



OTAGO GLOBAL  
HEALTH INSTITUTE  
A UNIVERSITY OF OTAGO RESEARCH CENTRE

# OGHI 10th Annual Conference Programme

15-16 November 2017 | Dunedin Public Art Gallery | 30 The Octagon



#OGHI17



# OGHI 10th Annual Conference 15-16 November 2017 Dunedin

Wednesday 15 November 2017

Dunedin Public Art Gallery  
The Octagon, Dunedin

Time	Session
	<b>Opening</b> <span style="float: right;"><b>Chair: David Fielding</b></span>
12:30 - 12:45	Registration
12:45 - 1:15	Pacific welcome and introduction, Professor David Fielding
	Welcome, Professor Robin Gauld Pro-Vice Chancellor, Commerce Division
	Global Health Perspective: Do We Need the Sustainable Development Goals?, Associate Professor Stephen Knowles
	<b>Session 1</b> <span style="float: right;"><b>Chair: Pauline Norris</b></span>
1:15 - 1:30	Moira Smith & Louise Signal, Tonga's school food policy: an evaluation
1:30 - 1:45	Viliani Puloka, Kids'Cam Tonga: The world of Tongan children through their eyes
1:45 - 2:00	Louise Signal, Children's view of housing quality in Tonga
2:00 - 2:15	Roshit K Bothara**, Medical student experiences and outcomes from collaborative global health learning among New Zealand, Samoa and Nepal
2:15 - 2:30	João Martins - Universidade Nacional Timor Lorosa'e, Profile of the Faculty of Medicine and Health Sciences from its establishment and its development to the present state and the future directions
2:30 - 2:45	<b>Plenary discussion</b>
2:45 - 3:15	<b>Coffee break</b>
	<b>Session 2</b> <span style="float: right;"><b>Chair: Tony Binns</b></span>
3:15 - 3:30	Trenton G. Smith, Is fast food addictive? Evidence from an experiment utilizing continuous glucose monitoring
3:30 - 3:45	Yonatan Dinku**, Health shocks and child time allocation decisions by households: evidence from Ethiopia
3:45 - 4:00	Susanna Campbell**, Revisiting human capital and development accounting
4:00 - 4:15	Endah Setyaningsih**, 'Success cases' from West Nusa Tenggara, Indonesia
4:15 - 4:30	Michael J Maze**, Social and health system determinants of mortality among febrile inpatients in Tanzania: a prospective social biopsy cohort study
4:30 - 4:45	Jerram Bateman, The Impact of the 2014-2016 Ebola outbreak on rural livelihoods in Sierra Leone – A case study of Panguma and Kayima
4:45 - 5:00	<b>Plenary discussion</b>
	Optional Conference Dinner - (for those registered)
6:00	Parcels Restaurant - Distinction Hotel - 6 Liverpool Street, Dunedin (A cash bar will operate)



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Thursday 16 November 2017

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**Session 3 Nutrition Chair: Lisa Houghton**

9:00 - 9:15	Pouya Saeedi**, Dietary patterns and markers of arterial health in primary school-age children
9:15 - 9:30	Deborah McIntosh**, Suboptimal feeding practices among young Indian children aged 12-24 months living in the slums of New Delhi
9:30 - 9:45	Aly Diana**, Predictors of anaemia in children aged 6 and 12 months in Sumedang District, West Java, Indonesia
9:45 - 10:00	Toani Narao, Microbiological contamination of drinking water, anaemia and diarrheal illness among children aged 6-23 months in Kiribati
10:00 - 10:15	<b>Plenary discussion</b>
10:15 - 10:30	Macandrew Bay School artwork
10:30 - 11:00	<b>Coffee break</b>

**Session 4 Asia-Pacific and biocultural health Chair: Hallie Buckley**

11:00 - 11:15	Hallie Buckley, Life and death in the early colonial settlement period of South Otago, New Zealand
11:15 - 11:30	Melandri Vlok**, Health problems surrounding immigration aren't new: disease and human interaction in prehistoric Asia
11:30 - 11:45	Sian Halcrow, Investigating the maternal-infant nexus in health in the past
11:45 - 12:00	Anna Wahyuni Widayanti**, Community-based intervention for type 2 diabetes in Kupang, East Nusa Tenggara, Indonesia
12:00 - 12:15	Jenny J. Bryant-Tokalau, Mosquitoes as a security threat: vector borne illnesses, water, climate and overcrowding in Pacific urban settlements.
12:15 - 12:30	<b>Plenary discussion</b>
12:30 - 1:30	<b>Lunch</b>

**Session 5 Infectious diseases Chair: John Crump**

1:30 - 1:45	Effua Usuf, Pneumococcal carriage serotypes in a rural Gambian population with high vaccine pressure.
1:45 - 2:00	David Jones, Tuberculosis registrations 2012-15 at a rural hospital in East New Britain Province, PNG – a descriptive study
2:00 - 2:15	Kathryn Bright, Trial of simplified Pneumococcal vaccination in Vietnam II: The herd immunity approach
2:15 - 2:30	Lika Apriani**, Interferon gamma release assays and tuberculin skin test positivity rate in new nursing and medical students in Bandung, Indonesia
2:30 - 2:45	Charles Shaw & Stephen Sowerby, Commercialising research findings for application in low resource settings
2:45 - 3:00	Tin Ohn Myat**, Bacterial causes of febrile illness among adult patients admitted to Yangon General Hospital, Yangon, Myanmar
3:00 - 3:15	<b>Plenary discussion</b>
3:15 - 3:45	<b>Coffee break</b>



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Thursday 16 November 2017		Dunedin Public Art Gallery The Octagon, Dunedin
<b>Session 6</b>	<b>One Health</b>	<b>Chair: Jackie Benschop</b>
3:45 - 4:00	Mark Bryan, Antimicrobial use in New Zealand production animals- a nationwide pilot analysis	
4:00 - 4:15	Ron Jackson, Owned dog population in rural households in Kyrgyzstan	
4:15 - 4:30	Joanna McKenzie, Integrated One Health surveillance systems for antimicrobial resistance and antimicrobial use in Asia and Africa	
4:30 - 4:45	Kate M. Thomas, Understanding <i>Campylobacter</i> and non-typhoidal <i>Salmonella</i> in the livestock and poultry meat pathways in Kilimanjaro and Arusha regions, Tanzania, 2015-2017	
4:45 - 5:00	<b>Plenary discussion</b>	
5:00 - 5:15	<b>Student presentation prize and closing</b>	
5:15 - 6:00	<b>Free time</b>	
6:00 - 7:00	<b>ASID NZ Drinks and nibbles (OGHI delegates welcome)</b>	
7:00 - 8:00	<b>Keynote address: McAuley Oration</b> Professor Mark McGillivray Research Professor in International Development Alfred Deakin Institute, Deakin University.  Which developing countries are better at converting economic growth into better health and why?  Venue: the Dunedin Public Art Gallery All welcome	<b>Chair: David Fielding</b>

**Poster Presentations**

Adeel Akmal\*\*, Lean thinking in healthcare: published success stories and their side-effects

Yonatan Dinku\*\*, Neighbourhood ethnic diversity and child health outcomes in Ethiopia

Nurul Syafika Amir Hamzah \*\*, Assessing mental health status among undergraduate students in University of Malaya: baseline data from the healthy campus initiatives study

Grace Johnstone, Workforce support systems for Papua New Guinea and Pacific Island allied ophthalmic personnel

\*\*denotes eligible for student prize

Student prizes and Macandrew Bay School artwork kindly sponsored by



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ABSTRACTS – IN ORDER OF PRESENTATIONS AND WHERE RECEIVED  
 \*\*DENOTES ELIGIBLE FOR STUDENT PRIZE

**TONGA’S SCHOOL FOOD POLICY: AN EVALUATION**

Viliami Puloka<sup>1</sup>, Moira Smith<sup>1</sup>, James Stanley<sup>1</sup>, Tim Chambers<sup>1</sup> and Louise Signal<sup>1</sup>

<sup>1</sup>University of Otago, Wellington, New Zealand

Non-communicable diseases (NCDs) are major public health issues in Tonga. A healthy school food environment is a key component of NCD prevention strategies. This presentation outlines an evaluation of *Tonga’s School Food Policy 2012-2015: A Pathway to a Healthier Life* (the Policy), which aimed to determine the Policy’s impact in a sample of Tongatapu schools, and to inform its revision. Three data sources – relevant documents, Kids’Cam Tonga images to assess the school food environment, and interviews with school principals/head teachers – were used and data triangulated. The evaluation showed that the Policy has the potential to deliver on its mission, however it has failed to be implemented. The food available for children in and around the school environment is largely unhealthy and often sourced from food vendors. A well-implemented policy could significantly contribute to children’s eating habits and positively influence the wider school community and villages. Its success is dependent on its implementation as part of Tonga’s wider NCD Strategy, with a whole-of-government approach focusing on children’s right to health and good nutrition. If successfully implemented the Policy will likely play a significant role in reducing overweight and obesity among Tongan children and the wider Tongan community as the children age.

**KIDS’CAM TONGA: THE WORLD OF TONGAN CHILDREN THROUGH THEIR EYES**

Viliami Puloka<sup>1</sup>, Moira Smith<sup>1</sup>, James Stanley<sup>1</sup> & Louise Signal<sup>1</sup>

<sup>1</sup>University of Otago, Wellington, New Zealand

Wearable cameras provide a unique means of understanding children’s lives and have been

shown to effectively identify public health features that impact their health and well-being. Kids’Cam Tonga aimed to determine the key features in the day-to-day lives of Tongan children, and how best to intervene to improve their health and well-being. From July-November, 2016, 108 randomly selected children aged 11-12, from 15 randomly selected schools in Tongatapu and Ha’apai wore cameras that automatically took pictures every seven seconds, and GPS recorders, for 3 days (Friday-Sunday). Approximately 18,000 images/child were generated. A content analysis of the images was conducted to identify the key public health features in the children’s environments. The features identified, including food, physical activity, tobacco, and alcohol, and the potential public health actions that could be implemented, are presented and discussed. The findings of this study will assist the Tongan government in meeting the objectives of its national NCD prevention strategy and support the United Nation’s Sustainable Development Goals. In doing so, the research aims to contribute to improving the health and well-being of children in Tonga. This research provides a model for research in other island nations.

**CHILDREN’S VIEW OF HOUSING QUALITY IN TONGA**

Andrew Robinson<sup>1</sup>, Sarah Hulme-Moir<sup>1</sup>, Viliami Puloka<sup>1</sup>, Moira Smith<sup>1</sup>, James Stanley<sup>1</sup> and Louise Signal<sup>1</sup>

University of Otago, Wellington, New Zealand

Housing is a significant determinant of health, particularly in developing countries, such as Tonga. Currently very little is known about the quality of the housing in Tonga, nor on the interaction between children and the home environment. The aim of this study was to identify health risk factors and behaviours in Tongan houses from a child’s perspective. An innovative methodology was used, Kids’Cam Tonga. Seventy-two Class 6 children (10



to 13 year olds) were randomly selected from 12 randomly selected schools in Tongatapu, the main island. The participating children wore a wearable camera on lanyards around their neck. The device automatically took wide-angled, 136° images of the child's perspective every seven seconds. The children were instructed to wear the camera all day from Friday morning to Sunday evening, inclusive. The analysis showed that the majority of Tongan children live in houses that have structural deficiencies and hazards including water damage, mould, electrical and burn risk factors. The findings indicate that simple community led improvements to the housing stock may reduce the associated health burden and increase building resilience to natural hazards.

#### **MEDICAL STUDENT EXPERIENCES AND OUTCOMES FROM COLLABORATIVE GLOBAL HEALTH LEARNING AMONG NEW ZEALAND, SAMOA AND NEPAL**

Roshit K Bothara<sup>1\*\*</sup>, David R Murdoch<sup>1</sup>, Susan Jack<sup>2</sup>, Faafetai (*Tai*) Sopoaga<sup>2</sup>, Jen Desrosiers<sup>3</sup>, Malama Tafuna'i<sup>4</sup>, Tony Walls<sup>5</sup>, Philip K Pattemore<sup>5</sup>, Ashis Shrestha<sup>6</sup>, Tim Wilkinson<sup>7</sup>, Andrew Miller<sup>1</sup>

<sup>1</sup>Department of Pathology, University of Otago, Christchurch, New Zealand, <sup>2</sup> Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand, <sup>3</sup> Department of Population Health, University of Otago, Christchurch, New Zealand, <sup>4</sup>Faculty of Medicine, National University of Samoa, Samoa, <sup>5</sup> Department of Paediatrics, University of Otago, Christchurch, New Zealand, <sup>6</sup>Department of Primary Care, Patan Academy of Health Sciences, Patan, Nepal, <sup>7</sup>Department of Medicine, University of Otago, Christchurch, New Zealand

Global Health is recognised as an essential component of undergraduate medical curricula to equip future physicians with the relevant knowledge, attitudes and skills to practice in a global world. The Global Health Classroom (GHCRC) was developed at the Otago Medical School (OMS) to create opportunities for medical students in different countries to engage and collaborate on student-led learning tasks to elicit global health learning. It presents an example of a reciprocal

and collaborative learning model between countries. In 2016, GHCRC pilot studies were conducted between New Zealand, Samoa and Nepal, and formed the basis of a research project in 2017. A mixed-method study approach was developed using questionnaires and in-depth interviews to explore student experiences and learning. Results suggest that the GHCRC model enables medical students to learn about diverse healthcare systems and determinants of health. Students also have opportunities to develop attitudes and skills considered important in global health learning and practice. Key findings from the research project will be summarised, along with how the GHCRC model has been incorporated into the undergraduate curricula at the OMS and in the Faculty of Medicine at the National University of Samoa.

#### **UNIVERSIDADE NACIONAL TIMOR LOROSA'E, PROFILE OF THE FACULTY OF MEDICINE AND HEALTH SCIENCES FROM ITS ESTABLISHMENT AND ITS DEVELOPMENT TO THE PRESENT STATE AND THE FUTURE DIRECTIONS**

João Martins

No abstract required.

#### **IS FAST FOOD ADDICTIVE? EVIDENCE FROM AN EXPERIMENT UTILIZING CONTINUOUS GLUCOSE MONITORING**

Daniel Hamill<sup>1</sup>, Trenton G. Smith<sup>2</sup>, Bernard Venn<sup>3</sup>

<sup>1</sup>New Zealand Ministry for Primary Industries, <sup>2</sup>Corresponding author. Department of Economics, University of Otago, P.O. Box 56, Dunedin 9054, New Zealand (e-mail: [trent.smith@otago.ac.nz](mailto:trent.smith@otago.ac.nz)), <sup>3</sup>Department of Human Nutrition, University of Otago

The dynamics of blood sugar response to highly processed foods have strong parallels to the effects of addictive drugs. We hypothesize that if glycemic response is indeed an important determinant of habit formation (and hence product demand) then the largest producers of proprietary commercial foods will have formulated their products accordingly. We asked 12 non-

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diabetic adult subjects to wear a continuous glucose monitor for 7 days while consuming at least one globally branded fast food meal, yielding a pooled time series dataset with nearly 25,000 observations. We find strong evidence that addiction-like dynamic properties of the glycemic response (dose, rate of absorption, and withdrawal) are greater for these foods as compared to fresh-prepared or off-brand processed foods. These differences are largely maintained when controlling for size of meal and nutrient content, suggesting that standard food labels may be insufficient to resolve what appears to be an important asymmetric information problem.

### **HEALTH SHOCKS AND CHILD TIME ALLOCATION DECISIONS BY HOUSEHOLDS: EVIDENCE FROM ETHIOPIA**

Yonatan Dinku\*\*, David Fielding and Murat Genc  
University of Otago

Little is currently known about the effects of shocks to parental health on the allocation of children's time between alternative activities, and on child labour. Using longitudinal data from the Ethiopian Young Lives surveys of 2006 and 2009, we analyze the effect of health shocks on the amount of children's time spent in work, leisure and education. We find that paternal illness increases the time spent in income-generating work but maternal illness increases the time spent in domestic work. Maternal illness has a relatively large effect on daughters while paternal illness has a relatively large effect on sons, but the effects of maternal illness are larger. Overall, parental illness leads to large and significant increases in the amount of child labour as defined by UNICEF.

### **REVISITING HUMAN CAPITAL AND DEVELOPMENT ACCOUNTING**

Susanna G Campbell\*\*

Department of Economics, University of Otago, PO Box 56,  
Dunedin 9054, New Zealand.

Much progress has been made in accounting for the proximate determinants of income levels: physical capital, human capital, and total factor productivity (TFP). There has been a consensus in the literature that a large part of the differences in income per worker between rich and poor countries is due to differences in TFP; agreeing that the reason poor countries are poor is due not only to the fact that they have less physical and human capital, but that they are not as efficient at using them. This research attempts to explain how much of differences in per capita income across countries can be accounted for by factor supplies, total factor productivity, and an adjusted measure of human capital. The latter will be split into three components; a quantity dimension (measured by years of schooling), a quality dimension (measured by cognitive skills), and a health indicator (for which adult survival rates will be used). By extending development accounting exercises I seek to calculate the relative contribution of input factors and TFP differences in explaining cross-country differences in income levels. Preliminary findings show the non-negligible roles of cognitive skills and health indicators in explaining the observed income per worker differences across countries.

**Relevance to Global Health:** I include a measure of health in the population in addition to the measure of average years of schooling and a measure of cognitive skills. Health can have an effect on output in a country through several channels; it seems to be a logical conclusion that healthier people tend to be better workers. A number of health outcomes can be observed and used as points of comparison across countries, referred to as health indicators. Adult survival rates (ASR), defined as the fraction of 15 year olds that survive until 60, are one such possible indicator. This measure is particularly interesting due to the fact that ASR measures survival during working years. Since the comparison is with output per worker, this seems to be the most relevant. Another benefit is that these measures are



provided in a consistent form for a large cross-section of countries. I discuss the alternative measures, carefully looking at the World Development Indicators, the World Health Statistics, and the OECD for health-related variables

**SOCIAL AND HEALTH SYSTEM DETERMINANTS OF MORTALITY AMONG FEBRILE INPATIENTS IN TANZANIA: A PROSPECTIVE SOCIAL BIOPSY COHORT STUDY**

Michael E. Snaveley<sup>a</sup>, Michael J. Maze<sup>b,c,\*\*</sup>, Charles Muiruri<sup>a</sup>, Lilian Ngowi<sup>c</sup>, Flora Mboya<sup>c</sup>, Julia Beamesderfer<sup>d</sup>, Glory F. Makupa<sup>e</sup>, Anthon G. Mwingwa<sup>e</sup>, Bingileki F. Lwezaula<sup>f</sup>, Blandina T. Mmbaga<sup>c,g</sup>, Venance P. Maro<sup>c,e</sup>, John A. Crump<sup>a,b,c,e,h</sup>, Jan Ostermann<sup>a,i</sup>, Matthew P. Rubach<sup>a,c,h</sup>

<sup>a</sup>Duke Global Health Institute, Duke University, Durham, NC, USA; <sup>b</sup>Centre for International Health, University of Otago, Dunedin, New Zealand; <sup>c</sup>Kilimanjaro Christian Medical Center, Moshi, Tanzania; <sup>d</sup>University of Pennsylvania, Philadelphia, PA, USA; <sup>e</sup>Kilimanjaro Christian Medical University College, Moshi, Tanzania; <sup>f</sup>Mawenzi Regional Referral Hospital, Moshi, Tanzania; <sup>g</sup>Kilimanjaro Clinical Research Institute, Moshi, Tanzania; <sup>h</sup>Division of Infectious Diseases, Duke University Medical Center, Durham, NC, USA; <sup>i</sup>Arnold School of Public Health, University of South Carolina, Columbia,

**Background:** We aimed to assess the sociocultural and health systems factors associated with mortality from febrile illness in northern Tanzania

**Methods:** We enrolled pediatric and adult patients with fever from two referral hospitals in Moshi, Tanzania and conducted standardized interviews to assess delays at home, in transport, and in the health care system. We assessed 6 week mortality and after matching on age, gender, and severity of illness, measured the association between delays and mortality using conditional logistic regression.

**Results:** We enrolled 475 children, of whom 18 (3.8%) died, and 260 adults, of whom 34 (13.0%) died. Among adults, a delay in care-seeking due to not recognizing a severe symptom was associated with mortality (odds ratio, OR 3.0). Taking >1 hour to reach a facility increased the odds of death in

paediatric (OR: 3.3) and adult (OR: 3.0) groups. The number of facilities visited and spending >4 days between the first facility and reaching tertiary care were associated with mortality for pediatric (OR: 1.6 and OR: 4.4 respectively) and adult (OR: 2.0 and OR 3.2) participants.

**Conclusions:** Delays at home and within the health care system are risk factors for mortality from febrile illness in northern Tanzania.

**THE IMPACT OF THE 2014-2016 EBOLA OUTBREAK ON RURAL LIVELIHOODS IN SIERRA LEONE – A CASE STUDY OF PANGUMA AND KAYIMA**

Jerram Bateman and Tony Binns

Department of Geography, University of Otago, Dunedin, Otago, New Zealand

The Ebola outbreak in West Africa was first reported in March 2014, and rapidly became the deadliest occurrence of the disease since its discovery in 1976. Between December 2013 and 10 April 2016, a total of 28,616 suspected, probable, and confirmed cases of Ebola were reported, and a total of 11,310 deaths were recorded, although the true toll of the epidemic, especially the number of deaths, was almost certainly greater. Sierra Leone was among the worst affected countries, accounting for more than half (14,124) of the total suspected, probable and confirmed cases, and more than a third (3956) of the total deaths. Much has been written about the Ebola outbreak, but within this emerging corpus of literature, little attention has been given to its impact on people’s livelihoods in rural communities. This research seeks to address this gap by exploring the impact of the Ebola outbreak on livelihoods in Panguma and Kayima, two small towns in the Eastern Province of Sierra Leone. Drawing on fieldwork undertaken in 2014 and 2017, this paper will examine how Ebola disrupted rural livelihood systems during the outbreak, its ongoing implications for livelihoods since the outbreak ended, and the lessons learned at the local scale.



## DIETARY PATTERNS AND MARKERS OF ARTERIAL HEALTH IN PRIMARY SCHOOL-AGE CHILDREN

Pouya Saeedi<sup>1\*\*</sup>, Sheila A Skeaff<sup>1</sup>, Jillian Haszard<sup>1</sup>, Katherine Black<sup>1</sup>, Paula ML Skidmore<sup>1</sup>

<sup>1</sup>Department of Human Nutrition, University of Otago, PO Box 56, Dunedin 9054, New Zealand

**Background:** The aim of this research was to investigate the association between dietary patterns and markers of arterial health i.e., pulse wave velocity (PWV) and augmentation index (AIx) in 9-11 year-old children.

**Methods:** Ethical approval for PEDALS was obtained from the University of Otago Ethics Committee (Ref No. 14/227). This cross-sectional study used data from the 'Physical activity, Exercise, Diet, And Lifestyle Study' (PEDALS), conducted in 17 primary schools in Dunedin, New Zealand. Principal component analysis was performed to identify dietary patterns based on data collected using a previously validated food frequency questionnaire. The SphygmoCor XCEL system was used to assess arterial health. Complete data for PWV and AIx analyses were available for 389 and 337 students, respectively. Mixed effects linear regression models with robust standard errors were used to assess association between dietary patterns and markers of arterial health.

**Results:** The majority of participants were of normal weight (76%). There was no clinically significant relationship between dietary patterns and markers of arterial health.

**Conclusion:** Our findings could be attributed to the relatively homogenous, normal weight PEDALS population, which emphasize the importance of healthy weight status in relation to arterial health. Dietary patterns were identified using data from a previously validated food frequency questionnaire using the principal component analysis. Year 5 and 6 students (usually between 9-11 years old) were invited.

Covariates including body composition, cardiorespiratory fitness, and physical activity

were measured using the bioelectrical impedance analysis machine (BIA), 20-metre shuttle run test (20msrt), and accelerometry, respectively.

## SUBOPTIMAL FEEDING PRACTICES AMONG YOUNG INDIAN CHILDREN AGED 12-24 MONTHS LIVING IN THE SLUMS OF NEW DELHI

Deborah McIntosh<sup>1\*\*</sup>, Geeta Trilok-Kumar<sup>2</sup>, Jill J Haszard<sup>1</sup>, Rosalind S Gibson<sup>1</sup>, Lisa A Houghton<sup>1</sup>

<sup>1</sup>Department of Human Nutrition, University of Otago, Dunedin, New Zealand, <sup>2</sup>Biochemistry, Institute of Home Economics, University of Delhi, New Delhi, India

**Background:** Inappropriate infant and young child feeding (IYCF) practices affects nutritional status, increases the risk of growth faltering and ultimately, impacts child survival. We aimed to characterise the feeding and caring practices of Indian children aged 12-24 months in relation to the WHO recommendations.

**Methods:** This cross-sectional study was conducted in low income households in a slum area of South Delhi. A household survey was administered to the mother/primary caregiver of 120 eligible children. Trained research assistants collected food intake data of 69 children over two non-consecutive days and selected infant feeding practices were described based on established WHO IYCF indicators.

**Results:** The majority of children (86%) achieved minimum meal frequency ( $\geq 3$ -4 meals per day), however, only one-half (52%) of the children consumed 4 or more food groups (minimum dietary diversity). Moreover, only 44% of the children achieved a minimum acceptable diet (a composite score of minimum meal frequency and minimum dietary diversity) and 18% consumed iron-rich or iron-fortified foods. Grains, roots, and legumes were staple foods with very little consumption of vitamin A-rich fruits and vegetables, eggs, or flesh foods.

**Conclusions:** Complementary feeding practices are suboptimal among these young Indian children and intervention strategies are needed.



Funding provided by the University Grants Commission, New Zealand-India Education Council and Otago University Research Grant

Funded by Meat and Livestock Australia and University of Otago Research Grant.

## PREDICTORS OF ANAEMIA OF CHILDREN AGED 6 AND 12 MONTHS IN SUMEDANG DISTRICT, WEST JAVA, INDONESIA

Aly Diana<sup>1,2\*\*</sup>, Dwi M Purnamasari<sup>1</sup>, Sofa Rahmania<sup>1</sup>, Dimas Luftimas<sup>1</sup>, Jill Haszard<sup>2</sup>, Rosalind Gibson<sup>2</sup>, Lisa Houghton<sup>2</sup>

<sup>1</sup>Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia, <sup>2</sup>Department of Human Nutrition, University of Otago, Dunedin, New Zealand

**Background:** Anaemia is a widespread problem in many low-income countries during infancy. Nutritional iron deficiency has been assumed to be the major cause of anaemia in Indonesia, but many co-existing factors, such as: multiple micronutrient deficiencies and inflammation are being recognized. However, to date their relative importance as predictors of anaemia during infancy in Indonesia has not been investigated.

**Methods:** We enrolled breastfed infants at 6 months (n=230); and followed them at 12 months (n=190); and examined seven micronutrients (folate, B12, vitamin D, ferritin (iron), RBP, zinc, and selenium). Logistic regression analysis was performed to examine the multivariate relationships between anaemia and household, maternal, and infant factors and micronutrients.

**Results:** The proportion of infants with anaemia was 33-38%. Ferritin, female sex, and lower CRP concentrations were associated with anaemia at 6 months of age, whereas ferritin and serum folate were the significant predictors at 12 months.

**Conclusions:** Anaemia remains a persistent and severe public health problem during infancy in Sumedang district, Indonesia. Low iron status remains a major predictor of anaemia even after adjustment for several other nutritional and non-nutritional factors. Hence there is an urgent need to re-evaluate the performance of iron deficiency control programs in this district.

## MICROBIOLOGICAL CONTAMINATION OF DRINKING WATER ANAEMIA AND DIARRHEAL ILLNESS AMONG CHILDREN AGED 6-23 MONTHS IN KIRIBATI

Toani Narao<sup>1</sup>, Rosally Aata<sup>1</sup>, Selima Tetau<sup>1</sup>, Teima Onorio<sup>1</sup>, Linda Biira<sup>1</sup>, Rick Steele<sup>1</sup>, Rachel Brown<sup>2</sup>, Lisa A Houghton<sup>2</sup>

<sup>1</sup>ChildFund Kiribati, Country Office, Betio, Kiribati, <sup>2</sup>Department of Human Nutrition, University of Otago, Dunedin, New Zealand

**Background:** Poor water, sanitation and hygiene (WASH) and suboptimal nutrition are important risk factors for morbidity and mortality in infants and young children. This study assesses the microbiological quality of household drinking water, diarrhoeal illness and prevalence of anaemia among a sample of Kiribati children aged 6–23 months.

**Methods:** Cross-sectional data examining sociodemographic, anthropometry, haemoglobin levels, and diarrheal illness were collected from 107 children aged 6–23 months residing in one of the largest townships of South Tarawa, Kiribati. In addition, samples of household drinking water were tested for *Escherichia coli* (*E.coli*) contamination.

**Results:** *E.coli* was detected in 98% of the children's household drinking water, with 49% of samples having an intermediate/high level of contamination (1-100 *E.coli*/100 mL), and 49% classified as very high risk (>100 *E.coli*/100 mL). Nearly one-third of mothers reported that their child had diarrhoea in the preceding two weeks; and of the 71 children who provided a blood sample, 85% were anaemic (haemoglobin < 110 g/L), with 30%, 67% and 3% classified as mildly, moderately and severely anaemic.

**Conclusion:** The overall prevalence of contaminated drinking water and anaemia among children aged 6–23 months in this study area was very high, reflecting a severe public health problem. Strategies focusing on both nutrition and

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WASH are needed to minimize anaemia and diarrhoeal disease.

*Funded by the ChildFund New Zealand, and NZ Ministry of Foreign Affairs & Trade.*

**LIFE AND DEATH IN THE EARLY COLONIAL SETTLEMENT PERIOD OF SOUTH OTAGO, NEW ZEALAND.**

Hallie Buckley<sup>1</sup>, Peter Petchey<sup>2</sup>, Jonny Geber<sup>1</sup>, Charlotte King<sup>1</sup>, Lisa Matisoo Smith<sup>1</sup>, Michael Knapp<sup>1</sup>, Rebecca Kinaston<sup>1</sup>, and Baylee Smith<sup>2</sup>

<sup>1</sup>Department of Anatomy, University of Otago, <sup>2</sup> Department of Anthropology and Archaeology, University of Otago

Two events are often linked to the early European settlement of Otago: the arrival of the first immigrant ships the Philip Laing and the John Wickliffe in 1848; and the series of Central Otago gold rushes in 1861-1862 that powered a commercial boom in Dunedin and a population explosion in the wider province. However, the establishment of farming was essential for the long term viability of the settlement, as the growing city of Dunedin needed a productive hinterland to provide food, and the easily won gold soon ran out leaving the miners the option of either moving on or settling down. The first settlers on the Tokomairiro Plain in South Otago arrived in 1850 to establish the town of Milton. Settlement in New Zealand was portrayed as offering opportunities for a healthier and more prosperous future compared to life in Britain<sup>[6]</sup>. A recent excavation at the St John’s Anglican burial ground in Milton has provided a unique opportunity to examine directly the health of early European settlers in the region. The preliminary multi-disciplinary results from historical records, osteology and chemical and molecular analyses will be presented and interpreted in the wider context of 19<sup>th</sup> century life in New Zealand.

**HEALTH PROBLEMS SURROUNDING IMMIGRATION AREN’T NEW: DISEASE AND HUMAN INTERACTION IN PREHISTORIC ASIA**

Melandri Vlok<sup>1\*\*</sup>, Hallie Buckley<sup>1</sup>

<sup>1</sup>Department of Anatomy, Division of Health Sciences, University of Otago, Dunedin, New Zealand

With recent tensions surrounding immigration and refugee movements, and problems in stemming outbreaks such as Zika, the impact of human interaction and spread of disease is a topical one. An evolutionary approach to the issue is beneficial to the discussion. Palaeopathological analysis assists in the overall understanding of the relationship that human populations have with their biocultural context in terms of health. Inter- and intra- population human interaction plays an integral part in the overall prevalence of disease in human groups, with the process potentially influencing resource access and introduction of new pathogens into a region. In the region of Asia there is genetic and archaeological evidence of complex interaction from the Neolithic (~7000BCE) onwards. With increasing population sizes due to intensification of agriculture, human interaction began to intensify. Over time, systems of trade were established, conflict of territories arose, and technology assisting in travelling long distances developed, expanding modes of contact.

This developing PhD project aims to undertake macroscopic analyses of disease on skeletal collections from sites throughout Asia from the Neolithic onwards. This will be pursued in order to assess health levels of populations undergoing varying levels of interaction: from contact with similar cultural groups to larger scale exogenous migrations. It is hypothesised that human group contact will increase levels of disease impacting overall health levels, which has modern health

**INVESTIGATING THE MATERNAL-INFANT NEXUS IN HEALTH IN THE PAST**

Sian Halcrow

No abstract supplied



**COMMUNITY-BASED INTERVENTION FOR TYPE 2 DIABETES IN KUPANG, EAST NUSA TENGGARA, INDONESIA.**

Anna Wahyuni Widayanti<sup>1,2</sup>, Pauline Norris<sup>1</sup>, James Green<sup>1</sup>, Susan Heydon<sup>1</sup>

<sup>1</sup>School of Pharmacy, University of Otago, New Zealand, <sup>2</sup> Faculty of Pharmacy, Gadjah Mada University, Yogyakarta, Indonesia

**Background:** This quasi-experimental study compared the effectiveness of an intensive community based intervention derived from qualitative work in this community, to usual care for type 2 diabetes patients in Kupang.

**Methods:** 67 participants (32 control; 35 intervention) were recruited. The 3-month intervention consisted of weekly group activities including education, clinical measurement, healthy snacking and physical activity. Usual care for participants in the control group was provided by community health centres. The primary outcome was change in HbA1C, compared between groups with ANCOVA with baseline HbA1c as covariate.

**Results:** Participants were 60% female, mean age 57 (range 36 to 75), and had diabetes for an average of 4.5 years. Baseline HbA1C did not differ (control mean 8.35%, SD 2.60; intervention 8.26%, SD 1.89). Post-intervention, both groups showed improvement in HbA1C (control mean 7.75%, SD 2.31; intervention 7.34%, SD 1.27). Although more intervention than control participants achieved HbA1C reduction of 0.5%, 43% compared to 31%, change between groups was not different ( $p = 0.4$ ).

**Conclusions:** Statistically, the effect of the intensive community based intervention did not differ from usual care. However, both groups made improvement, suggesting that the project might have indirectly triggered more intensive care to diabetes patients.

**MOSQUITOS AS A SECURITY THREAT: VECTOR BORNE ILLNESSES, WATER, CLIMATE AND OVERCROWDING IN PACIFIC URBAN SETTLEMENTS.**

Jenny J. Bryant-Tokalau

Te Tumu (School of Maori, Pacific and Indigenous Studies), University of Otago, Dunedin, New Zealand; and, School of Government, Development and International Affairs, University of the South Pacific, Suva, Fiji.

Epidemics of weather and climate-sensitive infectious diseases are challenging health systems in the Pacific. Outbreaks of mosquito borne illnesses including chikungunya, malaria and dengue not only have serious impacts on human health and socio-economic development, but also severely overburden health providers. These illnesses are increasingly found in overcrowded informal settlements in Pacific towns.

The arrival of new mosquito vectors that bite at any time and are also moving south into cooler areas are of particular concern, leading to new epidemics such as zika and chikungunya. Informal (or 'squatter') settlements are of particular concern. For example, of the 27,000 cases of dengue in Fiji 2013-14, the majority were in the settlements and poorer neighborhoods. The 2017 dengue outbreak across the Pacific islands is largely urban with more than 25,000 cases declared by July.

This research examines what is now a 'perfect storm' of deteriorating health conditions in Pacific urban areas. Declining water quality and availability, along with poor sanitation and resultant illnesses, as well as major disasters, such as cyclones, droughts and flooding are adding to what is rapidly becoming a health crisis for Pacific urban populations.

**PNEUMOCOCCAL CARRIAGE SEROTYPES IN A RURAL GAMBIAN POPULATION WITH HIGH VACCINE PRESSURE.**

Effua Usuf<sup>1,2</sup>, Christian Bottomley<sup>2</sup>, Kaddijatou Jawneh<sup>1</sup>, Abdoulie Bojang<sup>1</sup>, Ousman Secka<sup>1</sup>, Philip Hill<sup>3</sup>, Anna Roca<sup>1,2</sup>

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**Background:** In countries that have introduced pneumococcal conjugate vaccines (PCVs), there has been a change in the distribution of serotypes, with a decrease of vaccine serotypes (VT) and an increase of non-vaccine serotypes (NVT).

**Methods:** In 2016, we conducted a cross-sectional survey in rural Gambia five years after routine PCV13 and seven years after routine PCV7 in villages that had formerly participated in a community-wide PCV7 trial between 2006 and 2008.

During the survey, we collected nasopharyngeal swabs (NPS) from 2500 villagers: all children resident in the study area <5 years, 50% of children 5-14 years and 25% of villagers ≥15 years. All NPS were processed for pneumococcal isolation using standard microbiological methods.

**Results:** Overall, pneumococcal carriage was 57.5% (12.5% VT and 45.6% NVT). VT carriage decreased from 14.1% in children <5years to 5.1% in villagers ≥15 years (p<0.001). NVT also decreased from 69.1% to 25.2% (p<0.001). The most common VT serotypes were 19F (4.5%), 3(4.1%) & 6A (4.1%), and the most common NVT were NT (8.2%), 34 (8.0%), 23B (7.6%), & 15B (5.6%).

**Conclusion:** Five years after PCV13 in rural Gambian communities with high vaccine pressure, more than 10% of the population still carries pneumococcal VT.

**TUBERCULOSIS REGISTRATIONS 2012-15 AT A RURAL HOSPITAL IN EAST NEW BRITAIN PROVINCE, PAPUA NEW GUINEA – A DESCRIPTIVE STUDY**

Dr David Jones

Respiratory Physician, formerly Capital & Coast DHB, Wellington NZ, Volunteer physician (Voluntary Service Abroad NZ) 2015-16 St Mary's Hospital, Kokopo, East New Britain Province, PNG

**Background:** Tuberculosis is very common in PNG (Incidence 432/100,000 - WHO 2015 report). This retrospective review examines practice and results in one hospital.

**Methods:** At this rural provincial hospital in PNG, (estimated catchment population 100,000) TB cases are recorded in a standard handwritten register. Transcribing 2012-2015 case data into an Excel spreadsheet (for a merged public health database) enabled the presented information to be extracted.

**Results:** 432 cases were registered over four years, 232 Male 200 Female, mean age 38 (range 8-80); ie TB incidence of 108 per 100,000 /year. 350 were Pulmonary, 82 Extra-pulmonary; sputum smear positive 143, negative 152, none/not done 137. HIV status unknown in 350, Positive 6, Negative 76.

112 completed treatment, 34 with negative final sputum.

61 people died [28, 17, 11, 5 in the consecutive years] giving 14 % case fatality and 15.25/100,000/year population mortality rate (WHO rate 40 for PNG)

Care of 46 was transferred to another centre. 30 cases went missing, Another 183 had no information.

**Conclusions:** Incidence and mortality are lower than national rates, but inadequate follow-up information reveals a problem with treatment oversight – reasons to be discussed. The remedy would be real on-the-ground implementation of WHO's DOTS strategy.

Schedules for countries with established PCV programs that have already achieved herd immunity.

**TRIAL OF SIMPLIFIED PNEUMOCOCCAL VACCINATION IN VIETNAM II: THE HERD IMMUNITY APPROACH.**

Temple, Beth<sup>1, 2, 3</sup>; **Bright, Kathryn**<sup>3,4</sup>; Trong Toan, Nguyen<sup>4</sup>; Uyen, Doan Y<sup>4</sup>; Hau Phuc Tran<sup>4</sup>; Balloch, Anne<sup>3</sup>; Licciardi, Paul<sup>3, 5</sup>; Nguyen, Cattram Duong<sup>3, 5</sup>; Satzke, Catherine<sup>3, 5, 6</sup>; Smith-Vaughan, Heidi<sup>7</sup>; Vu, Thi Que Huong<sup>8</sup>; Nguyen, Thuong<sup>4</sup>; Mulholland, Edward Kim<sup>2, 3</sup>

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of Hygiene & Tropical Medicine, London, UK, <sup>3</sup>Pneumococcal Research, Murdoch Children's Research Institute, Melbourne, Australia, <sup>4</sup>Department of Disease Control and Prevention, Pasteur Institute of Ho Chi Minh City, Ho Chi Minh City, Vietnam, <sup>5</sup>Department of Paediatrics, University of Melbourne, Melbourne, Australia' <sup>6</sup>Department of Microbiology and Immunology, University of Melbourne at the Peter Doherty Institute for Infection and Immunity, Melbourne, Australia' <sup>7</sup>Child Health, Menzies School of Health Research, Darwin, Australia' <sup>8</sup>Microbiology and Immunology, Pasteur Institute of Ho Chi Minh City, Ho Chi Minh City, Vietnam

There are studies that demonstrate that PCV use results in significant herd protection for unvaccinated individuals. We hypothesise that maintenance control of IPD and pneumonia caused by vaccine type pneumococci may be achieved with only one or two doses of PCV, through herd immunity.

This trial is designed to address two key questions:

1. Does a 0+1 schedule of a) PCV10 or b) PCV13 administered at 12 months of age provide adequate immune responses and protection against NP carriage during the first two years of age?
2. Does a 1+1 schedule of a) PCV10 or b) PCV13 administered at 2 and 12 months of age provide adequate immune responses and protection against NP carriage during the first two years of age?

**Methods:** 2500 two month-old infants will be recruited in Ho Chi Minh City, Vietnam and randomized to one of five vaccination schedules. Participants will provide four nasopharyngeal swabs for analysis of pneumococcal carriage and up to three blood samples to assess immunogenicity of the schedules.

**Conclusion:** This trial will provide a critical evidence base on simplified and more affordable PCV schedules. If the trial achieves its aims, it will open the way to the future use of simplified PCV schedules for countries with established PCV programs that have already achieved herd immunity.

### INTERFERON GAMMA RELEASE ASSAYS AND TUBERCULIN SKIN TEST POSITIVITY RATE IN NEW

### NURSING AND MEDICAL STUDENTS IN BANDUNG, INDONESIA

Lika Apriani<sup>1,2\*\*</sup>, Sue McAllister<sup>2</sup>, Katrina Sharples<sup>3</sup>, Bacht Alisjahbana<sup>1</sup>, Rovina Ruslami<sup>1</sup>, Dick Menzies<sup>4</sup>, Philip Hill<sup>2</sup>

<sup>1</sup>TB-HIV Research Centre, Faculty of Medicine Universitas Padjadjaran Bandung, Indonesia, <sup>2</sup>Centre for International Health, University of Otago, <sup>3</sup>Department of Mathematics and Statistics, University of Otago, <sup>4</sup>Respiratory Epidemiology and Clinical Research Unit McGill University Montreal, Canada

**Background:** Nursing and medical students in high tuberculosis (TB) incidence countries are at risk for *Mycobacterium tuberculosis* infection and TB disease. We carried out a study in Bandung, Indonesia to estimate Interferon Gamma Release Assays (IGRA) and Tuberculin Skin Test (TST) positivity and conversion rates for latent TB infection (LTBI).

**Methods:** A cohort study was conducted at Universitas Padjadjaran, Bandung, Indonesia. All new students who started their internship program between September 2016 and March 2017 were recruited. QuantiFERON-TB Gold Plus (QFT-Plus) was used for the IGRA. A subset of the students also had a TST. Agreement between the two tests was assessed.

**Results:** Of the 461 students, 414 (89.8%) were eligible. The reasons for non-eligibility were: history of TB (n=29); on TB treatment (n=2); prior TST positive (n=2), and non-consent (n=14). The IGRA positivity rate was 21.5% (95%CI 17.8 to 25.7, n=414). The TST positivity rate was 32.4% (95%CI 27.0 to 38.2, n=272). The agreement of the two tests was 74.6% (kappa=0.34, p-value<0.00005). Of those who were QFT-Plus baseline negative and completed one year follow-up (n=73) in 2017, four underwent QFT-Plus conversion.

**Conclusions:** Nearly a third of students were positive for LTBI. Understanding risk factors for conversion is needed to inform TB control strategies.

### COMMERCIALISING RESEARCH FINDINGS FOR APPLICATION IN LOW RESOURCE SETTINGS

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Charles F. Shaw<sup>1</sup>, Richard C. MacKnight<sup>1</sup>, Phillip C. Hill<sup>2</sup> and Stephen J. Sowerby<sup>3</sup>.

Departments of Biochemistry<sup>1</sup>, Preventive and Social Medicine<sup>2</sup>, and Otago Innovation Ltd<sup>3</sup>.  
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Research for the benefit of those in low resource areas suffers a form a conundrum: who pays for the costs of translation? Despite altruistic motives, the provision of new research outputs for widespread application requires considerable capital investment and a framework of intellectual property and commercial monopoly. Using Point of Care (POC) diagnostic examples, we will show how academic research can be leveraged in a commercial setting to translate tools for low resource settings.

In the first example, fluidic devices developed at the University of Otago for quantifying worm burdens in farm animals, have been patented, a company spin-out formed, investment capital raised and technology manufactured. Applications in farm animals have a commercial agenda, but also enabled delivery of POC technology into the hands of parasitology researchers focused on human soil transmitted helminthiasis, which affects some 1.5 billion people annually, largely in low resource areas.

In the second example, we are developing a POC triage test for active Tb. For this technology, Mycolic Acids (MA) in sputum are an appealing biomarker because they have markedly different physical properties to the lipids found in normal healthy subjects. The commercial framework to support the translation of this technology is likely to be Johnes disease, caused by a MA producing mycobacterial infection of agricultural livestock. Critical to enabling these technologies is the patenting process. How the non-disclosure rules required for intellectual property protection rest within an academic paradigm of disclosure is simply a matter of timing.

## BACTERIAL CAUSES OF FEBRILE ILLNESS AMONG ADULT PATIENTS ADMITTED TO YANGON GENERAL HOSPITAL, YANGON, MYANMAR

Tin Ohn Myat,<sup>1,8\*\*</sup> Khine Mar Oo,<sup>1</sup> Win Thandar Oo,<sup>1</sup> Hla Kye Mone,<sup>1</sup> Wah Win Htike,<sup>1</sup> Matthew Robinson,<sup>2,3</sup> Damien K. Ming,<sup>2</sup> Tehmina Bharucha,<sup>2</sup> Paul N. Newton,<sup>2,3</sup> Stuart Blacksell,<sup>3,4</sup> Ampai Tanganuchitcharnchai,<sup>3,4</sup> Ambarish Biswas,<sup>5</sup> Rachel F. Hannaway,<sup>5</sup> James E. Ussher,<sup>5,6</sup> David R. Murdoch,<sup>7</sup> John A. Crump<sup>8</sup>

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**Background:** In Myanmar there has been little research on causes of fever other than malaria. We sought to identify bacterial causes of fever among patients admitted to Yangon General Hospital (YGH), Yangon, Myanmar.

**Methods:** We recruited febrile adult patients attending YGH from 5 October 2015 through 4 October 2016. We collected blood for aerobic blood culture, and acute and convalescent sera for leptospirosis microagglutination testing (MAT), and *Orientia* and *Rickettsia* immunofluorescence antibody (IFA) testing. Nucleic acid amplification tests (NAAT) for rickettsial infections and scrub typhus were performed on negative blood culture broths.

**Results:** From 947 participants, we isolated 94 pathogens from 93 (9.8%) positive blood cultures. Of 94 pathogens, 43 (45.7%) were *Salmonella enterica*, 20 (21.3%) *Escherichia coli*, 7 (7.4%) *Klebsiella pneumoniae*, and 6 (6.4%) *Staphylococcus aureus*. Among 690 samples tested by NAAT, 24 (3.4%) were positive for *Orientia* spp



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and 27 (3.9%) for *Rickettsia* spp. *Leptospira* MAT, and *Orientia* and *Rickettsia* IFA are ongoing.

**Conclusion:** Community-acquired bacteremia was common, with enteric fever predominating. Both scrub typhus and rickettsial infections were identified. The results suggest that empiric regimens for management of febrile inpatients in Yangon should include agents active against *S. enterica* and tetracyclines to cover scrub typhus and rickettsial infections.

### ANTIMICROBIAL USE IN NEW ZEALAND PRODUCTION ANIMALS- A NATIONWIDE PILOT ANALYSIS

Mark Bryan<sup>1,2</sup>, Skye Fruean<sup>2</sup>

<sup>1</sup>NZVA AMR Leadership Group, <sup>2</sup>VetSouth

**Background:** The New Zealand Veterinary Association (NZVA) has acknowledged the significance of antimicrobial resistance (AMR) by setting a goal of not needing to use antimicrobials for animal health and welfare by 2030. Part of this ambitious leadership involves assessing current antimicrobial use (AMU) and developing appropriate change management programmes.

**Methods:** Data were gathered from six major clinics across New Zealand for a single year by species type, number and age; farm type and ownership structure (dairy only), and all antimicrobials (by mg of active) sold to these farms were taken as a proxy for use.

**Results:** Data were gathered from 1462 dairy farms and 707 other (general) farms, representing 623430 adult milking cows, 27399 mixed age beef animals, 706035 mixed age ewes, and 12107 mixed age hinds and stags.

Mean PCU for all dairy farms was 8.54 mg/kg (min/max by clinic 4.72, 11.91). Mean PCU for all general farms was 0.57 mg/kg (min/max by clinic 0.32, 0.94).

**Conclusion:** These data confirm previous figures for the dairy industry, and also provide the first data on the red meat sector. The red meat sector in New Zealand has a remarkably low AMU profile compared to red meat use in other countries.

### OWNED DOG POPULATION IN RURAL HOUSEHOLDS IN KYRGYZSTAN

Ron Jackson, Kuban Abdykerimov, Nico Wageningen, Kalys Jumakanov, Kubanychbek Antanov, Mairambek Tairov

Fifty village health committees (VHCs) were purposively selected in late 2012 to conduct a survey designed to obtain reliable demographic information about the owned dog population in rural villages in Kyrgyzstan. These data were required for control plans for rabies and cystic and alveolar echinococcosis throughout the Republic. The control strategies embodied a philosophy of community action for health and VHCs were ideally placed for participation because of their unique responsibility for health and local knowledge. Two members from each selected VHC were contracted to interview 20 systematically selected households (10 per member) in their home village.

A total of 1,123 dogs were kept in 917 (84.83%) of the 1,081 households which were interviewed. Extrapolation of these data to 826,557 rural households in Kyrgyzstan produced estimates of 85% with dogs and 858,671 owned dogs. The estimated number of dogs was subsequently found to be almost twice the true number. The dog median age was 3 years, 81.8% were male, 70% were guard dogs, 20% were pets and about 8% were used for herding. About 65% sometimes roamed free in the villages, most (84%) were fed uncooked offal and all ate rodents or small animals. Older sheep (>5 years), which are the highest-risk group for infecting dogs, were more likely to be slaughtered between January and April than at any other time.

### INTEGRATED ONE HEALTH SURVEILLANCE SYSTEMS FOR ANTIMICROBIAL RESISTANCE AND ANTIMICROBIAL USE IN ASIA AND AFRICA

Joanna McKenzie<sup>1</sup>, Roger Morris<sup>2</sup>, Peter Jolly<sup>1</sup>

<sup>1</sup> International Development Group, Institute of Veterinary Animal & Biomedical Sciences, Massey University, Palmerston North, New Zealand, <sup>2</sup> MorVet Ltd, Consultancy services in

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health risk management and food safety policy and programs, 1 Homebush Road, Masterton, 5885, New Zealand

Antimicrobial resistance (AMR) is a global health issue involving a complex set of factors relating to humans, animals, the environment and their interaction. Collaborative One Health (OH) surveillance systems that generate AMR and antimicrobial use (AMU) data in the different populations and compare patterns between them can indicate epidemiological links and guide source attribution for the causal factors involved in emergence of antimicrobial resistance in zoonotic pathogens important to human health. These links can be investigated to understand AMR transmission pathways and develop evidence-based policies and programmes to mitigate AMR risks.

OH is a fundamental principle of the WHO-FAO-OIE Global Action Plan for AMR and the UK Department of Health's \$400 m. Fleming Fund Programme. As a technical partner to the Management Agent for the Fleming Fund, Massey University is working with countries in Asia and Africa to support integrated OH AMR and AMU surveillance systems that focus on WHO-priority zoonotic bacteria and antibiotic combinations. Surveillance will initially be strengthened and integrated in human and livestock populations by enhancing diagnostic testing and data analysis capabilities, and establishing multi-sectoral surveillance working groups responsible for interpretation of the surveillance information and guiding policy decisions within countries.

### UNDERSTANDING *CAMPYLOBACTER* AND NON-TYPHOIDAL *SALMONELLA* IN THE LIVESTOCK AND POULTRY MEAT PATHWAYS IN KILIMANJARO AND ARUSHA REGIONS, TANZANIA, 2015-2017

Kate M. Thomas<sup>1</sup>, Ruth N. Zadoks<sup>2</sup>, Gary C. Barker<sup>3</sup>, Jackie Benschop<sup>4</sup>, Joram Buza<sup>5</sup>, Sarah Cleaveland<sup>2</sup>, Margaret Davis<sup>6</sup>, Nigel P. French<sup>4</sup>, Rudovick R. Kazwala<sup>7</sup>, Blandina T. Mmbaga<sup>8</sup>, Niwael Mtui<sup>9</sup>, Gerard Prinsen<sup>10</sup>, Jo Sharp<sup>11</sup>, Emmanuel Swai<sup>9</sup>, John A. Crump<sup>1</sup>

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**Background:** Non-typhoidal *Salmonella* (NTS) is estimated to cause 680,000 deaths annually, mostly in Africa. Tanzania is a hotspot for zoonotic enteric pathogens, including both NTS and *Campylobacter*, which cause diarrhoea and non-malarial febrile illness. Healthy livestock and poultry are a potential source of both pathogens. We sought to determine the prevalence of these pathogens in the meat pathway.

**Methods:** Faeces, carcass swabs, and meat from cattle and goats were obtained at slaughter and from butchers and tested for NTS. Cloacal swabs were obtained from live chickens on farms and tested for NTS and *Campylobacter*. Environmental samples were taken from slaughter, butcher and farm sites.

**Results:** NTS were recovered from 21 (2.7%) of 785 chicken cloacal samples, 4 (1.2%) of 335 cattle faecal samples, 8 (3.4%) of 233 goat faecal samples, 50 (10.9%) of 460 beef samples, 20 (9.7%) of 207 goat meat samples, 5 (1.9%) of 269 cattle carcass, 6 (3.3%) of 183 (3.3%) goat carcass, 31 (13.7%) of 226 cattle and goat environmental, and 13 (16.5%) 80 chicken farm environmental samples. *Campylobacter* were recovered from 46 (7.0%) of 657 (7.0%) chicken cloacal samples. NTS were recovered at a significantly higher frequency from cattle and goat meat than from cattle and goat carcass or faecal samples ( $p < 0.05$ ).

*Campylobacter* was more commonly isolated from chicken samples than NTS.



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**Conclusions:** Further isolate characterisation by WGS will help to determine if livestock isolates are contributing to human NTS and *Campylobacter* disease in East Africa.

**KEYNOTE ADDRESS: MCAULEY ORATION**

**WHICH DEVELOPING COUNTRIES ARE BETTER AT CONVERTING ECONOMIC GROWTH INTO BETTER HEALTH AND WHY?**

Mark McGillivray

Alfred Deakin Institute, Deakin University, Geelong, Australia

There is a large literature that looks at links between economic growth and achievement in health in developing countries. This lecture also looks at this relationship, but in a different way to most studies. It asks why some developing

countries are better at converting economic growth into better health, rather than simply asking if economic growth matters for better health. The rationale for focussing on this question is provided, as are some of the research challenges it poses. The lecture then turns to a related question, that being which developing countries have higher health achievements than predicted by their incomes per capita. It presents empirical findings for this question. These findings have been obtained from a sample of 138 developing countries. Two alternative indicators of health are used: life expectancy and child mortality. The top achieving countries are identified and their characteristics are briefly discussed.

POSTER ABSTRACTS – IN ORDER OF PRESENTATIONS AND WHERE RECEIVED  
\*\*DENOTES ELIGIBLE FOR STUDENT PRIZE

**LEAN THINKING IN HEALTHCARE: PUBLISHED SUCCESS STORIES AND THEIR SIDE-EFFECTS SYSTEMIC EFFECTS OF DEFICIENT INTEGRATION AND PHILOSOPHICAL ASPECTS UNCOVERED VIA SYSTEMATIC LITERATURE REVIEW**

Adeel Akmal\*\*

University of Otago, Dunedin, New Zealand

**Background:** Lean Thinking is an integrative management philosophy originating in the automobile manufacturing supply chain sector, credited with highly beneficial fundamental systemic transformation. Applications of Lean Thinking in healthcare lack critical integration and philosophical aspects, leading to questions of why and how to remedy this?

**Methods:** A systematic literature review searched for missing features of Lean Thinking implementations in healthcare and their consequences for the wider system. A total of 77 case studies were systematically retrieved and analysed.

**Results:** The analysed cases implemented Lean Thinking only in their internal operations to achieve operational excellence—a finding at odds with

evidence of high integration found within manufacturing environments. As a result, Lean Thinking within a healthcare context appears to be a short-term tactical goal rather than a long-term strategic policy or organizational philosophy.

**Conclusion:** Integrating Lean Thinking within healthcare supply chain environments would ensure waste is removed from the system, instead of being transferred to other stakeholders. Lean Thinking needs to be implemented as an organizational strategy or philosophy, ensuring coverage of a set of crucial elements, rather than a tactical response, to address the complexity of the healthcare environment.

**NEIGHBOURHOOD ETHNIC DIVERSITY AND CHILD HEALTH OUTCOMES IN ETHIOPIA**

Yonatan Dinku\*\* , David Fielding and Murat Genç

University of Otago

Using a nationally representative sample from Ethiopia’s Demographic and Health Survey 2011, this paper provides new evidence on the link between ethnic heterogeneity and child health outcomes. Contrary to the traditional view that ethnic



heterogeneity impairs social and economic development, our study shows that children in relatively diverse communities are better nourished and more likely to receive a full set of vaccinations. There is also some evidence that the main channel for this effect is that women in ethnically diverse communities are better informed about health issues and more empowered in making health care decisions than their counterparts in homogeneous communities

### **WORKFORCE SUPPORT SYSTEMS FOR PAPUA NEW GUINEA AND PACIFIC ISLAND ALLIED OPHTHALMIC PERSONNEL**

Grace Johnstone

Fred Hollows Foundation New Zealand (FHFNZ)

Many of the graduates from the Fred Hollows Foundation New Zealand (FHFNZ) eye care training programmes are working in isolated regions within the Pacific that are often under resourced. Workforce Support (WFS) is important in retaining graduates within the workforce and providing them support and resources to deliver high quality eye care. To meet the WFS needs of trained allied ophthalmic personnel, FHFNZ designed a WFS programme, providing a comprehensive system that allows for in-country senior eye care trained nurses and other allied ophthalmic personnel to deliver a consistent level of quality eye care support to graduates. The structure also allows comparable reporting via a standardised approach, providing valuable information for FHFNZ to evaluate the work of graduates in the field, and the FHFNZ student training programmes. Data collected via WFS visits helps to inform the development of eye care training, education topics for in-country workshops, and evaluating clinic equipment and consumable needs.

### **ASSESSING MENTAL HEALTH STATUS AMONG UNDERGRADUATE STUDENTS IN UNIVERSITY OF MALAYA: BASELINE DATA FROM THE HEALTHY CAMPUS INITIATIVES STUDY**

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**Background:** The aim of this study was to examine the prevalence of depression, anxiety and stress and its association with demographic factors among undergraduate University of Malaya students.

**Methods:** A cross-sectional study was conducted in University of Malaya among first year undergraduate students that were recruited through universal sampling. Mental health status of students were assessed through Depression, Anxiety and Stress Scale-21 Items (DASS-21), along with sociodemographic questionnaire. Multiple logistic regression was used to test for risk factors of mental health problems. Ethical approval was obtained from UMMC medical review board (MECID No: 20156-1401).

**Results:** In total, 1606 individuals comprised the study population included in the survey analysis with the mean age of students were 19.46±0.66 years. The prevalence of depression, anxiety and stress from moderate to extremely severe were 22%, 50% and 12% respectively. Higher depression score was associated with living without family and having more than one financial support. Higher anxiety score was associated with female gender, living without family and having medical illness. Higher stress score was associated with Indian ethnicity and living without family.

**Conclusions:** First year undergraduate students suffers substantially high in DASS-21 scores. It shouldn't be neglected as mental health problems contribute to the global burden of diseases.

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