

Institute for Sustainability Solutions Research

STUDENT RESEARCH PRIZE 2015



**SUSTAINABILITY
WITH
PLYMOUTH
UNIVERSITY**

iSSR

Institute for Sustainability Solutions Research
Research excellence for environmental, social and economic impact

ISSR SUSTAINABILITY STUDENT RESEARCH PRIZES 2015

Plymouth University has established a reputation both nationally and internationally as a leader in the higher education sector for sustainability, taking an award-winning whole institutional approach and working collaboratively across operations, research and teaching and learning.

The Institute for Sustainability Solutions Research (ISSR) was launched in April 2012 and brings together the world class sustainability research underway at Plymouth University. The Institute has over 420 members, including over 300 researchers investigating sustainability from a variety of different disciplines and perspectives including Science, Business, Arts, Humanities, and Health. The ISSR is the single point of contact for organisations wanting to collaborate with the University on sustainability. We provide an incubator for developing multidisciplinary research projects, helping to find solutions to the world's most pressing environmental, economic and social challenges.

We launched the Sustainability Student Research Prize in 2015 to celebrate the breath and standard of undergraduate sustainability research at Plymouth University.

Congratulations to all the winners from this year, and thank you to everyone who has helped coordinate this year's prizes.

To find out more about the Institute for Sustainability Solutions Research, visit our website at www.plymouth.ac.uk/research/issr.

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JACK McCARTHY

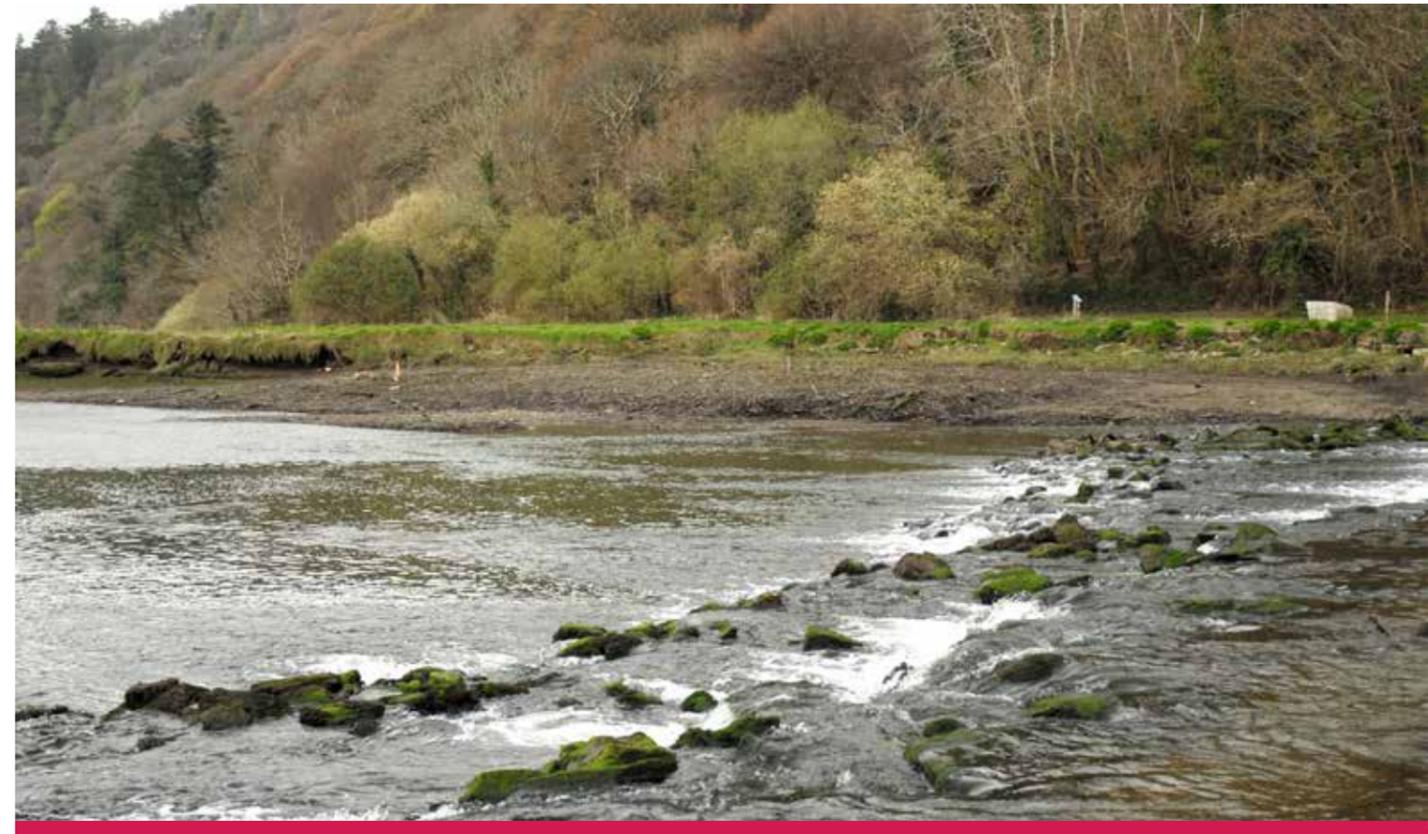
BSc (Hons) Geography (Faculty of Science & Engineering)
ISSR Management Team Lead: Professor David Gilvear

Is Fracking Environmentally Sustainable in the UK?

Hydraulic fracturing (fracking) has become a subject of current public, media and scientific debate and interest. There are associated environmental concerns with the practice. The issue is now starting to be debated in the UK, as hydraulic fracturing for gas in shale and tight sands is starting to be exploited. In the UK large reserves of shale gas exist which require the technique to access. There is public concern over whether the practice is environmentally sustainable, and this project begins to address this.

Surface water, soil and air samples were taken from 2 UK natural gas well sites. One drilled at Banks, Lancashire, and the other fracked at Elswick, Lancashire. Heavy metals and properties in SW and soil were analysed at both sites and compared to baseline data and each other to see if any enrichments associated with the hydrocarbon exploration, including fracking, occurred. CO₂ and CH₄ were analysed in air to look for air pollution from the sites. A significant enrichment of Cd, Pb, conductivity and salinity was found at Elswick in SW and soil, and although this may be evidence of pollution resulting from historical fracking at the site, there is not enough evidence to conclude this. There was negligible air pollution however this is not representative of the height of fracking activity. There is no evidence of GW contamination in the UK, but seismicity is identified as a significant risk to environmental sustainability.

Fracking in the UK is concluded to be environmentally sustainable, with evidence not conclusive enough to say that any pollution has occurred historically or currently, however the project highlights the need for stringent regulation and best practice in UK fracking in the future. It also suggests scientific monitoring-like this project- and transparency is key for UK fracking development to overcome its apparent social blockade.



GREGORY WANNELL

Bsc (Hons) Environmental Science (Faculty of Science & Engineering)
ISSR Management Team Lead: Dr Paul Lunt

Genetic population structure of Atlantic salmon (*Salmo salar* L.) in southern Europe revealed through microsatellite DNA variation, and its application in future conservation management

Atlantic salmon (*Salmo salar*) is a species of major conservation and management concern in southern Europe, where population abundance has declined by 66-81% over the past 40 years. Their anadromous lifecycle presents a difficult case for management. Effective conservation and restoration of populations require the understanding and delineation of genetic diversity and structure among populations. Towards this objective, this study aimed to assess the genetic structuring and extent of genetic differentiation between catchments throughout southern Europe, ranging from southwest Scotland to northwest France. A total of 1938 individual anadromous salmon were sampled from 35 river catchments that drain into the north-eastern Atlantic Ocean and the English Channel and were genotyped using 12 microsatellites. F-statistics revealed significant differences between the majority of populations sampled, demonstrating the existence of distinctive genetic populations. A neighbour joining (NJ) dendrogram and Bayesian cluster analysis identified these populations into five distinct reporting regions characterised by this extent of genetic differentiation among the populations. These were largely consistent with previously published genetic structuring in this region and likely influenced by the geographic distance between catchments as supported by a strong isolation by distance (IBD) signal. However, clustering was also found in some areas to be independent of geographical boundaries. Individual assignment tests were also performed to determine the power of the genetic baseline and to compare the success rate using three different panels of microsatellite loci. Using a panel of all 12 loci resulted in the highest assignment success. Over all populations, 52% were correctly assigned to the population of origin and 68% to the region of origin, with success as high as 80% in some regions. Using reference baselines of fewer, highly polymorphic loci resulted in less or equal assignment scores. The application of these findings for future conservation and management is discussed throughout.



MARK BUCKLEY

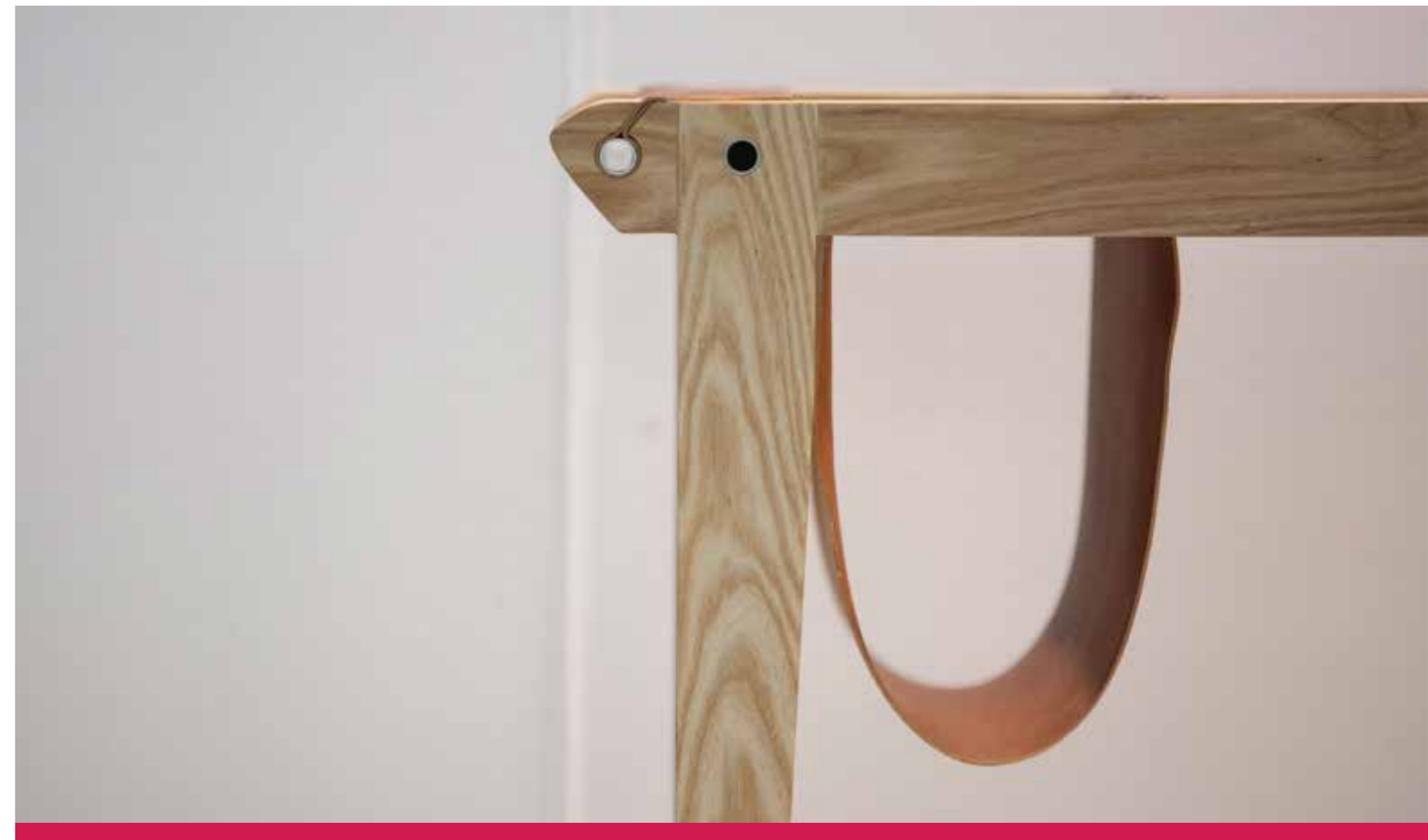
BA (Hons) 3D Design – Product Design (Faculty of Arts and Humanities)
ISSR Management Team Lead: Dr Pete Davis

Future of the Everyday

I am investigating how we will make, sell and use and dispose of the fast moving consumer goods in the future. As three billion new middle class consumers join the fast paced linear economy in the next fifteen years, I am enquiring how business, and society might act differently in a resource constrained world.

This study culminates in the design of seven distinct toothbrushes. Each toothbrush is designed to fully demonstrate an attitude to thinking differently, each creating their own exciting opportunities for brand, business retailer and customer. For business, a chance to build resilience, more intimate customer relationships, or differentiation in the market. Each attitude give opportunities to create brand experiences that are both globally consistent and locally relevant. The toothbrushes are also designed to resonate with people, to appeal to habits, cultures and ways of life.

These are complex problems, not resolved by a set of toothbrushes. However, this student aims to begin a visual narrative to demonstrate that there are alternatives, and the reason why now is the right time to make the shift towards a circular economy. It is a study which I will hope will make you ever more curious about how we will make, share and use materials and products in the future.



BETH HUGHES

BA (Hons) 3D Design – Designer Maker (Faculty of Arts and Humanities)
ISSR Management Team Lead: Dr Pete Davis

Mindful Living

The project celebrates Mindful Living through craft, skill and the essence of making. Just as there is demand for information about the origin of our food and the ethical aspects of its production, here is a similar demand within Design; people are becoming more interested in the origins of their objects.

Mindful Living focuses on quality and provenance over quantity; deprogramming a culture engrossed with consumption and re-nourishing it with the value of handmade goods.

In regards to the fast approaching 'Makers Revolution' the project takes a closer look into the detail of the objects that we surround ourselves with; the series brings personal wellbeing through the object's uses and interaction.

The careful considered selection of materials brings an element of tactility and comfort through our more instinctive senses. The pieces highlight our human desire to make, and also the authenticity and speciality that this gives an object. The Mindful Living series engenders simple satisfaction in the form of everyday objects, providing simplicity and convenience; ideal for those who have a busy lifestyle but want a beautifully functioning home, with a helping hand in organising new places for their clutter.



JAMIE MORRISON

BA (Hons) Fine Art (Faculty of Arts and Humanities)
ISSR Management Team Lead: Dr Deborah Robinson

Expanding Environments

My work is concerned with re-expressing the beauty of paths well-travelled and sights viewed on forays. Adopting a phenomenological approach through the use of installation. I bring attention to everyday foregrounds. I place the viewer in an environment made unrecognisable through the recreation of re-location of natural phenomena and am interested in our perception of the natural world and how our individual perceptions are constantly moulding our experience. The space highlights the importance of all forms of organic life and intends to make the viewer aware that they are experiencing themselves experiencing and perceiving themselves perceiving.



WILL CANE

BSc (Hons) Public Management and Business (Faculty of Business)
ISSR Management Team Lead: Dr Gregory Borne

The effects of a 'Sustainable University' on the waste and recycling habits of Plymouth University students

The objective of this research was to develop an understanding of how sustainability has brought about a change in University practice and however good the university is in terms of sustainable measure that doesn't necessarily mean that the students are going to embrace this concept of sustainability and take it forward into their future careers.

In order to do this I had to understand the role sustainability and recycling behaviour has on students at Plymouth University. I will look closely at how much the university has done to promote sustainability and the effects it has had on recycling behaviours of students around campus and their everyday life.

- To look into students recycling behaviour
- To examine the universities method of promoting sustainability
- To look at the development of how the university has come over the years in terms of becoming a sustainability powerhouse in the university spectrum in the UK
- To understand the process of a waste tender and how the university uses a waste tender to gain the best output of waste at minimal cost and what they look for when it comes to a waste tender



GEORGIA DEERY

BSc (Hons) Marketing (Faculty of Business)
ISSR Management Team Lead: Dr Victoria Hurth

What role does CSR play in reducing the intention-action gap in the fast fashion industry?: A qualitative study to understand the influence of competitive barriers, individual factors and CSR on consumers' purchasing behaviour

The contemporary consumer intends to purchase products based on a company's ability to act responsibly towards its stakeholders i.e. Corporate Social Responsibility (CSR). However, does intention always lead to action? The recent academic answer has been 'no'. The intention-action gap is becoming an increasingly discussed subject, however, few studies have been aimed at understanding the ways in which the intention-action gap can be reduced. One industry that is widely perceived as socially irresponsible, yet continually implements CSR initiatives, is fast fashion. Using a qualitative, semi-structured interview approach, this study attempts to elucidate whether CSR has the ability to reduce the intention-action gap in the fast fashion industry. It is proposed that if marketers avoid the competitive barriers, and address a number of influential factors, CSR should have the ability to reduce the intention-action gap. The results of the study reveal that CSR does have the ability to reduce the intention-action gap in the fast fashion industry, although its ability is limited. Practitioners who aim to reduce the intention-action gap will need to ensure that their use of CSR avoids the competitive barriers of price, aesthetics, location and cynicism. Corporations should also consider the importance of brand image, whilst anticipating the influence of consumers' preconceived perceptions of the fast fashion industry, CSR and buyer power.



EMMA L GOVER

BSc (Hons) Psychology (Faculty of Health and Human Sciences)
ISSR Management Team Lead: Dr Sabine Pahl

Energy Visualisation: Comparing Methods of Presenting Information on Household Energy Consumption

(Supervisor: Dr Christine Boomsma)

In the face of climate change, household behaviour is a key factor in national energy consumption. Understanding the underlying determinants of behaviour should enable interventions to provide appropriate information and promote behavioural change. However there are other psychological barriers to be addressed; lack of motivation, inaccurate perceptions and energy being invisible. The current study targets these by examining the effects of presenting information in an immersive visual method on intentions and actions to reduce household energy consumption. Fifty-two students were assigned to an immersive visual condition or a simple text-based condition. The participants completed a task matching appliances to yearly costs, followed by energy-saving tips. A questionnaire examined intentions to carry out the suggested behaviours. One week later, a follow up questionnaire examined behaviour and visualisation of energy. Within the results, no evidence was found for behavioural changes; however the visual method positively impacted learning, perceptions, visualisation and awareness. The misperception and invisibility barriers were successfully overcome, although more extensive research should examine actual behaviour changes. Suggestions are made for future research, such as utilising technological advancements to complement information interventions. This research can help to develop strategies for reducing energy consumption and the environmental and economic impacts it poses.



CERYS RUSSELL

BSc (Hons) Nursing (Adult) (Faculty of Health and Human Sciences)
ISSR Management team Lead: Professor Janet Richardson

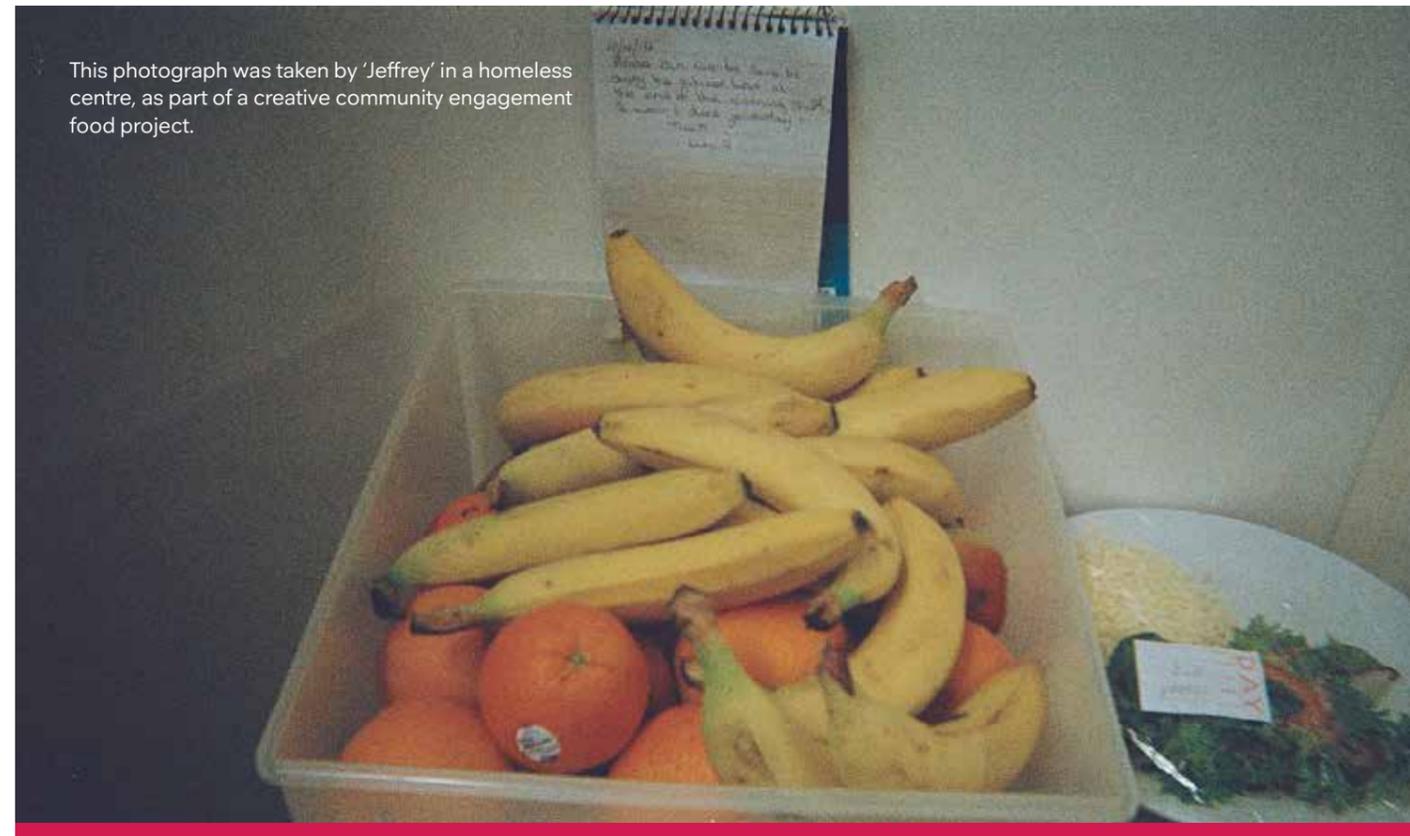
Surviving Survivorship: Does patient and family engagement with Intensive Care Unit diaries lessen the experience of psycho-social morbidity, particularly Post-Traumatic Stress Disorder, following critical illness? A Literature Review and Critical Appraisal.

Approximately 110,000 people spend time in intensive care units (ICUs) in England and Wales each year, the majority surviving to be discharged home. In an uncertain healthcare climate where demand increasingly outstrips supply, the fiscal deficit necessitates a new proactive healthcare which strives to invert the triangle of care: 'better care; better health; better costs' if our healthcare system will prove sustainable.

Sustainability: "... the planning, financing and delivery of services to meet the needs of future generations." (The Kings Fund, 2012:3) Therefore, depends on fine tuning cost-effectiveness and efficiency.

This review has found ICU diaries to provide 'better care', by facilitating client and family-centred interventions and reinforcing coping mechanisms, thereby have the potential to reduce new-onset psycho-social morbidity post critical illness and associated avoidable service consumption.

'Better health' therefore safeguards 'better costs'. However, the implementation of any new intervention requires an initial financial outlay. Accordingly, the clinical and cost-effectiveness (the extent to which incorporating it into clinical practice improves health outcomes against its' financial and carbon footprint) requires consideration prior to its translation into clinical practice. To introduce a statistically and clinically significant intervention which is not sustainable, only to withdraw it is not only wasteful but also unethical.



This photograph was taken by 'Jeffrey' in a homeless centre, as part of a creative community engagement food project.

NATALIE WHITE

BSc (Hons) Dietetics (Faculty of Health and Human Sciences)
ISSR Management Team Lead: Dr Clare Pettinger

Exploring food security in traditionally 'harder-to-reach' adults in Plymouth

Background: In the general population, higher levels of deprivation are linked to poorer diets and health inequalities. However, the food experiences of harder-to-reach individuals are often under-represented in research. In Plymouth, deprivation levels and healthy eating are worse than national averages, and with foodbank use increasing, the effects of the current economic climate are evident. Since harder-to-reach groups are often in vulnerable circumstances, the effects of these changes on the food experiences and security of these individuals needs considering.

Methods: A cross-sectional study was conducted of users of nine Plymouth services, including soup kitchens, temporary accommodation, and support services (n = 66, age ≥18 years). Sociodemographic, healthy eating, food experiences and barriers, and food security were assessed by face-to-face questionnaires. Healthy eating was assessed by the previously validated Eating Choices Index (ECI) tool of Pot et al. (2013). Descriptive and statistical comparisons were performed.

Results: Mean ECI score was lower than in the average stratified population. Health issues were reported by 85% of the sample, with 36% reporting mental ill-health. Food aid was used by 68% of the sample, with chi-square indicating those who had experienced benefit disruption were significantly more likely to have used food aid ($\chi^2 = 10.5$; $p = 0.005$).

Conclusion: Healthy eating may be lower in this harder-to-reach group, though further investigation is warranted. Since food aid was prevalent, especially when income was disrupted, research into the effects of food aid on nutrition and perceptions of food security in harder-to-reach individuals is indicated.

This project was brought together through the NUS 'Dissertations for Good' programme, (contact Kim Croasdale: kim.croasdale@nus.org)

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