A guaranteed home visit every week.
- Can control how much they spend and when and have someone to talk to about any problems and issues.
- Delivery provides an opportunity for the Age UK staff to build relationships, check on and identify problems and monitor key areas including personal or financial neglect, environmental risk, personal safety and depression, thereby addressing problems at early stages and ensuring they do not escalate.

The dedicated checkout contributes £4,000 a week to the taking of the Co-operative store.

In January 2009 the service had 205 customers, 80% of whom were housebound and frail, therefore at risk of malnutrition, falls and ill health.

By developing relationships, both prevention and early intervention is possible.

The Role of Community Meals

Community meals have a key role to play in this cross over between fully independent living and supporting people to stay in their own homes. Increasingly there is economic evidence of the cost effectiveness of community meals to add to the already well documented benefits of ensuring people living in their own homes are eating regularly, have personal contact and regularly monitored to ensure their care needs are met and their nutrition risk does not increase (Wilson in ILC-UK, 2010).

A report by the meals provider Apetito (2012) effectively demonstrates the cost benefits of continued investment in community meals services and the impact these savings would have on care homes admissions, hospital treatment and the incidence of malnutrition in the community. As 78% of older people admitted to hospitals come from their own homes, the study calculates that changes are needed to community services in order to meet demand by 2020 (and taking into account the increasing ageing population). On a local level, research from both Hertfordshire and Leicestershire clearly demonstrates the vital role of community meals (HCM, 2012; Leicestershire Meals Service 2012). The box below demonstrates the investment needed to support community meals services according to the report and presents data on Social Return on Investment calculations conducted by two community meals providers.

Social Return on Investment (SROI) is an analytic tool for measuring a broader concept of value than just economic value. It incorporates social, environmental and economic costs and benefits into decision making, providing a fuller picture of how value is created (NEF, 2012). SROI can assign a monetary figure to social and environmental value which is created and aims to reduce inequality and improve wellbeing.

Apetito (2012)

Changes are needed to meet the projected increase in demand for community meals by 2020.

An annual additional subsidy of just over £5 million for meals on wheels services would support 10% of the older population to remain in their own homes and would save £1.7 billion, even taking into account the projected cost of domiciliary care in 2020.

Social Return on Investment

Hertfordshire Community Meals service (HCM) is a non-for-profit organisation with 160 employees providing 1800 meals daily through the county.

HCM calculated that for every £1 invested the social value is approximately **£5.28**. In addition, clients have reported feeling more safe and secure, having increased independence and being able to stay in their own homes (Hertfordshire Community Meals, 2012).

Leicestershire Community Meals conducted a similar calculation using SROI and reported a return of **£2.90** for every £1 invested (Leicestershire Meals Service, 2012).

This SROI ratio could only be achieved with the hot meals service (as opposed to frozen meals).

Conclusions

It has been observed that addressing malnutrition requires a universal attitude to ageing, support for nutritional care in older people, an understanding of the implications of ignoring the issue of malnutrition as well as the benefits of ensuring all people have access to healthy and affordable food (Wilson, 2009). The application of costs to better understand the economic and health impact of malnutrition, and the savings which can be made, creates a clear argument for the need for change and for organisations to work in a more integrated way to prevent and treat malnutrition.

A number of conclusions can be drawn from this report:

1. The prevalence of malnutrition is well understood through screening research and initiatives.
2. There are studies which consider the cost of malnutrition in the UK and demonstrate that the direct and associated costs of malnutrition are in the order of billions (Elia & Russell, 2009; Guest et al, 2011).
3. Screening for malnutrition and early intervention has been shown to be cost effective and can save money (NICE, 2012).
4. There are gaps in estimating costs of malnutrition. These gaps can limit the development of a local business case for change at a regional, local authority or Clinical Commissioning Group (CCG) level.
5. Work is on-going to update cost calculations and understand the impact of malnutrition on a local level.
6. The cost of treatment is better understood in some settings than others e.g. care homes, but what is required are calculations which identify the cost, cost effectiveness and need for treatment.
7. Prevalence rates of malnutrition are high among older people and, according to projects of population ageing, the number of malnourished people could increase, meaning that the cost of treating malnutrition could also increase. This issue can no longer be ignored.
8. The costs associated with malnutrition are far reaching, including not only the health and social care costs and resource use, but also personal, health and social costs.
9. Malnutrition is often largely preventable and treatable, meaning there is great potential to reduce the costs associated with this condition and ensure better health and wellbeing for older people.
10. More support is needed for preventative services to enable them to help older people to stay healthy and independent.
11. Further research is needed into the cost of dehydration and the impact it has on the individual as well as health and social care services.

References

- Age Concern/Help the Aged (2009) 'Prevention in Practice: Service models, methods and impact', Age Concern/Help the Aged, London.
- Age UK (2012) Economic Monitor: Autumn 2012, Age UK, London.
- Age UK (2012b) Fact sheet: Later Life in the United Kingdom, December 2012, Age UK, London.
- Age UK (2013) Later Life in the United Kingdom, February 2013)
- Amarel, T.F., Mattos, L.C., Tavares, M. M., Subtil, A., Martins, R. Nazare, M. & Sousa Pereira, N. (2007) 'The economic impact of disease-related malnutrition at hospital admission', *Clinical Nutrition*, 26, pp 778-784.
- Ashman, K.E., Cawood, A.L., Stratton, R.J. (2012) 'Bapen symposium: "original communications": OC-038 Healthcare use according to body mass index (BMI) category in individuals registered to GP practices Gut ;61:Suppl 2 A16-A17doi:10.1136/gutjnl-2012-302514a.38
- Apetito (2012) 'The Value of Meals on Wheels, Report.
- Brotherton, A., Stroud, M. & Simmonds, N. (2010) 'Malnutrition Matters: Meeting quality standards in nutrition care' BAPEN Quality Group, BAPEN.
- Campbell, N. (2011) ' Dehydration: why is it still a problem? Nursing Times, Vol 107, No 22, pp 12-15.
- Carers UK (2011) ' Malnutrition and Caring: The hidden cost for families' Carers UK
- Carers UK (2012) 'Facts about carers 2012'
http://www.carersuk.org/media/k2/attachments/Facts_about_carers_2012.pdf
- Cawood, A.L., Smith, A., Pickles, S., Church, S., Dalrymple-Smith, J., Elia, M. & Stratton, R.J. (2009) 'Effectiveness of implementing 'MUST' into care homes within Peterborough Primary Care Trust, England', *Clinical Nutrition Supplements*, 4(2), pp 81.
- Cawood, A.L., Green, C. & Stratton, R. (2010) ' The budget impact of oral nutritional supplements on older community patients at high risk of malnutrition in England', *Proceedings of the Nutrition Society*, Volume, 69, OCE7, E544.
- Cawood A.L., Elia, M. & Stratton, R (2012). 'Systematic review and meta-analysis of the effects of high protein oral nutritional supplements' *Ageing Res Rev* 2012; **11:278-296**.
- Community Food and Health Scotland (2010) 'Evaluation of the Food train in terms of its Economic Value – Marian Lacey', CFHS.
- Elia M, Stratton RJ, Russell C, Green C. & Pang F. (2005) 'The cost of disease related malnutrition in the UK and economic considerations for the use of oral nutritional supplements (ONS) in adults'. Redditch: BAPEN.
- Elia, M. & Bistran, B. (Eds) (2009) 'The economic, medical, scientific and regulatory aspects of clinical nutrition: what impacts what?', Nestec Ltd, Vevey (Switzerland & S Karger AG, Basel (Switzerland)
- Elia, M. & Russell, C.A. (Eds) (2009) 'Combating Malnutrition: recommendations for action: Report from the advisory group on malnutrition, led by BAPEN', BAPEN.
- Elia M & Stratton RJ. (2009) 'Calculating the cost of disease-related malnutrition in the UK in 2007 (public expenditure only)' in: *Combating Malnutrition: Recommendations for Action. Report from the advisory group on malnutrition, led by BAPEN*.

ENHA, BAPEN, ILC-UK (2006). Malnutrition among older people in the community: policy Recommendations for Change.

Freijer, K., Swak Tan. S., Koopmanschap, M.A., Meijers, J.M.M., Halfens, R.J.G. & Nuijtenh, M.J.C. (2012) 'The economic costs of disease related malnutrition', *Clinical Nutrition* in press. Online at: <http://www.clinicalnutritionjournal.com/article/S0261-5614%2812%2900132-X/fulltext>

Guest, J. F., Panca, M., Baeyens, J.P., de Man, F., Ljungqvist, O., Pichard, C., Wait, S & Wilson, L. (2011) 'Health economic impact of managing patients following a community-based diagnosis of malnutrition in the UK', *Clinical Nutrition*, Volume 30, Issue 4 , Pages 422-429, August 2011

Heismayr, M., Schindler, K., Pernicka, E. Schuh, C., Schoeniger-Hekele, A., Bauer, P., Laviano, A., Lovell, A.D., Mouhieddine, M., Schuetz, T., Schneider, S.M., Singer, P., Pichard, C., Howard, P., Jonkers, C., Grecu. I., Ljungqvist, O. & The NutritionDay Audit Team. (2009) Decreased food intake is a risk factor for mortality in hospitalised patients: The NutritionDay survey 2006', *Clinical Nutrition*, 28, pp 484-491.

Hertfordshire Community Meals (2012) 'Case study for the Malnutrition Task Force. www.malnutritiontaskforce.org.uk

Hill, K., Sutton, L & Hirsch, D (2011) 'Living on a low income in Later Life', AGE UK.

ILC-UK (2010) Personalisation, Nutrition and the Role of Community meals: A report from a round table discussion on Personalisation and Community Meals, Lisa Wilson, ILC-UK, London.

Johansson, L., Sidenvall, B., Malmberg. B. & Christensson, L. (2009) 'Who will become malnourished? A prospective study of factors associated with malnutrition in older persons living at home', *Journal of Nutrition, Health & Ageing*, 13(10), pp 855-861.

Jones, J., Duffy, M., Coull, Y. & Wilkinson, H. (2009) Older People Living in the Community - Nutritional Needs, Barriers and Interventions: a Literature Review, Scottish Government Social Research, The Scottish Government.

Leicestershire Meals Service (2012) 'Case Study for the Malnutrition Task Force', www.malnutritiontaskforce.org.uk

Malnutrition Task Force (2013) 'Cost of Malnutrition: Methods, Estimation and Projection, Jose Iparraguirre for the Malnutrition Task Force.

McGurk, P., Cawood, A., Walters, E., Stratton. R.J. & Elia, M. (2012) 'DDF plenary session: OC-042 The burden of malnutrition in general practice' *Gut*; 61: Suppl 2 A18doi:10.1136/gutjnl-2012-302514a.42

Meijers J.M.M, Halfens, R.J.G., Wilson, L., Schols, J.M.G.A. (2011) Estimating the costs associated with malnutrition in Dutch nursing homes', *Clinical Nutrition*, Volume 31, Issue 1 , Pages 65-68, February 2012

National Institute for Health and Clinical Excellence (NICE). Clinical guideline 32. London: NICE, 2006.

National Institute for Health and Clinical Excellence (NICE), (2012) 'Quality Standard for Nutrition Support in Adults, NICE Quality Standard 24, guidance.nice.org.uk/qs24

National Institute of Health and Clinical Excellence (2012b) 'Implementation Programme - NICE support for commissioners and others using the quality standard on nutrition support in adults, November 2012.

New Economics Foundation (2012) at <http://www.neweconomics.org/projects/social-return-investment>

Office for National Statistics (2010) '2010-based National Population Projections' (<http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2010-based-projections/index.html>)

Office for National statistics (2011) 'Focus on Older People, Older People's Day 2011', www.ons.gov.uk

Parsons, E.L., Stratton, R.J., Jackson, J.M. & Elia, M. (2012) 'Oral Nutritional Supplements are cost effective in improving quality adjusted life years in malnourished care home residents', *Gut*, Vol 61, Suppl 2, pp A17.

Pernicka E., Wilson, L., Bauer, P., Schindler, K., Ljungqvist, O., Hiesmayr, M. (2010) 'Malnutrition Assessed by BMI and weight loss causes increased length of hospital stay: results of the NutritionDay study', *Clinical Nutrition Supplements* Vol. 5, Issue 2, Page 168

Rice N, Normand, C (2012) 'The cost associated with disease-related malnutrition in Ireland'. *Public Health Nutrition*, 15(10):1966-1972

Royal College of Nursing (2007) 'Water for Health: Hydration best practice toolkit for hospitals and healthcare', Royal College of Nursing and NHS National Patient Safety Agency, London.

Russell, C. A. & Elia, M. (2011) 'Nutrition Screening Survey in the UK and Republic of Ireland in 2010; A report by the British Association of Parenteral and Enteral Nutrition (BAPEN) Hospital Care Homes and mental Health units' BAPEN.

Weekes, C.E, Spiro, A, Baldwin, C, Whelan, K, Thomas, J.E, Parkin, D. & Emery, P.W. (2009) 'A review of the evidence for the impact of improving nutritional care on nutritional and clinical outcomes and cost', *Journal of Human Nutrition and Dietetics*, 22, pp 324-335

Wilson, L.C (2009) 'Preventing Malnutrition: The role of community food projects, A report for Age Concern England', Age Concern England, London

Note to Reader: The key questions the review aimed to answer were:

- What are the direct and associated costs of avoidable and preventable malnutrition in later life?
- What are the
 - a) costs
 - b) cost effectiveness and
 - c) potential financial savings

of interventions which are primarily focused on tackling avoidable malnutrition in later life?

Interventions include efforts to both prevent malnutrition and to treat it. This would include screening, monitoring, managing, service interventions and treatments.

- What would be the costs of screening the over 75 population?
- What are the relative costs of earlier preventions and late treatment?