FACT SHEET 3:

PUBLIC HEALTH AND SUSTAINABLE COMPOSTING

JULY 2009

BACKGROUND

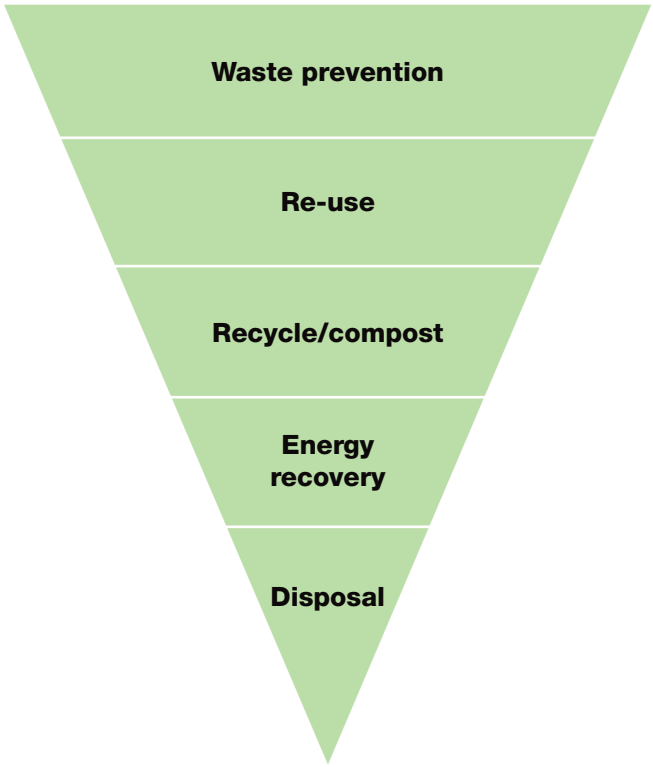
Every sustainability minded gardener is as proud of their home produced compost as they are of anything else cultivated in the garden. The transformation of garden and household waste into the rich, dark compost that can go on to sustain and enhance the life of future plants and animals is nothing short of an everyday miracle. Those who make and use their own compost have the benefit of knowing exactly what goes into their gardens, and feel reassured about the health giving nature and quality of what it produces.

But is making compost healthy? Are there any risks, especially to those creating or working with compost?

For many people, composting is simply one element of gardening, and from a health perspective it is difficult to distinguish the specific benefits of each. Participation in gardening and all its various activities such as composting will undoubtedly bring related health risks and benefits.

Primarily in response to the need to comply with EU directives to reduce the amount of material going to landfill, industrial facilities to convert organic waste to compost are operating throughout the UK. The science of composting is better understood now than ever before, which makes community and commercial production more feasible, and in this fact-sheet the health related benefits and potential harms of composting – whether at home or commercially produced will be explored.

Composting is one of the important elements in the waste hierarchy.



WHAT IS COMPOST ?

Composting is the biological decomposition and stabilisation of organic material under conditions that allow development of thermophilic temperatures (i.e. 45°C – 75°C) as a result of biologically produced heat, to produce a final product that is stable, free of pathogens and plant seeds and can be beneficially applied to land.[1] It is a process that facilitates the recycling of life sustaining elements such as nitrogen and carbon, and in nature occurs primarily through aerobic decomposition of waste by the action of microscopic organisms such as bacteria and fungi, assisted by insects and earthworms that inhabit the soil.[2] Life on earth as we know it would cease if this natural recycling process failed. In the presence of oxygen, aerobic decomposition breaks organic matter down into fine particles; with the microbes using the released nitrogen and carbon as their primary food source. Aerobic composting has dual benefits, since it contributes to sustainable waste management by reducing the amount of organic waste sent to landfill and generates a product that enhances the structure and fertility of soil.[3]

DRIVERS FOR COMPOST PRODUCTION

The main driver for compost production is undoubtedly the financial implications of the EU Landfill Directive (1999).

EU LANDFILL DIRECTIVE 99/31/EC

The Landfill Directive, adopted in 1999, established a set of detailed rules for waste landfills. The objective was to prevent or minimise the negative effects that landfill sites can have, such as pollution of water, soil and air, and emissions of methane, a powerful greenhouse gas. The directive also helped to promote the recovery and recycling of waste. Member states were required to reduce the amount of biodegradable waste they landfill to 35% of 1995 levels by 2016. Countries with high reliance on land-filling such as many of the new member states, but also the UK and Greece were allowed to postpone the targets by a maximum of four years to 2020.

The EU Landfill Directive (1999) has been influential in steering waste management policy and practice within the UK. It sets targets which encourage the diversion of biodegradable waste from landfill, to a process that will entail recovery or recycling. Compared to levels in 1995, the amount of biodegradable municipal waste (BMW), including household waste going to landfill should be reduced to 75% by 2010; to 50% by 2013, and to 35% by 2020. The waste strategy for England 2007 made commitments to the key targets of the Landfill Directive and placed great emphasis on waste prevention and re-use.[4,5] The strategy set a new target to reduce the amount of household waste not re-used, recycled or composted from over 22.3 million tonnes in 2000 to 15.9 million tonnes in 2010 (29% reduction) and to 12.2 million tonnes in 2020 (45% reduction), with higher targets for recycling and composting of household waste – at least 40% by 2010, 45% by 2015 and 50% by 2020.

As a negative incentive to landfill, the UK government had been increasing the landfill tax by £3 per tonne each year, but in the 2007 budget, the Chancellor announced that the landfill tax would increase more quickly and to a higher level than previously planned. Increases of £8 per tonne per year were announced to run from 2008/09 to at least 2010/11. The current standard rate of landfill tax is £24/tonne. This rate applies to active wastes (those that give off emissions). This will double to £48/tonne in 2010/11. The increase in landfill tax has already had a significant impact on the amount of waste going to landfill, which fell from 96 million tonnes in 1997/98 to 72 million tonnes in 2005/06 - a reduction of 25%.[6] The Climate Change Act (2008) will encourage investment in sustainable alternatives to landfill and in the 2009 budget the Government announced that it would assess the case for introducing further restriction on the landfilling of biodegradable wastes.[7]

RATIONALE FOR EU DIRECTIVE

Households, commerce and industry in the UK produce approximately 100 million tonnes of waste each year.[5] The majority of this waste is deposited in landfill, where the biodegradable (organic) component is attacked by bacteria, leading to the production of a mixture of greenhouse gases; and in particular, methane and carbon dioxide.[5] Methane is of concern because it has twenty three times the global warming potential of carbon dioxide (CO_2).[3] In modern landfill practice, specialist heavy machinery is used to compact the waste, driving out most of the oxygenated air around it. If the organic material in the waste such as paper, food and green material decomposes in the absence of oxygen, anaerobic digestion ensues leading to the production of considerable quantities of methane. Landfills released 25% of the UK's methane emissions in 2003, representing about 2% of UKs total greenhouse gas emissions.[8] The decomposition of organic material in landfill sites is the primary source of methane in the atmosphere.[9] Increased awareness of the positive environmental impact of composting has resulted in the expansion of both industrial and home composting.[10,11] The aerobic decomposition (i.e. in the presence of oxygen) of organic waste through composting produces far less methane and therefore has less impact on global warming with all its negative consequences, both for the environment and health.[12]

As well as greenhouse gases, the percolation of water through decomposing waste produces a noxious liquid - the leachate - which, if not controlled, can contaminate and seriously pollute both surface and ground water.[13]

COMMERCIAL COMPOST PRODUCTION

In 2005-06, approximately 27% of waste was recycled or composted, representing a quadrupling of this activity since 1996-97. Less waste continues to be landfilled, with a 9% fall between 2000-01 and 2004-05. The total amount of waste being produced is still increasing, but the waste growth rate is coming down, with municipal waste growing less quickly than the economy.[5] The association for organics recycling (previously known as the composting association) estimates that in the UK, total compost production is 2.1 million tonnes and current capacity is 3.4 million tonnes, but this could be relatively easily increased to six million tonnes if needed.[14] This indicates that there is the capacity to divert substantially more organic waste to compost than is currently the case.

Large scale commercial production of compost from waste can only be carried out under licence and with an environmental permit or an exemption. The Environment Agency regulates larger scale/industrial composting facilities under the Environmental Permitting (England and Wales) Regulations 2007, while the medium and smaller scale sites must register but are usually exempt from the need for a licence or permit.

There are two main technologies used in commercial composting, open windrow and in-vessel composting. Properly managed open windrows, where the maturing material is regularly turned or aerated by other means are ideal for composting green waste. This process requires less technology, but more land and there would normally be strict restrictions on location of sites due to the level of odour and bioaerosols produced. In-vessel composting facilities are enclosed and many use sophisticated technology to minimise odour and reduce bioaerosol emissions. Where food or animal by-products are involved, in-vessel composting must be used.

Ideally, composting facilities should be located as near as possible to the source of the biodegradable waste to reduce transportation costs and associated air pollution. However, difficulty in gaining planning permission and licensing are major barriers to the development of any new composting facility and this can lead to environmental health injustice. Distrust of regulatory bodies and (not in my backyard) NIMBYism is commonplace; and public opinion of waste management practices is often low. People living in more deprived neighbourhoods often have less political power and are less able to practise the ‘politics of exclusion’ that can be employed to prevent the development of a new waste

management facility; as a result new composting plants are located more frequently in areas of relatively high deprivation.[15,16,17]

The Compost Quality Protocol was finalised during 2007 and this, together with the BSI PAS100 specification for recycled compost has reassured customers of the quality of the compost they are buying, which has helped to grow the market. Certified quality compost that conforms to the BSI PAS100 specification can only be produced from source segregated waste, which ensures that it does not contain potentially harmful shards of glass or heavy metals. High standards of quality assurance are considered essential for the sustainability and growth of effective markets for commercially produced compost.[18] Quality control is important, because maximum benefit from diverting organic waste from landfill to compost production can only be achieved and sustained if customers want to buy and use the compost that is produced.

Provided compost has achieved the quality standard, it is no longer classified as 'waste' with all the restrictions this entails and instead becomes a commercial product. Horticulturalists and farmers are increasingly using commercially produced compost in place of chemical fertilizers. Concerns about the nitrification of water courses still exist, and restrictions on the amount of compost that can be spread on land are in force. However, risks of pollution are lower because the nitrogen and other nutrients in compost are released more slowly.[19]

Commercial recycling of food waste has also been successfully piloted in several local authorities. An incredible 6.7 million tonnes of food is thrown away each year. This waste of perfectly good food costs UK consumers a total of £10 billion a year (£610 a year for the average family).[18] Questions must be asked about whether this can be afforded not only individually but also nationally from a waste of energy and environmental impact point of view.

SMALLER SCALE / COMMUNITY COMPOSTING

There is one small in-vessel composter that uses innovative but simple technology to produce compost from waste in about fourteen days and is suitable for any organisation that produces between 50 and 7000 litres of food waste, or a mix of food waste and garden waste per week. This in-vessel composter has been given animal by-product regulations approval to treat food waste containing meat and fish or woodchip based animal bedding and is increasingly popular in universities, schools, conference centres, community composters, hospitals etc.[20]

GARDEN COMPOSTING

Neighbourhood composting is being encouraged by local authorities and many offer composting receptacles for home or community use at a reduced price.

The process of home composting takes longer; and green waste is slowly broken down by worms and other animals rather than by mechanical shredding. Temperatures do not usually reach the heights achieved in commercial production, which may potentially affect health, since the sanitisation of compost is only achieved if a high temperature of between 45°C – 75°C is maintained for sufficient length of time.

HEALTH RISKS ASSOCIATED WITH COMPOST PRODUCTION

Before composting can take place, separation of green and/or food waste must take place. It is this stage that many households find a nuisance or distasteful. Most people support the notion of recycling of waste and are happy to comply, but some of the householders who refused to participate in pilot food waste programmes reported reluctance to separate food waste. The most common reasons given for not participating related to concerns about potential hygiene, odour or vermin issues (24% of non-participants combined). However, these issues were considered less important by residents who were involved in the collections (6% of participants), indicating that these are often perceived issues rather than problems experienced by people who engage with this activity. An evaluation of the schemes found that provided bins were kept outside and out of the sun they did not cause any undue problems or odour.[21]

There are many potential pathogens associated with the various stages of composting. These are outlined in an Environment Agency report 'Health impact assessment of waste management: methodological aspects and information sources'.[24] The main potential source of health problems comes from the bioaerosols and the volatile organic compounds (VOCs) that are released during the composting process. Bioaerosols are particles of microbial, plant or animal origin and are often referred to as organic dust.[22] This can include live or dead bacteria, fungi, viruses, allergens, bacterial endotoxins (components of cell membranes of Gram-negative bacteria), antigens (molecules that can induce an immune response), toxins (toxins produced by microorganisms), mycotoxins (toxins produced by fungi), glucans (components of the cell wall of many moulds), pollen, plant fibres etc. However, bioaerosols exist naturally in the ambient air and their concentrations are difficult to measure, since they are affected by the external environment and vary naturally with topography, strength of the wind and season of the year. Although the presence of these materials in the air does not necessarily correlate with risk of disease, bioaerosols do have the potential to produce health effects such as aspergillosis, hypersensitivity pneumonitis, skin complaints and exacerbation of asthma. However, the ability to cause disease depends on the concentration of viable organisms, their virulence and the susceptibility of the exposed person. A review of occupational exposure to bioaerosols concluded that there is little published evidence of serious/chronic disease in compost workers, although there is evidence of early health responses to bioaerosol exposure.[23] At high doses, or in susceptible individuals at lower doses, there is evidence of a causal link between some of the micro-organisms present in the bioaerosols and adverse effects in humans.[24] Since there is no agreed 'safe' value and information about bioaerosols is limited, the Environment Agency has adopted a precautionary approach that requires a site specific risk assessment where there is a dwelling or workplace within 250m of a composting site boundary.[25] Most research suggests that under normal conditions, beyond 250m, bioaerosol concentrations are similar to those in the background.

If the composting process is not managed properly, strong unpleasant odours can occur, but this is often categorised as a nuisance rather than a health risk. Although people living near a composting facility reported higher levels of somatic symptoms generally, the type of self reported symptoms was not influenced by odours and bioaerosol concentrations, except for nausea which was clearly linked to annoying odours.[26] However, strong odours can create the public perception that compost production is a hazardous process and this may lead to psychological distress.[24]

Several health impact assessments of composting were uncovered during this review, but in most cases the evidence about negative health impacts was limited; and although positive health impacts such as 'feelings of satisfaction' and 'raising awareness of environmental health issues' were anticipated, all lacked strong scientific evidence.[27] Most research to date has been conducted on the occupational risks for waste workers, but many of the studies mentioned below rely on self reported health problems; are cross sectional studies, including some that have no control group for comparison so provide relatively weak evidence; or they may be biased in other ways.

One older (1997) and three relatively recent literature reviews exploring the human health impacts of composting were examined.

The 1997 work concluded that there was no information about risks to households living in close proximity to a composting facility, but none was expected. However, exposure of organic waste collectors and compost workers to bioaerosols was high and health risks may exist.[28] This report suggested the need for more work to explore possible exposure related effects and how waste collection and compost processing might be carried out to reduce potential risk.

The 2003 review conducted by Saffron and colleagues found that the association between bioaerosols and health outcomes was biologically plausible and the most important route of exposure

was inhalation, but that there was insufficient evidence to link residence near a centralised composting facility with health problems.[29]

Harrison's review of 2007 found that acute and chronic respiratory health effects, mucosal membrane irritation, skin diseases and inflammatory markers were all raised in compost workers.[30] They also showed a response to elevated exposure to bioaerosols despite the fact that there was a "healthy worker" effect (compost workers' general health apart from potential compost-related illness was better than average). Harrison also found an association between the distance an individual lived to an outdoor composting facility, and respiratory symptoms and general health complaints, but not allergies or infectious disease.

The most recent review conducted by Domingo and Nadal (2008) explored human health risks in domestic waste composting facilities only, but it was less categorical about the conclusions and essentially found that information relating to occupational risks was scarce. The authors suggested adopting a precautionary approach and the development of surveillance systems for those working with compost.[31]

Examples of the specific pieces of work that these reviews depended on are considered below. Many come from the Netherlands, Denmark or Germany where recycling and industrial composting has been undertaken for considerably longer than in UK, but application of the findings to the UK should be undertaken with care, since waste collection techniques may well be dissimilar and bioaerosol concentrations in particular are known to be affected by local weather patterns.

In a double blind cross sectional study by Herr et al., self reported irritative airway complaints were associated with residency in an area with high bioaerosol exposure, and with a composting facility in the neighbourhood.[32,33] The study found that self reported health complaints such as 'waking up due to coughing' odds ratio 6.59 (95% CI 2.57 – 17.73), 'coughing on rising or during the day' odds ratio 3.18 (95% CI 1.24 – 8.36), and 'bronchitis' odds ratio 3.59 (95% CI 1.40 – 9.40), 'excessive tiredness' odds ratio 4.27 (95% CI 1.56 – 12.15), were higher in people living in areas with highest bioaerosol exposure, 150 – 200m away from a large scale composting site. The health complaints were not accompanied by increased self reports of disease diagnosed by a doctor. The model for the logistic regression included age, odour annoyance, period of residence as fixed co-variates, and additional confounders were gender, composting in own garden, collection of organic waste in the home, distance of home from a busy street, smoking, and exposure to passive smoke. The same study found that storage of organic waste indoors for more than two days was associated with skin-related complaints, and people with a history of an atopic condition (e.g. hay fever, eczema or other allergies) were at greatest risk.

Cobb et al. (1995) administered a health questionnaire to people living near a mushroom composting facility and a comparison group further away, but no significant differences in health complaints were found.[34]

Workers at a composting facility in Denmark reported more diarrhoea than other waste workers.[35] The adjusted prevalence proportion ratio was 2.8 (95% CI 0.90 – 8.80) but results were not significant.

Another cross sectional study comparing compost workers to drinking water supply workers in Denmark found a slightly increased risk of self reported vomiting and diarrhoea with an odds ratio of 7.51 (95% CI 1.17 – 48.10).[36] Although a control group was used, several possible confounding factors were not controlled for in this study.

A cross sectional study of upper airway inflammation and respiratory symptoms in workers collecting domestic waste in the Netherlands found an increased prevalence of self reported respiratory symptoms.[37] This was supported by increases in inflammatory markers measured via nasal lavage. The inflammatory changes were considered to be caused by exposure to organic dust, mediated by neotrophils resulting in the respiratory symptoms. In this study 47 waste workers were compared to 15 office workers at the same plant. Numbers were relatively small and there were differences between the two groups in factors such as length of time employed, sex and smoking habit that could have acted as confounding factors.

A similar cross sectional study in Germany found that compost workers had significantly more symptoms and disease of the airways and the skin than controls.[38] The high exposure to bioaerosols among compost workers was significantly associated with higher frequency of minor health complaints as well as higher concentrations of specific antibodies against moulds and actinomycetes. There was no control of potential confounding factors undertaken in the analysis.

An article by Hansen et al. (1997) reported on a cross sectional study comparing Danish waste collectors with park workers.[39] This was a larger study and concluded that waste collectors have moderately increased prevalence of several respiratory problems such as cough, itching nose, wheeze and chronic bronchitis. This study attempted to control for confounding factors and concluded that the main causes for the observed differences were probably exposure to vehicle exhaust and bioaerosols.

The most important health problem identified that might also be a potential problem for home composters is aspergillosis, a lung disease caused by inhalation of spores of Aspergillus, a fungus that grows on dead plant or animal matter and is commonly found in compost. The Daily Telegraph headline of 12th June 2008 read 'gardener killed by fungus in his compost.' This followed publication earlier in the week of a case report 'Gardening can seriously damage your health' in the Lancet.[40] The man in the case study had opened a bag of compost and mulch which had been left to rot. Although a smoker and a welder by trade, he had previously been regarded as healthy. The man became ill 24 hours after exposure and died about a week after being admitted to hospital. This case was extraordinary, since severe illness and death only usually occurs in people with weakened immune systems or who have damaged lungs. Cases of hypersensitivity pneumonitis due to Aspergillus in compost have been reported, but again are rare.[41]

MAIN HEALTH BENEFITS ASSOCIATED WITH COMPOST

Essentially no scientifically measurable health benefits are associated directly with composting. However, in several health impact assessments that were reviewed, it was acknowledged that separation of green waste or home composting creates a 'feel good' factor. People who engage in composting feel that they are doing their bit for the environment and this in turn increases their sense of wellbeing and health.

Many of the health benefits derived from composting come indirectly and are difficult to quantify.[3] For example, the application of compost to agricultural land increases its water holding capacity. This in turn helps to reduce the risk of flooding and saves water, both of which are clearly good for health. The use of compost in agriculture and horticulture decreases the need for artificial fertilisers, saves money and energy associated with their manufacture as well as reduces the pollution of waterways and associated health risks. The application of compost to land leads to carbon sequestration, and appears to act as a carbon sink, thereby reducing the risk of health effects associated with carbon emissions and global warming.

For home gardeners, composting is one aspect of contact with the natural environment which many believe benefits health. It is possibly easier to appreciate how a walk in the park, or the sound of birdsong could contribute to 'complete mental, physical and social wellbeing'[42] but if composting is acknowledged as an essential element in the production of sustainable green landscapes, then maybe we can 'stretch' the evidence sufficiently to include this natural recycling process. Wilson's 'biophilia' hypothesis[43] suggested that humans are innately attracted to other living organisms and this has been expanded of late to include a bond with nature [and presumably composting] more generally.

Horticultural therapy has long been recognised as salutary.[44] It is used effectively to promote health and wellbeing in community groups, and for programmes with older people, those with disabilities and special education needs, and in prison settings.[45,46,47]

Whilst this factsheet is primarily about composting, the links between this and the health benefits from gardening cannot be completely ignored, because home or community composting facilitates the related physical activity and the production and increased consumption of fruit and vegetables; all of which are linked to better health.[48] Researchers in the USA have shown that gardening can offer enough moderate physical activity to keep older adults healthy.[49]

Obesity and cancer rates are higher in deprived urban areas where home gardening could have greatest impact and reduce the effect of the 'food deserts'* commonly found in these areas.

School gardening and composting schemes are increasingly popular, and one study in the USA (2004) found that as well as helping to increase children's interest in eating fruit and vegetables which is linked to reducing the risk of obesity in later life, the composting of the organic waste produced a gross saving of $6,230 in disposal fees alone.[50]

The development of a school based food garden in Australia resulted in pupils showing greater attention to origins of produce (garden grown and fresh), as well as increased consumption of vegetables and fruits, and enhanced confidence in preparing fruit and vegetable snacks.[51]

RESEARCH GAPS AND RECOMMENDATIONS

The Landfill Directive and government policy will shift the emphasis away from landfill and towards an increase in composting (as well as other forms of recycling) as part of a more integrated waste management strategy over the next few years. To avoid undue transport and associated costs, composting (and other recycling) facilities need to be located in close proximity to the urban areas where the waste that feeds them is produced. This will inevitably lead to an increase in planning applications and large public consultations. The lack of research evidence about the health impacts of composting will be problematic when public health professionals are asked for advice on planning applications. Research into risk perception to assist the understanding of people's fears and concerns will help the development of effective communication strategies and encourage informed debate and acceptance of composting and other recycling facilities.

Local authorities and public health professionals will need to work hard to win the hearts and minds of their communities to encourage more households to separate organic waste materials for collection and/or engage in home composting.[52] Better evidence about the health benefits of composting to underpin these appeals will undoubtedly help this struggle.

Clinical and environmental health disciplines to date have tended to address the same question: Is there an association between exposure and outcome? Despite having a definition that endorses health as a resource for positive health for over sixty years, the research agenda has remained firmly fixed and focused on potentially unhealthy exposures. "Research and teaching … have centred on the hazardous effects of various environmental exposures, such as toxic chemicals, radiation and biological and physical agents … However some kinds of environmental exposures may have positive health effects. As we learn more about the health benefits of contact with the natural world, we need to apply this knowledge in ways that directly enhance the health of the public."[53] If we are to achieve the levels of recycling required to reach government targets and ameliorate the effects of climate change, research to support positive messages about the health benefits of composting is urgently needed.

Since an independent review by the National Consumer Council in 2006 established its effectiveness, the use of a social marketing approach to encourage healthy behaviour has become a key feature of government policy and is now widespread.[54] Social marketing is an adaptable approach used to achieve and sustain behaviour goals on a range of social issues and would be an ideal methodology to employ to encourage composting. One of the problems that local authorities face is the need to change the image of composting from something rather unpleasant that eccentric gardeners do (and public health

* A food desert is an urban district with little or no access to foods needed to maintain a healthy diet, but often served by plenty of fast food restaurants

professionals encourage), to it being a regular, normal activity that everyone can and should do.

Social marketing for health uses traditional marketing strategies to tailor a campaign to identified needs. The key to good marketing is finding out what the customer wants or values, and might be prepared to offer in exchange. Research to gain insight into the barriers and motivating factors, and inform social marketing approaches to composting for different sections of the public is needed.

There is a growing interest in organic gardening, and several schools in the UK are participating in gardening (which includes composting) in an attempt to tackle the growing obesity crisis. This not only provides physical activity, but also education about the nature of food and where it comes from. Very few of these schemes have been going long enough to be able to say with any certainty that they can create sustainable behaviour change in physical activity and eating habits. So there is a clear need for better evaluation of such schemes.

Obesity levels in children are rising and are a great cause for concern.[55] It is interesting to note that in the USA, Candice Shoemaker recently received a $1.04 million grant from the U.S. Department of Agriculture's National Research Institute to study whether gardening [including composting], particularly in schools can promote a healthier lifestyle and combat childhood obesity. Is something similar needed in the UK?

Planners also have a role and can encourage more sustainable local food production, and encourage home and community gardens. It would be useful to explore how public land could be used for gardening and composting activities and thereby contribute to improving the public's health.[56]

There have been interesting and very successful developments in some of the large cities of India and Bangladesh, relating to the decentralised composting of urban organic waste.[57,58] In both cases, communities took responsibility for the collection and composting of green waste, and were able to sell the compost that was produced. The benefits included community control and therefore acceptance, reduced need for transportation of waste, increased local employment and a small financial profit. Key to the success of both schemes was municipal support and in the case of Bangladesh, approval from the Bangladesh Agricultural Research Council, and policy support from the Ministry of Agriculture. Would there be any benefit in exploring the possibility of setting up similar small scale schemes in the UK?

USEFUL WEB SITES

www.defra.gov.uk/environment/waste/index.htm

www.environmentagency.gov.uk/business/topics/waste/35411.aspx

www.wrap.org.uk/composting/

www.organics-recycling.org.uk

www.wasteonline.org.uk/resources/InformationSheets/WasteDisposal.htm

www.quickcompost.co.uk/index.shtml

www.nsms.org.uk/public/default.aspx

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THIS HEALTH + SUSTAINABILITY FACT SHEET WAS WRITTEN AND EDITED BY MARY LYONS, CLARE LUSHEY AND HARRY SUMNALL

Acknowledgements:
Keith Osborn, Paolo Luria and David Neary

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ISBN: 978-1-906591-84-7 (Print version)
ISBN: 978-1-906591-85-4 (PDF version)

Published July 2009

THE NEXT ISSUE WILL FOCUS ON SUSTAINABLE WATER AND PUBLIC HEALTH

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