



CENTRE *for*
SUSTAINABLE
HEALTHCARE

Case Studies:

*UK medical school teaching on
sustainability, climate & health*

**Sustainable
Healthcare
Education** 

In partnership with

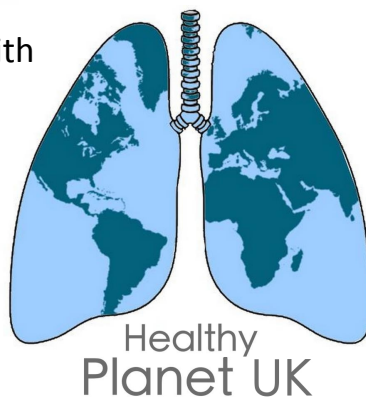


Table of Contents

Introduction.....	3
Climate Change and Health: the challenge and the opportunities	4
The WHO's key messages for the last climate summit (COP18)	4
What does sustainable health care mean?	5
Saving Carbon, Improving Health.....	6
Overview of medical schools included.....	6
Reflections on innovations and the main lessons learnt from these case studies... 	7
Bristol	9
Leeds	13
Leicester.....	16
Liverpool.....	18
Oxford	20
Sheffield.....	23
University of East Anglia (UEA).....	26
Teaching materials recommended by respondents.....	28
A list of other resources compiled by Healthy Planet students	31

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Introduction

This document is primarily a series of case studies of teaching on climate change and sustainability and their links to health and healthcare from 8 medical schools in the UK. The information in the case studies was collected through a combination of surveys over email, and/or through structured telephone interviews depending on contributors availability. Except where otherwise stated, they refer to the academic year 2011-2012. Many of them have participated – to varying degrees – in the activities of the SHE Network in the past, sharing experience in order to build upon one another's, primarily through conference calls and emails.

Those selected as case study examples are a fairly heterogeneous group in terms of eg. format, duration, number and stage of students and the particular topics focused on. What they have in common is a certain depth of engagement with around climate and sustainability - beyond one or two lectures for example – and innovative ideas which set them apart from teaching in the majority of medical schools.

The Centre for Sustainable Healthcare (CSH) is based in Oxford and seeks to support the transformation of healthcare for a sustainable future. The Sustainable Healthcare Education (SHE) Network runs under the umbrella of the CSH as its education arm. It is a fast-growing group of clinicians, academics, medical educators and students across the UK who believe that the impacts of the environment on health and healthcare should be part of the curriculum for all health professionals and are working to make this a reality.

The student group Healthy Planet UK, who work in partnership with the SHE Network, seek to engage in the issues that surround climate, health and sustainability through a combination of learning, teaching, action and advocacy. They believe that, in order to protect the health of vulnerable groups now and of future generations, medical students need to ask more of older generations and to act themselves in mitigating and adapting to climate change - starting with healthcare sustainability.

Climate Change and Health: the challenge and the opportunities

A 2008 UCL-Lancet Commission called climate change ‘the biggest threat to global health of the 21st Century.’ This statement is no exaggeration: there is now overwhelming evidence of the danger from heat waves, flooding, extreme weather events, drought, altered disease patterns, crop failure, economic and ecosystem collapse, migration, and conflict over scarce resources.

The General Medical Council’s document Tomorrow’s Doctors emphasises that “health and safety of the public must be an important part of the curriculum” - and this is particularly important in relation to climate change and health inequity.

Poor and marginalised people are by far the most vulnerable: according to the WHO, the health impacts of disasters and climate sensitive diseases are more than 300 times greater in countries which cannot provide essential health services. This week, just ahead of the next climate summit COP18, the World Bank has produced a report highlighting the fact that we are currently on track to a world four degrees warmer by 2100 without rapid and concerted action; the report also makes clear that this prospect is inimical to both health equity and poverty reduction.

Health is not only important in creating a better understanding of and engagement in the problem; it can also be part of the solution. Efforts to mitigate climate change, through the promotion of lower carbon, sustainable lifestyles, have huge potential to benefit public health and health equity. As a respected voice, the health community needs to engage better in issues related to climate mitigation and adaptation – through and beyond the UN process – in order to promote health and protect the health of the most vulnerable and of future patients.

We wish to make the case for the importance of medical student education on such topics – as tomorrow’s doctors, and as a group able to speak with some authority on issues related to health. Moreover, if we wish to build a sustainable healthcare system, education is perhaps the most lasting and effective way to make this possible.

The WHO’s key messages for the last climate summit (COP18)

The WHO’s key messages for climate and health¹ are relevant in this context, and are summarised overleaf:

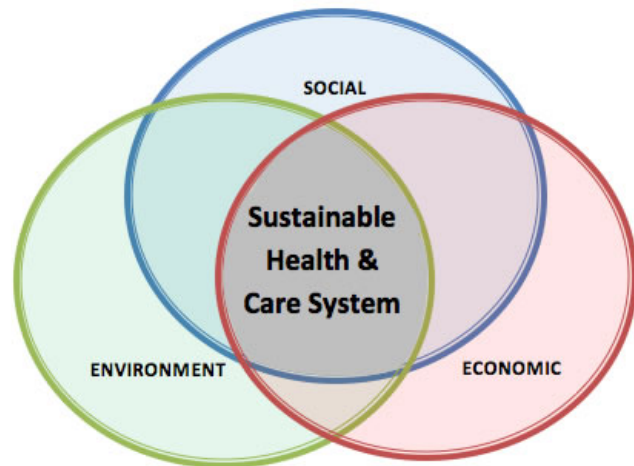
1. The impact on human health is among the most significant measures of the harm done by climate change – and health can be a driving force for public engagement in climate solutions.

¹Maria Neira, World Health Organization, Outreach Magazine, 3/12/2012
http://www.stakeholderforum.org/fileadmin/files/Outreach_COP18%20Day7_Health.pdf

2. Protection and enhancement of health is an essential pillar of sustainable development, and of the response to climate change. A more integrated and intersectoral approach can improve policy coherence and increase efficiency.
3. Well-designed policies to increase resilience to climate change, and mitigate greenhouse gas emissions, also have great potential for improving health, health equity and gender equality.
4. Progress in protecting and enhancing health should be tracked and monitored, both in relation to actions taken by the health sector itself, and by other health-determining sectors, such as water resources and energy.
5. Health impacts and co-benefits should be valued in selecting and financing climate change adaptation and mitigation policies.

What does sustainable health care mean?

In this set of case studies, we have collated examples of teaching on impacts of climate change on health, of the need for a more sustainable healthcare system and of content and various innovative teaching approaches set around those general themes. There are many ways in which sustainability – and therefore sustainable healthcare – can be defined. Perhaps the most straightforward is an adaptation of the Brundtland definition of sustainable development: that sustainable healthcare should meet the needs of the present without compromising the ability of future generations to meet their own needs. It is conceptualised as the situation where social, economic and environmental sustainability intersect.



This can apply at a range of scales, and the present focus of the NHS' Sustainable Development Unit is primarily on the first two:

1 - Sustainable Health Sector

'Greening' the health sector with particular attention to energy, travel, waste, procurement, water, infrastructure adaptation and buildings. This ensures resources are used efficiently and responsibly.

2 - Sustainable Health Care

Slightly broader than point 1 and involves working across the health system and partners to deliver health care that delivers simultaneous financial, social and environmental return on investment. It includes more sustainable models of care.

3 - Sustainable Health & Well-being

This is the broadest level and involves considering the sustainability of everything that impacts on health and well-being (e.g. education, farming, banking etc.).

Saving Carbon, Improving Health

This is title of the NHS Sustainability Development Unit's Strategy Document¹, which makes the case for a sustainable NHS and lays out a strategy for achieving this goal. It emphasises the following areas as those needing action. The bold ones are the ones which are perhaps the most specifically relevant to the context of medical education:

- | | |
|--|---|
| i. Energy and carbon management | vi. Sustainability in the built environment |
| ii. Procurement and food | vii. Workforce development & education |
| iii. Low carbon travel, transport & access | viii. Developing partnerships & networks |
| iv. Water efficiency | ix. Governance and carbon management |
| v. Waste management and recycling | x. Finance and carbon literacy |

It could be argued that point vii - medical education and workforce development - is important not only in its own right, but also as a means to facilitating all of the others. Improving the education and training of tomorrow's health professionals with regard to sustainability will be crucial if the transition to a sustainable and resilient health system is to be successful and sustainable.

Overview of medical schools included

Medical School Name	Main focus of case study	Year	No of Students 2011-12	Core/optional	Other (core) teaching?
Bristol	Sustainable Healthcare SSC	2	22	Optional	Yes
Leeds	Healthy People, Health Planet SSC	3	≈12	Optional	Yes
Leicester	2 Seminars: Dragon's Den and Household energy use/indoor air pollution	?	Optional	Optional	1 lecture
Liverpool	Climate & Sustainability in PBL teaching content	1 & 2	All	Core	N/a
Oxford	Sustainable Healthcare SSM	6	2	Optional	Limited in undergraduate, some postgrad.
Sheffield	Climate and Sustainability ILA (3 other relevant ones)	4	10	Optional	Yes
UEA	Health and environment SSC	4	?	Optional	Yes

¹ NHS Sustainable Development Unit: 'Saving Carbon, Improving Health: NHS Carbon Reduction Strategy For England' (January 2009)

http://www.sdu.nhs.uk/documents/publications/1237308334_qyIG_saving_carbon,_improving_health_nhs_carbon_reducti.pdf

Reflections on innovations in teaching and main lessons learnt from these case studies

The majority of the examples here are optional modules such as student selected modules/components (SSMs/SSCs) or integrated learning activities (ILAs), which are all broadly the same thing. Although some also have a certain amount of core teaching, it is perhaps a reflection of the current stance on teaching medical students about climate or sustainability and their links to health that the majority of content on offer to students is optional rather than core, and as such is open only to a relatively small group of students. A common theme regarding core inclusion was that the possibility was often contingent upon the opportunities for incorporation, for example within global health lectures, as well as the attitudes and decisions of those responsible for curriculum planning and reform being of central importance.

Some case studies gave students the opportunity to develop resources or pilot activities, with Bristol's, Leeds' and Oxford's being particularly notable in this respect. Leeds' SSC used the opportunity to produce shareable, engaging, usable resources, often in under-researched areas.

In a similar vein, one part of the Bristol SSC was called 'Sustainability in Practice Projects' – focused on students planning and implementing an educational, audit or campaigning project, which in 2012 were in a local secondary school, planning for events for a Green Week, and pitching the idea of Bristol becoming a Transition Medical School to the Dean.

Sheffield stands out for the breadth of content, both core and optional, which is either directly or indirectly related to climate and sustainability. There are core lectures in years one and three as well as an ILA on climate and health and several others in related subjects, including for example globalisation and health, and tele-medicine and tele-health, which are likely to be highly relevant to making healthcare more sustainable even if this is only one part of why they are being used and this course was not taught specifically from a sustainability perspective.

One particularly exciting development at Sheffield, which we were unable to write up for this report but intend to add in the future, is the first ever SSC (to our knowledge) on care pathway ecological footprinting, with a focus on maternity care, which a medical student who had previously interned at the CSH (Alistair Wardrope) was instrumental in setting up.

Leicester is the only example which focuses specifically on energy and health for a whole (half-day) session, and for the fact that it piloted the idea of a 'Dragon's Den' style session which has been replicated in several other settings, although it is a much shorter amount of contact time than many of the other SSMs.

Cambridge has integrated sustainability into clinical school teaching in the context of leadership and management, which is worthy of note but unfortunately we were unable to gather sufficient information to write this up into a case study in time.

Oxford's SSM in 2011-12 was very small scale, with only 2 students, who were effectively on 2 week placements at the Centre for Sustainable Healthcare. The advantage of this was that these students received a large amount of 1-to-1 input and supervision and were able to learn a significant amount produce high quality resources during their time even though it was only a total of 2 weeks.

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

An exception to the trend of most content on climate and health being taught through SSMs is Liverpool, which is notable for the different approach taken, and so may serve as a useful model for other medical schools thinking about integrating these topics across their teaching. They have successfully incorporated the following topics across the problem-based learning content taught to all students in their first and second years, each of which can be subject to examination:

- key aspects of evidence for health effects of climate change
- social, economic and ecological determinants of health in the context of obesity
- occupational and environmental determinants (inc. climate) in the context of asthma
- sustainable development of NHS provision
- sustainability as another criterion to consider in evaluating quality of health care
- concepts of sustainability related to renal care (e.g. health co-benefits)

This is markedly more than the core content on climate, co-benefits, healthcare sustainability taught in most UK medical schools, and another quite important factor here is that it is quite early on in the course. This is of particular relevance because part of the argument often made with regard to teaching sustainability and health – and related subjects such inequalities, determinants of health, distributive justice for example - is that it is more of a ‘lens’ through which to teach and to learn than a large amount of extra content.

Anecdotally, students who have been involved in Healthy Planet UK generally seem to feel that if students were introduced to the core concepts and a small amount of key information near the start of the course, that this may well put them in a better position in subsequent years to consider other subjects, and perhaps also their own assumptions, from a sustainability and a ‘systems’ perspective, as they progress through the rest of the course.

The case studies included are arranged in alphabetical order, and this is a working document to which we hope to add in further case studies as new medical schools try out different ideas and approaches; if you would like to submit a case study please contact France.Mortimer@sustainablehealthcare.org.uk or Isobel B

Bristol

Summary

This course, a 2 month long year 2 student-selected component (SSC), was first set up in 2006 and has been running from October-December every year since then except for 2011. This year there were 22 students participating, a similar number to previous years, though this year all the places were booked within 48 hours of release suggesting increased interest. Since 2006 it has evolved quite significantly, both to reflect what has worked well and also to make use of new technologies such as social media. It has also become increasingly collaborative, through building links with other parts of the University, Bristol Hub (www.bristolhub.org), local student groups and others working on sustainability across the UK.

Learning outcomes

- 1) Gaining a thorough understanding of sustainability from a systems perspective
- 2) Exploring the impact of human activity on health and the global environment
- 3) In particular, understanding the environmental impacts of the healthcare industry
- 4) Developing a vision of a sustainable NHS and our part in realising that vision
- 5) Taking a scholarly look at one particular subject area linking sustainability and health
- 6) Learning to work together in small and large groups in achieving clear objectives
- 7) Learning about effective behaviour change in individuals and organisations

The SSC has four main areas of activity:

- 8) a) 6 **“Seminars”** - meet as a group and have an interactive session on a particular topic for which there is some preparatory reading. These sessions usually include a short talk by a subject expert (or enthusiast!)
- 9) b) **“Personal Learning Options” (PLOs)** - students draw from a list of environmentally themed options which are self-organised or available across the city. Your experience is written up.
- 10) c) **“In-depth Assignment” (IDA)** - an essay of 1500-1800 words exploring an aspect of sustainable healthcare in greater depth. This is an assessed piece of work done in pairs.
- 11) d) **“Sustainability in Practice Project” (SIPP)** - an opportunity to do an educational, audit or campaigning project with a group of other students, which was facilitated by the Bristol Hub (www.bristolhub.org)

Teaching format

This is a combination of interactive lectures, group discussion and debate, private reading of key articles, environmental audit and direct action through practical projects, research and presentation. At least one field trip makes up the 'activism' component of the course. Dr. Thompson emphasises that “the student activism theme is really important – students are excited about doing things in the community, as they feel real.”

The emphasis on direct action and getting students involved 'beyond the classroom' differentiates this SSC from more didactic approaches, and means that the SSC also has the potential to make a lasting impact and get students involved in action on an ongoing basis. For example, the Bristol University farmers' market was started up as part of the SSC (which helped them to jump through

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

health and safety 'hoops' etc) in 2006, but now is entirely student-run and happens on a fortnightly basis. 2012 was the first time that one of the students who had previously participated in the SSM, Jonathan Broad, helped deliver a seminar themed around 'Food for people and planet' it was also the first year with a session in a local school. This was set up by the Bristol Hub manager, Elena Lynch, and the medical students did an initial presentation on the concept of sustainable healthcare and what that might mean, and then split the classroom into four stations, which were each manned by one of the medical students. The pupils then moved from station to station every 15 minutes, and explored a different aspect of climate change and sustainable healthcare at each station (food, travel, the NHS and sustainability, climate change).

According to Dr. Thompson, "the fact that it is student-selected is very important in our planning, so we've incorporated PLOs (personalised learning objectives) into the structure - a choice of films, volunteering, lectures from a list prepared by the course organisers." The course handbook states: "We see students as assets, learners, researchers, activists, teachers and even as artists. Not as receptacles".

This year for the SPPs – unlike previous years - the organisers have devised projects in advance. Though this has taken some decisions out of students' hands, it should be more satisfying with more substantial projects being possible, and enable students to be up to speed a lot quicker. The plan is to divide the cohort into groups of either 4 or 5 students, with one project each. Two are green impact assessments (a type of audit – see www.greenimpact.org.uk/bristol), one is educational (designing and delivering an engaging and informative workshop about sustainable healthcare to a group of 14-16 year olds in a local school). One is policy-related (researching and preparing a proposal and pitch for Bristol Medical School to become a Transition Medical School) and one is a campaign - the imaginative and creative planning and delivery of a Sustainability Awareness Week (10th-14th December 2012) in the medical school

The SSC aims to break down 'traditional 'boundaries' – for example an emphasis on getting students off-campus – the 2012 SSC will include a day trip to a pharmaceuticals factory in Ravenmouth, a visit to Dr. Thompson's practice (a Healthy Living centre) as well as a local nephrology ward which is very sustainability-focused and local 'care farm' (these use part or all of a farm to provide health, social and/or educational care services for vulnerable groups of people, and provide a supervised, structured programme of farming-related activities) to see how it works in practice.

Photos: Jonathan Broad



Since starting the SSC, the course organisers have picked up on the potential value of using social media as a tool - especially given how much students tend to use facebook, twitter, blogs etc, and how it can help to reach a wider audience. For example, 1 facebook group will be set up per team for them to post information about what they're doing and why etc, and students also need to write one 200-300 word blog post at www.bristolgreenmedics.wordpress.com and one comment on another participant's blog post as part of the PLO component of the course.

Intellectual rigour and gaining academic experience, eg. of writing a paper, is nevertheless also an important part of the SSC, says Dr. Thompson: "I try to get fair a bit of in-depth work and

interpretation of academic papers into it, as it can be easy to skate over the surface of the topics covered. The idea is to use this to teach students new skills: for example, their write-up has to be written in a way that they could publish it, using the Student BMJ format.” In addition, important contributors in the first iterations of the course have been Dr Chris Johnson, a medical doctor, author and addictions specialist, and Prof. Paul Valdes, climate scientist and IPCC author.

Assessment

This course has three assessed elements:

- a) In-depth assignment (IDA). One submission from each pair of students. (40% of total)
- b) Presentation of Sustainability in Action (SAP). (30% of total)
- c) Reflective Account. (30% of total)

The reflective essay consists of up to 1000 words on the follow themes:

- What I learned from my Personal Learning Options (PLOs)
- My experience of working with others on the course
- How I would improve this SSC for future generations of students
- The relevance of the sustainability dimension to medicine
- My overall impression of being part of this SSC

The primary criteria in assessment of the IDAs were structure, effort to research the article properly, a vivid and engaging style, precision, accuracy and proof-reading, and properly done references and captions. SAP presentations were assessed on the basis of originality, how much was achieved in the time available, teamwork and the quality of audio-visual and/or verbal aspects of presentation.

The course organisers’ expectation is that all students will score >60% overall (a good, very good or excellent pass) and that those who engage wholeheartedly and critically will score >70%. There is also an expectation of attendance and submission of at least one article and one comment to the Bristol Green Medics blog.

Lessons learned

Learning from successful experience at Leicester, which has been shared through the SHE Network, this year Bristol decided to try out a 'Dragon's Den' session for the first time, based broadly on the way the idea has been run previously but with some adaptations in that the groups aren't presenting on similar topics but instead their SIPPs.

However, the central idea - of a 'pitch' and being cross-examined by a panel of interrogators (including Mr Martin Wiles (Heads of Sustainability, UoB) and Dr David Pencheon (Director, NHS England Sustainable Development Unit) – still stands.

According to Dr. Thompson, “Connecting with the 'civil service' of sustainability within the University/medical school is really helpful on this front – they're usually more concerned with estates than education but it can be a massive help to get them on board”. In most Universities or medical schools there will generally be an energy management and or environment or sustainability officer (or a whole office as in the case of Bristol, which has a team called BUST - the Bristol University Sustainability Team - which includes both staff and students).

For example, in conjunction with BUST and the Bristol Hub, they have been developing the concept of a 'Transition Medical School' - along the same lines as a Transition Town or Transition University (an idea piloted in Edinburgh). It is early days still, but there is already some traction: the Medical School strategy committee have agreed to listen to and consider a 10-minute student presentation

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

pitching their idea and plans for how it would work. Field trips outside the University and medical school itself are also highly recommended and offer students a very different sort of learning experience.

Other teaching on climate, sustainability and health at Bristol

The SSC is not the only component on climate, sustainability and health at Bristol Medical School: Dr. Thompson also teaches 2 core lectures on these subjects – a Year 1 lecture which introduces students to concepts such as systems theory and feedback loops, small, medium and big systems (from human physiology to the biosphere) and the global determinants of human health. The Year 3 lecture, “Environmental Challenges in Global Health” covers topics such as “how will we run the NHS on 40% less energy?” and impacts of climate change on health. Intercalating students doing a BSc in International Health also have a seminar on climate change and water, led by Dr Ian Baker.

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Leeds

Summary

This SSC is an option open to students at the end year 3 of Leeds Medical School's undergraduate course. It is comprised mainly of self directed project work and involves weekly 2 hour meetings with (two) co-tutors aimed to give offer opportunity for debate, discussion and learning; plus discussion & support for project work. There is a final day presentation session with tutors and senior medical school representatives.

It was first delivered June 2011 to 12 students and delivered for a second time 2012.

Teaching format

5 week full time SSC, one or 2 2-hour seminars per week plus self-directed project work. Also independent reading and preparation each week.

Learning outcomes / course content

Largely based on (old) SHE Network learning outcomes. These are based on 2011 tutorials at Leeds, but could be used flexibly:

Week 1 Communicating for sustainable health & health care

Week 2 Global health, global environments and sustainability

Week 3 National policies, local communities, health and sustainability

Week 4 Sustainable healthcare services

Week 5 Presentation day - *Invited audience [including SSC tutors and invited figures from the medical school] saw student groups give a 10-15 minute presentation on the resource they had produced. Each group was asked questions by tutors and audience members.*

Project work

- 3 groups [4 students]: Communicating with patients (GP theme), communicating to the public (PH theme), communicating to colleagues (Medical school/health professionals).
- Could be run with different groups dependent on student interest/ideas
- Aim to research subject and approach using UK and international examples
- Research can build on existing networks/resources
- Aim to produce a shareable resource - e.g. leaflet, presentation, website
- Aim to develop something that is engaging and can be used in the real world
- Aim to present the developed resource and reflection on developing it

Group projects in 2011:

- Group A – a resource for medical student education
- Group B - video for patients in primary care
- Group C – teaching for 6th formers
- Group D – waste and clinical services

Some of the resources produced can be found at

<http://sustainablehealthcare.org.uk/sustainable-healthcare-education/resources/2011/10/2nd-year-students-made-these-resources-5-week-ssc>

Group projects in 2012:

1. Mapping sustainability across the Leeds curriculum (has now been expanded into a larger project following a successful grant application)
2. Calculating the carbon footprint of medical student travel
3. Creating a learning resource and article about environmental change and food security
4. Researching and compiling a booklet which compares health systems in different countries from an ecological perspective
5. designing a lecture and learning resource on global population in relation to ecology and health.

sustainable lifestyles and health

4. A written report on the resource and its development, with references (group assessment).

NB This was marked against standard School of Medicine SSC marking criteria. Students were shown these marking criteria at the start of the SSC.

* Students had to hand in an academic integrity form for each piece of work. i.e. an individual form for their reflective log + a separate form for the written report

Course background/origins

New course, usual SSC pathway for implementation

Lessons learned/barriers encountered

Feedback from the first year showed that students wanted more information from the start about assessment, course structure etc, so that was improved for the second year.

Sarah found that emphasising creativity and fun for the presentations worked really well.

Need one or two tutors per 12 students

Ensure technical support and resources available

Summary of key feedback from 2011 cohort:

- Enjoyable SSC; some were surprised by amount they learnt; two students have since contacted us to ask if they can do follow on projects.
- Students enjoyed the freedom to choose and develop their project
- Students would have liked earlier direction about what their project would involve.
- Some would like more technical support (but didn't ask for any at the time!)

Assessment

Content was not included in exams but students were assessed on:

1. Reflective learning diary (individual assessment)
2. Presentation of the work in developing their resource [mostly via a 10-15 minute presentation on how the product was developed, plus a presentation of the resource itself, to the tutors and invited audience, including references]
3. The practicality, applicability, evidence base and innovation of the resource. Assessment based on engagement with the chosen audience; originality and thoroughness of approach; evidence base and integrity of content; and ability to communicate the relationship between

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

- Some of them would like more contact teaching time. Tutors found the 2 hrs per week very tight. Students would like taught sessions earlier in the week.

Most students said that they learnt presentation skills and IT skills, rather than mentioning behavior change /health promotion/ critical thinking/ debate. (The tutors however said they hoped they also learnt something of the latter!)

Future Plans

Next year the set up is changing – this particular SSC won't be offered and it is now going to be a longer-term (2-year) programme for 4th and 5th year students. It will most likely be led by James Chan and Frances MacGuire after Sarah leaves Leeds.

Delivered by:

Sarah Walpole and David Pearson

Contact:

Sarah Walpole, Academic Clinical Fellow - argotomunky@yahoo.co.uk

Leicester

Dragon's Den: Climate Change, Health and Sustainable Healthcare

Leicester was the first medical school to pilot the idea of running a 'Dragon's Den' for healthcare sustainability, and students were asked to prepare presentations and present them to a panel during a morning session. Students' task was to find out more about problems related to emissions and wasteful use of resources for one setting of the NHS, and to propose solutions. They are tasked with making a rough estimate of how much money is wasted or CO₂ generated by wasteful activity in the setting allocated to their group, from a list of three (see box, right).

Teaching format

The morning session also included an hour-long introductory talk by Stefi Barna (co-director of the Sustainable Healthcare Education Network) on systems-thinking, health and climate, NHS Carbon Reduction Strategy, co-benefits. This was then followed by the presentations and constructive critiques, as well as a session mapping the Dragon's Den proposals to the GMC's requirements for teaching and training and finally half an hour to discuss 'doubts, concerns, lessons for the future' related to the course.

Groups need to research how their setting generates waste and consider ways to reduce it, and how to present their ideas, which can be any way of their choosing. Each of the three groups then have to make a pitch to the Dragons to gain funding for their ideas about how to reduce the waste produced by the NHS, particularly in relation to the production of carbon dioxide.

Instructions given to students:

Ideas should be specific, not simple generalisations such as 'turning down the heating.' Each pitch should last no more than 10 minutes. During the pitch students should present your findings about the actual level of waste and say how much funding they want the 'dragons' to provide. Students are instructed to indicate how they expect this to be paid back by savings and to focus on specific interventions relevant to the setting. For example if looking at a community pharmacy it is suggested that they might visit a local pharmacy at a quiet time and speak to the pharmacist to find out how medicines are collected by/delivered to patients; whether all prescriptions made up are collected; how much of what is dispensed is actually used; how much stock expires before use-by date.

After the pitch, three members of another group have to quiz students from each group about their solutions and say whether they will provide the start up funds or they don't believe your ideas will produce a positive result). The session facilitator will act as the presenter of the programme and interview the group after the pitch. Students then receive feedback from the invited speaker and the module leader at the end of the session.

Solutions proposed by students included, for example, giving people £300 to give up their parking for a year as a way to encourage cycling and use of public transport, or switching to e-prescriptions and a secure electronic communications system for referral letters etc.

GROUP A

You will consider the waste generated by a hospital ward with 24 beds.

GROUP B

You will consider the waste generated by a GP Practice of five doctors and 10,000 patients.

GROUP C

You will consider the waste generated by an Operating Theatre Suite of four theatres and a recovery area.

Household Energy in Resource Poor Countries



Image: WHO

The aim of this session is for students to learn about the health effects of indoor air pollution, particularly as a result of burning bio-mass fuels and to understand the biological consequences of exposure to pollutants. Through a lecture presentation they learn about a collaborative programme between Leicester University and the University of Gondar, Ethiopia (which they also have the opportunity to become more involved in later in the course -

<http://www2.le.ac.uk/institution/gondar-information-hub>)

Students are asked to read articles on 'Indoor air pollution' and 'Awareness of health effects of cooking smoke' before meeting with their groups to plan their presentations.

Whilst reading the articles they are recommended consider these questions:

- Why do people cook with a polluting fuel?
- What are the main diseases resulting from using biomass fuels?
- What are the mechanisms by which pollutants exert their effect?
- How many deaths are caused each year?
- Why do women in rural Ethiopia have a low awareness of the effects?
- What behaviour changes do they believe to be feasible?

Working in small groups, students are asked to research some of the possible solutions to the problem, and whether these have proved successful in practice. Two organisations that have worked on this issue are given as examples:

- Practical Action (<http://practicalaction.org/>)
- The HEDON Household Energy Network (<http://www.hedon.info/>)

Questions to be answered in groups:

If the topic is very broad, students can present the results of a study, research project or practical initiative in one country, or even a single region. Each group in turn presents answers to the first question, then the second one for their group:

Group C

1. What is the experience in Central America of using 'self-build' stoves for cooking?
2. How will a village in resource poor country not connected to the grid obtain sustainable electricity for high current uses (refrigeration, cooking, mobile phone masts, health centre and school)?

Group B

3. Has a forestry project aimed at producing sustainable supplies of firewood and charcoal proved successful?
4. Is there a prototype of a sun powered cooking stove that is in regular use?

Group A

5. How much deforestation is caused by gathering wood for cooking?
6. Will solar power provide electricity for homes in rural India?

Delivered by: Adrian Hastings

Liverpool

Summary

The content which has been incorporated into Liverpool's undergraduate medical curriculum spans a number of different aspects of climate impacts on health and sustainable healthcare recommended in the SHE Network's suggested Learning Outcomes, but unusually is integrated across the problem-based learning (PBL) content in the first two years meaning that all students in the year are exposed to it. This has the dual advantage of showing how such issues are directly related to clinical conditions and public health challenges, as well as the fact that all students in the year have to study and think about the questions, rather than an interested minority.

Delivered by:

PBL group facilitators (curriculum content designed by Dr. Gillian Maudsley, who is in charge of the 'Population Perspectives' theme – the new term used at Liverpool for public health and related subjects - which runs through the whole course as a vertical theme).

Teaching format:

Cross-curricular, delivered entirely through integration into problem-based learning (PBL), which includes elements of independent reading, group work and presentation. Groups of 10 with a facilitator (usually a doctor) focus on a particular clinical situation for a two week block, covering different parts of the problem allocated according to a series of learning outcomes provided alongside the main rubric.

Learning outcomes:

Knowledge and skills that students are expected to gain related to sustainability and climate change are given below, organised below according to the title of the 2-week PBL module (in quotation marks with the clinical situation given in brackets) of which they are a part:

"A Wheezy Adolescent" (asthma)

- To illustrate the concept of determinants of health with reference to asthma (particularly occupational and environmental [including climate] determinants) and the three levels of disease prevention.

"Having a Baby"

- To compare the main features of cross-sectional (prevalence), cohort, case-control study design, and different data collection methods (questionnaire, interview, focus group, record abstraction); consider evaluating quality of health care (Maxwell criteria: accessibility, acceptability, appropriateness, equity, effectiveness, efficiency; and consider 'sustainability'); and outline clinical audit.

"Weighty Issues" (obesity)

- Apply the principles of health promotion to improving diet and fitness, identifying barriers to action and referring to wider determinants (such as ecological, social, and economic policy) and health inequalities.



Image source: cargocycling.org

“Pink Spit”

- Outline key aspects of evidence for health effects of climate change

“Yellow eyes, tattooed arms” (jaundice):

- Consider sustainable development of NHS provision

“Tired & Itching” (kidney disease):

- Illustrate the concept of health inequalities with reference to renal services; outline theories and evidence about how they arise and what should be done; and consider concepts of sustainability related to renal care (e.g. health co-benefits)

Assessment

Students now also see the full curriculum map, including this wording, meaning that they know it's possible for them to be assessed on it. That hasn't happened in a major way as yet, but assessment is likely to increase over time.

Origins/implementation of the course

Gillian Maudsley has been instrumental in incorporating this content. According to Dr. Maudsley, the fact that Liverpool moved to an integrated PBL-style course has made it possible to relate clinical conditions to environmental determinants of health such as climate change, and the need for sustainability in the health system, in a way that complements other components of teaching rather than being seen as competition. It has also apparently been important to incorporate content 'bit by bit,' since it wasn't feasible to introduce a whole module or SSC, but this also has certain advantages.

Lessons learned

The importance of horizontal themes in the course structure has helped to increase the weight given to this area in several parts of the course. This content is still quite a small proportion of the course, but should open the way to increasing the breadth and depth of cover of various topics in the future.

Other related parts of the course

There is the option of SSMs for students who are especially interested to undertake more in-depth exploration of the issues, but this is not an option suggested as standard.

Contact:

Dr. Gillian Maudsley, Head of the Population Perspectives course
Institute of Psychology, Health and Society, University of Liverpool
Waterhouse Building, Block B, 2nd Floor, Brownlow Street, Liverpool L69 3GL, U.K.
gillmau@liverpool.ac.uk

Oxford

Overview:

In February - March 2012, two final (6th) year medical students in Oxford took part in a pilot two-week full time special study module (SSM) on “Sustainable Healthcare”. The students each chose to focus on one of the four dimensions of sustainable healthcare identified by the Sustainable Healthcare Education (SHE) Network, and undertook a related project.

The Centre for Sustainable Healthcare wished to offer medical students in Oxford the opportunity to learn about sustainability, to gain some practical experience, and to reflect upon the opportunities to benefit health through preventative, low carbon healthcare in their future careers.

Teaching format

Because the students were undertaking the SSM in two separate 2-week blocks, the main format was individual study, with educational supervision via email and face-to-face meetings.

Learning outcomes

Both students were expected to achieve the following core learning outcomes:

- Understand that the spread or containment of diseases, globally and locally, is affected by human behaviour and environmental and climatic change
- Understand that clinical care contributes significantly to environmental degradation, due to resource use (mainly water, raw materials and fossil fuels) and waste production (mainly carbon, other greenhouse gases, non-clinical waste for landfill and clinical waste for incineration).
- Understand that clinicians can maximise the sustainability and quality of care by using medical technologies effectively, managing information appropriately, minimising low value activities and using natural resources (non-pharmacological interventions) and human resources (self care) effectively

Students chose their own learning outcomes from SHE [recommended learning outcomes](#) to focus on in further reading and for a project. The ones chosen included:

- introduction to sustainable healthcare and action to date in NHS;
- principles of sustainable clinical practice;
- prescribing to increase medicines compliance;
- creating behaviour change;
- project management

Student projects:

The students each chose to focus on one of the [four dimensions of sustainable healthcare](#) identified by the Sustainable Healthcare Education (SHE) Network, and undertook a related project.

One student chose the “Management” theme. She attended an NHS Sustainable Development conference, with focus on Trust and Estates management. She collaborated with an anaesthetist and

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

an operating department practitioner at the John Radcliffe Hospital in Oxford, who had been responsible for introducing recycling into the operating theatres, to plan and carry out a theatre waste audit and write up a case study: a waste audit in theatres & [case study](http://map.greenerhealthcare.org/oxford-radcliffe-hospitals-nhs-trust/introducing-recycling-operating-theatres) on introducing recycling, published at <http://map.greenerhealthcare.org/oxford-radcliffe-hospitals-nhs-trust/introducing-recycling-operating-theatres>. In order to support further change in staff recycling behaviours, she (and students from another SSM) created a poster to inform staff about the initiative and feed back the impacts to date.

The second student chose the “Clinical Practice” theme. She carried out a literature review on evidence for walking interventions in hypertension and wrote an article to communicate this topic in a clinical framework for a student/GP audience (currently under revision). In addition, she attended Green Week lectures on climate change and health at the Whittington Hospital and interviewed participants in their Green Ward competition for this [blog](#) article, which was posted in the Sustainable Healthcare Education Network.

Assessment

The learning was not graded or formally assessed but feedback was provided in person and on the SSM Self-Assessment & Sign-off form.

Lessons Learned

The original plan had been designed around a small group of students and was more structured, including activities such as an ethics debate, a joint project and presentations to the group. The peer support and interaction would have been useful, but the two students who chose to take up the SSM were allocated different two-week sessions. In future we plan to offer the SSM only once, with the aim that students will undertake the course together. It was good to keep the practical focus with the projects and to offer the opportunity to take part in sustainability action in a clinical setting. We were fortunate with timing that there were relevant events (NHS Sustainable Development Conference and Whittington Hospital Green Week), which the students were able to attend to gain different perspectives. Without this, the course would have benefited from invited speakers.

Plans for 2013:

Offer SSM again - aim to run so that students can work as a group.

Quotes

“I undertook the Sustainable Healthcare SSM with the Centre for Sustainable Healthcare. I was able to pursue my own interests in how recycling can be implemented into NHS hospitals and got involved in running a project to assess the impact of introducing recycling bins into theatres. The SSM enabled me to better understand the impact of healthcare on the environment. Through implementing the recycling project I got to experience the challenges of change management on ground level and the strategies that can be used to overcome these challenges.”

Felicity Hughes, medical student

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

"I thoroughly enjoyed learning about sustainability in the NHS, a subject I had not previously really thought a great deal about. However, climate change is happening and the health implications are vast, so we, of all people, should be the biggest protagonists for change. The most poignant take home message from the two weeks was of "moral offset" - something I have thought about a lot in the months since my SSM - and that just because we feel we may do good in one area of our lives, that it lets us off the hook elsewhere."

Emily Clark, medical student

Full case study at <http://sustainablehealthcare.org.uk/sustainable-healthcare-education/resources/2012/05/oxford-ssm-sustainable-healthcare-2011-12>

Other (core) teaching:

The non-graduate entry students don't have a global health course but all students have a public health module in year 5.

In February 2013 Frances gave a 1-hour seminar on a core Global Health course for 25 year two, pre-clinical graduate entry students covering:

- Health impacts of climate change
- Common causes of climate change and ill health
- Co-benefits of climate change policy for health

Delivered by:

Dr Frances Mortimer (lecture and SSC) and Dr Mark Scarfe (SSC)

Contact details:

Dr. Frances Mortimer,
Medical Director, Centre for Sustainable Healthcare
frances.mortimer@sustainablehealthcare.org.uk

Sheffield

Summary

This is an option in the Integrated Learning Activities (ILA) during fourth year, covering the basics of climate change and health in a 10 hour module. Normally 10-15 students take part: in 2012, 10 participated. It starts in May and runs over 5 weeks, 1day/week

Delivered by: Jason Horsley and a volunteer for the final session

Learning outcomes

The main objective is to engage them and encourage them to read further about areas they are interested in. Secondary objectives are to get them thinking about the broader implications of clinical practice and the wider determinants of health, and to use climate change as a understandable vehicle for this.

Curriculum

Content covered includes:

- ⤴ Climate change and sustainability basic science.
- ⤴ Health impacts of climate change.
- ⤴ Assessing the scientific evidence.
- ⤴ Role of the NHS.
- ⤴ Politics of climate change and health, and how policy is implemented.
- ⤴ Delivering an advocacy message.
- ⤴ How to promote behavioural change.

Sessions are very loosely structured, deliberately so in order to allow chance to explore areas of discussion the students are interested in.

Teaching format

Small group tutorials – presentation of evidence, group discussion, student presentations at end.

Materials used

Some slides to cover the evidence base. Numerous websites and journal articles (Lancet series and recent BMJ series on climate change particularly). Main resource is the discussion base however – so a flipchart and a marker pen are key!

Module blurb in the ILA Masterclass options booklet:

“You have been asked by your local MP to brief her and her colleagues on the health impacts of climate change. What are the most important problems, where do you start, and how can you do the most good with this opportunity? This module explores the potential health impacts of climate change and some of the science behind climate change, as well as exploring how to deliver a message in health advocacy. The module is quite flexible, and students will have opportunities to identify their key learning needs and to set the direction of discussions”.



Assessment

Students expected to produce a 15-30 min group presentation they have not yet met.

Image:

<http://www.thewhatever.com/post/4984797999/im-afraid-you-have-humans>

Lessons learned

This year was the second year this course has been run and it develops year-on-year based on student feedback. Next year the format may change so that the two groups address different topic areas in their presentations. This year both groups were put in direct competition on this, and assigned some class time to preparing their presentation, which dramatically improved the quality of the talks.

Future plans

The course will be run in broadly the same format again next year, but they are hoping to add in a field trip of some sort if possible. After Jason leaves Sheffield Medical School (the year after) the plans for the ILA are not yet clear – he hopes it will be possible to find a successor.

Other related content in the course at Sheffield:

There are also core components related to climate change and health for all students (150). In first year there is a 1 hour lecture in the 'Introduction to Public Health' lecture series, and for fourth years who missed this as it hadn't been introduced when they were first years, with a 2-hour lecture entitled 'How the environment impacts on public health.' Both cover broadly the same topics: definition of sustainability, impacts of healthcare on sustainability, the carbon cycle and global warming, national and international impacts of climate change on human health. They also cover energy security and peak oil, solutions and role of health professionals and the need for societal change.

In terms of pursuing special interests, students have the opportunity to intercalate at the School of Health and Related Research (Scharr) to gain a Masters' in public health, which can cover aspects of climate and sustainability. Moreover, there are at least 3 other ILAs relevant to climate and sustainable healthcare, each with two hours of contact time per week, over 5 weeks: there is one on globalisation and health (1), one on emergency planning and response (with a UK focus) (2) and one on telemedicine and telehealth (3) – see box below for more info. There is also an ILA covering decision-making, rationality and the perception of risk in the context of clinical decisions which has relevance to responses to climate change and how clinical decisions around healthcare sustainability are made. For the first time in 2013 an clinically-oriented option on care pathway ecological footprinting was piloted, which we hope to include in the final version of this document.

Summarised module descriptions for each of the other ILAs mentioned above:

(1- globalisation and health) We live in an increasingly globalized world with societies interconnected in a multiplicity of ways. Globalisation has brought about advances and benefits to countries, but it also has adverse consequences. Students will explore key issues in global public health by means of facilitated group work.

(2- emergency planning and response) 'In June 2007, after days of torrential rain, severe flooding struck towns in South Yorkshire. Vast areas were cut off from road access and power supply was compromised in several areas. In addition, structural damage to a local reservoir threatened potentially catastrophic flooding to low-lying areas downstream. Hundreds of local residents were displaced. How would you respond?

(3 – telemedicine and telehealth) The course description highlights how these new technologies 'can be well placed to help meet the QIPP goals of improving the patient experience, ensuring value for money and promoting self-care' (all of which are important for sustainability), and states that, 'issues around barriers to implementation will help you to understand some key issues surrounding change management within healthcare ... as newly qualified healthcare professionals, you will be in the unique position of being there at the beginning of a revolution in healthcare delivery. This Masterclass will give you a head start in understanding the critical issues, and equip you to be part of its evolution over the coming years'.

Feedback from students on the climate and health ILA

"I learnt about interesting things that I wouldn't have otherwise had a chance to in the medical course.

"It was interesting bringing in other points other than climate change, some of which I came out wanting to know more and looked up, very relevant to what is going on at the moment."

"It was good to get a better understanding of climate change as a whole, both the evidence behind it and the impact it will have. I am also now aware of the many ways in which we can tackle climate change and that our individual actions can, in fact, make a big difference."

"Interactive, felt like discussion was encouraged. Learnt about interesting things that I wouldn't have otherwise had a chance to in the medical course".

"Generally I thought it was a great ILA but perhaps it could be improved by a little more emphasis on the health aspects of climate change.

In answer to the question 'Should this ILA run in the Masterclass ILA programme next year?' The majority of answers given were positive or very positive, eg. "definitely and "most definitely". One student disagreed however, saying "No. I can honestly say that I left the final session with no more knowledge about climate change than I had on the first day. Despite this the sessions were enjoyable but I do not think that it is something that students should miss 12 hours of term time for. Maybe if the sessions were on in the afternoon when wards are usually quieter then it would not matter as much that students are missing opportunities for valuable placement teaching."

Contact details:

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Andrew Lee - andrew.lee@sheffield.ac.uk

University of East Anglia (UEA)

Summary

This new 20-hour module, taught to year 4 students, introduces three main aspects of the question, 'what does a doctor need to know about the links between human health and the natural environment?'

Course content:

Part I covers environmental impact, part II covers the relationship between nature and human health, and part III covers the effects of climate change on healthcare. The course blurb introduces the module as 'what does a doctor need to know about the links between human health and the natural environment? This module will introduce three aspects of the question and include at least two field-based sessions'. There are also about 20 hours of self-directed learning and it uses resources from the NHS SDU, SHE network and MedSin Healthy Planet.

Part 1: Environmental impact

Human impacts on the environment can arise from industrial and commercial development, transportation, telecommunications, and domestic household activities. This part takes an overview of the UK and EU governments' responses to environmental impacts of human activities. It also takes a practical look at how they are managed in practice, including within the NHS.

Part II: Nature and Human Health

This section examines the role of nature in human wellbeing: there is a growing body of evidence to suggest that contact with nature has a positive effect on our health. At the same time, wild places and wildlife in the UK – like elsewhere – are increasingly under threat. As human activities degrade habitats and increase the rate of species extinction, are we also damaging human health? This section examines the role of nature in human well-being, and looks at how nature helps us appreciate how the planet works and how an understanding of ecology can provide a sense of 'place'. It also examines the evidence that nature plays an important role in our mental health and finally looks at conservation in the UK -how wildlife and natural places in the UK can be protected despite mounting pressures from an expanding population, increased development and a changing climate.

Part III: Effects of Climate Change on Healthcare

This section explores the various ways in which climate change is predicted to undermine population health, both locally and globally, as well as to give an overview of how the NHS is responding in ways that will affect clinical practice. It discusses how health professionals will increasingly be called upon to harness the health benefits of a low-carbon society to reduce the burden of chronic, non-communicable disease.

Future plans:

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

The lecture may run again next year, depending on student interest , with some refinements based on teaching elsewhere and new materials. Stefi describes one of her objectives being to become clearer and more concise.

Other content related within UEA's curriculum:

1 core lecture on 'Human Health and the Global Environment' which is compulsory for all students (17) in Year 1. It is also included in 2 core lectures on global health in years 1 and 4.

The Year 1 lecture has been given since 2009. It was a natural expansion of the existing environmental health lecture and required no significant curricular change. It required a few hours of study by the lecturer to become familiar with the materials provided by the SHE Network. The stated learning outcome was that students should be able to discuss environmental hazards to health, including the effects of climate change.

The first half of the lecture outlined various definitions of environmental health; looks briefly at the traditional environmental hazard categories (physical, biological, chemical); the changes in environmental threats from the industrial revolution to the present); and the concept of environmental justice / health inequity. The second half of the lecture focused on the health effects of climate change, globally and locally, linked to environmental hazard categories, and ways to reduce chronic disease through carbon reduction strategies.

Barriers/Challenges:

It is difficult to cover an introduction to environmental health in addition to the climate change and health co-benefits in such a short time.

Student feedback:

SSC: Student feedback on all of Year 4 is collected at the end of the year.

Year 1 lecture: there are always a few students who stay back after class to ask questions or find out how to get more involved. A few students generally mention the class as a high point of public health teaching in the end of year evaluations.

1 core lecture on health and environment in Year 1 (mainly on climate change) and it is also included in 2 core lectures on global health in years 1 and 4.

Delivered by:

Stefi Barna, Rob Coleman and Faye Jackson (SSC); Stefi Barna (Year 1 lecture)

Contact person:

Stefi Barna, Co-director, Sustainable Healthcare Education Network and Lecturer in Public Health, Norwich Medical School, UEA.

S.Barna@uea.ac.uk

Teaching materials recommended by respondents

Leeds

1. A comprehensive overview of the **health impacts of climate change, climate science**, present issues and future outlook: Lancet/UCL Commission, May 09, <http://www.ucl.ac.uk/global-health/ucl-lancet-climate-change.pdf>
 2. Friel S, Marmot M, McMichael A, Kjellstrom T, Vågerö D. Global health equity and climate stabilisation: a common agenda. Lancet 2008; 372: 1677-83 doi: 10.1016/S0140-6736(08)61692-X PMID: 18994666.
<http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2808%2961692-X/abstract> - Log in to Uni library account or register to access the full text
- Climate and Vector-borne diseases <http://www.ajpmonline.org/article/S0749-3797%2808%2900706-X/fulltext>
 - Different carbon calculators
 - NHS Sustainable Development Unit - www.sdu.nhs.uk and SDU carbon reduction strategy: http://www.sdu.nhs.uk/documents/publications/1237308334_qylG_saving_carbon_improving_health_nhs_carbon_reduction.pdf (students asked to 'note down at 3 things that surprised them and 3 things they have questions or would like to learn more about').
 - <http://bit.ly/gpRdZX>, a 10 minute tutorial about climate change, sustainability and health
 - NHS carbon reduction strategy update <http://www.sdu.nhs.uk/publications-resources/42/NHS-Carbon-Reduction-Strategy-Update/>
 - CSH website - <http://greenerhealthcare.org/>
 - World Health Organization on Climate Change http://www.who.int/world-health-day/toolkit/report_web.pdf
 - UK Climate & Health Council - www.climateandhealth.org
 - Intergovernmental Panel on Climate Change (IPCC) <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter8.pdf>
 - Stott R. Contraction and convergence: healthy response to climate change. BMJ 2006;332:1385-7. PMID:16763255
doi:10.1136/bmj.332.7554.1385
 - Roberts I & Stott R Doctors & Climate Change Lancet 2010; 376: 1801-2
 - BMJ editorial: <http://www.bmj.com/content/342/bmj.d2807.full> and the report it refers to <http://www.marmotreview.org/reviews/cold-homes-and-health-report.aspx>
 - Leo Horrigan, Robert S. Lawrence, and Polly Walker. How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture *Environmental Health Perspectives* • VOLUME 110 | NUMBER 5 | May 2002
<http://ehp03.niehs.nih.gov/article/viewArticle.action?articleURI=info:doi/10.1289/ehp.02110445>
 - Wellcome Trust video (<http://www.wellcome.ac.uk/climatechange>)

Suggested but optional:

- Natural and unnatural synergies <http://www.who.int/bulletin/volumes/87/10/09-067116/en/index.html>
- For those who would like an explanation of El Nino, the health effects and why 1982-3 was a particularly bad year, see <http://earthobservatory.nasa.gov/Features/ElNino/>

Case Studies: UK Medical school teaching on Sustainability, Climate and Health

- <http://www.guardian.co.uk/environment/2011/may/29/carbon-emissions-nuclearpower> .
- The Australian Medical Students' Association video (http://www.youtube.com/watch?v=CqMaDc4G_vs)

Materials produced by students at Leeds:

<http://sustainablehealthcare.org.uk/sustainable-healthcare-education/resources/2011/10/2nd-year-students-made-these-resources-5-week-ssc>

Bristol

- Several from links on <http://www.healthyplanetuk.org/resources.html>
- Ludvig von Bertalanffy 'General Systems Theory'
- Carbon calculators: <http://actonco2.direct.gov.uk/index.html> www.thecarbonaccount.com
- www.carbonrationing.org.uk/file/files/crags-carbon-footprinting-worksheet
- The first three chapters of Drs. Schroeder and Thompson's book on Sustainable Healthcare (via Dropbox)
- "How to Write a Feature Article" by Rebecca Ghani

Sheffield

Jason Horsley:

- <http://wakeupfreakout.org/film/tipping.html>
- www.gapminder.org
- R. Horton - The Climate Dividend, *Lancet* 2009, 374:1869---70

Core lecture reading list:

- McMichael AJ, Nyong A, Corvalan C. Global environmental change and health: impacts, inequalities, and the health sector. *BMJ* 2008; 336:191-194.
- McMichael AJ, Powles JW, Butler CD, Uauy R. Food, livestock production, energy, climate change, and health. *Lancet* 2007; 370: 1253-1263.
- Guillebaud J, Hayes P. Editorial: Population growth and climate change. *BMJ* 2008; 337:a576.
- IPCC. Climate Change 2007: Synthesis Report.
- NHS SDU. Saving Carbon, Improving Health: A draft carbon reduction strategy for the NHS in England. http://www.sdu.nhs.uk/downloads/draft_nhs_carbon_reduction_strategy.pdf
- DEFRA. Waste strategy for England 2007.
- <http://www.defra.gov.uk/ENVIRONMENT/waste/strategy/strategy07/pdf/waste07-strategy.pdf>
- The NHS Confederation. Taking the Temperature: Towards an NHS response to global warming. <http://www.nhsleadtheway.co.uk/Uploads/documents/NHS-Report-Taking-the-Temperature.pdf>
- WHO Healthy Cities Initiative <http://www.euro.who.int/Healthy-cities>

Globalisation and health reading list:

- Feachem, RGA. Globalisation is good for your health, mostly. *BMJ* 2001; 323: 504---506.
- (2002).
- Globalisation and the challenges to health systems. *BMJ* 325: 95---97
- Huynen M et al, The health impacts of globalisation: a conceptual framework.

- Globalization and health, 2005, 1:14. <http://www.biomedcentral.com/content/pdf/1744-8603-1-14.pdf>

Oxford :

- Sustainable Healthcare Priority Learning Outcomes (SHE Network)
- Marmot Review of Health Inequalities (Marmot, 2010)
- NHS Carbon Reduction Strategy (NHS SDU, 2012)
- Sustainable in the NHS Health Check 2012 (NHS SDU, 2012)
[http://www.sdu.nhs.uk/documents/publications/Sustainability in the NHS Health Check 2012 FINAL PRINT.pdf](http://www.sdu.nhs.uk/documents/publications/Sustainability_in_the_NHS_Health_Check_2012_FINAL_PRINT.pdf)
- Moynihan R. The Greening of Medicine. BMJ 2012;344:d8360
- Mortimer F. The Sustainable Physician. Clinical Medicine 2010, Vol10, No2: 110-11
- Horne R. Compliance, Adherence, and Concordance: Implications for Asthma Treatment. Chest 2006;130:65S-72S
- Green Nephrology case study template, accessible from
<http://sustainablehealthcare.org.uk/green-nephrology/case-study-template>
- Preventing damage from pharmaceuticals A primer (Health Care Without Harm, 2007), accessible from
[http://www.noharm.org/lib/downloads/pharmaceuticals/Prevent Damage from Pharmaceuticals.pdf](http://www.noharm.org/lib/downloads/pharmaceuticals/Prevent_Damage_from_Pharmaceuticals.pdf)
- NHS Carbon footprint

A list of other resources compiled by Healthy Planet students

(Up to date version at <http://www.healthyplanetuk.org/resources.html>)

1) Background to climate change

The International Panel on Climate Change (IPCC) *Fourth Assessment Report* (2007) and IPCC site

Stern Review on the Economics of Climate Change (2006) - a comprehensive investigation into the predicted economic costs of action and inaction on climate change.

Generally the UK Youth Climate Coalition have some great resources so have a look through their site.

SkepticalScience.com has the science on the most used climate myths and an absolute mountain of great resources to help you get to grips with climate science and the key issues and misunderstandings - a great site!

In the same vein, the Met Office's guide is a very useful site as is NASA's page on climate change

2) Information on Climate Change and Health:

The Lancet series on Climate Change and Health: <http://www.thelancet.com/series/health-and-climate-change>.

The IPCC Chapter on Health

The Health Effects of Climate Change in the UK (2001) - an updated version is due to be published soon.

For more general background information the World Health Organisation's site is also useful.

Climates and Change – the Urgent Need to Connect Health and Sustainable Development (2007)[pdf]

These lectures from a conference held a few years back at the Royal College of Physicians

A Google Talk on climate change and health by Prof Paul Epstein, one of the world's experts on the subject.

An overview of climate and health - talk by Mike DePledge

3) Information on sustainability and health co-benefits:

Taking the Temperature – Towards an NHS Response to Global Warming (2007)

Building Health: Creating and Enhancing Places for Healthy, Active Lives (2007)

HEAL and HCWH's report, Acting NOW for better health: A 30% reduction target for EU climate policy

The UK's Faculty of Public Health's webpage on Sustainable Development

The EcoHealth Student association has lots of good links and resources related to ecology and health more generally.

The Lancet co-benefit series

This Lancet paper summarises the economic co-benefits of the strategies with public health co-benefits analysed

4) Information on Sustainable Healthcare:

The Centre for Sustainable Healthcare and its subsidiary sites have several very useful resources as well as a network of engaged people in the UK.

The NHS SDU has links to several key publications <http://www.sdu.nhs.uk/publications-resources/key-reports.aspx>

Sustainable Development: Environmental Strategy for the National Health Service (2005)

Francis Mortimer's article 'The Sustainable Physician'

A recent paper on 'Medical Students, Climate Change and Health'

Best Foot Forward's GP Footprinter tool - this requires GMC registration to use, but allows GPs not only to track the carbon savingscost savings achieved within their surgery.

The Act On CO2 carbon calculator for individuals

The CSH's 10:10 GP Checklist

5) NHS SDU resources:

Case studies, a video library, practical guides to reducing emissions from energy, travel and procurement

The areas of their Route Map to Sustainable Health are:

Models of care

Technology

System governance

Use of resources

Societal behaviours and attitudes

Individual behaviours and attitudes

This series of 'how-to' guides :

How to buy paper in a low carbon way

How to reduce paper use: an example from NHS Manchester

How to plan and hold sustainable events

Handouts covering:

Sustainability, health and the NHS and the role of the NHS in tackling climate change

6) WHO Publications:

Inc. these 10 key facts and a report entitled Protecting health from climate change: Connecting science, policy and people

WHO priorities and areas of work in climate and health:

Advocate and raise awareness

Strengthen partnerships

Enhance scientific evidence: Linkages of health and climate, burden of disease, economic costs

Strengthen health systems and increase climate resilience of communities and the health system