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EDITORIAL

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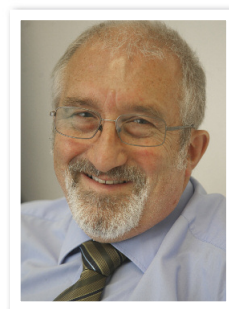
Julie Barratt

Julie is the Director of the Chartered Institute of Environmental Health Wales, with responsibilities including liaison with the National Assembly for Wales, local authorities and non-governmental organisations, promoting and representing the CIEH's policies, and generally seeking to raise the profile of Environmental Health in the Principality. She has had close involvement in a number of high-profile campaigns, including the ban on smoking in public places, the trade against illegal meat and, most recently, the Tattoo Hygiene Rating Scheme. She is a regular contributor to BBC radio and television on consumer and environmental health-related issues and writes extensively on these. Julie is a visiting lecturer in law and legal practice at Cardiff Metropolitan University.



Dr Chris Day – Editor

Chris qualified in Environmental Health in 1979 and after eleven years of working as an EHO set up as a freelance trainer and adviser, before taking up an appointment as a lecturer at King's College London, eventually leading the accredited MSc Environmental Health programme. Chris's teaching and research interests have spanned the field of Environmental Health, though his particular research interest lies in the epidemiology of infectious intestinal disease and the role performed by surveillance in informing (and sometimes misinforming) the aetiology of food-borne illness, which was the subject of his doctoral thesis. Chris's appointment as Education Officer of the CIEH in January 2011 has provided new challenges including the editorship of JEHR and with it the profession's wish to encourage greater research activity and publication amongst students and EHPs.



Dr Jill Stewart

Jill Stewart's environmental health and housing career began in local government, leading to her current post as Senior Lecturer and Research Lead in the School of Health and Social Care at the University of Greenwich. She teaches at undergraduate and postgraduate levels across public health, environmental health and housing subject areas. She is a Chartered Member of the CIEH, a Member of the Chartered Institute of Housing and Fellow of the Royal Society for Public Health. Her main research interests include evidence-based practice



and the effectiveness of front-line strategies and interventions. In this field she recently developed the CIEH's Private Sector Housing Evidence Base working collaboratively with a wide range of practitioners and academics around the country. She is currently involved in researching public health history.

Dr Marie Vaganay

Marie is a lecturer at the University of Ulster and the course leader for the Masters in Environmental Health Management programme. Marie has diverse research and teaching experience but her main interests lie in epidemiology and public health. Over the years Marie has lectured, supervised, reviewed and published widely on these subjects and is a member of several review panels and government committees. She holds a doctorate in accident prevention. Marie is the immediate past Editor of the JEHR.



AIMS AND SCOPE

The *Journal of Environmental Health Research* is a peer-reviewed journal published online.

The Journal publishes original research papers, review articles, literature reviews, commentaries on technical and professional matters, book reviews, workshop/conference reports and short communications covering the diverse range of topics that impinge on public and environmental health. These include: occupational health and safety, environmental protection, health promotion, housing and health, public health and epidemiology, environmental health education, food safety, environmental health management and policy, environmental health law and practice, sustainability and methodological issues arising from the design and conduct of studies.

A special category of paper – the ‘first-author, first-paper’ – is designed to help build capacity in environmental health publications by encouraging and assisting new authors to publish their work in peer-reviewed journals. Here the author will be given active assistance by the editors in making amendments to his or her manuscript before submission for peer review.

The Journal provides a communications link between the diverse research communities (academics, students, practitioners and managers) in the field of public and environmental health and aims to promote research and knowledge awareness of practice-based issues. Beyond this it aims to highlight the importance of continuing research into environmental health issues.

Editorial correspondence

Items for publication, letters and comments on the content of the Journal and suggestions for book reviews should be sent to the editors, by email, to c.day@cieh.org

Details regarding the preparation and submission of papers (‘Notes for Authors’) can be found at the back of this issue and at www.jehr-online.org

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EDITORIAL

An encouraging picture

by Dr Chris Day, editor, CIEH

I began my editorial to the last edition of the *Journal of Environmental Health Research* that appeared in December 2013 with an apology regretting the delay since the previous edition which was, in part, down to administrative problems. However, one year on my regret is that in the nine months to June so few manuscripts were submitted, despite requests and various pleadings through *Environmental Health News* for authors to send through drafts, in whatever state of completion. To those who did contribute papers or else forwarded ideas and subjects for projects, my thanks on behalf of the editorial board.



However, just in the last three months or so a far more encouraging picture has started to emerge. It is as if the profession is waking up to the need for its practitioners to recognise the importance and value of their contribution to the evidence base, so long described as inadequate. Aside from the valuable work being performed directly by the CIEH's Education & Research Special Interest Group in promoting research, the newly-formed Research Strategy Group has begun by plotting a course, with defined objectives, that will see research activity performed, recognised, and those performing it, supported.

What is more encouraging still are the reports coming back from the CIEH Regions that they are aware of, or actively participating in, initiatives designed to variously:

- identify those who are active in research locally and facilitate 'networking';
- explore means of supporting researchers 'into the field'; and,
- encouraging them to see the outcome of their research published.

In this edition of JEHR, we are pleased to be featuring the efforts of a 'new' researcher and first-time author, a project undertaken through a 'Knowledge Transfer Partnership'; and, to welcome an account of the work of one such Region as it has sought to develop and implement a research initiative.

Subject-wise, I hope there is something for everyone, beginning at the dawn of the modern era of public health with a fascinating piece by Norman Parkinson that recognises the force for change and reform of the Health of

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Towns Association in the period after Chadwick's ground-breaking report in 1842 and ahead of local, then national, legislation, culminating in the Public Health Act 1848.

If the Health of Towns Association occasioned the legislation that provided the mechanism for local authorities to deliver sanitary services to their residents, the research conducted by Joanne Fozzard and Gai Murphy into the impact of austerity cuts on the delivery of one such local service – pest control – speaks volumes for the high regard held for it, and the likely impact this will have should local authorities seek to make savings through cutting services further.

Arguably the most topical and pressing environmental health issue of the moment is traffic-mediated air quality, and especially the impact on health of particulates. In a study by a research team at the Institute of Occupational Medicine in Edinburgh, lead by Karen Galea, something one would guess intuitively – that infants and small children in buggies located closer to the ground and so the exhaust system of motor vehicles might expect to be exposed to higher concentrations of PM_{2.5} than adults pushing them – was dispelled through field experiment.

Challenging intuition was partly an element of Katie Brady's local study into the uptake of a 'healthy eating' initiative by takeaway premises in Wirral. It came as a surprise to find, amongst other things, that once the proprietor had decided to commit to the initiative, relative affluence/deprivation of the takeaway's location played a minor part in causing the fare on offer to change for the better as the enlightened proprietor noticed it was offering a commercial advantage over their competition who continued to seek to exploit the consumer's choice for high-fat, high-salt and energy-dense foods. Clearly, there is much need for more work around how the eating behaviour of the consumer can be modified, but key to this is to first convince the food business proprietor of the advantages.

A paper looking at the use of 'virtual worlds' or 'Second Life' in the teaching of Environmental Health was a particularly welcome submission from a team lead by Kirsten Ross of Flinders University in Adelaide that spoke to a problem that is experienced far wider, including here in the UK. Presented as part-evaluation project, part-guide, the tool found favour amongst staff and students in handling a suspected outbreak of Legionnaires' disease which would present educative difficulties, not least the rarity of the experience.

A new feature in this edition of JEHR, but one that the editorial board would like to see appear again, is a paper that serves to inform practitioners on a technical,

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legal or social issue with a clear bearing on practice. In this case EHP and lawyer, Tim Everett, reviews 'Judicial Review' around the Rose Theatre Trust case and how this, and changes to the rules implemented by Government, have enhanced standing but imposed tighter limits on time and the financial status of the challenger.

This edition concludes, as did the last, with an Article describing how a group of EHPs, supported by other health professionals, has sought to encourage greater research activity focused on practice, and to see this work published in some shape or form. In this case, rather than it being a reference guide, the CIEH's South-West Region takes a critical look at its own efforts to encourage greater research effort and publication output, and particularly the value and lessons learned from the series of workshops in 2013 and 2014 which brought together practitioners, academics and other health professionals.

Chris Day – November 2014



ARTICLE

The Health of Towns Association and the genesis of the Environmental Health Practitioner

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ABSTRACT

From 1844 to 1848 the Health of Towns Association was the main source of political pressure for national legislation to address the sanitary problems of UK towns. Its well-orchestrated campaign utilised public meetings, lecture programmes and publications. It was steadfast in the face of vigorous opposition. While its major asset was the support that it received from influential individuals from politics, medicine and engineering, it also encouraged and organised the involvement of working people. To some extent the Association was a mouthpiece for Edwin Chadwick and his circle.

Throughout its existence the Association supported the creation of local Boards of Health each with an obligation to appoint an Inspector of Nuisances, the forerunner of today's Environmental Health Practitioner (EHP). It was active in Liverpool whose Health of the Town Committee was the first UK Health Committee to appoint an Inspector of Nuisances, in 1844. The Liverpool Branch of the Association was influential in the promotion of the Liverpool Sanitary Act of 1846 that gave power to the Borough to appoint a Medical Officer of Health and the obligation to appoint an Inspector of Nuisances. The Liverpool Act was a precedent for the Towns Improvement Clauses Act of 1847, the Public Health

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Act 1846, The City of London Sewers Act 1846, the Nuisances Removal and Disease Prevention Act 1855 and the Metropolis Management Act 1855.

The Association undertook what was probably the first questionnaire survey of public opinion on the state of public health and the existing local capacity to address it.

Its principal failings were its commitment to the miasmatic theory and its inability to directly influence vested interests in London.

The Health of Towns Association faded away after the passing of the 1848 Act and the appointment of most of its prime movers to full-time posts with the new General Board of Health.

Key words: Health of Towns Association, Environmental Health Practitioner, Sanitary Reform, Thomas Fresh, Edwin Chadwick.

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The period that began in 1834 with Chadwick's Report on the Poor Law and ended with the passing of the 1848 Public Health Act has been dubbed 'the Public Health Agitation' (e.g. Hutchins, 1909). This was start of the era of 'sanitary reform' that shaped the genesis and evolution of the EHP.

The 'agitators' were influential individuals and voluntary movements that helped to change the prevailing attitude and approach to public health from 'laissez-faire' to 'interventionist', and furthered the social and political acceptance of the institution and ideology of 'inspection'. The most celebrated individual was of course Sir Edwin Chadwick. The most celebrated voluntary organisation was the *Health of Towns Association*. Indeed, 'After 1844, agitation was *mainly* carried on through the medium of the Health of Towns Association' (Flinn, 1965, p68).

Chadwick had written to Lord Ashley on 11 May 1844 suggesting that an apolitical 'third voice' might be raised:

'There is certainly a very large class of questions affecting the condition of the labouring classes on which external aid will be of much service. There are many small interests adverse to the condition of the labouring classes that might by such aid be usefully kept in check by the representations of a body that would be properly attended to if well directed...an associated voice should surely be raised on the other side'.

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Thus, the inaugural meeting of the Health of Towns Association (HTA) took place on 11th December 1844 at Exeter Hall, in the Strand, London. The choice of venue was significant; it was strongly associated with reform movements. Indeed, the Anti-Slavery Society, the Reformation Society, the Royal Humane Society, and the Anti-Corn Law League all met there. This was an age of radicals, evangelists and reform.

The meeting was organised by Thomas Southwood-Smith with the help of some exceedingly well-placed individuals: the Marquis of Normanby and Lord Ashley MP (later to become the Earl of Shaftesbury). Chadwick, who was acquainted with all three (Lewis, 1952), was behind the scenes, but as a prominent civil servant and because he was so unpopular at the time, he preferred to keep in the background (Lewis, 1952; Flinn, 1965). Finer (1952) went so far as to claim that Chadwick was a *de facto* leader of the Association. Normanby chaired the meeting; the Treasurer was John Thornton Leslie-Melville, the future Earl of Leven and Earl of Melville. The Hon Secretary was Henry Austin, Charles Dickens' brother-in-law and later to be an Inspector for the General Board of Health.

The Committee membership reads like a 'Who's Who' of Victorian public health. There were Members of Parliament, peers, clergy, and prominent engineers and physicians. They included: Leslie-Melville; Normanby; Ebrington; Ashley; Robert Slaney; Henry Austin; Henry Gavin; Richard Grainger; William Guy; John Simon; Thomas Southwood-Smith, and John Sutherland (Grainger, 1845). Most of the Committee were (inevitably) Whigs, but the Association intended to be cross-party. Notable among the Tories were Lord Ashley and Benjamin Disraeli, then a backbencher. While most of the Committee were established players in the public health agitation, and were to remain prominent, Hamlin (1998, p250-1) asserts that some were there out of self-interest and others were 'choking on their own virtue'.

There were no 'ordinary people' present. This was a time of overt social stratification. Offensive and patronising as it may seem to today's eyes, the HTA set up a parallel association for 'working people' under the chairmanship of the Bishop of London (another of Chadwick's friends). The HTA succeeded in motivating people of all social classes in the cause of sanitary reform. The Working Classes Association for Improving the Public Health was encouraged and assisted to be active in seeking reforms and applying pressure. There were branches in London, Newcastle and Gateshead, Warrington, and elsewhere, though it was not well received in Glasgow where there was a near riot at the first meeting (Lewis, 1952). The paternalistic middle-class obsession with

sanitary legislation and infrastructure clashed with the more immediate public health concerns of the labouring classes, such as poverty, hunger, wages and working hours.

The inaugural meeting of the HTA was stimulated by Chadwick's *Report on an Inquiry into the Sanitary Condition of the Labouring Population of Great Britain* (1842) and the *Royal Commission into the Health of Towns* under the Duke of Buccleuth and Queensberry (but with Chadwick in the background), and a feeling that the incumbent Tory government of Robert Peel would do nothing without unrelenting pressure.

The HTA was staunchly 'sanitarian'. It followed Chadwick's recommendations and the 'sanitary idea' – including a commitment to the miasmatic theory – that diseases were transmitted by 'vitiating air' - gases and smells emitted by faeces, unwashed bodies and rotting biological matter (e.g. Grainger, 1845). It didn't matter that the HTA's science was bad, the remedies that it sought – a plentiful supply of wholesome water; water closets, drains and sewers; public wash-houses; paved streets; effective refuse collection; well-ventilated dry houses; the regulation of overcrowding; and the removal of nuisances – were correct and desperately needed.

To achieve this they needed to bring about major changes in legislation, administrative mechanisms and systems of capital financing. They sought a rational system of local government to replace the chaos of overlapping parishes, Boards of Guardians, municipal corporations, town councils and Improvement Commissions. The new unitary local government Boards of Health would need more effective intervention powers and local paid officers: Medical Officers; engineers, and Inspectors of Nuisances to implement the sanitary reforms at a local level. Chadwick strongly disapproved of the appointment of unqualified, inexperienced, unpaid and often unwilling lay officers (volunteers or appointed on rota) that had hitherto been the practice outside large towns. The Inspector of Nuisances would evolve via the sanitary inspector and public health inspector into today's EHP.

The HTA's *modus operandi* was to influence public opinion through public meetings, political lobbying, propaganda, and publications. There was a national lecture programme for influential people in the major towns that explained miasmatic theory and how poor ventilation and nuisances were prejudicial to health (e.g. Grainger, 1845; Guy, 1845). They also promoted new technologies for drainage and sewerage. There was a separate programme of lectures for the working classes, of course. Among the HTA's publications was a weekly sheet of facts and figures, intended to provide ammunition for individuals and local

pressure groups. The HTA also published pro-forma petitions, and encouraged and coordinated the submission of petitions to Parliament both by its own branches and by other organisations (Hanley, 2002).

HTA committee member Robert Slaney MP, a barrister, prominent social reformer and influential Whig MP, had been Chair of the *House of Commons Select Committee on the Health of Towns* that in 1840 had made the first explicit official recommendation for the creation of Boards of Health and the appointment of Inspectors of Nuisances/Sanitary Inspectors:

'sanatory regulations in many of the principal towns of the realm are most imperfect and neglected, and ... hence result great evils, sufferings and expense to large bodies of the community. The Committee propose the establishment of Boards of Health and local inspectors' (Slaney, 1840, p29)

'It would be of the greatest advantage to the inhabitants of the great towns if an inspector was appointed to enforce the due execution of sanatory regulations... such an officer should have the power of proceeding by indictment to abate nuisances, an old remedy in English law which it seems quite necessary to revive and extend, to prevent and put down injury to multitudes' (Slaney, 1840, p57)

Normanby included the Select Committee's recommendations in his Bills of 1842 and 1843, but neither achieved government support and both failed. Nevertheless, the momentum of the public health movement persisted with Chadwick's *Sanitary Report* and the two Reports of the *Royal Commission on the Health of Large Towns* in 1844 and 1845. In 1845 Lord Lincoln promoted a Bill that included provisions for an Inspector of Nuisances and a Medical Officer of Health, but this failed following Prime Minister Robert Peel's resignation after the repeal of the Corn Laws. The HTA published a detailed critique of Lincoln's Bill in which it supported as 'sound provisions' the creation of Local Boards of Health and the appointments of Inspectors of Nuisances and Medical Officers of Health (HTA, 1847). According to Lewis (1952) this was written by Southwood-Smith and Chadwick. Paterson (1948) asserts that Southwood-Smith was the sole author, but Finer (1952) reports a draft in Chadwick's handwriting in the Chadwick archive!

One of the HTA's objectives was to encourage the establishment of branch or auxiliary associations and it published a brochure with suggestions on how this might be achieved (Slaney, 1845). Local associations were established in Bath, Derby, Edinburgh, Halifax, Manchester, Marlborough, Plymouth, Rugby, Walsall, Worcester and, notably, in Liverpool.

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While sanitary reform organisations were usually at odds with town councils, the *Liverpool Health of Towns Association* was established in April 1845 at a meeting called by the Mayor (Liverpool Health of Towns' Association, 1845a). The Borough was ahead of the game in that it had already established a Health of the Town Committee following the Liverpool Improvement Act of 1842, and it had made history when on 4 September 1844 it had appointed Thomas Fresh as its Inspector of Nuisances. He was the first full-time public health officer appointed by a UK Health Committee. Fresh had previously been responsible for environmental health interventions while employed by Liverpool's Watch Committee, but he had so impressed the Health of the Town Committee that they requested that he should be transferred to their exclusive service and be appointed as their Inspector of Nuisances (Parkinson, 2013).

Fresh was intelligent, travelled, literate and articulate, from good country 'yeoman stock'. He was able to bridge the gap between the middle-class sanitary reformers and the 'labouring classes' (Parkinson, 2012). The Inspector of Nuisances had to be prepared to go out into the filthy, wretched, overcrowded, disease-ridden and dangerous parts of town to put policy into practice. That meant facing up to the landlords and the industrialists, the slaughterhouse owner and the butcher. Yet, as Sir Benjamin Ward Richardson (cited in Johnson, 1983, p43) observed in 1892, 'he should be what was called a respectable man... presentable in private houses'. Fresh successfully established the post as a key element of the local public health infrastructure, and it was incorporated into Liverpool's precedential 1846 Sanatory (sic) Act (Parkinson, 2013).

According to Frazer (1947) it was the *Liverpool Health of Towns Association*, together with William Duncan's lectures and pamphlets on the health of the city (Liverpool had the highest death rate, highest infant mortality rate and lowest average age at death in England and Wales) that, in the wake of the failure of Lord Lincoln's Bill, prompted the Borough to promote Liverpool's private 1846 Sanatory Act. Liverpool's Bill included many of the proposals in Lincoln's Bill including the mandatory statutory appointment of an Inspector of Nuisances and the discretion to appoint a Medical Officer of Health. In January 1847 Fresh and Duncan were, unsurprisingly, the first to be appointed to the new statutory posts.

Physician John Sutherland was Secretary of the *Liverpool Health of Towns Association* in the period leading up to the promotion of the Liverpool Act (Liverpool Health of Towns Association, 1845b). He edited *The Liverpool Health of Towns Advocate* during 1845-6 before moving to practise in London where he became editor of *The Journal of Public Health and Monthly Record of Sanitary Improvement* from 1847-49. In 1848 Sutherland was appointed as an inspector to the first General Board of Health under Chadwick, Lord Ashley and

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Lord Morpeth. He took with him a knowledge of Liverpool's Thomas Fresh and his Nuisance Department. This may well have informed the Assistant Secretary to the Board of Health's request in 1851 for information on how Liverpool regulated lodging houses, and it may explain why Fresh was a consultee on the future role of Medical Officers of Health. The Liverpool connection re-surfaced in 1855 when Sutherland became Head of the Sanitary Commission to the Crimean War and Thomas Fresh was invited to Balaclava to 'oversee sanatory arrangements' (Parkinson, 2013).

The Towns Improvement Clauses Act of 1847 provided for the mandatory appointment of an Inspector of Nuisances and the power to appoint an 'Officer of Health', but this was 'model' or 'template' legislation that towns and districts could, if they should so wish, petition to adopt and thus save the cost of drafting and promoting their own private act (Great Britain, 1847). Nevertheless, it gives an indication that the government and Parliament had at least become sympathetic to the appointment of an Inspector of Nuisance, even if opposition from commercial and property interests continued to prevent the imposition of sanitary reform on all districts. The form of words relating to the Inspector Of Nuisances was taken from Liverpool's Act.

The HTA continued to campaign for national legislation that would unify all local government agencies into Local Boards of Health each with a duty to appoint an Inspector of Nuisances and the power to appoint a Medical Officer of Health. That legislation began to arrive on the 30th March 1847 when, under a Whig government, Viscount Morpeth introduced his Bill into the House. Morpeth's speech showed how much public opinion had changed; the rationale for sanitary reform was now primarily humanitarian, but 'it is by no means to be slighted on the grounds of economy itself' (Morpeth, in Hansard, 1847).

Morpeth referred three times to the Health of Towns Association and to its 'very full and able report' on Lincoln's Bill; he even quoted from the HTA report. He told the House that while he disagreed with the local appointment of a Medical Officer of Health, like Liverpool's, he was convinced that every district should have an Inspector of Nuisances:

'the Bill will contain a power to appoint an Inspector of Nuisances, who will see to the removal of substances that may be prejudicial to health. Provisions will also be incorporated in the Bill for preventing the nuisance of smoke' (Morpeth, in Hansard, 30 March 1847 cc617-45).

Smoky chimneys were seen by many as an indicator of economic health, and if his Bill were to succeed, Morpeth could not afford to take on the Northern

industrialists, so the smoke nuisance provisions and much of the Bill was lost to political compromise. At the second attempt, and in the shadow of cholera, Morpeth's Bill finally passed into the statute book as the Public Health Act 1848. It would not apply to London, and the establishment of Local Boards of Health would not be made compulsory, but the obligation on a Local Board of Health to appoint an Inspector of Nuisances remained. The HTA got its way when the discretionary power to appoint a Medical Officer was inserted.

The HTA had conducted a strong and successful lobbying campaign. It had provided statistical information to individuals and branch associations, and it had organised meetings and petitions. It backed its claims with what must surely have been the first questionnaire survey of local opinion on the state of public health and the existing local capacity to address it (HTA, 1848a). The results of that survey were described in Parliament as 'slander':

'(Mr Urquhart, Member for Stafford) was compelled to allude to the proceedings of a body so respectable in most (my italics) of its members as the Health of Towns Association; but they had, in their reports, put forth, in support of this Bill, calumnies the most vile, statements the most unfounded, language the most unseemly, and propositions the most absurd. Anonymous slanders on one town after another had been sanctioned by the authority of that body. ... there were sinister motives at work' (Urquhart, 1848).

Urquhart seems to be referring to Chadwick and his commitment to centralisation. In a private letter to John Delane, editor of the Times, noted in Finer (1952), Chadwick admitted having had a hand in the HTA's report. The Corporation of the City of London took great exception to the report and started a diatribe against the HTA. The HTA would generally carefully respond to all such opposition by standing its ground and addressing the critics with yet more and better evidence. On this occasion it responded with an even more insulting report (HTA, 1848b). The HTA was not afraid to meet criticism head-on when it knew it was right.

While the whole of the metropolis was eventually excluded from the Act, the fear of inclusion did result in the City quietly promoting its own Sewerage Bill. The City of London Sewers Act, 1848 (Great Britain, 1848b) provided for the mandatory appointment of one or more Inspectors of Nuisances and the discretion to appoint Medical Officers of Health. The form of words was the same as in Liverpool's Act, except that the City's Act permitted the appointment of more than one of each type of public health officer. Liverpool's format was also used in the Metropolis Management Act of 1855.

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The first Medical Officer of Health of the City of London was of course John Simon. Simon was a Health of Towns Association committee member, but at his interview for the post he denied all involvement in the HTA's campaign against the vested interests in the City! Also interviewed was Hector Gavin, whose strong affiliation to the HTA may well have cost him the job (Spriggs, 1984).

The HTA and other 'agitators' had successfully assisted the passage of the Public Health Act 1848 through Parliament, but the final version was very much a political compromise (Great Britain, 1848c). Still, with the establishment of the General Board of Health, albeit for a limited 'probationary' period of 5 years, Parliament had at last formally accepted that it had a central role in maintaining the public health. The rationalisation of the local government system had been furthered with the facility to create local Boards of Health. Above all, public opinion at all levels had been directed to sanitary reform and the need for coordinated action. In the next five years 284 districts applied to establish a Board of Health, more than had obtained local acts in the previous 45 years (Hanley, 2002). In total, 419 Local Boards of Health were formed under the 1848 Act, though some were slow and ineffective, and a few were apparently elected to do nothing at all (Lewis, 1952).

After the HTA's last recorded meeting in 1849, it seems to have simply petered out. Some writers (e.g. Paterson, 1948) have commented that it had achieved its objective with the passing of the 1848 Act. Yet much remained to be done; the Act did not apply to Scotland and Ireland or even to the metropolis. It had not been adopted in many districts of England, and the drafting of the Act itself was both deficient and defective. It is more likely that the appointment of Chadwick, Ashley and Morpeth as Commissioners to the General Board of Health, Gavin as its Secretary, Southwood-Smith as medical advisor and Austin, Grainger and Sutherland as Inspectors, took away the Association's prime movers... or, I might suggest, its puppet masters.

SUMMARY

For five years from 1844 to 1849 the Health of Towns Association maintained constant pressure on the Government to introduce much needed local government and sanitary reforms. It drew upon the support of influential individuals from political life, medicine, engineering, the clergy and the working classes. It helped to shift the rationale for sanitary reform from economic to humanitarian objectives. To a great extent the Association was a mouthpiece for Edwin Chadwick and his circle.

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The first official recommendation for the creation of local Boards of Health and the appointment of an Inspector of Nuisances came from a House of Commons Select Committee chaired by a leading member of the Health of Towns Association. Throughout its existence the Association sustained this policy. It was active in Liverpool when in 1844 the first Inspector of Nuisances was appointed by a UK town's Health Committee, and it was influential in the promotion of the Liverpool Sanatory Act of 1846 which was the precedent for the Town Improvement Clauses Act of 1847, the Public Health Act 1848, the City of London Sewers Act 1848, and the Metropolis Management Act 1855.

The HTA undertook what was probably the first questionnaire survey of public opinion on the state of public health and the existing local capacity to address it.

Its principal failings were its commitment to the miasmatic theory to the exclusion of alternative theories of disease causation, and its inability to influence vested interests in London.

The HTA faded away after the passing of the 1848 Act and the appointment of most of its prime movers to full-time posts with the new General Board of Health.

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The Health of Towns Association and the genesis of the Environmental Health Practitioner

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ARTICLE

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Public's perception of the local authority pest control service in the UK

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ABSTRACT

In the wake of the global economic downturn, the UK government has identified ways in which savings can be made year on year, and this has resulted in significant cuts in the financing of public services. In addition to other contingencies, many local authorities are introducing or increasing charges for their pest control services so as to be able to maintain their service in-house. Others have elected to reduce the service and in some cases to discontinue their in-house service.

The control of urban pests is generally taken to be a core element of environmental health in the protection of public health, based in the knowledge that pests have the potential to harbour and spread disease. Although local authorities have a legal obligation to keep their districts free from rats and mice under the Prevention of Damage by Pests Act 1949 (PDPA 1949), there is no statutory duty placed on them to provide an in-house, pest control service.

A questionnaire administered in 12 local authority areas of the UK identified that 86% of the 574 respondents believed their local authority pest control department to be an important element of public health protection, with 64% believing it is the responsibility of their local authority to ensure a pest-free environment. Over half of the respondents questioned stated they would contact their council when looking for information on rodents or insects.

Central to Integrated Pest Management (IPM) is the adoption of a pro-active approach and this requires the co-operation of the public in reporting problems. Clearly, savings might be made by off-setting costs by charging, reducing the service or discontinuing an in-house pest control service. However, the long-term outcome is likely to be a reduction in the reporting of pest issues by the public, a loss of knowledge and expertise, and increased risk to public health.

Key words: pest control, public perception, public health

INTRODUCTION

In the UK, environmental health has been a conspicuous element of health protection since public health emerged from the filth and grime of the 1840s. Research carried out by Lowndes and Pratchett (2012) identified that local government has been adversely affected by austerity cuts, with an estimated loss of 27% in funding. To cover this loss, new performance measures were proposed to help authorities focus on the services their communities want, rather than 'defined or prescribed metrics'.

Difficulties faced by authorities meeting their suggested targets continue to be highlighted. Research conducted by Interserve and YouGov (2012) confirmed that 26% of local authority services were currently out-sourced to third parties, with 31% of the local authorities questioned stating they were not expecting to achieve their budget cut targets in the financial year 2014/15.

A press release on 14th September 2012 by North Tyneside Council reported the first full-scale out-sourcing of environmental health services to the private company Capita Symonds. The authority was said to be suffering difficulties in meeting their spending review target of achieving £47 million of efficiencies over four years. Agreeing to out-source the environmental health department, North Tyneside acknowledged that "...it was the only option in order to protect their community" (Headly, 2012; Capita Symonds, 2012).

The National Pest Technicians Association (NPTA) considered the pest services offered by UK local authorities in the financial year 2010/11. Their research found that, of the 243 local authorities they canvassed and who responded, 173 (71%) confirmed that they continued to operate an in-house pest control service, 39 (16%) sub-contracted their services and 31 (13%) confirmed that they no longer had an in-house service. The same survey identified that 105 (43%) of the authorities indicated that *all* aspects of their pest control service

were subject to a charge, with 75 (31%) stating that their rodent treatments were still carried out free of charge, and 63 (26%) had differential charging regimes depending on circumstances (NPTA, 2012).

Concluding 'Britain's pest populations are growing', Liverpool Victoria Insurance (2012), surveyed pest controllers and UK householders and found that 65% of the former thought that the number of pests in UK homes had increased in the past year with '...a surge in rats, mice, squirrels and bedbugs', and 27% of the householders said they had seen more rats on their streets. In addition, 21% indicated that pests had damaged their homes, with chewed electrical cabling reported by 94% of these householders.

A policy briefing note from the Chartered Institute of Environmental Health (CIEH) in 2011 expressed its concerns over the increasing number of local authorities deciding to reduce or discontinue offering a pest control service, commenting that there was little evidence to suggest that cost savings were achieved in the long-term by doing so. It concluded: '...increasing charges for pest control services and/or contracting out the service is inconsistent with local authorities' public health responsibilities.'

In the past local authorities (LAs) undertook proactive community inspections and applied the principles of Integrated Pest Management (IPM) in order to control certain pest populations. Since the economic downturn, many local authorities have been unable to continue with these IPM activities, resulting in them only responding to pest control requests, as and when they were made by the public (Coates *et al.*, 2011).

Public perception

To date there has been little research carried out to gauge the public's perception of pest control services, their knowledge of pests, and to canvass their views on pests and their control locally. This research project sought to remedy this shortfall by investigating how the public perceived the pest control service offered by their local authority; their expectations of this service; and how education might serve to increase knowledge and awareness.

METHODS

Between March and August 2012, the principal investigator visited the ten local authorities in Greater Manchester, Bristol and Birmingham. A face-to-face, semi-structured questionnaire was administered in town centres with respondents who were given the opportunity to end participation at any point.

Local Authority area	Number of sample
Salford City Council	37
Rochdale MBC	44
Oldham MBC	41
Tameside MBC	50
Stockport MBC	50
Bury MBC	39
Wigan MBC	44
Bolton MBC	50
Trafford MBC	39
Manchester City Council	50
Bristol City Council	64
Birmingham City Council	66
Total sample	(574)

Table 1
Number of respondents
per authority area

The questionnaire consisted of 20 questions designed to give quantitative data and seven that served to provide qualitative data. Together they were intended to provide information on the general characteristics of respondent and the tenure of the home in which they lived; their views on the nature and importance of a pest control service offered by the local authority; their opinion on charging for that service; and their knowledge and feelings about pests.

Table 1 details the number of respondents who completed the questionnaire at each location. The intention was to survey 50 members of the public in each area visited, though the actual number responding was accounted for by the amount of time that could be spent at each location.

RESULTS

Characteristics and housing tenure of the respondents

Of the 574 respondents, 54% were female and 59% were aged 'over 35', which for the purposes of this project means 36 years or over (reference hereafter to the 'under 35' cohort means '35 years and under'). 55% reported that they owned their own home, the remainder were renting privately, from the council or through a housing association.

		Yes	No	Sample number	Significance (χ^2)
Age	≤35 years	97 % (178)	3 % (6)	184	0.440
	>35 years	96 % (313)	4 % (13)	326	
Gender	Male	94 % (229)	6 % (14)	243	0.018
	Female	98 % (262)	2 % (5)	267	
Housing tenure	Rent	94 % (202)	6 % (13)	215	0.017
	Own	98 % (289)	2 % (6)	295	

Table 2

Do you believe the pest control department of your Local Authority is an important part of public health protection?

Importance of a local authority providing a pest control service and their perceived responsibilities

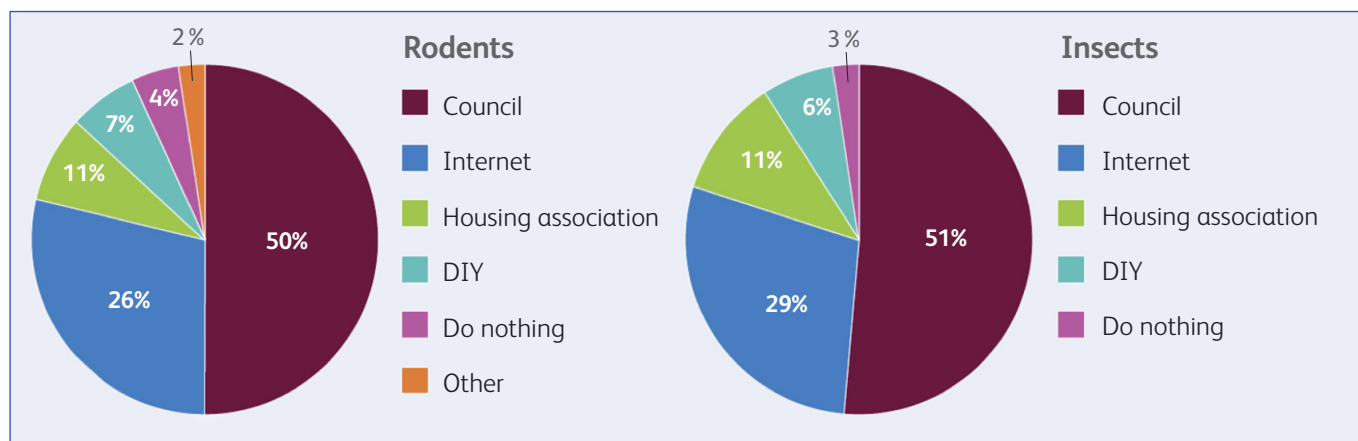
Of the sample population (n=574) canvassed as to their views on the pest control service provided by their local authority, 86% considered it to be an important part of public health protection, with 11% unsure and 3% holding a contrary view. When considered by gender, age and tenure, and using Chi-squared analysis, there was a significant difference of viewpoint with females and those of both sexes owning their own property believing it to be more important than males and those in rented accommodation, respectively (see Table 2).

Asked who they believed was responsible for maintaining a pest-free environment, 64% believed it to be their local authority, 28% considered it to be the responsibility of 'everyone' in the community, and 6% thought that it should be the responsibility of the homeowner.

Respondents were asked where they would look first for information on rodents and insects, if they discovered an infestation in their property. The results are presented in Figure 1.

Figure 1

Where would you look first for information on rodents and insects?



		Yes	No	Sample number	Significance (χ^2)
Age	≤35 years	43 % (70)	57 % (91)	161	0.003
	>35 years	62 % (61)	38 % (38)	99	
Gender	Male	62 % (71)	38 % (43)	114	0.001
	Female	41 % (60)	59 % (86)	146	
Housing tenure	Rent	52 % (79)	48 % (72)	151	0.272
	Own	48 % (52)	52 % (57)	109	

Table 3

Were you aware that your local authority can provide guidance, advice and pest control for many pest issues?

Although roughly half of the respondents would approach the Council directly on both rodents and insects, something over a quarter would consult the Internet.

The questionnaire went on to ask respondents for comments on what they would do first if they discovered an infestation in their home. The outcome was clearly influenced by tenure, but 54 % indicated that they approach the Council, 13 % said they would go to a DIY retailer and 11 % would consult the Internet.

Those not opting to contact their local authority on discovery of an infestation were asked if they knew about the services that local authorities could provide, such as advice, guidance and a pest control service. Again, a χ^2 test was used to analyse the data by age, gender and tenure (see Table 3).

With around two-thirds of the older cohort (over 35s) aware of the services offered by their local authority, the younger cohort – under 35s – were significantly less well-informed, rather less than half knowing about these services ($\chi^2 = 8.1$; $df=1$; $p=0.003$). Significantly more men (62 %) than women (41 %) were aware of the services on offer ($\chi^2 = 11.5$; $df=1$; $p=0.001$).

Charging for pest control services

Respondents were asked whether they would be willing to pay for a treatment to eradicate rodents and insects, and, if not, who should. Of those who said that they would be unwilling to pay, 44 % said that they thought the local authority should cover the cost and 38 % the person 'who is to blame' or responsible for the infestation. Table 4 identifies their responses for both rodents and insects for the categories of age, gender and dwelling ownership.

Payment for the treatment of rodents

A significant difference was found between the under 35 and over 35 age groups, with 74 %, (n=339) of the over-35 year olds prepared to pay against

		Willing to pay £10–£100+	Unwilling to pay	Sample number	Significance (χ^2)
Rodents					
Age	≤35 years	54 % (126)	46 % (109)	235	<0.001 (0.000)
	>35 years	74 % (251)	26 % (88)	339	
Gender	Male	72 % (193)	28 % (72)	265	0.001
	Female	59 % (184)	41 % (125)	309	
Housing tenure	Rent	48 % (124)	52 % (134)	258	<0.001 (0.000)
	Own	80 % (253)	20 % (63)	316	
Insects					
Age	≤35 years	65 % (153)	35 % (82)	235	<0.001 (0.000)
	>35 years	82 % (278)	18 % (61)	339	
Gender	Male	80 % (213)	20 % (52)	265	0.004
	Female	70 % (218)	30 % (91)	309	
Housing tenure	Rent	63 % (163)	37 % (95)	258	<0.001 (0.000)
	Own	85 % (268)	15 % (48)	316	

Table 4
Payment for treatments

26 % (n=235) of the under-35s. Respondents who owned their own home were significantly more likely to be prepared to pay for the treatment of rodents (80 %, n=316) ($\chi^2 = 64.5$; df=1; $P \leq 0.001$) compared to those who rented their property (48 %, n=258). Females were significantly less likely to indicate a willingness to pay for a treatment to eradicate rodents (59 %, n=309) ($\chi^2 = 11.2$; df=1; $P = 0.001$) compared to male respondents (72 %, n=265).

Payment for the treatment of insects

To a lesser extent, though still statistically significant, 82 % (n=339) of the over 35 age group indicated that they would be prepared to pay for a treatment to eradicate insects, compared to 65 % (n=235) of the under 35s ($\chi^2 = 21.2$; df=1; $p \leq 0.001$). Again, respondents who owned their own home were significantly more likely to be prepared to pay for the treatment to eradicate insects (85 %, n=316) compared to those who rented their property

Reason	Rodents (rats and mice)	Insects
Dirty and cause disease	50 % (111)	1 % (3)
Revulsion	22 % (44)	23 % (75)
Dirty	9 % (19)	14 % (41)
Get everywhere	5 % (10)	21 % (70)
Allergies	2 % (6)	2 % (6)
Large numbers	1 % (5)	12 % (37)
Bite	2 % (6)	11 % (36)
Hard to control	–	6 % (20)
Hard to see	–	5 % (16)
Acceptance	8 % (18)	1 % (2)
Other	1 % (3)	4 % (13)
Total	N=220	N=325

Table 5

Pests respondents would least like to have in their home: reason

(63 %, n=258) ($\chi^2 = 35.5$; df=1; $p \leq 0.001$). Female respondents were again less likely to indicate a willingness to pay for treatment to eradicate insects (70 %, n=309) compared to males (80 %, n=265) ($\chi^2 = 7.4$; df=1; $p = 0.004$).

The public's perception and knowledge of pests

To establish which of the pest types the public were likely to tolerate or report, respondents were asked which pest they would least like to have in their home – rodents or insects?

Some 38% indicated that would not wish to have rodents in their home, whereas 56% would not wish to share their home with insects. The remainder (6%) expressed no preference. When asked which pest type they would be prepared to tolerate in their home, 86% indicated 'rodents', 7% said 'insects' and remainder (7%) indicated neither i.e. they would not make a distinction.

Table 5 details the reasons given by the 220 respondents who stated they would be less likely to tolerate having rodents in their home, with half referring to them being 'dirty' and capable of 'carrying disease'. Respondents who stated they would be less likely to tolerate having insects in their home (n=325) indicated that this was because of revulsion (23%), because they 'get everywhere' (21%) or because they were dirty (14%).

DISCUSSION

Results from the survey show that respondents value the pest control service offered by their local authority and support the need for pest control services to remain in-house. Those charged with making financial savings within local authorities are likely to focus on eliminating services that do not fulfil statutory requirements, which puts in-house pest management services at risk. In recent years it was thought that these budget restrictions would come to an end around 2015. However, in November 2012 it was announced that these budget reductions would continue until at least 2018 (BBC News Business 2012).

The questionnaire identified the degree to which respondents valued their local authority in-house pest control service. Half of respondents indicated they would turn to their local authority for information should they experience a problem with rodents or insects. Over three quarters of the people surveyed believed their pest control service to be an important part of public health protection both in providing a pest control service to control infestations and in making available information to encourage the prompt and efficient control of pest populations.

Whilst this might not be surprising given that local authorities' obligations and responsibilities under the PDPA 1949, a service that was once considered preventative of infestation and so pro-active, appears to be shifting towards the re-active, in consequence of which pest populations could increase, and the prospect that duties listed within the PDPA 1949 may not be fulfilled (CIEH 2011).

Many local authorities have provided free pest control services for public health pests in the past, but more authorities have introduced charging for services in order to keep their service in-house (CIEH 2011). Although charging for a service is no longer seen as a unique way to sustain in-house services, questions have been raised as to whether this is the best course of action (CIEH 2011).

This research has identified that around half of those responding to the questionnaire would be prepared to pay £10–£40 for a pest control service, though these were far more likely to be owner occupiers. This suggests that tenants – be they renting privately, from the local authority or housing association – believe that pest control should be covered by their rent. According to the CIEH (2011), the consequence of imposing a charge is to cause a decline in uptake of the service and for charges to '...fall disproportionately on those less able to pay'.

Whilst the CIEH recognises the need for local authorities to operate within restricted budgets, charging for pest control services could lead to greater costs

in the future and the loss of in-house expertise (CIEH, 2011). Certainly, there is evidence of an increasing prevalence of local authorities 'contracting out' pest control services to private companies (NPTA, 2012), though the CIEH (2011) believes there to be: '...little clear evidence that cost savings are achieved in the long term if no service is provided or the contract is inadequate.'

Surveys conducted by the National Pest Advisory Panel in 2002 and 2009 showed a reduction in pest control services provided by local authorities, with the proportion indicating that they no longer provided an in-house service increasing from 1% to 10%. In addition, Coates *et al.* (2011) observed a decline in the qualifications, technical expertise, knowledge and understanding of pest species among those responsible for public health.

CONCLUSION

Understanding the perceptions of a population is important in order to guide decision makers who provide services that benefit the whole community (Bonney *et al.*, 2008). In these challenging times, delivery of pest management services by local authorities is reducing year on year (NPTA survey, 2012). Pests carry many diseases and have the potential to cause ill health and affect wellbeing. Greater awareness and clearer public knowledge is indicated, and the outcome of this survey of public perception supports the need, in particular, for community education as to the risks that rodents pose to public health. This highlights the importance of environmental health in addressing the social and environmental factors that could increase exposure to pests and so risk of disease. Even in modern societies, pest and vector-borne diseases continue to pose a threat to public health, and deprived of in-house pest control expertise, this risk might increase.

Pest control services must have a recognised 'worth' in supporting community life and keeping communities pest-free. Certainly, this research demonstrates a clear expectation on the part of the public in favour of retaining a local authority-based pest management service. The pro-active approach to pest management has helped to provide a pest-free environment that is largely taken for granted, but one that is threatened by the move towards a re-active service. Only by adopting a sustainable approach can there be effective control of pests through Integrated Pest Management (IPM) with its focus on an expert knowledge base and an understanding of urban landscapes. Local authority pest control technicians, as part of an in-house service, have this knowledge so making effective IPM achievable, whilst supporting the requirements expected of a local authority under the PDPA 1949.

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PAPER

Are children in buggies exposed to higher PM_{2.5} concentrations than adults?

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ABSTRACT

Young children and infants in buggies travel closer to the ground and the height of average vehicle exhaust, and so may be subjected to higher pollutant concentrations than adults. A mobile system attached to an unoccupied child's buggy was used to sample real-time PM_{2.5} concentrations at two heights – the nominal breathing zones of a seated child and that of the adult pushing the buggy. Measurements were collected along three pre-defined routes in the city-centre of Edinburgh, UK, on six weekdays during August 2013. During each monitoring period, the real-time instruments were co-located at the child breathing zone height to quantify the comparative relationship between the two devices' performance. Further co-location measurements were obtained to investigate the performance of the devices over a wide range of concentrations. The co-location comparisons allowed for necessary corrections to be applied (to the child measurements, designated child_c data). Geometric means of both the adult and child_c concentrations were calculated for all monitoring periods. For each period the average ratio was obtained and a two-tailed paired t-test was used to determine if there was a significant difference between the adult and child_c concentrations measured. Further examination of the data involved consideration of the peak levels. On each day, sampling was completed once along each route, resulting in 18 sets of measurements, comprising in excess of 3,240 individual adult and child comparison data points. The average ratio results over almost all of the 18 monitoring periods suggest that adults are

exposed to higher concentrations of PM_{2.5} than children. In addition, the peak levels were found to be higher for adults, significantly so on days 1, 3 and 5. Our dataset suggests that children in buggies are not exposed to higher PM_{2.5} concentrations than adults pushing the buggy.

Key words: children, particulate matter, vehicular emissions, urban air quality, measurement

INTRODUCTION

Ambient air pollution is a major concern to public health and has been linked to lung cancer, chronic obstructive pulmonary disease and ischaemic heart disease. IARC recently classified outdoor air pollution as a leading environmental cause of cancer (IARC, 2013). Emerging evidence also suggests possible links between long-term PM_{2.5} (particulate matter with an aerodynamic diameter less than 2.5µm) exposure and impaired neurodevelopment and cognitive function (WHO, 2013). The update of the Global Burden of Disease project estimated that ambient particulate matter pollution accounted for an annual total of 3.1 million deaths and 3.1% of global disability-adjusted life years (Lim *et al.*, 2012). The health of children is of particular concern in relation to air pollution. There is evidence that children living or attending schools close to busy roads have poorer respiratory health, and this has been attributed to long-term exposure to traffic-related air pollution (Gauderman *et al.*, 2007; Brauer *et al.*, 2002). Short-term fluctuations in air pollution may result in reduced lung function in asthmatic children or an increase in asthma symptoms (O'Connor *et al.*, 2008). Laxen *et al.* (2012) concluded “there is limited evidence on this point, but the acute effects of PM_{2.5} exposure are expected to be predominantly amongst those with pre-existing disease, and in particular amongst children and the very elderly.” There are suggestions that PM_{2.5} may be a good marker to assess the risk of adverse health effects associated with particulate air pollution (Janssen *et al.*, 2011).

In recent years there has been considerable research effort to better understand the spatial-temporal variation on air pollution concentrations. Laxen *et al.* (2012) showed the importance of long-range transmission of aerosols, secondary aerosol formation and localised point and diffuse sources, mostly associated with the road network. Close to roads there may be complex dispersion patterns dependent on meteorology, local buildings and other roadside structures (Hu *et al.*, 2012).

Little is known about the variation in the vertical direction. The exhaust from road vehicles is approximately 30–60 cm above the ground, and it is reasonable

to assume that the highest concentrations of emitted pollutants will exist close to the source. Albriet and Sartelet (2010) developed a computational fluid dynamics model for vehicle exhaust emissions and showed that the jet of exhaust slowly expands as it leaves the exhaust, with the evolving aerosol being constrained to close to ground level, in calm air. Where pavements or pedestrian areas are very close to roads, there are limited opportunities for the dispersion of emitted pollutants.

UK local authority air quality monitoring is undertaken at a height that is representative of adult exposure – sometimes higher, dictated by the design of the monitors' housing. Young children and infants in buggies (strollers) will be closer to the ground and height of the average vehicle exhaust and therefore may be exposed to higher pollutant concentrations than either adults or the fixed location monitors. Buzzard *et al.* (2009) provide a limited dataset comparing the concentration of diesel exhaust particulate measured at adult head height (four measurements) and the height of a child's buggy (six measurements). Their data showed the adult particulate concentrations were on average about half those relevant to children. A brief experimental comparison of traffic-related ultrafine particulate (UFP) exposure at different breathing zone heights demonstrated that an infant in a bike trailer was exposed on average to 35 % higher concentrations of UFP when compared to a child on a bike (Burtscher and Schüepf, 2012). It is important to understand further the likely differences in exposure to vehicular air pollutants between adults and children because of height differences.

METHODS

Experimental set-up

The sampling campaign was designed to assess whether there was a significant difference in PM_{2.5} concentrations due to height of sampling. A mobile sampling system attached to an unoccupied child's buggy was used. Sampling was undertaken at two heights – the nominal breathing zone of a seated child (74 cm) and at the breathing zone height of the adult pushing the buggy (136 cm). Measurements were made while walking over a series of pre-planned routes.

Two TSI SidePak AM510 direct reading aerosol monitors fitted with PM_{2.5} impactors were used. Before each monitoring day, both monitors were set to a time constant of 1 second, calibration factor to 1.00, flow rate to 1.7 l/min and UK date and time. Data was set to record in ten second intervals. Tygon® tubing was fixed to the inlet of each to allow the measurements to be collected from within the breathing zone areas, with the tubing lengths (80 cm) being

the same for both monitors. Great care was taken to ensure that the curvature of the tubing connected to the child and adult breathing zones were similar to avoid any issues of one tube having more curvature/ bends than the other.

During each monitoring period, the SidePaks were initially co-located in the buggy at the child breathing zone height for 10 minutes. The inlet of one was then repositioned to the adult breathing zone (Adult) with the inlet of the second remaining at the child breathing zone height (Child). After a 30 minute monitoring period, the adult inlet was again co-located with the child inlet for at least ten minutes. The co-location periods of measurement allowed the comparative relationship between the two devices' performance to be quantified.

Monitoring routes and measurement periods

The measurements were collected along three pre-defined routes in the city-centre of Edinburgh, UK (St. Johns Road, Balgreen Road and Gorgie Road), selected due to their high traffic density. Sampling was undertaken during three time periods (9–10am, 10–11am and 11am–12pm) on six weekdays (6th–13th August 2013). On each day, sampling was completed once along each route, resulting in 18 sets of measurements (two repeats for each route and time period combination), with four co-location periods each day. The post- co-location period for route 1 was also taken as being the pre- co-location measurement for route 2; the post- co-location for route 2 was also taken as the pre- co-location period for route 3.

Other information recorded during trials

Contemporaneous notes of relevant events such as road maintenance, construction activity, proximity of direct cigarette smoke or stationary traffic were recorded. Meteorological conditions were measured and video recordings were obtained during the monitoring periods to allow for checking of events at specific time points. Official hourly PM_{2.5} measurements at a Scottish Government monitoring station (St. Leonards, classified as 'urban background') approximately 3.2 kilometres from the routes were also downloaded (www.scottishairquality.co.uk) for the corresponding sampling periods, although these were not available for days 1 and 2.

Data analysis

The PM_{2.5} data were downloaded from the SidePaks using TrakPro software and exported into Microsoft Excel.

The supplementary co-location data were investigated in order to establish a relationship between the results obtained from the two monitors. This

relationship was then used to correct the data obtained from the child monitor during the buggy measurement periods so as to ensure that both the child corrected (child_c) and adult concentrations were equivalent (see Supplementary information).

Due to the log-normal nature of the data all descriptions were carried out using the natural log of the data. Geometric means (GM) of both the adult and the child_c concentrations were calculated for all monitoring periods. For each monitoring period the GM ratio, and 95% confidence interval was obtained by taking the log of the ratio of the adult measurement to the corrected child measurement at each time point before taking the exponential of the average of these log ratios.

In order to examine whether there were any differences between the adult and child levels at the peak concentrations (i.e. whether one was experiencing higher peak values than the other) we compared the levels measured by both instruments where a peak was experienced. For both instruments all peak measurements were identified, where a peak was defined as 10 times the minimum level recorded over the measurement period, typically around 50 µg/m³. At each of these peaks the corresponding measurement for the other monitor was also extracted. These measurements were then compared as above, taking the log of the ratio of the two monitors at each peak time point and presenting the exponential of the average of these ratios (GM ratio) and associated confidence interval. When examining the confidence intervals of the GM ratio, if the interval includes the value one it can be concluded that there is no significant difference between the two monitors, on average.

The analysis was carried out using Genstat V16 and R, plots were generated using Sigmaplot.

RESULTS

Comparison of the Adult and child_c PM_{2.5} concentrations

The GM adult concentration was variable over the monitoring periods, ranging from 5.5 on day 5 to 54 µg/m³ on day 3 (Table 1). The GM child_c levels were lower, in general, ranging from 5.9 to 46.6 µg/m³. The average ratio of adult to child_c was, for the most part, greater than 1 indicating that the adult PM_{2.5} concentrations were higher than the corrected child's. The pattern in GM PM_{2.5} concentrations over the sampling days is consistent over the three routes and also consistent with the concentrations measured at the 'urban background'

Day	Balgreen Road			Gorgie Road			St. Johns Road		
	GM adult (µg/m ³)	GM child _c (µg/m ³)	Urban (µg/m ³)	GM adult (µg/m ³)	GM child _c (µg/m ³)	Urban (µg/m ³)	GM adult (µg/m ³)	GM child _c (µg/m ³)	Urban (µg/m ³)
1	8.2	5.9	–	11.5	8.6	–	10.3	8.1	–
2	12.1	9.4	–	16.5	15.0	–	14.9	12.1	–
3	54.6	46.6	16	25.5	18.6	12	35.9	31.1	6
4	11.6	7.7	5	14.6	8.3	4	10.9	6.9	3
5	5.5	6.6	8	8.8	10.1	2	10.1	11.7	7
6	9.2	7.3	6	12.3	10.0	5	14.9	10.2	5

– no data available for these dates

Note: 'background' refers to urban background measurements recorded at St. Leonards monitoring station at time of monitoring period (located ~3.2 km from measurement route)

monitoring station, with each having the highest concentrations on day 3. On day 5 the pattern is different with the child_c levels being higher, on average, than the adult levels. On five of the six days of sampling, the average ratio of adult to child_c was statistically significantly greater than one at all three locations, indicating that the adult PM_{2.5} concentrations were significantly higher than the corrected child's' (Table 2). However, the ratio on day 5 was the reverse of this, with the average ratio of adult to child_c statistically significantly less than 1, indicating significantly higher child exposures, although no explanation could be found for this.

Table 1
Adult and Child corrected (child_c) concentrations measured by the monitors as well as the levels recorded at the St Leonard's monitoring station

Table 2
Average (GM) ratio of adult to child corrected (child_c) concentrations and associated 95% confidence interval

Day	Balgreen Road			Gorgie Road			St. Johns Road		
	Adult: child _c	95% CI		Adult: child _c	95% CI		Adult: child _c	95% CI	
1	1.39	1.32	1.47	1.34	1.26	1.42	1.27	1.23	1.32
2	1.28	1.22	1.36	1.10	1.06	1.14	1.23	1.19	1.27
3	1.17	1.15	1.20	1.37	1.33	1.41	1.15	1.12	1.18
4	1.51	1.45	1.58	1.76	1.67	1.86	1.58	1.52	1.65
5	0.84	0.79	0.88	0.86	0.81	0.92	0.87	0.83	0.91
6	1.26	1.19	1.33	1.23	1.17	1.29	1.47	1.41	1.53

Peak values analysis

Figure 1 shows an example of the data collected during a 30-minute monitoring period (example taken at Gorgie Road on day 4, recorded between 11am and 12pm). There are clear peaks in the data and these, along with the peaks in all locations and sampling periods, were examined further in order to compare peak concentrations experienced at different heights.

The maximum corrected concentrations measured by the child monitor ($child_c$) do not appear to be very different from those measured by the adult monitor ($p=0.184$) (Figure 2). On day 2 a very high value was recorded on the adult

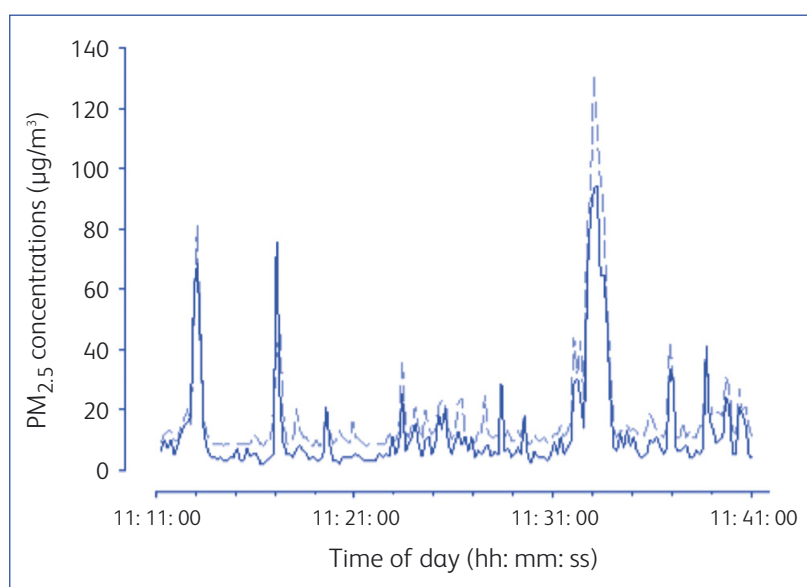


Figure 1
PM_{2.5} concentrations (µg/m³) for child corrected ($child_c$) (solid line) and adult (hashed lines), Day 4, Gorgie Road

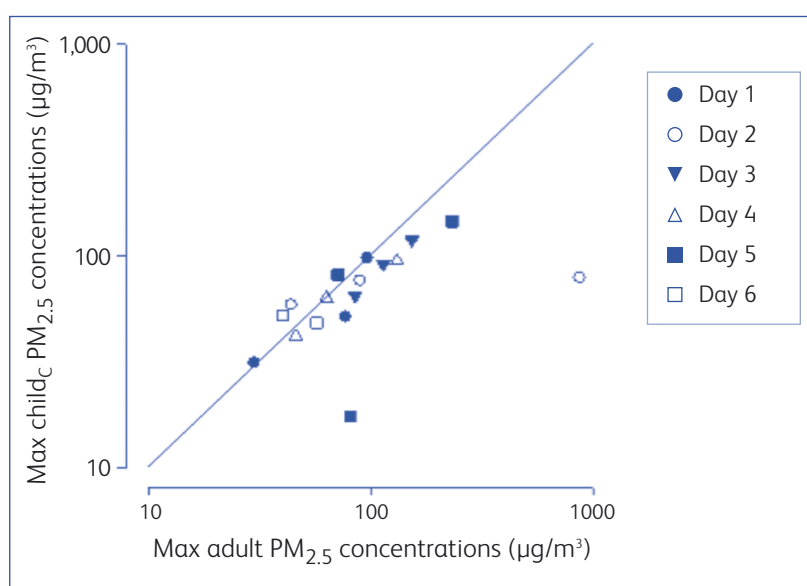


Figure 2
The maximum PM_{2.5} concentration recorded for the adult and child corrected ($child_c$) monitors over each monitoring period. The solid line is the line of equality

Day	N peaks (child _c and/or adult)	GM Ratio	95% CI	
1	104	1.11	1.02	1.21
2	9	1.73	0.52	5.78
3	127	1.14	1.11	1.18
4	23	1.03	0.86	1.23
5	154	1.13	1.07	1.20
6	11	1.02	0.73	1.44

Table 3

GM Average ratio of adult to child corrected (child_c) concentrations and associated 95% confidence interval for the peak levels (greater than 10 times the minimum level measured in that monitoring period)

monitor; examination of the contextual information and video recordings could not provide an explanation, with the only notable event at this time being the passing of a delivery van.

The GM ratio of the adult to child_c peak levels is greater than one for all six monitoring days (Table 3), indicating that the adult peak levels are higher than those of the child, on average. The adult levels are significantly higher on days 1, 3 and 5, while there is no significant difference between the two peak levels on days 2, 4 and 6 (as the confidence interval includes one) but the number of peaks on these days is low.

DISCUSSION

PM_{2.5} concentrations at the breathing zone height of adults were compared to the concentrations at the height of a child in a buggy, to determine whether children are exposed to higher concentrations of air pollution due to their closer proximity to vehicle exhaust.

The measurements were obtained in August which coincided with both the school holidays and the Edinburgh Fringe festival and may not reflect typical exposure concentrations during weekday commutes. There will be slight differences in the height of the child's breathing zone, depending on model of buggy but this study was not intended to be representative of all height positions.

Two TSI SidePak monitoring devices were used to determine the relative differences in mass concentration of PM_{2.5}. These were set to the standard calibration for Arizona road dust, with no correction factor being applied to

account for the different aerosol being measured. Comparing the actual PM_{2.5} concentrations with other data should therefore only be done with caution.

One SidePak was consistently allocated as the 'child', the other the adult. Despite the devices being recently calibrated and serviced, the co-location comparisons indicated significant difference in the measurements and allowed for necessary corrections to be applied to the data. An alternative approach would have been to alternate the 'adult' and 'child' monitors between monitoring periods and use a multivariate model to test for the significance of the monitoring device as a factor on the PM_{2.5} concentrations. Taking into consideration the additional co-location dataset we collected we are confident that our correction approach using co-location data is suitable to allow for comparisons between the measurements collected by the two monitors when placed in the 'adult' and 'child' locations. Similar methodology has been applied by others e.g. Bocquet *et al.*, 2011.

Based on the analysis of the average ratio, the results suggest that children are not exposed to higher concentrations of PM_{2.5} than adults, with the general trends suggesting the opposite. When examining only the peak PM_{2.5} concentrations the maximum corrected concentrations measured by the child monitor (child_c) did not appear to be very different from those measured by the adult monitor however, the average adult concentration was again significantly higher than average child_c concentration. The data collected during the monitoring periods do not provide an explanation for the differences in trends observed for the data collected on Day 5. It is however noted that the GM adult concentrations for all three measurement routes on this day were lower than those recorded on the other measurement days. As the same correction was applied to all data the dataset on Day 5 may have been over-corrected due to the converse relationship.

The PM_{2.5} concentrations measured at the urban background monitoring station and those measured by the SidePaks are not thought to be equivalent as they were collected using different devices, in different locations, influenced by different weather and traffic variations. However, it was reassuring that the correlation between the two measurements was reasonably good (0.75), but this also suggests that the PM_{2.5} being measured was arising predominately from other sources rather than localized vehicular emissions.

PM_{2.5} may not be the most appropriate marker to determine exposure to pollutants from vehicular exhausts. Hoek *et al.*, (2002) identified black carbon as being more closely related to traffic pollution than PM_{2.5}. While Boogaard *et al.*, (2011), who found higher particle concentration measured at the kerbside

compared to urban background concentrations, observed that the ratio of these measurements differed for black carbon (1.9) and PM_{2.5} (1.2). It is considered that any further studies aimed at investigating differential exposure to vehicular air pollutants with height should include direct measurement of black carbon, in addition to monitoring over different seasons and time periods to account for variability in pollutant concentrations.

Our study results appear to contradict those reported by others who have measured vehicular exhaust pollutant concentrations at different breathing zone heights (Buzzard *et al.*, 2009; Burtscher and Schüepp, 2012) however it is important to consider some of the differences in experimental design employed. Whilst Buzzard *et al.*'s more limited dataset showed adult particulate concentrations were on average about half those relevant to children, their measurements were collected in a static location during separate experimental periods rather than simultaneously and when mobile (as we report). The vehicle used by Buzzard *et al.* in the drive-by simulations had an original tailpipe discharging directly to the kerbside, which they attempted to keep at a distance of 0.75 m horizontally from the sample probes. Vehicles are typically designed and manufactured to discharge exhaust towards the centre of the carriageway, away from the kerbside and we consider most of the passing vehicles during our measurement campaigns were discharging towards the centre of the carriageway. In addition, as our experimental design was mobile, over pre-defined public routes, there was a need for the researcher to respond and move to allow passage of other pedestrians and obstacles. It was therefore not always possible for the researcher to maintain a constant distance from the kerbside and passing vehicles although attempts were made to do so. Burtscher and Schüepp (2012) report a single experiment where an infant in a bike trailer was exposed on average to 35% higher concentrations of particles <0.1 µm in diameter when compared to a child on a bike. This is a smaller aerosol size fraction than what we assessed, with pollutant levels being measured among, rather than alongside moving vehicles. In addition no inter-sampler comparison of the measurement equipment was reported.

The inhalation rates of children differ from adults due to their size, physiology, behaviour, and activity level. While greater amounts of air and pollutants are inhaled by adults than children over similar time periods on an absolute basis, the relative volume of air passing through the lungs of a resting infant can be up to twice that of a resting adult on a body-weight basis. Age-related differences in lung structure and function, breathing patterns, activity patterns and how these affect the inhaled dose and the deposition of particles in the lung are important factors in assessing risks from inhalation exposures (EPA, 2011). It is clear that further studies should be undertaken to understand further the likely

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differences in exposure to vehicular air pollutants between adults and children because of height differences.

CONCLUSION

Our dataset suggests that children in buggies are not exposed to higher PM_{2.5} concentrations than adults pushing the buggy.

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SUPPLEMENTARY INFORMATION

Co-location data collection

During each monitoring period, the SidePaks were initially co-located in the buggy at the child breathing zone height for 10 minutes. The inlet of one was then repositioned to the adult breathing zone (Adult) with the inlet of the second remaining at the child breathing zone height (Child). After a 30 minute monitoring period, the adult inlet was again co-located with the child inlet for at least ten minutes. The co-location periods of measurement allowed the comparative relationship between the two devices' performance to be quantified.

In order to further investigate the relationship between the two monitors and allow for appropriate corrections to be made additional data was collected. The data was collected over four monitoring periods (~30–60 minutes duration), where the monitors were co-located for the entire duration. The measurements were collected outside the window of a moving vehicle so as to ensure that the concentrations recorded covered as wide a range as possible.

Results

Table 4 shows that the PM_{2.5} concentrations collected during the supplementary trials ranged from 5 to 1,941 µg/m³ (adult) and 2,700 µg/m³ (child). The maximum concentration obtained during the buggy measurement period co-location periods was 132 µg/m³, although it is worth noting though that the maximum recorded during the monitoring periods was just over 800 µg/m³.

Fitting a linear relationship to the supplementary data set resulted in a best fit line of:

$$\ln(\text{Adult}) = 0.23 + 0.91 * \ln(\text{Child}) \quad [1]$$

Co-location comparisons	Monitor	Minimum concentration (µg/m ³)	Median concentration (µg/m ³)	Maximum concentration (µg/m ³)
Measurement periods	Adult	3	11	132
	Child	2	9	131
Supplementary data	Adult	5.2	31	1,941
	Child	5.7	32	2,763

Table 4
PM_{2.5} concentrations (µg/m³) obtained during co-location comparisons

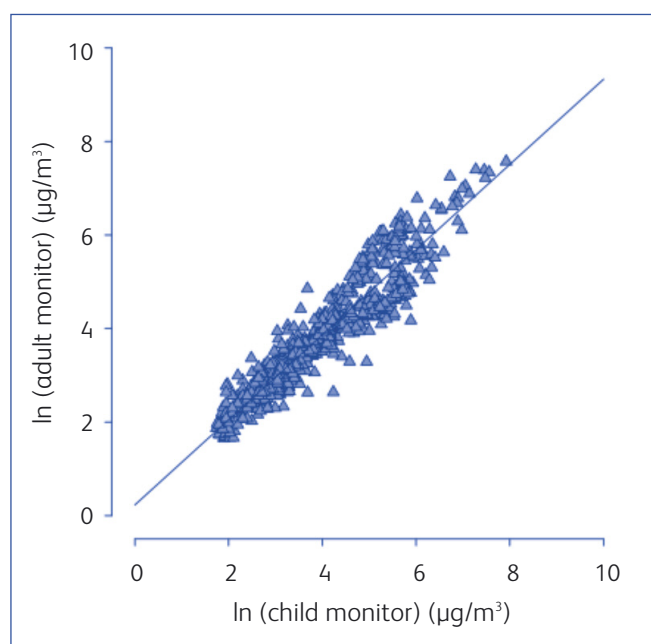


Figure 3
The measurements obtained in the supplementary co-located trials. Natural log (ln) of measurements from the child monitor vs Natural log (ln) of measurements from the adult monitor. The line shown in the plot is the best fit line as described by equation [1]

The slope was significantly different from one so the relationship was not the same over the entire concentration range. In fact, the resulting line suggested that the concentrations measured using the adult monitor were higher than the child monitor at lower concentrations, while child monitor concentrations were higher at higher concentrations.

In order to determine that this relationship would hold in the data collected during the buggy measurement periods a line was fitted to the co-located data collected during the trials. The best fit line for this data [2] was found to be different to [1]:

$$\ln(\text{Adult}) = 0.6475 + 0.7970 * \ln(\text{Child}) \quad [2]$$

The co-located data collected during the buggy trials were at the lower end of the range of concentrations measured in the supplementary dataset. In order to determine whether the relationship between the two monitors was consistent over all monitoring periods the additional data was restricted to consist of only the data recorded below 130 $\mu\text{g}/\text{m}^3$. The best fit line for this data was:

$$\ln(\text{Adult}) = 0.6136 + 0.785 * \ln(\text{Child}) \quad [3]$$

This relationship between the two monitors is very similar to that obtained using the buggy trial co-location data [2] so we can be reasonably confident

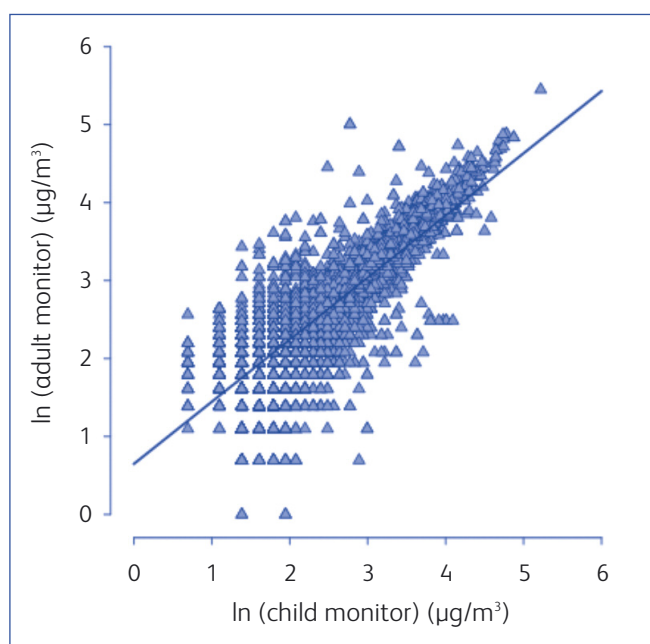


Figure 4
Natural log (ln) of measurements from the child monitor vs Natural log (ln) of measurements from the adult monitor. The line shown in the plot is the best fit line as described by equation [2]

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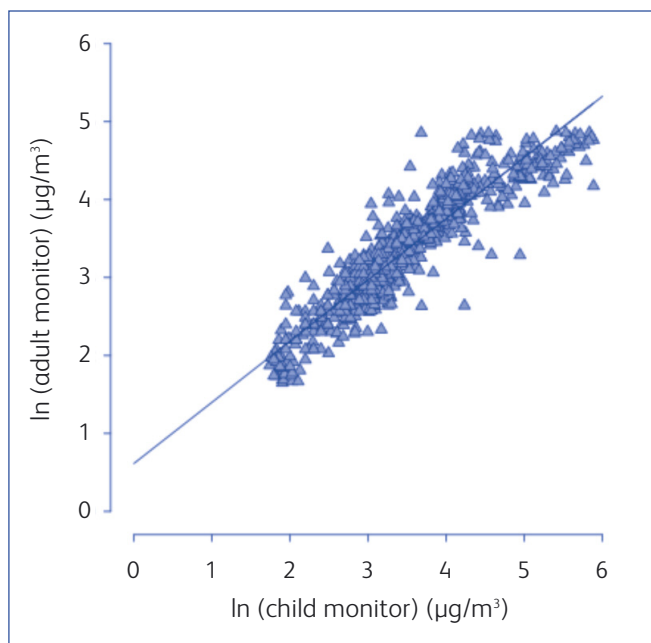


Figure 5

The measurements obtained in the supplementary co-located trials, restricted to measurement range of the SBS measurements obtained during the buggy trials. Natural log (ln) of measurements from the child monitor vs Natural log (ln) of measurements from the adult monitor. The line shown in the plot is the best fit line as described by equation [3]

the relationship fitted using the entire range of concentrations recorded in the supplementary data could be used to make corrections to one monitor (child) to ensure that the levels were equivalent.



An evaluation of the Wirral Healthy Takeaways Initiative

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ABSTRACT

Takeaway and fast food often contain excess levels of saturated fat, salt, sugar and calories per portion. The abundance of takeaways and fast food outlets serving this food at a reasonable price makes frequent consumption of these foods easier. As well as the impact this has upon public health, the takeaway industry lacks regulation with regard to nutrition; making the task of creating 'healthier takeaways' a formidable task for Environmental Health Practitioners.

The aim of the research was to identify what influences a takeaway's decision to adopt a healthy eating initiative (HEI) and produce healthier meals. Using convenience sampling, the study looked to collect quantitative data using questionnaires. The study identified that for takeaways which had adopted the HEI, the most important reason was to make food healthier, whereas those takeaways who were considering adopting the HEI in the future identified customer demand as the reason for adopting it.

In addition the study established that the level of deprivation of the area in which a takeaway was located was not related to the uptake of the HEI. These factors have been quantified through administering questionnaires to 40 takeaway proprietors in person, in the study area (Wirral). This identified that lack of interest, customer demand and lack of enforcement are the main problems that result in takeaways not producing healthier options.

Recommendations to change some of the unhealthy food on offer in Wirral takeaways include further education for food businesses, increased funding from the council for marketing the initiative and an incentive for takeaways to participate.

Key words: healthy eating, healthy takeaways, obesity, socio-economic deprivation

INTRODUCTION

There has been an inexorable rise in obesity in the past thirty years, with the incidence of obesity doubling worldwide (Swinburn *et al.*, 2011; WHO, 2011). Britain has one of the highest rates of obesity in Europe, resulting in a significant burden on health and the economy, amounting to an annual cost of £8.7 billion to the NHS (DOH, 2010). In England, two out of three adults were classified as overweight or obese in 2008 (DOH, 2009).

It is widely accepted that frequent consumption of takeaway foods carries an increased risk of an individual becoming overweight or obese (Miura *et al.*, 2009; Alder, 2008; Foresight, 2007). The general consensus from policy makers and public health professionals is that income has a profound effect on the diet we eat, with those in the lower socio-economic groups consuming less fruit and vegetables than those in the higher socio-economic groups and takeaways being more prevalent in less affluent areas. (Baggott, 2011; DOH, 2010; Marmot Review, 2010; Thornton *et al.*, 2011; Donaldson & Scally, 2009; Wirral NHS, 2009; Foresight, 2007). Therefore this research looks to use Wirral's Index of Multiple Deprivation (IMD) as a mechanism to identify social economic deprivation.

Yet whilst Government has legislated on health issues such as tobacco, sexual health, alcohol and infectious diseases, food and nutrition policy appears to have escaped legislation. This has resulted in a steady increase in the number of local authorities introducing nutritional initiatives (such as The Wigan Healthy Business Award initiative and the Liverpool Eatright Initiative). In line with these Wirral Borough Council introduced the Wirral Healthy Takeaway Initiative (WHTI) in 2010. The WHTI involved the selection of 40 takeaways within the Borough which were visited and given practical advice, education and guidance to help make food healthier. The selection criteria for these 40 takeaways were selected on a random basis. The takeaways provided English, Chinese, Turkish, Indian and Italian cuisine. Information on current Government adult Guideline Daily Amount (GDA) was provided, and education

mainly emphasised the health effects of meals which contain excessive salt, monosodium glutamate (MSG), sugar, saturated fat, and calories. In conjunction with the advice, paper inserts to supplement the Safer Food Better Business packs were provided which detailed nutritional information on how to make meals healthier. The inserts were completed by the Food Business Operators. Therefore this study looks to establish if the adoption of the WHTI was dependent upon the socio-economic area a takeaway was located within, and the reasons as to why takeaways adopted the HEI.

METHODS

The research methods, based upon questionnaires, were to be descriptive and quantitative in nature to assess the implementation of healthy food options in takeaways, obtain measurable and quantitative data, and examine possible differences between geographical areas, types of cuisine and reason for uptake of the HEI.

The sampling frame consisted of 40 takeaways, all of which had originally participated in the Initiative. This method of sampling is defined as non-random or convenience sampling and is appropriate for evaluation research (O'Leary, 2004). Due to the specific purpose of the research the sampling method was considered to produce the most valuable results (Denscombe, 2003) and similar sampling methods to evaluate the effectiveness of healthy food initiatives have been utilised for similar studies (Kirklees Healthy Choice Award; Liverpool Eatright; Surrey's Eat Out Eat Well; Antrim Healthy Takeaway Project).

Data for the research was collected via questionnaires and as such was in line with other healthy eating evaluations, such as the Antrim Healthy Takeaway Award and the Surrey Eat Out Eat Well Initiative (Foodvision, 2010).

Each premises was contacted directly and an appointment made with the food business owner to facilitate the completion of the questionnaire and to establish if the healthy eating inserts had been completed. In addition a letter (between A and D) was assigned to each takeaway, depending upon which area it was situated in. The areas were based on the Wirral Index of Multiple Deprivation (IMD) ranking and involved using the postcode of each takeaway and the interactive map from Wirral NHS to ascertain the type of socioeconomic area the takeaway fell into. However, it must be pointed out that slight discrepancies may exist, due to the difficulty in accurately pinpointing the location of some takeaways within the socioeconomic areas, although these are thought to be minimal and would not affect the validity of

the results. To ensure the validity and reliability of the questionnaire, it was piloted before use.

The data was analysed using the statistical package SPSS version 17.0 and questionnaire data entered into cross tabulation tables. Statistical significance of the data was considered by using the Chi Squared test to analyse the significance of the association between uptake of the Initiative and the geographical area; this assesses the reliability of the findings and provides a p-value (a p value of <0.05 indicates that the findings are statistically significant). The data analysis focused solely on the IDM as this was the primary focus of the research.

A confidentiality agreement was provided to all participants and the research was also subject to Liverpool John Moores University Ethics approval.

RESULTS

The main findings of the study established a positive response rate to the Initiative with 75 % of the takeaways surveyed saying they had made healthier changes. Table 1 illustrates the implementation of the Initiative across all four areas of the Wirral and shows receptiveness to the healthy eating initiative is not dependent on area. It appears takeaways are not more or less likely to implement healthy changes depending on their area. Using the Chi Squared test, to determine the statistical significance of these findings, shows no clear significance between the different IMD areas and the uptake of the initiative (table 2). However, it must be noted that due to the limited data the test may not be reliable and results may be due to chance.

Table 1
Cross tabulation of the implementation of healthy eating by area

			Area BY Wirral IMD				TOTAL
			A	B	C	D	
Q1	Yes	Count	2	6	8	14	30
		% within Area BY IMD	66.7 %	75.0 %	66.7 %	82.4 %	75.0 %
	No	Count	1	2	4	3	10
		% within Area BY IMD	33.3 %	25.0 %	33.3 %	17.6 %	25.0 %
TOTAL		Count	3	8	12	17	40
		% within Area BY IMD	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.046^a	3	0.790
Likelihood Ratio	1.050	3	0.789
N of Valid Cases	40		

Table 2
Chi Squared test to test for statistical significance

Table 3 provides an overview of the takeaways that implemented healthier food, and offers some insight into the differences that may exist between different types of cuisines. When comparing the percentage uptake of the initiative within cuisine types, Chinese takeaways were less likely to implement the initiative than the English takeaways. Although the total number of English cuisine takeaways is fewer than the Chinese, the data shows they were more likely to make healthier changes by 85.7%, compared to 70.8% of the Chinese takeaways. Similarly, a high percentage of Indian takeaways made healthier changes, although it is worth noting there were considerably fewer Indian takeaways in the sampling group.

Further data from the questionnaire was analysed to explore the reasons for adopting the HEI. Takeaways were asked to identify the most important reason for their adoption of the HEI. Chart 1 illustrates that the most important reason given for most of these takeaways as being making food healthier, whereas customer demand was the least. Table 4 provides some more insight into these and identifies takeaways with Chinese cuisine as being the least likely to select making food healthier as their most important reason for adopting the HEI.

Table 3
Cross tabulation of different cuisine takeaways implementing the initiative

			Q7 Type of cuisine						
			Chinese	English	Indian	Italian	mix	Turkish	TOTAL
Q1	Yes	Count	17	6	2	1	1	3	30
		% within Q7	70.8%	85.7%	100.0%	100.0%	50.0%	75.0%	75.0%
	No	Count	7	1	0	0	1	1	10
		% within Q7	29.2%	14.3%	0.0%	0.0%	50.0%	25.0%	25.0%
TOTAL	Count	24	7	2	1	2	4	40	
	% within Q7	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

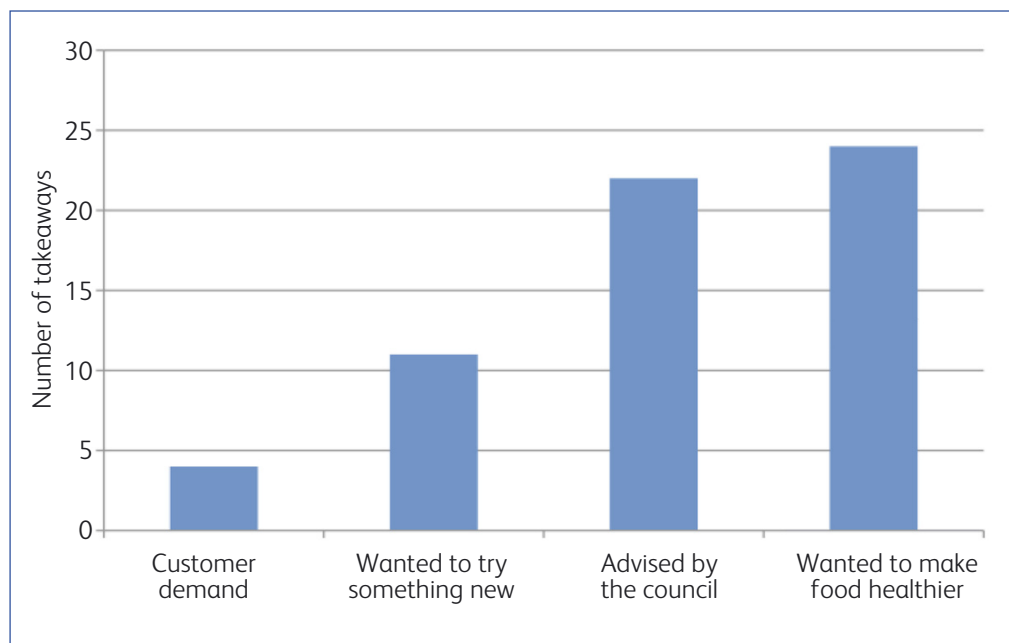


Chart 1
Reason why takeaways implemented healthier food

For takeaways who had not yet adopted the HEI, a similar ranking exercise identified customer demand as the most common reason for adopting the HEI in the future (chart 2).

The data also demonstrates a high number adopting the Initiative because they were advised by the council. Therefore the Initiative itself may have been a key driver for the changes made within some takeaways, as all were given advice on healthier food

Table 4
Why takeaways implemented healthy changes by cuisine type

		Q7						TOTAL
		Chinese	English	Indian	Italian	mix	Turkish	
Q3 D	Not chosen	5	1	0	0	0	0	6
		29.4%	16.7%	0.0%	0.0%	0.0%	0.0%	20.0%
Q3 D	Wanted to make food healthy	12	5	2	1	1	3	24
		70.6%	83.3%	100.0%	100.0%	100.0%	100.0%	80.0%
TOTAL		17	6	2	1	1	3	30
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

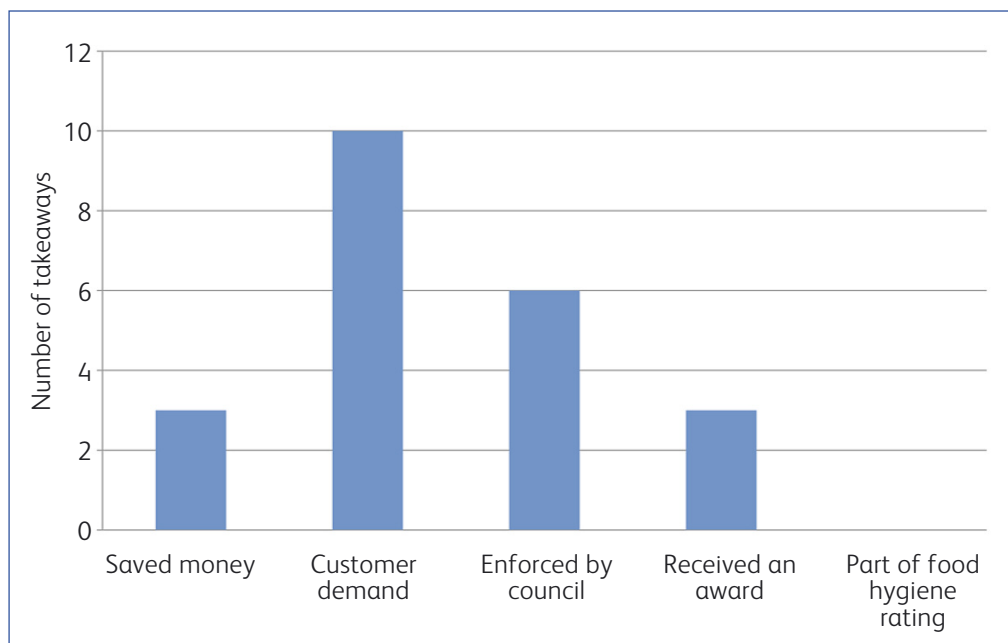


Chart 2
Takeaways’ reasons for implementing healthier food in the future

Table 5 provides data of the customers’ feedback on the Initiative in some of the takeaways. This possibly highlights a customer demand for healthier food choices, as it shows a high number of customers reporting solely positive feedback. There is no entry in the table for solely negative feedback as the data collection showed none of the takeaways reported solely negative feedback. A number of customer responses gave both positive and negative feedback and are labelled “mixed” In addition, there is no data for the Indian cuisines as these takeaways had not received any feedback.

Most takeaways reported no cost effects of implementing the Initiative, suggesting the Initiative is sustainable. Table 6 shows the cost difference

		Q7				TOTAL	
		Chinese	English	Italian	Turkish		
Q6	Positive	Count	3	3	1	0	7
		% within Q7	50.0%	100.0%	100.0%	0.0%	58.3%
	Mixture	Count	3	0	0	2	5
		% within Q7	50.0%	0.0%	0.0%	100.0%	41.7%
TOTAL		Count	6	3	1	2	12
		% within Q7	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5
Cross tabulation of customers’ feedback on the healthy changes within different takeaways

		Q7						TOTAL
		Chinese	English	Indian	Italian	mix	Turkish	
Q2	Cheaper	4	0	0	0	0	0	4
	More expensive	3	3	1	0	0	0	7
	No difference	10	3	1	1	1	3	19
TOTAL		17	6	2	1	1	3	30

Table 6
Correlation between cost of implementing healthier food and the type of cuisine

between types of cuisine. This was examined to see if certain types of takeaways find making healthier food more or less expensive. The data illustrates that the majority found it made no difference in cost, however the Chinese takeaways were the only ones who reported it as being cheaper, which could be due to using less salt and MSG. Interestingly, half of the English cuisine takeaways also found it more expensive which is contrary to the findings of

			Inserts		TOTAL	
			Completed	Not completed		
Q6	Chinese	Count	12	12	24	
		% within Q7	50.0%	50.0%	100.0%	
	English	Count	6	1	7	
		% within Q7	85.7%	14.3%	100.0%	
	Indian	Count	1	1	2	
		% within Q7	50.0%	50.0%	100.0%	
	Italian	Count	1	0	1	
		% within Q7	100.0%	0.0%	100.0%	
	mix	Count	0	2	2	
		% within Q7	0.0%	100.0%	100.0%	
	Turkish	Count	1	3	4	
		% within Q7	25.0%	75.0%	100.0%	
	TOTAL		Count	21	19	40
			% within Q7	52.5%	47.5%	100.0%

Table 7
The completion of inserts by cuisine type

Type	No. took up initiative		No. did not take up initiative		TOTAL
	No. completed inserts	No. not completed inserts	No. completed inserts	No. not completed inserts	
Chinese	12	5	0	7	24
English	1	1	0	0	2
Indian	5	1	1	0	7
Italian	1	0	0	0	1
mix	0	1	0	1	2
Turkish	1	2	1	0	4

Table 8
Inserts completed by take up of Initiative

other healthy takeaway evaluations, in which English takeaways reported a significant reduction in the use of salt for fish and chips (Eastbourne Shake The Salt Habit Scheme). One Indian cuisine also found it more expensive, however, the other Indian cuisine participants reported no difference in cost.

Analysis was undertaken to identify any relationship between the completion of the inserts and type of takeaways. Table 7 shows that Chinese takeaways completed the highest number of inserts in number, however in proportion only 50% completed the inserts. This is in contrast to the English and Italian takeaways that had a higher proportion of completion. However, the inserts were only available in the English language, which may have impacted upon their completion.

There is a clear correlation between the completion of inserts and the uptake of the Initiative. Most takeaways that implemented changes also completed the inserts, and only one of the takeaways which did not implement the Initiative had completed the inserts, as shown in table 8.

DISCUSSION

The aim of this study was to examine whether or not the adoption of the Wirral Health Takeaways Initiative was dependent upon the socio-economic area in which a takeaway was located and the reasons for adopting it. The findings of

this study did not show any such differences in uptake of the Initiative. Although most takeaways in the Wirral are placed within the lower socio-economic areas, and the existing literature confirmed that fast food outlets are predominantly placed in poorer areas, this research does not suggest that this is a barrier to providing healthier food. Nevertheless, the increased prevalence of takeaways in these areas, which also show a high prevalence of obesity, may be a significant factor in the contribution to diet-related health problems.

Amongst those customers who gave feedback, Chinese and Turkish cuisine takeaways received the highest percentage of mixed comments from customers. Food sampling from local authorities have shown that the flavouring of MSG and levels of salt are present in high quantities of Chinese food, therefore it is not surprising that removing or reducing these ingredients will be noticed most by consumers. This finding differs from both the Antrim Healthier Takeaways Project and Norfolk Salt Shaker Project which found few negative customer responses to a reduction in salt. However, no Chinese cuisine takeaways are in the list of participating businesses for these initiatives; suggesting that salt in foods from English-style takeaways is easier to reduce or remove and that customers may find it easier to add their own salt to English style food (such as fish and chips) compared with Chinese food. This potentially presents further challenges for Chinese takeaways in implementing healthier recipes if it is considered difficult or if there is the potential for these businesses to lose customers because of the altered taste.

The study revealed that 75% of the takeaways had implemented healthy changes and showed a strong desire for wanting to make food healthier. The reasons given for producing healthier food in the future identified that customer demand (they perceive the Initiative to be a commercial advantage or enabled them to corner a niche in the market) and council enforcement were the driving factors, rather than an awareness of the health implications of energy-dense food. For the remaining 25% of takeaways which had not implemented the HEI a lack of customer demand was cited. However, if customers are not aware of or are not given the choice to purchase healthier alternatives they may be unlikely to ask for them, resulting in only the foods on offer being selected, which takeaways therefore perceive as there being no customer demand for healthier options. The data from this study suggests either a lack of education, knowledge or apathy towards the health effects of takeaway food exists within these takeaways. These reasons may be a potential barrier for EHPs and public health professionals when persuading food businesses to produce healthier food.

The majority of takeaways surveyed found there to be no difference to the cost of implementing healthier food, which is a positive from a sustainability

point of view as takeaways are more likely to continue the initiative if it saves them money. The study however has shown that Chinese takeaways were the only ones that found it cheaper to produce healthier food. This could be attributed to the reduction in salt and MSG which is widely reported to be an expensive ingredient. Interestingly, half of the English takeaways found the initiative more expensive. This is in contrast to the findings of other healthy takeaway evaluations, where English style cuisines reported a significant reduction in cost. For example, the evaluation of the Surrey Eat out Eat well Initiative found a high percentage of food businesses reporting the healthy eating initiative as being cost effective. In addition, the evaluation for the Eastbourne Shake the Salt Habit Initiative found takeaways ordered less bags of salt and identified a significant reduction in cost by 50%.

Chinese, Mixed and Turkish takeaways showed the highest proportion of non-completion of the healthy eating inserts. This may be due to language issues or it may also imply the inserts were perceived as an added burden for takeaways, who felt they did not need the task of extra paperwork in order to cook healthier foods. The healthy eating inserts should therefore not be seen as an effective way of replacing nutritional advice from public health professionals due to their possible ineffectiveness or unnecessary burden for businesses. Furthermore, they may not provide proof that takeaways are producing or promoting healthier foods based on whether they are completed or not.

After completion of the questionnaire, all participants enthusiastically engaged with the researcher on the healthy eating project. The general consensus from most was that healthier food in takeaways is difficult to implement. This anecdotal response was similar to the responses found in the Surrey Eat Out Eat Well evaluation, and provides some insight into the wider implications and challenges of creating healthy takeaways.

CONCLUSION

The evaluation of the Wirral Healthy Takeaways Initiative revealed that it was successful in educating and encouraging some takeaways to think more about the food they produce. It has also been shown to be the starting point of a potentially larger initiative if it received more resources; 40 takeaways were visited in the evaluation, there are approximately 270 food businesses classed as takeaways in Wirral, therefore there is potential to expand the initiative as part of Government's wider public health agenda.

Whilst the existing research has linked obesity to the consumption of takeaway food and has identified that less affluent areas have a higher prevalence of takeaways, this research has established that the location of a takeaway within a particular social-economic area does not provide a barrier to the uptake of the HEI.

In addition, takeaways who have adopted the HEI have a desire to provide healthier food and can see a commercial advantage in providing it, rather than providing it out of fear of enforcement action.

RECOMMENDATIONS

A new approach is needed to increase healthier foods in Wirral takeaways. Although a high percentage of takeaways implemented changes, more needs to be done to encourage further participation. To achieve the sustainability of the initiative and to attract more businesses to the Initiative will require a more effective approach.

- The creation of a healthy eating logo which could be placed in the takeaway window to demonstrate their commitment to provide and promote healthier food
- Participation in the Initiative by a food business to be included on the Council's hygiene ratings website
- Use of social networking sites in increase awareness of the Initiative
- Promotion of the potential cost benefits to food business in adopting the Initiative
- Subsidised nutrition training for staff of food businesses who choose to adopt the Initiative
- Creation of the healthy eating inserts in various languages
- A re-evaluation of the Initiative, once participation in the Initiative has increased
- Further research into the impact that food supply has on healthy takeaways

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FIRST AUTHOR, FIRST PAPER

An evaluation of the Wirral Healthy Takeaways Initiative

Katie Brady, Graeme Mitchell and Rose Khatri

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Teaching environmental health concepts using a virtual world: a 'how to' guide

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ABSTRACT

Virtual worlds lend themselves to teaching things that cannot be taught in the 'real' world, especially where the activities would present hazards to participants. A teaching group from two institutions, comprising a microbiologist, toxicologist, a teaching and learning specialist and two information and communication technology specialists developed a case study to teach microbiological and investigative skills; specifically, investigating an outbreak of Legionnaires' disease, using the virtual world, Second Life.

The target learning group were higher education students, though the workshop could equally be used for the professional development of practicing EHOs. The process was monitored using a wiki, which allowed the team to identify what worked, the hurdles faced and the costs involved. The outcome amounts to a 'guide' to others involved in environmental health education who might wish to engage in similar educative tool development. It provides a summary of the activity, its learning outcomes, the process involved in developing such an activity and some of the associated developmental and on-going costs.

Student engagement and interactivity were assessed using Likert-scaled questions and student learning was assessed by asking pre- and post- activity questions, and by requiring each student to write a marked report at the end of the activity. The activity was found to be successful, both in terms of student engagement and student learning, although the small sample size precludes any stronger conclusions.

Key words: Second Life, environmental health, microbiology, online learning

INTRODUCTION

Environmental health, the branch of public health concerned with the impact of the environment on human health, seeks to anticipate, regulate and prevent public health effects caused by the environment humans live in (EnHealth 2007). One of the major roles of a practicing environmental health professional is the inspection, assessment and evaluation of environments that affect public health. Additionally, they may have a legal responsibility to advise on, and enforce, public health standards within built environments.

Authentic learning is known to be desirable for the purpose of developing practical learning outcomes and for increasing engagement and motivation of students (Bean, 1996; Herrington and Herrington, 2006; Lombardi 2007). Principles of environmental health protection in the built environment have historically been taught via a number of field trips to real environments. Students are taught inspection procedures and complaint investigation procedures and they discuss legal and regulatory tools that protect public health.

The disadvantages of this method of teaching are that only premises with good public health protection measures in place generally allow students to visit, and in-depth investigations are not possible. Sometimes, for occupational health and safety reasons, a decision is taken not to expose students to environments investigated by practitioners. This means that in the course of their learning experience students might not be exposed to conditions where they can apply the legal, regulatory and advisory aspects of the profession. In addition, there is often limited time for thorough inspections to take place and the legal procedures of real-life public health investigations (particularly those leading to prosecution) are often prolonged and confidential. Taken together, those engaged in teaching and instruction are prevented from showing students these real-life situations when they do arise.

Simulations have been used for some time in the educational field to overcome problems associated with cost, time and exposure of participants to hazards (Damassa and Sitko, 2010; Ingram and Jackson, 2004). Apart from overcoming the disadvantages of real-life involvement, simulations may also encourage and promote for the good, risk taking, group work and role play (Damassa and Sitko, 2010). In the past, simulations themselves could be seen as costly, and the skills required for development purposes inaccessible to academics, but with the more recent advent of virtual worlds, the cost of developing such simulations and overcoming problems of accessibility are decreasing (Damassa and Sitko, 2010).

It was decided that Second Life (SL) had the potential to address some of the drawbacks described above and take advantage of the educational value of simulations to provide an authentic (albeit non identical) experience to the real world. SL is a digital world where its residents create its content virtually (Rymaszewski *et al.*, 2006). Students create a person (an avatar) that is able to interactively explore the virtual village and perform actions such as moving around, taking photographs and talking to other avatars. SL provides the tools necessary for building a three-dimensional world for communication, collaboration and creation (Ritzema and Harris, 2008), with great potential for teaching and learning. There has been significant uptake of SL as a teaching tool, with 3,577 registered education providers on the Education Wiki provided by SL. This is an increase from "a handful" of educators in 2005 (Lester, 2006).

Evidence suggests that SL has value in a number of areas of tertiary study, including medical and health education (Kamel Boulos *et al.*, 2007), business (Livingston & Kemp 2006) and science (Doherty *et al.*, 2007; Swanson, 2007). However it is important to use the tool to create and develop new effective ways of teaching, rather than replicate real life and classrooms, particularly by focusing on things that can only be carried out in a virtual world (Kamel Boulos *et al.*, 2007).

This paper presents an overview of a workshop investigating an outbreak of Legionnaires' disease for environmental health university students by a development team based at two teaching institutions. Methods are presented in enough detail to guide others wanting to undertake similar development of resources in SL, and include descriptions of the difficulties encountered and some of the costs involved. The paper also presents the results of an assessment of experiences of students involved in using SL. These students were from two tertiary education institutions, Batchelor Institute of Indigenous Tertiary Education and Flinders University. The student cohort from Batchelor were undergraduates and the Flinders' students were post graduates. Both student cohorts were enrolled in an environmental health course.

MATERIAL AND METHODS

We have built a sports centre that is the focus of a disease outbreak. The sports centre is the built environment suspected of harbouring *Legionella pneumophila*, the bacteria causing Legionnaires' disease, which, in the fictional scenario presented to the students, has caused a number of cases of legionellosis. The students are given information about the outbreak in the same manner that environmental health practitioners would receive information in a real Legionella outbreak i.e. sequentially, with progressively more information becoming available as they undertake investigation. The activity follows the approach described below (RW denotes real world, VW indicates virtual world):

Students receive an email from the state health department indicating that there have been reported a number of cases of suspected legionellosis that is suspected to be related to a sports centre (RW) (Figure 1). The student then enters the sports centre, which is deserted (owners having fled). They take samples from the pool, spa, cooling tower and shower systems (all manufactured water systems that are capable of harbouring *L. pneumophila*) using appropriate safety procedures (respiratory protection etc) (VW) (Figure 2). They collect data about the current water quality in the spa, pool and cooling tower by clicking on the different components in each (VW) (Figure 3). They go through the filing cabinet and check records about maintenance of recreational water quality, cooling tower maintenance and design (available by clicking on



Figure 1
Sports centre (left) and microbiological testing centre (right) (conveniently located next door)

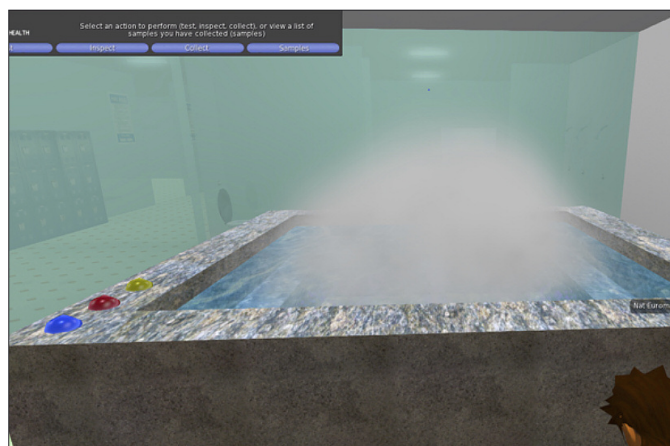


Figure 2
Collecting water sample for microbial analysis

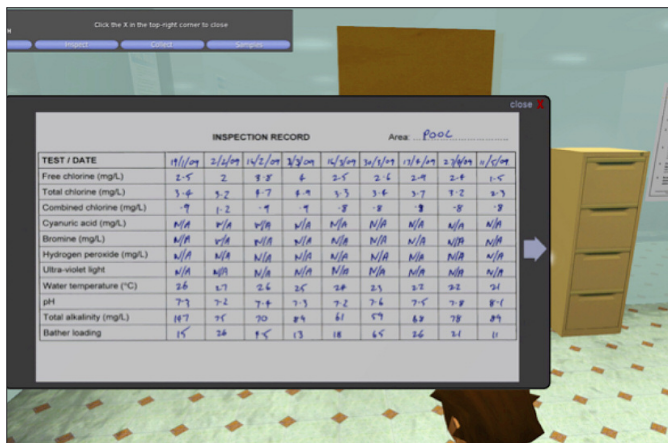


Figure 3
Collecting water quality data from the pool

PAPER

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Click the X in the top-right corner to close

INSPECTION RECORD		Area: Pool									
TEST / DATE	11/1/19	21/1/19	14/2/19	21/2/19	14/3/19	21/3/19	11/4/19	21/4/19	11/5/19	11/6/19	11/6/19
Free chlorine (mg/L)	2.5	2	1.8	4	2.5	2.6	2.9	2.4	1.5		
Total chlorine (mg/L)	3.6	3.2	1.7	1.9	3.3	3.6	3.7	1.2	1.3		
Combined chlorine (mg/L)	1	1.2	1	1	0.8	0.8	0.8	0.8			
Cyanuric acid (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Bromine (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Hydrogen peroxide (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Ultra-violet light	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Water temperature (°C)	26	27	26	25	24	23	22	22	21		
pH	7.7	7.2	7.4	7.3	7.2	7.4	7.5	7.8	8.1		
Total alkalinity (mg/L)	117	115	110	111	111	111	111	111	111		
Bather loading	15	24	15	13	18	15	26	11	11		

Figure 4
Going through the filing cabinet

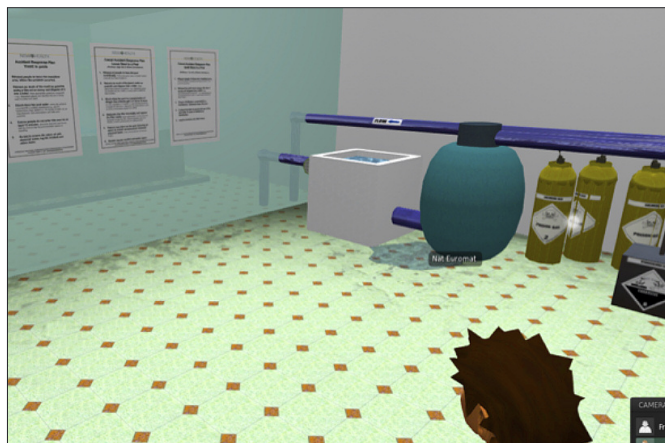


Figure 5
Pool safety plans, equipment hazards, etc (each piece of equipment is 'clickable' to find out more information about its maintenance, etc)

the filing cabinet (VW) (Figure 4). They observe the condition of the built environment, including dirty areas and poorly maintained equipment. They also check for things such as pool safety plans (loose stool in a pool, etc) (contained in the cabinets or on the walls as signs) (VW) (Figure 5). They take the water samples to the microbiology lab to drop off (by clicking on the appropriate water sources and by walking with the samples to the microbiology lab) (VW) (Figure 6). Microbiological results are emailed to the students after half an hour (RW). Other evidence such as the date, the sports centre manager's details, etc is available in cabinets or on the walls and has to be found (VW) (Figure 7).



Figure 6
Microbiology lab – submitting samples



Figure 7
One of the clues: evidence of sports centre's owners details

It is the students' responsibility to take notes, fill in the (commercially available) pool and spa and cooling tower inspection sheets, and to take photographs of the files and other parts of the built environment (VW) to develop a portfolio of evidence that may subsequently be used in legal proceedings or enquiries (RW). The assessment for the exercise is that students submit a portfolio of evidence, together with recommendations for actions to be taken (within the legislative power the EHOs have) to the Department of Health to enable prosecution of the Sports Centre managers under state public health legislation.

The design of the activity was primarily informed by a number of review papers that identified features of activities that result in best learning outcomes. Issenberg *et al.* (2005) cited providing feedback, repetitive practice and curriculum integration as the most important features of simulations. Feedback was not integrated into the activity, but students were able to monitor their progress by making use of (commercially available) inspection sheets for swimming pool and spa and cooling tower inspection sheets (the sheets provided guidance on the information that needed to be gathered). Repetition was integrated into the activity by requiring multiple collection of water samples, comparison between anticipated and actual results and repeating the action if necessary, and by having to acquire information from virtual filing cabinets and then return again and again to the virtual sports centre to validate the information gathered. The activity was fully integrated into the curriculum by being undertaken as part of a microbiology course, which meant the activity was preceded and followed by educationally relevant material.

Hew and Cheung (2010) reviewed literature specifically assessing SL as a teaching tool. They reported that students liked the capacity to experience virtual field trips and simulated experiences, an outcome similar to that which we observed. Notably, Hew and Cheung (2010) also reported that students disliked the inability to access the virtual world through older computers and the unfamiliarity with virtual world software. Jarmon (2008, 2009) reported students' frustration with the steep learning curve required to learn to use the software. We overcame these potential obstructions to students' engagement by undertaking the exercise in a computer laboratory, where each student had access to their own high-speed computer, and technical staff were on hand to provide guidance through the stages where students were grappling with the software. We also encouraged students to familiarise themselves with SL in their own time prior to the exercise to acquaint themselves with its capabilities. Warburton (2009) identified issues in teaching with Second Life, some of which (technical, economic, time, collaboration) were dealt with (as described above) by students undertaking the exercise synchronously and in an environment where computing facilities were provided. Other issues (identity, culture, standards and scaffolding

persistence and social discovery) were seen as not so pertinent to this exercise as the activity was performed as a discrete, isolated activity. Notwithstanding, part of the evaluation of this exercise was to assess the cultural acceptability of behaving as an avatar, particularly for Indigenous Australian students from remote communities.

SL activity development

Flinders University purchased an island (65,536 m²) in SL in 2009 and made areas of the island available to various departments. The cost of annual rent for this size island is around \$7,000 (£4,300)/year. Environmental Health was allocated an area of approximately one quarter of the island. The sports centre and environmental health office were designed to take up approximately three quarters of this area, with the other quarter being for construction of a law court in the future. The activity was named CSI: Environmental Health (hereafter the workshop). Initially there were four people involved in developing the workshop, two environmental health lecturers (one from each of the participating tertiary education institutions), an ICT educational specialist and a project officer with significant ICT development and coordination experience. A fifth casual staff member was recruited for building the SL area. This person had experience with graphic design and 3D modelling.

We followed a project management approach based upon the work of Alexander (1999), and the role playing approach of Smith and Boyer (1996). One of the first things we did was to identify the learning outcomes. This became important as it provided a focus point that was useful if we started to move off track. These learning outcomes were used as the foundation for decision making during the development of the workshop.

A wiki was established with access restricted to the development team. Detailed records of our progress were maintained in order to ensure we followed an appropriate project management framework.

Progress followed this approach:

- (i) a project plan: a document including the project overview, project scope, identification of the stakeholders, methods for communication (meetings, project documentation, dissemination), time management (key dates, time estimates) and budget;
- (ii) an activity description: a document including an activity overview, activity specifications (scenario, preparation, orientation, etc), constraints and a glossary;

- (iii) a document describing the interactions students would be required to perform in SL.

These steps were undertaken for all activities in the workshop, and all documents were updated regularly, and newer versions made via the workshop wiki.

Activity assessment

Students from both Batchelor Institute and Flinders University were asked to take part in the workshop as part of their study. Approval for social and behavioural research to be undertaken using human subjects was sought and granted under both Batchelor Institute and Flinders University's ethical research procedures (detailed below). Students' consent was sought prior to beginning the workshop.

Students were given instructions to access the SL site online, and hard copy materials to guide them through the investigation. It was explained to students that we wanted to assess the value of a new teaching tool, and they were invited to take part in this assessment. Students willing to take part (from both Batchelor Institute and Flinders University) were asked a number of both quantitative and qualitative questions over the course of the investigation to determine their engagement and their use of the technology.

Prior to beginning the workshop, students were asked questions to gather demographic information (gender, age, whether they identified as Aboriginal or Torres Strait Islander, computing experience). They were also asked two short answer questions to determine their level of understanding of the subject matter being taught (investigation of Legionnaires' disease outbreak). On completion of the workshop, students were re-asked the same two questions. Each response was given a 'grade', a mark out of 10, which allowed us to determine 'quantitatively' how much the students had learned about the subject. In addition, after the workshop students were asked a number of Likert scale questions to determine the experience of using SL and the workshop itself (was it easy to use, did they enjoy using it, etc). They were also asked to give information about the best/worst thing about the workshop, learning experience, and other comments. Further information about students' learning experiences was gathered from their assignment associated with the workshop - a written report for presentation to the (fictional) state health department. This written piece of work was submitted several weeks after the completion of the workshop. Each report was graded, with a mark out of 10, to determine students' understanding of their responsibilities in terms of inspection, reporting and making recommendations as an EHO. All assessment questions were constructed to elicit as much information as possible without being onerous. They were also constructed to allow a qualitative analysis

of the technology to be made, which, given the small sample size and differences between the two student populations (Flinders University students are postgraduate, not undergraduate) was important.

Data analysis

Before/after questions were analysed using a paired two sample t-test to determine whether there were differences between student marks pre- and post-workshop. Marks given to the students for their written report were compared with gender and institution (and therefore also whether students identified as Aboriginal and Torres Strait Islander) using Mann-Whitney U test. These marks were also compared with age and self-reported computing experience, tested for normality and relationships assessed using Pearson's correlation coefficient (age) or Spearman's Rho (correlation) (computing experience). The qualitative data (responses to engagement questions) were compared with the marks for the written report. This was done by allocating 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree and 1 for strongly disagree. Data were tested for normality, and relationships assessed using Spearman's Rho (correlation). Data are also presented graphically.

RESULTS

Student cohorts

Three students from Batchelor Institute and nine students from Flinders University took part in the workshop exercise. One student from Flinders University did not submit a research consent form, so his/her responses are excluded from this study, resulting in a sample size of 11. The authors of this study acknowledge the small sample size, and consider this when discussing the results of this study (below). All students from Batchelor Institute were undergraduate students studying the three-year Bachelor of Applied Science (Environmental Health), and all students from Flinders University were studying the one-year Graduate Diploma in Environmental Health Practice. All students from Batchelor Institute identified as either Aboriginal or Torres Strait Islander or both, and no students from Flinders identified as either Aboriginal or Torres Strait Islander.

Student engagement

Student responses to the question "I enjoyed using CSI:EH" were very positive, with over 80% indicating that they either agreed or strongly agree with this statement (Figure 8). All Batchelor students strongly agreed with this statement. This was supported by students' responses to the statement CSI:EH was motivating, with 9 out of 11 students agreeing or strongly agreeing with

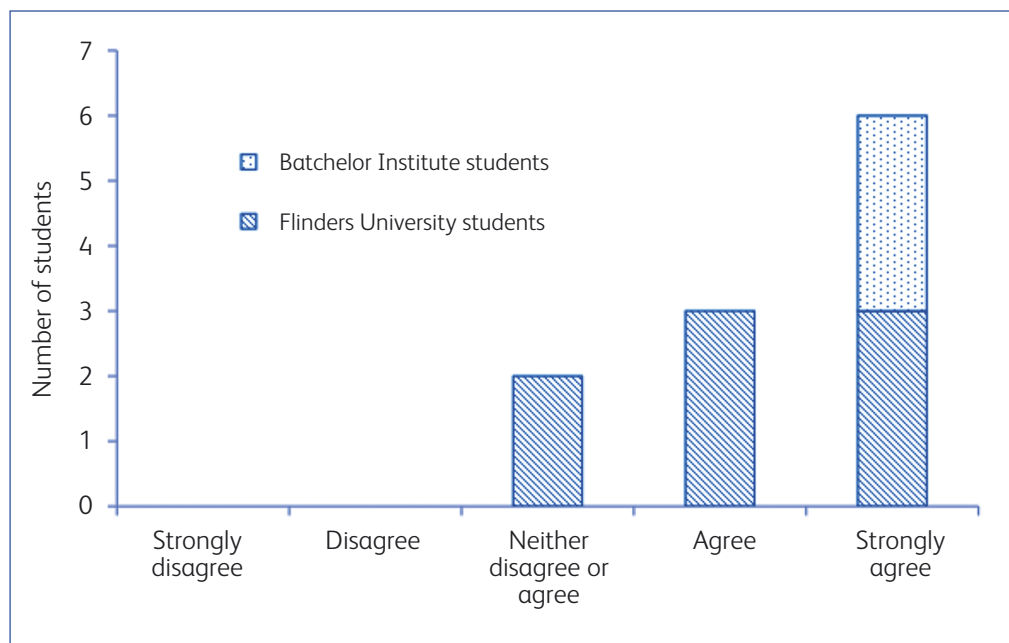


Figure 8
Response to the question "I enjoyed using CSI: EH"

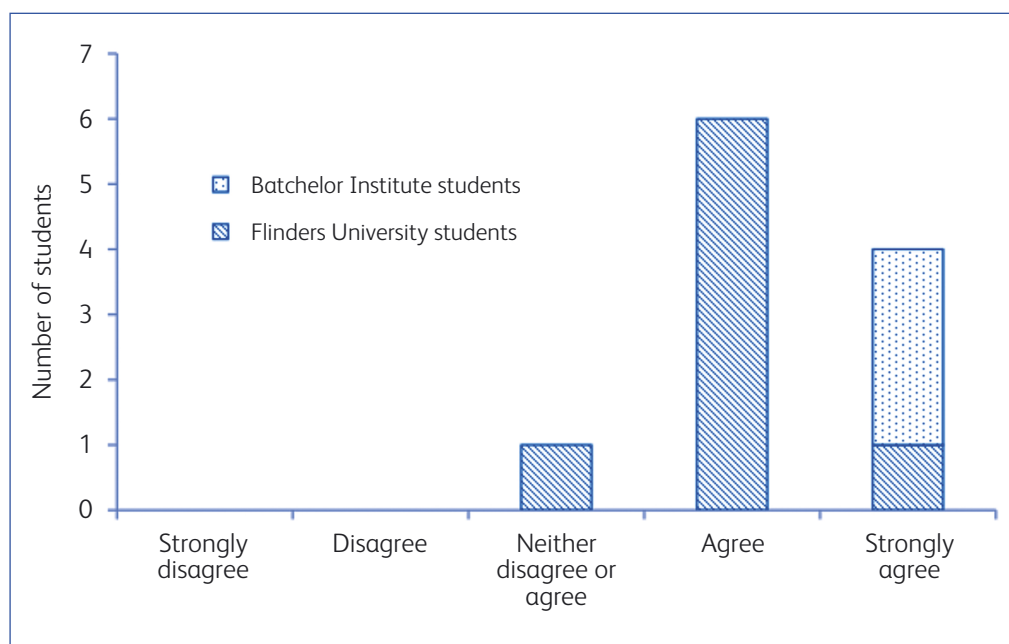


Figure 9
Response to the question "I worked with others doing CSI: EH"

the statement (Figure 9). There was no relationship between students enjoying the exercise or indicating that it was motivating and their mark for the report they wrote ($R = -0.030$ and -0.426 respectively).

Most students also agreed with the statement "I worked with others while doing CSI:EH", with 90% with agreeing or strongly agreeing with the statement (Figure 10). Again, however, there was no relationship between agreeing with

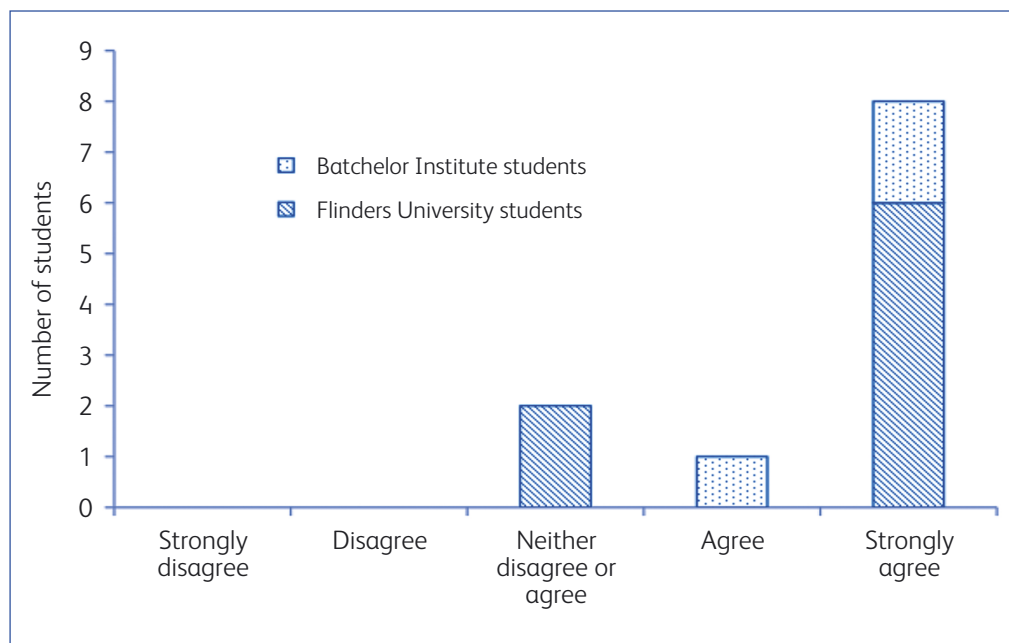


Figure 10
Response to the question
"CSI: EH was motivating"

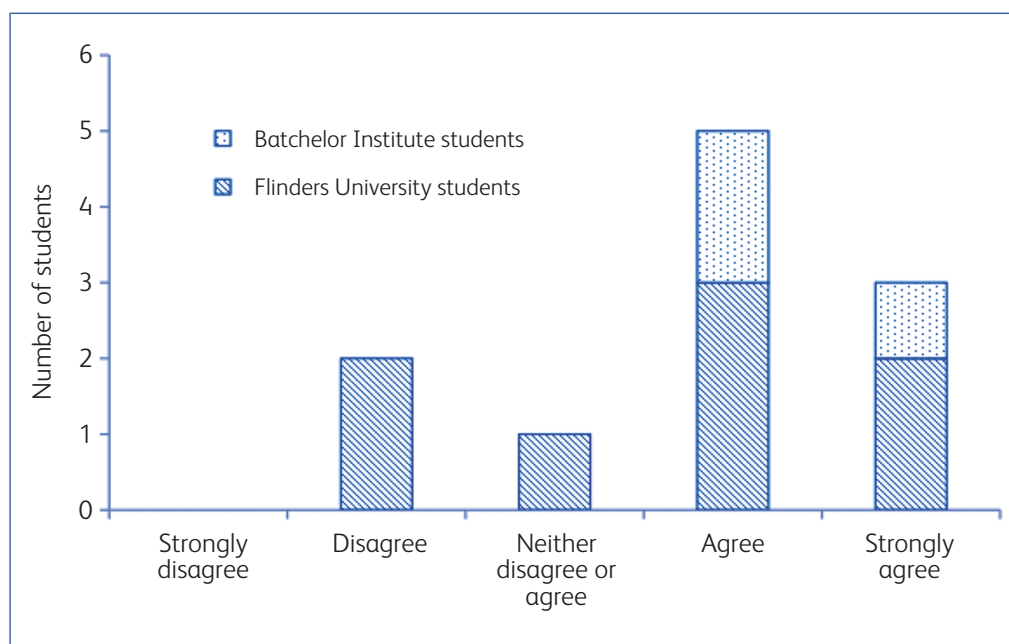


Figure 11
Response to the question
"CSI: EH was easy to use"

this statement and the mark for the report ($R = 0.144$).

Students' responses to the statement "CSI:EH was easy to use" was slightly less positive, with two students (18%) disagreeing with the statement, although 73% indicated that they either agreed or strongly agreed with the statement (Figure 11). There was no relationship between finding VW easy to use and the mark for the report ($R = 0.560$).

Students were also asked to further explain their responses to the above statements if they wished. Below is a summary of students' qualitative responses.

What students liked:

"Good medium for learning techniques when can't be done on site."

"A great way to learn when you can't do it in real situations."

"I am a hands on learner so it was very useful."

"It was hands on, not just reading pages of notes."

"It was a fun learning environment and it was good engaging with other students."

"Allowed a more realistic experience compared to classroom approach."

"Gaining 'virtual' real life experiences in our duties as an EHO in a disease outbreak."

What students disliked:

"Having to stop."

"Program was a bit hard to figure out."

"[It was hard] moving around and between buildings and rooms."

"Not knowing enough about the software."

What we could improve for next time:

Students were asked to indicate what could be improved to increase their learning outcomes. The main focus was on spending more time both in initial training and in the activity itself.

"Probably would have been better if had some initial training"

"I think more time is needed to get the hang of the system and the tools on the computer"

"Only had 3 hours to complete the tasks and needed about 1 hour to get a feel for the program"

"If we had more time"

"We had more time, and maybe if we did another inspection in another situation"

"I had a little more time to get to use Second Life"

"More time to do the study/inspection"

"More than one case was done"

Student learning

Marks allocated to individual student responses to the question "If so, can you list sources of Legionnaires' disease?" (following on from the question: "Have you heard of Legionnaires' disease?") indicated that there was a significant improvement in students' understanding of the sources of Legionnaires' disease ($p=0.0009$) (Figure 12). This was supported by the responses to the question "You are an EHO working on local government. You have been notified by the Director of Environmental Health from your State

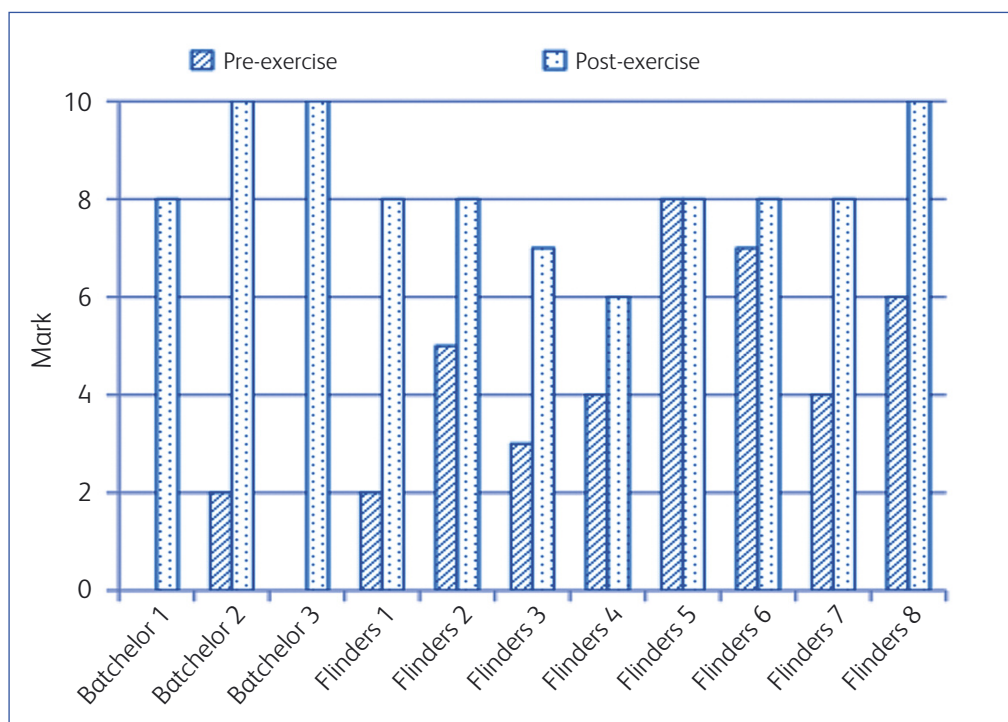
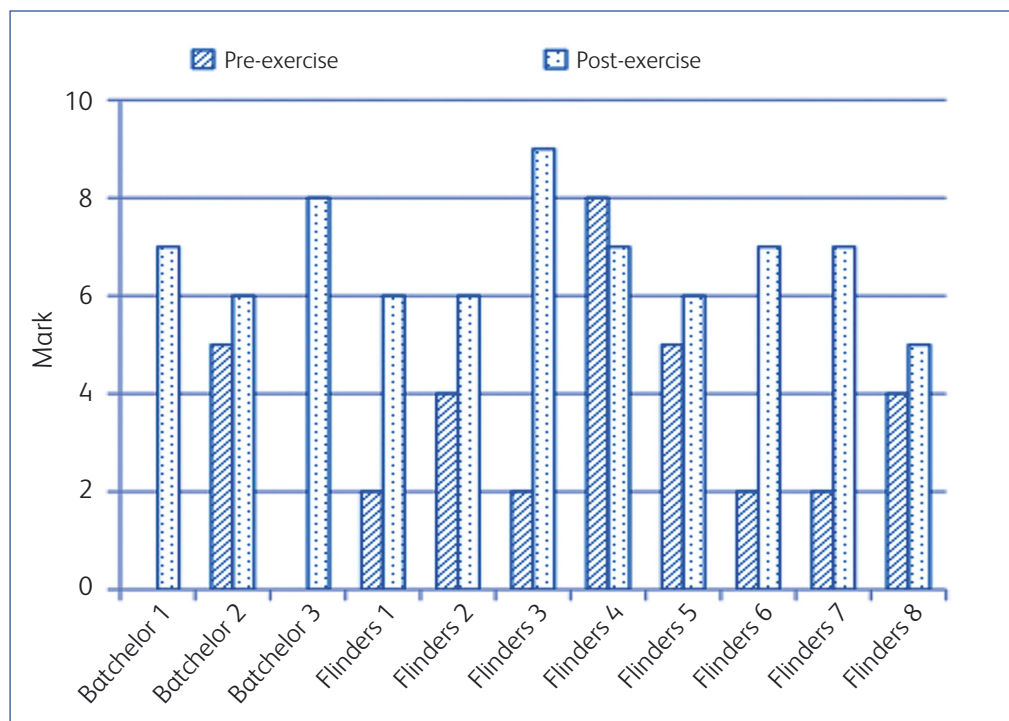


Figure 12
Mark given to the question "If so, can you list sources of Legionnaires' disease?" (Follows on from the question "Have you heard of Legionnaires' disease?") (pre- and post-workshop)

**Figure 13**

Mark given to the question "You are an EHO working in local government. You have been notified by the Director of Environmental Health from your State Health Department that there is a possible Legionnaires' disease outbreak associated with a sports centre in your local council area. List the actions you might take." (pre- and post- workshop)

Health Department that there is a possible Legionnaires' disease outbreak associated with a sports centre in your local council area. What would you do? List actions you might take." There was a statistically significant difference between the responses students gave prior to the workshop and those after the workshop ($p = 0.0031$) (Figure 13). These significant differences were very apparent, despite the small sample size.

Demographic information (gender, age, whether they identified as Aboriginal or Torres Strait Islander and computing experience) was also assessed against the mark that students received for their report. These variables were found to not have a statistically significantly detectable affect in determining the student's grade.

DISCUSSION

We have shown that SL can be used successfully to achieve the advantages of authentic learning and overcome certain disadvantages of operating in real life. It can be used in achieving particular intended learning outcomes for students and be motivating for students (and staff!) We believe a key component of the success was using the methodology as advocated by Alexander (1999).

The workshop was successful in terms of educational outcomes. This can be judged in a number of ways, primarily by the quality of the reports that were submitted as part of the students' final assessment – a report giving advice to the state health minister on the situation and the action that should be taken to protect public health. Students produced very high quality reports – the 'seriousness' of the event was apparent to them. As noted above, a number of students commented on the fact that the activity was "no longer a game", and this was apparent in the quality of their work. This was also apparent in the students' discussions with one another as they were undertaking the workshop. Students discussed problems, solutions, potential outcomes and concerns as they progressed through the activity. Their considered approach was a good indication of the fact that learning outcomes were being achieved, as they worked together and evaluated all available information, as would happen in 'real life'.

The workshop was successful in terms of cultural acceptability, which is particularly important in engaging with Indigenous students. Students felt comfortable interacting within the SL environment, and with each other online.

Difficulties

While several of the development team were 'digital natives', others had to learn enough about the technological side of SL to allow them to understand the capabilities of the program. While it wasn't necessary that these academic staff contributed to the development *per se*, it was important that they were able to recognise the potential and the limitations of this particular virtual world. Time had to be invested by these academic staff to understand this. The steep learning curve encountered by the academic staff means that time will be more efficiently used next time. We suggest that this time requirement is incorporated into budget estimates.

The academic staff were the major contributors to delays of the project. As the technical staff were paid for their time, they generally were up to date with the project, and had to wait for academic staff to make their contributions. To address this, we moved away from sole reliance on the wiki page for contribution of academic information, and initiated face-to-face or phone meetings with the staff causing the hold-up.

Other related projects on the Flinders Island have not yet reached their potential, and are not currently used for teaching purposes. This means that the cost of island rental is becoming prohibitive, as the island is only supporting one area of teaching and learning. In hindsight, developing the teaching resource in Open Sim[®] would have been significantly cheaper.

Costs

The current set up fee for a similar island is \$2,000 (£1,200) with a \$7,080 (£4,300) annual maintenance fee (this is for the equivalent of two islands – one island is \$3540 [£2,150]). This is shared between the four disciplines at Flinders University that have access to the island. The highest development cost was the cost for labour to employ an IT specialist to build the sports centre and the laboratory. This was about \$8,000 (~£5,000), at \$50/h (160 hours). In-kind contributions from academic and professional staff were approx. one quarter of this time (40 hours each), equating to about \$8,000-\$10,000 (£5,500) in kind. We also bought prefabricated furniture (\$100).

Assessing the success of the workshop required travel for one of the members of the development team, and the work was presented at an Environmental Health Australia national conference, which used up the rest of the two grants we had received to develop the workshop; one of \$11,000 (~£7,000) (Flinders University Teaching and Learning grant) the other \$5,000 (~£3000) (Batchelor Institute internal research grant).

Educational outcomes

The strong before/after impact in terms of understanding the roles and responsibilities of an EHO in disease outbreak management was clear. While this could possibly be achieved by a good quality lecture, the requirement to enter a location unprepared, to collate and evaluate evidence, and to prepare a portfolio verifying decisions made, created a realistic situation which fulfils the requirements of deep learning, including the importance of interdisciplinary thinking (Warburton, 2003) (e.g. microbiology, legal studies, risk assessment and communication), the importance of being task centred and task appropriate (Biggs, 1993) and the importance of reflection (Garrison and Cleveland-Innes, 2005). The use of games has been criticised because of the lack of well-designed evaluative studies to establish learning validity (Keys and Wolfe, 1990). This was overcome by having an assessment approach that involved thoughtful evaluation and required the students to consider the evidence they had collected, a risk assessment framework and the legislation required to deal with the situation they were confronted with. The lack of relationships found between variables (gender, age, computing experience) and the mark given for the report could be a result of the small sample size. However the apparent appeal of the activity (demonstrated by the responses to the Likert questions – discussed below) suggests that the activity captured the students' attention across the student population. No significant relationships were found between responses to the questions "I enjoyed using CSI: EH", "I worked with others doing CSI: EH", "CSI: EH was motivating", "CSI: EH was easy to use", and report mark, although as with the demographic data and the report mark, this might be a result of the very

small sample size. However the marks assigned to students for this exercise were higher than the grades achieved for other assessable times in the topic, particularly with the Batchelor Institute cohort. This might be evidence that the 'real-life' nature of the exercise (as opposed to essays and quizzes) appealed to students (supported by numerous authors, including Tuzun *et al.* (2009)), who reported students made significant gains in achievement pre-and post-games in geography learning, and Kim *et al.* (2001) who reported significant improvements in physics education in learner-supported virtual reality (VR) compared with teacher supported VR and teacher-centred course work.

CONCLUSION

The development of a workshop in Second Life allowed students to learn skills that would not be possible in the 'real' world. The project has provided a valuable teaching tool that has been used annually for five years, without major technical changes. While the set up costs are high, the only on-going cost is the rental of the island in SL. Establishing learning outcomes prior to starting a project like this is important, and creating a tool that can be used over and over results in a high value for money learning experience. The workshop resulted in deep learning and a thorough understanding of an important public health issue.

Environmental health practitioners or academics involved in teaching environmental health who would consider using this 'virtual world' tool for teaching and learning purposes are invited to contact the author for access and log in details.

ACKNOWLEDGEMENTS

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REVIEW

Who can bring an action for Judicial Review?: the Rose Theatre Trust case revisited

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The supervisory role of the higher courts over public authorities and other bodies has had a long history, based on the old prerogative writs and orders. It is now contained in Part 54 of the Civil Procedure Rules. There are many distinct features of using these procedures, one of which is the potentially much wider range of people and organisations who can take such action.

As Ministers and other public bodies do not always welcome such challenges, this aspect has been the subject of much argument over the years.

In the “Rose Theatre”ⁱ case the court looked at when organisations have the necessary standing to challenge official decisions through this procedure.

In the legislationⁱⁱ the requirement is “No application for judicial review shall be made... unless... the applicant has a sufficient interest in the matter to which the application relates.” The old two-stage procedure under Order 53 has been subsumed into the Civil Procedure Rules and is substantially the same in many respects, but with no reference to standing.

In respect of groups or associations such as taxi ownersⁱⁱⁱ it has been held that they have the same standing as individuals where a decision directly affects their collective interest, so that policy decisions of licensing authorities can be challenged by either.

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The House of Lords in the IRC case^{iv} has confirmed that at the first stage of seeking permission (another distinct feature of judicial review), the criteria should be to exclude mere busybodies or mischief-makers. At the substantive hearing if leave is granted the question of standing can be looked at in more detail.

In “Rose Theatre”, a trust was set up to seek the listing of the remains of the theatre discovered during redevelopment as an Ancient Monument. The trust applied to the relevant Government Minister to make an Order, and then challenged the refusal decision by judicial review. The trust failed on both the merits of the case and its lack of standing. The High Court held:

“2) That the decision of the Secretary of State not to schedule the remains of the theatre was a governmental decision in respect of which members of the public had insufficient interest to be entitled to apply for judicial review; that a member of the public did not obtain a sufficient interest in the decision by making the application to the Secretary of State and receiving a reply thereto; and that, therefore, since the members of the applicant company had no locus standi as individuals, the company they had created had no standing to apply for judicial review”.

However in the challenge by Greenpeace^v of a decision about nuclear waste by the then HMIP (now part of the Environment Agency), Otton J held:

“(4) Greenpeace had a ‘sufficient interest’ to amount to locus standi to challenge the decision to vary the existing authorisation. It had national and international standing and was an entirely responsible and respected body with a genuine concern for the environment. This concern led to a bona fide interest in the activities carried on by BNFL at Sellafield and in particular the discharge and disposal of radioactive waste from their premises.”

It had also been established that Greenpeace had approximately 2,500 members and supporters in the area. However the substantive case was lost on its merits.

In a later challenge on a decision to fund the building of a dam in Malaysia^{vi}, the Court went further and held that the World Development Movement had sufficient standing. This was on the basis that there was unlikely to be another challenger, the claim was one with merit and the Movement could demonstrate it had the necessary expertise and knowledge. The application was successful.

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In Dixon^{vii}, Sedley J reviewed at length the issues around standing, and said (at p121):

“Public law is not at base about rights, even though abuses of power may and often do invade private rights; it is about wrongs — that is to say misuses of public power; and the courts have always been alive to the fact that a person or organisation with no particular stake in the issue or the outcome may, without in any sense being a mere meddler, wish and be well placed to call the attention of the court to an apparent misuse of public power.”

Again the application failed on the substantive issues.

In Residents against Waste Site Ltd^{viii}, the line of reasoning in Dixon and other cases was followed, and in this case a company formed specifically to both challenge the operators and to provide some financial protection was held to have sufficient standing. The Council had argued that a company formed in part to protect individuals from an award of costs if unsuccessful should not be allowed such a role. Insofar as this was an issue the court felt that it should be dealt with by an appropriate undertaking for costs. In this case the application was successful.

More recently the matter has been looked at twice by the Supreme Court. In the AXA General Insurance case^{ix}, the main issue was a challenge to the action of the Scottish Ministers over legislation on liability for pleural plaques caused by asbestos inhalation. While the insurers' appeal was dismissed, the Court allowed the cross-appeal by various individuals who would benefit from the legislation accepting they had the necessary standing as interested parties. While the Scottish Courts have their own rules^x these involve similar principles.

In the Walton case^{xi}, an individual appealed against rulings that Scottish Ministers had not contravened the Strategic Environmental Assessment Directive^{xii} in authorising modifications to a major highways scheme, and also that he had no standing to bring the challenge. While the Supreme Court found against him on the substantive issue, he was held to be both a “person aggrieved” for the purposes of the relevant highways legislation^{xiii} and had sufficient standing to raise the matter by judicial review.

Lord Reed stated at paragraph 90 about the earlier “AXA” decision:

“this court clarified the approach which should be adopted to the question of standing to bring an application to the supervisory jurisdiction. In doing so, it intended to put an end to an unduly restrictive

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approach which had too often obstructed the proper administration of justice: an approach which presupposed that the only function of the court's supervisory jurisdiction was to redress individual grievances, and ignored its constitutional function of maintaining the rule of law."

And in paragraph 92:

"A busybody is someone who interferes in something with which he has no legitimate concern. The circumstances which justify the conclusion that a person is affected by the matter to which an application relates, or has a reasonable concern in it, or is on the other hand interfering in a matter with which he has no legitimate concern, will plainly differ from one case to another, depending upon the particular context and the grounds of the application. As Lord Hope made plain in the final sentence, there are circumstances in which a personal interest need not be shown."

From this it can be seen that the effects of the Rose Theatre decision have been limited, and that there are circumstances where neither an individual nor an organisation need have any directly affected interest. To a large extent it can be argued that the issue of standing will be linked to the merits of the case and whether the court perceives a possible abuse of power that should be challenged.

However, concerned about the increase in the number of judicial review cases being brought, the UK Government is changing the rules. Some changes were implemented last July^{xiv}, reducing time periods for bring such challenges. More substantial changes are going through Parliament now.^{xv} These do not attack standing as such, but the Courts will in future have to refuse permission where it considers the outcome would not be substantially different if the conduct complained of had not occurred. The Courts will also have to refuse permission where it is unclear that the applicant has the financial resources to proceed.

Claims for judicial review in relation to environmental decisions may attract a protective costs order, which will limit claimant's liability to third party costs to £5,000 for individuals and £10,000 for others. A losing defendant can only be ordered to pay up to £37,000^{xvi}. However these rules require Article 9 of the Aarhus Convention to apply, and the courts' early approach in applying the "Garner"^{xvii} principles appears to be restrictive^{xviii}.

From an applicant's point of view being allowed standing to bring a case under this procedure will be of little benefit if in practice it will be ruled out at the first stage under any of these new measures.

ACKNOWLEDGEMENTS

(This is an updated and expanded version of material previously contained in work submitted to De Montfort University as part of an LLM in Environmental Law and appears with their agreement).

CASES CITED IN THIS REVIEW

- i R v. Secretary of State for the Environment ex parte Rose Theatre Trust [1990] 1 All ER 754
- ii Section 31(3) of the Senior Courts Act 1981 (originally entitled Supreme Court Act 1981)
- iii R v Liverpool Corporation ex parte Liverpool Taxi Fleet Operators' Association [1972] 2 QB 299
- iv IRC v National Federation of Self Employed and Small Businesses [1982] AC 617
- v R v. Inspectorate of Pollution ex parte Greenpeace [1994] 4 All ER 329
- vi R v. Secretary of State for Foreign and Commonwealth Affairs Ex p. World Development Movement Ltd [1995] 1 W.L.R. 386
- vii R. v Somerset CC, Ex p. Richard Dixon (1998) 75 P. & C.R. 175
- viii Residents against Waste Site Ltd v Lancashire CC [2007] EWHC 2558 (Admin)
- ix AXA General Insurance Ltd and others v Lord Advocate and others [2011] UKSC 46
- x Act of Sederunt (Rules of the Court of Session 1994) as amended Scottish SI:1994/1443
- xi Walton v Scottish Ministers [2012] UKSC 44
- xii Directive 2001/42/EC
- xiii The Roads (Scotland) Act 1984 Schedule 2 Paragraphs 2-4
- xiv Civil Procedure (Amendment No.4) Rules 2013/1412
- xv Criminal Justice and Courts Bill 2014
- xvi Civil Procedure (Amendment) Rules 2013/262; Civil Procedure Rules Part 45 Part VII, and Practice Direction 45
- xvii R. (on the application of Garner) v Elmbridge DC [2010] EWCA Civ. 1006
- xviii R. (on the application of Young) v Oxford City Council [2012] EWCA Civ. 46



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Supporting Environmental Health Practitioners to evaluate and publish: a review of activity in South-West England

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ABSTRACT

Evidence-based practice is fast becoming the expectation for professions still represented in local authority practice, most notably environmental health who are now seeking public health funding for their services. It is a problem, then, that Environmental Health Practitioners (EHPs) do not have a tradition of evaluating and publishing their work, nor of embedding an evidence-based approach in their daily practice. In addition, they are rarely to be seen involved in high-level public health research undertaken nationally or even regionally. The authors of this review believe that this is serious enough to jeopardise the future of the profession and that there needs to be fresh emphasis on practitioner research and publication.

The Chartered Institute of Environmental Health's South-West Region (CIEH-SW) has adopted a proactive role in seeking to tackle this issue by providing a series of workshops bringing together practitioners, academics and others from

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a variety of backgrounds. This review considers what we have learnt and concluded from delivering these workshops over the last two years and indicates our future plans.

It is clear that there is a real interest locally amongst EHPs and others in developing and embedding an evidence base into their daily working practice. To this end there is a need to develop research capacity, co-ordinate the development of 'grey' and other literature, focus resources, and provide access to the existing literature for practitioners.

The CIEH-SW is now established on a positive trajectory, but it is recognised that to maintain momentum they require support, mentoring and investment if they are to see the evidence-base delivered into publication and practice. Our aim is that this paper will serve to support and enthuse others in similar positions elsewhere.

Key words: environmental health, research workshops, evidence-based practice, embedding research in practice, public health commissioning, practitioner research

INTRODUCTION

The development of an evidence informed approach in Environmental Health (EH) has become increasingly important in recent years, particularly since austerity in the UK has led to public spending cuts (Hunter, 2013), and the Health and Social Care Act 2012 transferred the NHS's public health (PH) resource to local authorities (LAs). Many EHPs now report to a Director of Public Health and this has altered the context in which they work.

Cuts aside, and they are hard to ignore, there is the potential for existing services within LAs to contribute to the PH agenda. However, DPHs and senior LA managers are unlikely to fund projects and services unless an evidence-based case can be made. These structural and policy changes have emphasised the need to embed evidence-based practice in EH.

There are many papers published every year relevant to EH practice, but very few are written by practicing EHPs, or indeed are accessible to them (Couch *et al.*, 2012). In light of the impact that failure to represent the environmental health perspective might have on health and well-being, it is widely held amongst those pressing for an 'insider' perspective on EH that policy and practice should be researched and shared.

Arguably, one of the greatest challenges facing the profession is to encourage EHPs to evaluate the activities in which they are involved day-to-day, to seek to see their experiences published, and to make the leap to informing their work with the best available evidence as routine. This is by no means a new problem, but has become far more pressing with the changes described above and the opportunities they bring.

EHPs are generally considered to be the only people employed in local government who are engaged full-time in public health (Acheson *et al.*, 1998) and as a service it can trace its antecedents back to the origins of local government in the mid-19th century. Elements of this service have recently been subject to severe budgetary constraint, which together with reductions in statutory functions, have reduced its 'visibility' which is likely to make retaining funding in the future more challenging (Dhesi, 2014). Previously there has been no real expectation on the part of EHPs to evaluate their work and share their conclusions and observations, but to fail to do so now may well be a threat to the very future of the profession.

To this end we share below our experience of delivering three workshops in the South West (SW) region in the hope that it will encourage EHPs to evaluate and publish their work. We describe the region and local networks; detail the design and delivery of the workshops; and set out our evaluation of the success of the initiative, including the things we have learnt from it. Finally we outline the views and opinions of the EHPs attending the workshops with suggested actions for continuing to promote evidence-based practice in the South-West.

The CIEH South West Region

The CIEH-SW is the largest geographical region in England and Wales. It has six counties, six universities, two medical schools, a dental school, the European Centre for Environment and Human Health, and the World Health Organisation's Collaborating Centre for Urban Environments. Internationally significant PH research is being undertaken in the SW, largely, as we have said, without EHP input or participation. In 2013 the CIEH-SW regional management board undertook to make good this omission.

CIEH-SW has been fortunate to work with Professor Kevin Elliston who has managed the Peninsula Public Health Network (PPHN) (previously the Peninsula Public Health Teaching Network) www.pphn.org for over seven years. Through his management and commitment, the network has grown to over 500 members, and whilst most work in mainstream PH, the CIEH were invited to join the network in 2007 and have held a position on the steering committee since then. It is through the CIEH-SW's involvement with PPHN, that EHPs have access to a network of academic and wider PH colleagues.

A series of PH events were held in the South West by CIEH-SW during which delegates were asked for their opinion as to what might be done to improve PH in the region. The theme that emerged was one of EHPs (and TSOs) recognising they did not have an understanding of the PH 'language', lacked current PH knowledge, and the means of linking up with the wider PH community in order to secure greater professional involvement.

The next steps

CIEH-SW decided to move forward on this project and the second series of events took place in April 2014. These focused on how EHPs might contribute more effectively to building the evidence base and, once built, how they might use it to support their current work plans. In addition, CIEH-SW sought to 'map' regional resources, thereby producing a rudimentary database of potential sources of information and projects.

The 2014 events attracted academics, public health colleagues and EHPs, which immediately provided opportunities for networking and the development of working relationships outside of those that would normally be available. Once again, the opportunity was taken to ask the delegates what might encourage them to see their work published.

The workshops revealed no shortage of access to data and information sources that could be of value to the EHP researcher, with one of the speakers from academe outlining even more that could be obtained free of charge. Delegates were also aware of a considerable volume of research activity in the region, identifying projects under development or in progress involving EH and PH colleagues with clear relevance to mainstream EHP work. Pressed to explain what barriers they believed prevented them from seeing their work published in journals, three broad themes emerged: confidence and skills, time and resources, and inclination.

Confidence and skills

Although identified in their own right by some, the two were inextricably linked. EHPs see their work as problem-solving and as one problem is solved another appears. They tend not to take time out to evaluate or reflect upon their interventions, but when they do they are conscious that the skills they acquired during their degrees have 'faded'. Others, who qualified through the diploma route, may never have acquired and practised these skills. So it is the lack, or perceived lack, of skills that presents a fundamental problem because it affects the confidence needed to undertake research and then see it through to publication.

When EH students complete their BSc or MSc dissertations/final project it is vital that they should be encouraged to publish, with those providing training placements playing a part in choosing subjects to research that might be useful for the authority. To aid this process the SW Practice Based Evidence Sub Group has begun to work with the universities in the region to encourage collaboration which will benefit all concerned, but key to this is producing something worthy of publication and seeing to it that it is published.

Director of CIEH Wales, Julie Barrett, who spoke at the 2014 events, reported having considerable success in Wales using this method and CIEH-SW intends to do likewise in the South-West. Certainly, there seems to be an enthusiasm for this from the lecturing staff of the University of West of England (UWE) and Weston College. CIEH-SW will be doing what it can to suggest to local authorities and EHPs the value of the research, but skills development as a means of raising confidence is central to this achieving the purpose.

Finding other ways of building capacity also emerged from the discussions at the 2014 events and in particular how EHPs might benefit from completing MPhils or PhDs. Otherwise, they might consider undertaking an MRes degree programme which incorporates instruction in research skills and the production of publishable material. It was duly agreed that the CIEH-SW would explore how EHPs might secure funding for completing such training.

Lack of time and resources

This is a theme that was raised frequently; EHPs may wish to research and publish but they are too busy doing the work they have been employed to do and they receive no support from their employer to follow this inclination during working hours. Otherwise, they are unable to find the time and resources to do this in their own time.

With no immediate solution to this the CIEH-SW is looking to encourage, and, if necessary, support, members of the Group to submit simple case studies for publication on the CIEH website, with the prospect of obtaining points toward Chartered status and hours to meet CPD requirements. Beyond this, CIEH-SW will endeavour to see projects with which members are engaged through into publication as this is seen as an important source of motivation in its own right.

Lack of inclination

Although many EHPs may feel ambivalent towards the value of research and publication and would dismiss the calls for them to commit to so engage, this initiative has identified a significant number in the SW who are enthusiastic for both. Although, at present, the CIEH has not established a national research

budget, the regions can provide financial support to practitioner-researchers, albeit very small sums. Beyond this, CIEH-SW will continue to promote the need for a robust evidence base for EH interventions and seek to encourage practitioners to see the benefits of carrying out research and evaluations which when published might benefit the profession as a whole.

DISCUSSION

The events organised by CIEH-SW in 2013 and 2014 have proved pivotal in mobilising opinion around research and publication but they have served especially to bring like-minded people together, and in the case of the EHPs, introducing them to academics with a great deal of experience of undertaking research and seeing it published. The feeling of 'not being alone' is vital.

In response to the 2013 events, the CIEH-SW set up the Practice Based Research Sub-Group consisting of academics, practising EHPs and students. This subgroup is well placed to take forward many of the issues highlighted by delegates for action at the regional level. It is already providing a coordinating and mentoring role for EHPs seeking to secure publication. The two events in 2014 are part of a longer-term programme of skills development in the SW to encourage and inspire EHPs to undertake research. Importantly they also provided support in fields of specialist practice. These events have established that the challenge for CIEH-SW is now to harness and channel the considerable amount of activity already underway into publication.

CONCLUSION AND RECOMMENDATIONS

In conclusion, encouraging EHPs to pursue research and evaluation, and to see this through to publication, is a long-term goal of CIEH-SW. For it is only in this way that the profession will discover the evidence base that should routinely inform practice. However, this will not be achieved alone and demands the commitment of others.

Accordingly, we recommend the following:

- CIEH funding for research capacity building, through the development of training courses and sponsorship for research degrees;
- the development of a mentoring scheme to support EHPs through the publication process;

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- the collection, collation and distribution of 'grey literature' from high quality student and practitioner projects;
- the setting up of a 'clearing house' of project 'outlines' and for this information to be supplied to students, local authorities and other PH organisations in the SW;
- creation of a directory of academic 'lead officers' in the SW (together with their fields of specialist interest and experience);
- dissemination of information on key data sources through regional websites;
- finding the means of 'seed funding' research, looking, first, to the CIEH to provide this through the regional network;
- development of practical guidance on how to apply for research funding; and, facilitating direct access to research literature for EHPs.

The three events held in the SW region have built momentum and set CIEH-SW on a positive trajectory. We are starting to see the distinctions and divisions between practitioners and researchers eroded. It is of paramount importance these gains are consolidated, and we hope that by sharing our experiences here we might encourage other regions and groups to start out on this path.

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These should be kept to a minimum consistent with the concise nature of the papers published in the Journal. Each item should be numbered as follows; 1, 2, 3 etc. and should carry a short descriptive title.

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