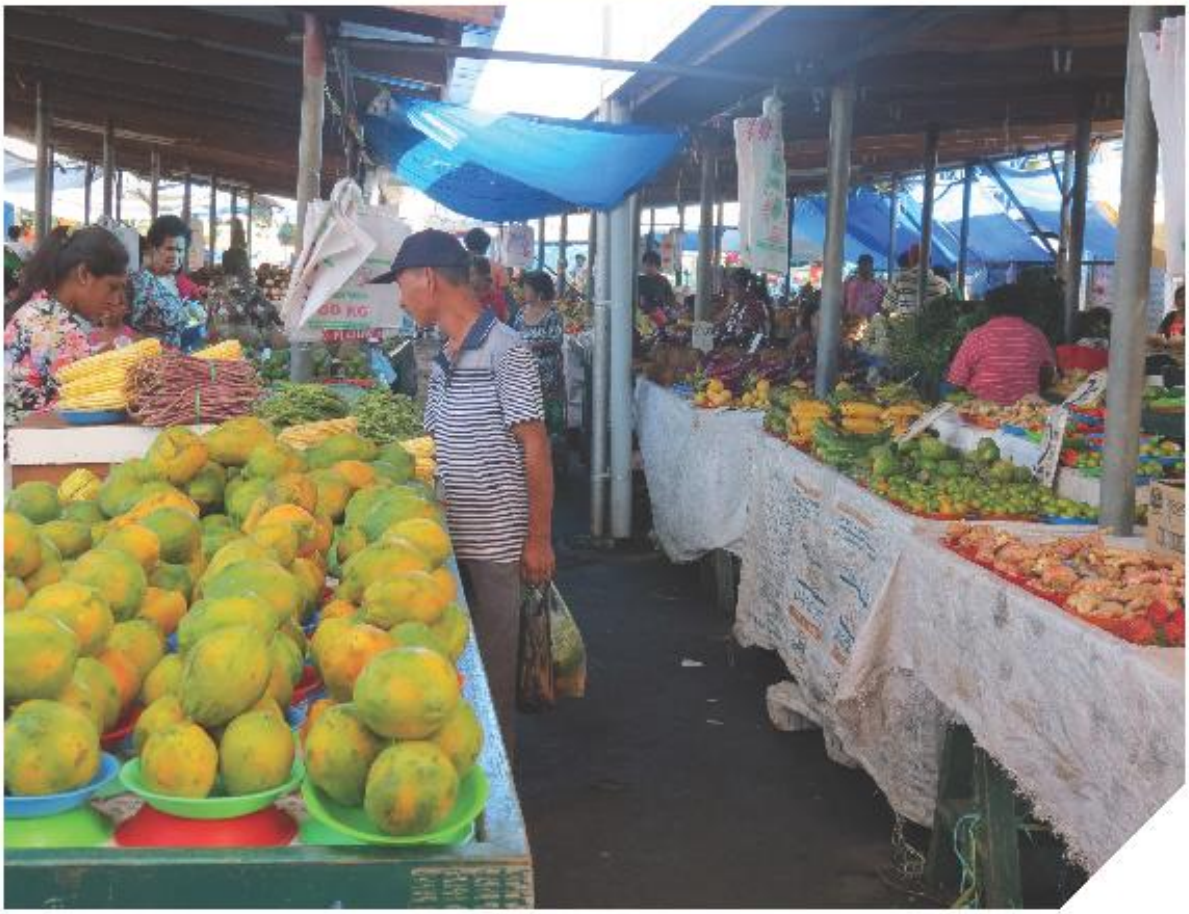
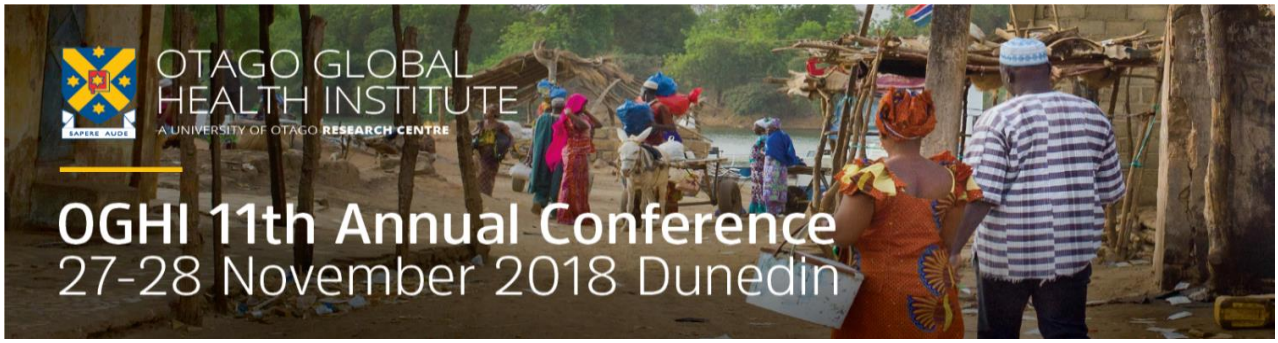
OTAGO GLOBAL HEALTH INSTITUTE
A UNIVERSITY OF OTAGO RESEARCH CENTRE

Otago Global Health Institute 11th Annual Conference Programme

27-28 November 2018 | Hutton Theatre, Otago Museum



#OGHI2018



Programme			**Tuesday 27 November 2018**	Hutton Theatre Otago Museum,Dunedin
Session			**Opening**	**Chair: Lisa Houghton**
12:00	**-**	**12:30**	Lunch	
12:30	**-**	**12:45**	Registration	
12:45	**-**	**1:15**	Introduction: Professor Richard Barker, Pro-Vice-Chancellor, Science	
			Pacific welcome: Dunedin Kiribati Community	
			Global Health Perspective 2018: Associate Professor Lisa Houghton	
Session 1				**Chair: Lisa Houghton**
			SUSTAINABLE DEVELOPMENT GOALS · 2 ZERO HUNGER · 3 GOOD HEALTH AND WELL-BEING · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	
1:15	**-**	**1:30**	Stephen Goodman, CEO Volunteer Service Abroad (VSA)	
1:30	**-**	**1:45**	Paul Eme**, Quantitative estimates of dietary intakes of adults (19-60 years) in South Tarawa, Kiribati	
1:45	**-**	**2:00**	Tony Binns, Rural livelihoods and food security: Long-term insights from Sierra Leone's Eastern Province	
2:00	**-**	**2:15**	Tim Green, Iron deficiency does not explain the high rate of anaemia among non pregnant women of reproductive age (WRA) in Cambodia: Findings of 2x2 factorial, double-blind, randomized controlled trial	
2:15	**-**	**2:30**	Mark Vicol, Studying home gardens as if people mattered: Why don't food-insecure households in rural Myanmar cultivate home gardens?	
2:30	**-**	**2:45**	Discussion	
2:45	**-**	**3:15**	**Afternoon coffee**	

Programme			Tuesday 27 November 2018 continued	Hutton Theatre Otago Museum,Dunedin
Session 2				**Chair: Tony Binns**
			   	
3:15	**-**	**3:30**	Grace Johnstone, The Fred Hollows Foundation New Zealand: Developing sustainable eye care systems in Pacific Island Countries	
3:30	**-**	**3:45**	Josh Cronin-Lampe**, Improving the uptake of diabetes retinal screening services in the Pacific: A case study of the Pacific Eye Institute in Fiji	
3:45	**-**	**4:00**	Sofa Rahmannia**, Influence of the national wheat flour fortification program on the micronutrient adequacy of the diets of lactating women in Sumedang district, West Java, Indonesia	
4:00	**-**	**4:15**	Widyasanti Atmaharmoni**, Determinants of the adequacy of micronutrient intakes among lactating women in a rural area of Indonesia	
4:15	**-**	**4:30**	Romulo F. Nieva Jr, Assessment of medicines supply chain management of select primary care facilities in the Philippines	
4:30	**-**	**4:45**	Sumera Akhtar **, The role of Pakistani mothers in children's medicine-taking in New Zealand	
4:45	**-**	**5:00**	Stacey Ward**, Wealth does not equal health: A multidisciplinary study of material inequality and its effect on health at Iron Age Non Ban Jak, Northeast Thailand	
6:00			**Optional Conference Dinner** (for those registered) **University of Otago Staff Club** **Gallery Room – ground floor** **Union Place by the Water of Leith** **(A cash bar will operate)**	

Programme			Wednesday 28 November 2018	Hutton Theatre Otago Museum, Dunedin
Session 3				**Chair: Ros Gibson**
				
9:00	**-**	**9:15**	Tim Green, High micronutrient deficiencies despite adequate caloric intake on remote reef islands of Kiribati	
9:15	**-**	**9:30**	Sue McAllister, Disease characteristics and treatment of patients with diabetes mellitus attending government health services in Indonesia, Peru, Romania and South Africa	
9:30	**-**	**9:45**	Lisa Daniels, Breast milk volume and micronutrient composition, the association of maternal diet and adequacy of micronutrient intake of exclusively breastfed Indonesian infants	
9:45	**-**	**10:00**	Aly Diana, Breastmilk intake among exclusively breastfed Indonesian infants is negatively associated with maternal fat mass	
10:00	**-**	**10:15**	Hannah Sim**, Samoan, New Zealand and Nepalese medical student perspectives and ideas regarding global health within medical curricula	
10:15	**-**	**10:30**	Macandrew Bay School artwork	
10:30	**-**	**11:00**	**Morning coffee**	
Session 4				**Chair: Richard Edwards**
				
11:00	**-**	**11:15**	Mark McGillivray, Weighting the human development index: Health matters most	
11:15	**-**	**11:30**	Saeideh Babashahi**, Priority list of chronic non-communicable diseases to guide R&D initiatives and spending: Results from New Zealand	
11:30	**-**	**11:45**	Priya Mohan**, Smokeless tobacco – A barrier to achieve sustainability development goal in India	
11:45	**-**	**12:00**	Anupa Pathak**, Use of clinical outcome measures in developing countries: Are we using the right scales?	
12:00	**-**	**1:00**	**Lunch**	

Programme			Wednesday 28 November 2018 continued	Hutton Theatre Otago Museum, Dunedin
Session 5				**Chair: John Crump**
				
1:00	**-**	**1:15**	Susan Heydon, Experiencing smallpox – a disease of childhood in Nepal in the 1960s	
1:15	**-**	**1:30**	Christian S. Marchello, Global typhoid fever incidence: a systematic review and meta-analysis	
1:30	**-**	**1:45**	Tin Ohn Myat**, Molecular mechanisms of antimicrobial resistance and phylogenetic relationship of *Salmonella enterica* serovars Typhi and Paratyphi A from febrile patients in Yangon, Myanmar	
1:45	**-**	**2:00**	Win Thandar Oo**, Incidence of typhoid and paratyphoid fevers among adolescents and adults in Yangon, Myanmar	
2:00	**-**	**2:15**	Soraya Kaewpitoon, Community-based intervention for liver fluke in Nakhon Ratchasima, Northeast Thailand.	
2:15	**-**	**2:30**	Natthawut Kaewpitoon, Surveillance of intestinal helminthic infection in village level in Northeast Thailand	
2:30	**-**	**3:00**	**Afternoon coffee**	
Session 6				**Chair: Philip Hill**
				
3:00	**-**	**3:15**	Lika Apriani**, Prevalence of positive tuberculin skin test and associated risk factors in health care workers at a general hospital in Bandung, Indonesia	
3:15	**-**	**3:30**	Haider Al-Darraji**, Tuberculosis knowledge among prisoners and correctional officers in a prison with high tuberculosis burden in Malaysia	
3:30	**-**	**3:45**	Prakash Khadka**, Inhaled rifampicin for the treatment of tuberculosis	
3:45	**-**	**4:00**	Basanth Babu Eedara**, Cocrystal approach to improving treatment of pulmonary tuberculosis	
4:00	**-**	**4:15**	Susan Jack, Impetigo and scabies among school children in rural Samoa.	
4:15	**-**	**4:30**	Student presentation prize and Closing	
4:30			Free time to walk to Te Wao Nui. Otago Business School	

Programme			Wednesday 28 November 2018 continued
5:00	**-**	**5:30**	**Venue: Te Wao Nui, Otago Business School** **Drinks and nibbles**
			Chair: Lisa Houghton
5:30	**-**	**6:30**	**Keynote address: McKinlay Oration** **Assessment and control of vitamin and mineral deficiencies globally: generating better data for more coherent public health programs.** **Kenneth H Brown, MD**
			Chairs: John Crump & David Fielding
6:30	**-**	**7:00**	**Otago Global Health Institute Launch** **Dr Royden Somerville, QC** **Chancellor - University of Otago** **All welcome**

Poster Presentations

Paul Eme**, Prevalence of obesity and overweight and its associated factors among the residents of South Tarawa, Kiribati

Arezoo Fakhimi **, 'A study of the effect of marketing strategy on purchase intention by mediating variables in healthcare (case study: cosmetic surgery clinics in Isfahan)

Mehran Kamali , Identifying the effective factors of customer empowerment for health insurance development

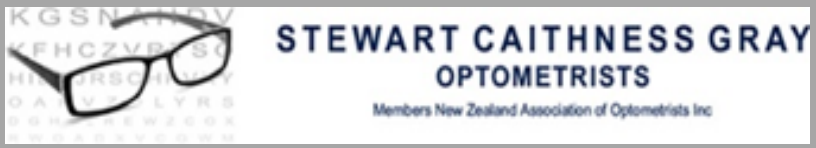
Mona Koushan **, Cause of surgery cancellation: A systematic literature review

Debbie McCorkindale, Formulating antimicrobial reduction strategies using farmer-led participatory development

Saadlee Shehreen**, Horizontal transfer of antibiotic resistance genes: A CRISPR connection?

**denotes eligible for student prize

Student prizes and Macandrew Bay School artwork kindly sponsored by



ORAL PRESENTATIONS

QUANTITATIVE ESTIMATES OF DIETARY INTAKES OF ADULTS (19-60 YEARS) IN SOUTH TARAWA, KIRIBATI

Paul Eme**

Background: Macro and micronutrient malnutrition are public health concerns in most Pacific Small Island Developing States including Kiribati, partly due to monotonous, cereal-based diets that deficit diversity. The aim of the study was to assess the dietary intakes of adult population in South Tarawa, Kiribati.
Methods: A cross-sectional community-based study composed of 161 households that were randomly selected from Betio, Bikenibeu and Teaorereke was conducted. Ethical approval and informed consents forms were obtained from the respected authority and subjects respectively. Family dietary surveys including 24 H dietary recall and assessment of dietary diversity using Household Diet Diversity Scores (HDDS) were done. A 3-day weighed food record was done on the sub-sample (10%) of the sample size. Data analyses were done using FoodWorks Pro 8 and SPSS and presented in tables and charts.
Results: The mean ±SD of Energy Density (ED) for males and females was 7.00±2.39 kcal/g and 6.39 ±2.64 kcal/g. About 90% of the subjects consumed rice-based dishes, 77.8% consumed flour-based dishes, and 33.3% consumed breadfruit based dishes. Sixty-one of the subjects had the lowest dietary diversity, 36.3% had a medium dietary diversity and only 2.7% had the highest dietary diversity. Based on the weighed food record results, the males' subjects of all age groups had adequate intake of riboflavin (Vit. B_2), niacin, vitamin C, iron and zinc but had consumed excess protein, sodium and magnesium and low intake of potassium and calcium. The females' subjects of some age groups had adequate intake of vitamin C, iron and zinc but had consumed excess protein, sodium and magnesium and low intake of potassium and calcium.
Conclusion: Nutrient inadequacies are prevalent among the adult population in South Tarawa. Recommendation: Food-based dietary diversity approaches are highly recommended.

RURAL LIVELIHOODS AND FOOD SECURITY: LONG-TERM INSIGHTS FROM SIERRA LEONE'S EASTERN PROVINCE

Tony Binns and Jerram Bateman

Tony Binns: Department of Geography, University of Otago, Dunedin, New Zealand
Jerram Bateman: Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand.

Sierra Leone is one of the world's poorest countries, which in the last two decades has suffered from a devastating civil war and more recently an epidemic of the deadly Ebola disease. Both economy and livelihoods have suffered considerably and the government and local communities are now working hard to re-build these. Food insecurity has been a longstanding issue among Sierra Leone's rural households. This paper considers some of the main parameters in the food security debate, and then examines food security in the context of the country's rural development policies. Using data collected from field-based research undertaken in two Eastern Province communities in the 1970s, and more recently in 2014, a valuable long-term perspective is provided in relation to seasonal and intra-household food insecurity and the impact of certain shocks in exacerbating the situation. The paper concludes that further rural extension support, increasing cash crop production and community education programmes could help to raise awareness of food insecurity issues and possibly lead to an improvement in nutritional levels in communities and within individual households.
Key Words: Food security, Sierra Leone, rural livelihoods, farming, households

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Professor J.A.(Tony) Binns FRGS, FNZGS, FHEA
Ron Lister Chair of Geography
President (2008-2016), Commonwealth Geographical Bureau
President (2010-2011), New Zealand Geographical Society
President (1994-1995), The Geographical Association (UK)
Visiting Professorial Fellow, School of Global Studies, University of Sussex, Brighton, UK
Otago Global Health Institute, Leadership Group
Series Editor, Routledge *Perspectives on Development*
Chair, International Editorial Advisory Board, *Australasian Review of African Studies*
Africa Commission- International Geographical Union, Steering Committee
Hon. Chief Manjawah of Sandor (Sierra Leone)

IRON DEFICIENCY DOES NOT EXPLAIN THE HIGH RATE OF ANAEMIA AMONG NONPREGNANT WOMEN OF REPRODUCTIVE AGE (WRA) IN CAMBODIA: FINDINGS OF 2X2 FACTORIAL, DOUBLE-BLIND, RANDOMIZED CONTROLLED TRIAL.

Crystal Karakochuk[1] Kroeun Hou[2] and Tim Green[3]

[1]Department of Food, Nutrition, and Health, University of British Columbia, and the British Columbia Children's Hospital Research Institute, Vancouver, Canada
[2]Helen Keller International, Phnom Penh, Cambodia
[3]Discipline of Pediatrics, University of Adelaide, and Healthy Mothers, Babies, and Children's Theme, South Australian Health and Medical Research Institute, Adelaide, Australia

Background: Anaemia in nonpregnant WRA in Cambodia is >50%. It is often assumed that 50% of anaemia is caused by iron deficiency (ID) in low income settings. Genetic haemoglobin disorders, not ID, explain most of this anaemia in observational studies. However, serum ferritin and transferrin receptor are elevated in these disorders. To clarify the role of iron in the aetiology of anaemia, we measured the effect of daily oral iron with or without multiple micronutrients (MMNs) on haemoglobin response in nonpregnant Cambodian WRA screened as anaemic.
Design: Women (18-45y; n=809) with hemoglobin <117g/L (at screening) were randomized to receive 12wks of iron (60 mg; Fe group), MMNs with no iron (MMN group), iron plus MMNs (Fe+MMN group), or placebo capsules.
Results: Baseline anaemia was 58%. The predicted proportions (95% CIs) of women with a haemoglobin response (>10 g/L at 12wk) were 19% (14%, 24%), 9% (5%,12%), 30% (24%, 35%), and 5% (2%, 9%) in the Fe, MMN, Fe+MMN, and placebo groups, respectively.
Conclusions: Overall, ~24% of anaemic women responded to iron supplementation, with no additional benefit of MMN. Even a lower percentage would respond in the wider population.
Implication: A plan for blanket iron supplementation of nonpregnant WRA in Cambodia has been stopped.
Funding: Micronutrient Initiative, Sight and Life, and the Canadian Institutes of Health Research.

STUDYING HOME GARDENS AS IF PEOPLE MATTERED: WHY DON'T FOOD-INSECURE HOUSEHOLDS IN RURAL MYANMAR CULTIVATE HOME GARDENS?

Bill Pritchard[1], Mark Vicol[1], Anu Rammohan[2], Elen Welch[1]

[1]University of Sydney
[2]University of Western Australia

An extensive body of research, mainly undertaken by nutrition scientists and economists, indicates that the presence of a home garden is positively associated with improved household nutrition (and in particular, dietary diversity) in rural households of the Global South. However, this literature is relatively silent on the contexts that influence home garden uptake. This is problematic given rapidly changing social and economic landscapes, which reshape the place and scope for home gardens within rural households' livelihood and food provisioning arrangements. This paper reports original research from a large-scale mixed-methods food and nutrition security and livelihoods study in Myanmar that shows patchy uptake of home gardens amongst food insecure households. Using qualitative data from household interviews conducted in three states, we argue that emergent socio-economic contexts for rural households are posing heightened challenges for home gardens to contribute to food and nutrition security. The insights reported here emphasise the importance of applying a livelihoods lens to food and nutrition security research in the Global South.

THE FRED HOLLOWS FOUNDATION NEW ZEALAND: DEVELOPING SUSTAINABLE EYE CARE SYSTEMS IN PACIFIC ISLAND COUNTRIES

Grace Johnstone

The Fred Hollows Foundation New Zealand, Auckland, New Zealand

The Fred Hollows Foundation New Zealand carries on the work of University of Otago Alumnus and legendary New Zealander, the late Professor Fred Hollows. Fred was an ophthalmologist and social justice activist who championed the right of all people to high-quality and affordable eye care. The Foundation works in the Pacific, where an estimated 40,000 people are blind and many more suffer from visual impairment. Visual impairment and blindness has significant impact on quality of life and substantial economic consequence, yet, the majority of cases can be treated or prevented.

The Foundation partners with local ministries of health and universities to train and support eye health specialists to provide eye care services in their own communities and works to strengthen local health systems to achieve universal access to quality eye care. This presentation will illustrate the approach of the Foundation through a series of case studies, describe key outcomes to date, and identify ongoing challenges and opportunities for the Foundation.

IMPROVING THE UPTAKE OF DIABETES RETINAL SCREENING SERVICES IN THE PACIFIC: A CASE STUDY OF THE PACIFIC EYE INSTITUTE IN FIJI

Josh Cronin-Lampe**

The University of Auckland

Diabetic Retinopathy (DR), a salient complication of diabetes and primary cause of visual impairment and irreversible blindness, is a major public health concern in Fiji. With expedited diagnosis and timely treatment, DR-related vision loss can be largely averted. However, DR screening programmes typically suffer from suboptimal uptake and follow-up, hindering preventative action. This study examined the factors that influence DR screening uptake, and – using the Pacific Eye Institute (PEI) in Suva as a case – describes the demographic and clinical characteristics of those who presented to photoscreening and their attendance at follow-up. A systematic review of the literature searched for papers examining the facilitators and barriers of DR screening uptake, with an emphasis placed on screening programmes in low & middle income countries. Barriers included complex referral pathways, financial, temporal and geographic constraints, negative perceptions of DR screening, as well as a poor understanding of the disease by both patients and clinicians alike. Following the systematic review, a retrospective cohort study included all new patients presenting to the PEI for photoscreening between January of 2012 and December of 2017. The preliminary results from the descriptive analysis will be discussed in light of the evidence from the systematic review

INFLUENCE OF THE NATIONAL WHEAT FLOUR FORTIFICATION PROGRAM ON MICRONUTRIENT ADEQUACY OF THE DIETS OF LACTATING WOMEN IN SUMEDANG DISTRICT, WEST JAVA, INDONESIA

Sofa Rahmannia[1**], Aly Diana[2], Dimas E Luftimas[2], Dida A Gurnida[2], Dewi MD Herawati[2], Lisa A Houghton[3], Rosalind S Gibson[3]

[1]Graduate School of Biomedical Sciences Master Program, Faculty of Medicine, Universitas Padjadjaran, West Java, Indonesia
[2]Faculty of Medicine, Universitas Padjadjaran, West Java, Indonesia
[3]Department of Human Nutrition, University of Otago, Dunedin, New Zealand

Background: Whether the national wheat flour fortification program in Indonesia overcomes existing micronutrient inadequacies in lactating women's diets is uncertain. We assessed the dietary intakes of rural Indonesian breastfeeding mothers and investigated their micronutrient adequacy with and without the consumption of wheat flour fortified with thiamin, riboflavin, folate, iron, and zinc.
Methods: Dietary intakes were assessed from 3-day in-home weighed food records from 121 exclusively breastfeeding women at 2-5 months postpartum. Usual intakes and major food sources of energy and micronutrients were determined and the prevalence of micronutrient adequacy calculated with and without fortification.
Results: Without fortification, prevalence of adequacy was < 50% for folate, thiamin, riboflavin, niacin, vitamin B6, vitamin C, calcium; and 52% for vitamin B12. Fortification increased the prevalence of adequacy for folate from 41 to 80%, thiamin from 48 to 60%, and riboflavin from 41 to 69%, whereas the prevalence of adequacy for iron and zinc was > 90% with and without fortification. The overall mean prevalence of adequacy across 11 micronutrients was 49% ± 25% without fortification and 56% ± 28% with fortification.
Conclusions: Only some of micronutrient inadequacies were targeted by wheat flour fortification. Expanding the program to include niacin, vitamin B6, and B12 as fortificants should be considered.
Supported by the Bill and Melinda Gates Foundation and Indonesia Endowment Fund for Education (LPDP).

DETERMINANTS OF THE ADEQUACY OF MICRONUTRIENT INTAKES AMONG LACTATING WOMEN IN A RURAL AREA OF INDONESIA

Sofa Rahmannia[1], Widyasanti Atmaharmoni[1**], Aly Diana[1,2], Dimas Luftimas[1], Lisa A Houghton[2], Rosalind S Gibson[2]

[1]Faculty of Medicine, Universitas Padjadjaran, West Java, Indonesia
[2]Department of Human Nutrition, University of Otago, Dunedin, New Zealand

Background: Despite a national wheat flour fortification program in Indonesia, rural lactating women are at risk to multiple micronutrient inadequacies which may compromise both maternal and infant health. Here we explore relationships between the adequacy of micronutrient intakes, dietary diversity, and sociodemographic variables.
Methods: Three-day weighed food records were collected over 6 mos from 121 rural Indonesian exclusively breastfeeding women 2-5 mos postpartum to assess: (a) intakes (g/d) of 9 food groups and contribution (%) to intakes of energy and 11 micronutrients; (b) mean food group diversity score (FGDS) from 9 food groups; (c) determinants of mean probability of adequacy (MPA) via multiple linear regression.
Results: Starchy staples provided the major source of energy (68%) and most micronutrients except vitamins A, B12, and C. Energy intake from animal-source foods (17%) and fruits and vegetables (5%) was low. Total carbohydrate was high at 62% of energy whereas fat was low at 24%. Mean FGDS was 4.3 (SD 1.2). MPA was positively associated with education, energy intake, and FGDS (adjusted *R2 0.75; p<0.001)*. Intake of organ meats and vitamin-A rich fruits and vegetables were significant positive determinants of MPA after adjusting for energy intake and sociodemographic factors.
Conclusions: Poor dietary diversity and low intakes of micronutrient-rich foods likely accounted for the low micronutrient adequacy of the diets of these lactating women.
Supported by the Bill and Melinda Gates Foundation

ASSESSMENT OF MEDICINES SUPPLY CHAIN MANAGEMENT OF SELECT PRIMARY CARE FACILITIES IN THE PHILIPPINES

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[1]Policy Advocacy Associate, Zuellig Family Foundation, Manila, Philippines
[2]President, Philippine Pharmacist Association, Inc., Manila, Philippines

Background: Lack of access to medicines is a key health systems problem in a lot of developing countries. In the Philippines, lack of access to medicines is compounded by health system inefficiencies in relation to medicines management by municipal governments in a devolved set-up. The objective of the study was to determine the medicines supply chain management practices of the local health facilities in 10 municipalities.
Methods: This assessment used a desk review of existing regulations on medicines management in 10 municipalities, plus 32 key informant interviews with mayors, municipal health officers, and public health nurses. Questions asked were mainly on the processes on drug selection, procurement, storage, distribution, and disposal implemented in managing medicines at the local health facilities. Data gathered from the interviews were transcribed verbatim and subjected to content analysis for desk review.
Results: Findings indicated that all municipalities had problems in terms of accessibility and availability of essential medicines. Data showed that existing problems at various stages of the medicines management cycle, and challenges in medicines' quantification, storage, distribution, utilization monitoring and disposal were apparent in all of the targeted municipalities. In particular, medicines management functions were exercised by all municipal governments; however, these were below the standard.
Conclusion: There is a need for local officials to understand systemic challenges in medicines management such as logistical issues brought about by decentralized procurement system and limited resources.
Keywords: Medicines management; Primary care facilities; Municipalities

THE ROLE OF PAKISTANI MOTHERS IN CHILDREN'S MEDICINE-TAKING IN NEW ZEALAND

Sumera S. Akhtar[1**], Susan Heydon[1], Pauline Norris[1]

[1]School of Pharmacy, University of Otago

Global migration leads to people bringing beliefs and practices from one country into another, including those related to medicines. Using in-depth semi-structured interviews, we investigated how Pakistani mothers influenced medicine-taking practices among their children in New Zealand. We also examined how cultural difference, language barriers and access to medicines influenced medicine-taking practices. Participants were Pakistani women, who were born and educated in Pakistan, but now living in New Zealand and providing care to children. We interviewed 20 immigrants. Each interview lasted just under one hour and was conducted in Urdu or English. The interview guide was drafted in a way that participants were able to talk about their past knowledge and experiences regarding medicine-taking behaviour for their children as well as their experiences in New Zealand. Our results found that a) the majority of mothers first treat their children at home; b) home remedies are considered a primary treatment for children before taking them to a GP; c) the mothers practice self-medication due to the long wait at after hours and emergency departments. For this group of mostly well-educated mothers, language was not perceived a barrier.

WEALTH DOES NOT EQUAL HEALTH: A MULTIDISCIPLINARY STUDY OF MATERIAL INEQUALITY AND ITS EFFECT ON HEALTH AT IRON AGE NON BAN JAK, NORTHEAST THAILAND

Stacey Ward[1**], Sian Halcrow[1], Hallie Buckley[1], Charles Higham[2], Kate Domett[3], Dougald O'Reilly[4] and Louise Shewan[5].

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2. Department of Anthropology and Archaeology, University of Otago, Dunedin, Otago, New Zealand.
3. College of Medicine and Dentistry, James Cook University, Townsville, QLD, Australia.
4. School of Archaeology and Anthropology, Australian National University, Canberra, ACT, Australia.
5. School of Earth Sciences, University of Melbourne, Melbourne, VIC, Australia.

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Background: Increasing social inequality and a concurrent health deterioration have been observed in Iron Age (420BCE-500CE) northeast Thailand. Whether declining health relates to inequality or another biocultural process is not fully understood. The Iron Age site Non Ban Jak provides archaeological evidence for inequality alongside well-preserved human remains, allowing investigation of the relationship between inequality and health. This paper presents some results of this investigation.
Methods: A total of 196 human skeletons were analysed for indicators of physiological stress. Indicators used were long bone length and linear enamel hypoplasia. Social inequality was identified through regression analysis of quantities of grave offerings, while spatial statistics were used to visualise wealth distribution. Variations in health and wealth by age, sex, time period and between the east and west areas of the site were also identified using regression.
Results: Wealth and stress indicators were unevenly distributed across Non Ban Jak. Western area individuals, males, old individuals and particular burial clusters had greater wealth, suggesting developing inequality. The 'Osteological Paradox' interpretive model proposes that better health manifests as increased evidence of physiological stress. Following this model, the reduced prevalence of stress indicators in the wealthy western mound may represent poorer health.
Conclusions: Greater wealth may relate to poorer health at Non Ban Jak. Agricultural intensification and long-distance trade increase disease risk and are associated with the wealthy individuals of the site. These activities are proposed as the drivers of developing inequality and the accompanying health deterioration.

HIGH MICRONUTRIENT DEFICIENCIES DESPITE ADEQUATE CALORIC INTAKE ON REMOTE REEF ISLANDS OF KIRIBATI.

Tim Green[1] Rachel Brown[2] Kyly Whitfield[3] Yichao Huang[4] Robert Gibson[4] Maria Makrides[1] Lisa Houghton[2]

[1]Discipline of Paediatrics, University of Adelaide, and Healthy Mothers, Babies, and Children's Theme, South Australian Health and Medical Research Institute, Adelaide, Australia
[2]Human Nutrition, University of Otago, Dunedin, New Zealand
[3]Applied Human Nutrition, Mount Saint Vincent University, Halifax, Nova Scotia, Canada [4]Agriculture, Food, and Wine, University of Adelaide.

Background: The Republic of Kiribati is a small pacific island country spread out over a great distance in the Pacific Ocean. Food security is poor, and the country is reliant on imports for most of its food. Since 2015 over 75 cases of suspected beriberi (thiamine deficiency) have been identified on Kuria Islands (population 1000). Most of the cases were men, but some women and infants were also affected. In 2017, in collaboration with the WHO and the Kiribati Ministry of Health we undertook a comprehensive nutritional assessment on the Kuria Islands.
Design: Cross-sectional survey. All households with a pregnant woman or a child 0-59 months were invited to participate. Socio-demographic and health data were collected by questionnaire. Anthropometric measures were collected using standardized techniques. Two 24-hour dietary recalls, on non-consecutive days, were collected from all participants over 6 months Blood was collected by venipuncture from all participants, except for children under 6 months.
Results: Over 98% of eligible households participated. Over 80% of adults were classified as obese (BMI > 30 kg/m^2). Adjusted mean energy intake for non-pregnant women was 2500 kcal/d and for men was 3000 kcal/d. The prevalence of inadequacy for micronutrients was variable. For example, for non-pregnant women the prevalence of inadequacy (% ≤ EAR) was: >80% for calcium, folate, iron and riboflavin; 40-60% for vitamin C and vitamin A, 23% for thiamine, but less than 10% for zinc and vitamin B12. Anaemia rates were 33% (<110 g/L; n=40), 6% (<120 g/L; n=65) and 0% (<130 g/L; n=65), among children (6-59 months), non-pregnant women, and men, respectively. Low ferritin (<12 µg/L) was present in 33% of children 6-59 months and 14% in non-pregnant women (<15 µg/L). Biochemical findings were similar in non-pregnant women and men except that biochemical thiamine deficiency was higher (~35%). Rates of micronutrient deficiencies and prevalence of inadequacy were much higher in pregnant women, but the sample size was small (n=8).
Iron deficiency anaemia (Body Iron Stores = 0 mg/kg + anaemia) was 25% in children 6-59 months, 4% in non-pregnant women and 0% in men. In children, based on blood biomarkers using appropriate cutoffs, micronutrient deficiencies were 70% for zinc, 30% for vitamin A, 14 % for thiamine, and less than 5% for selenium, zinc, and folate. Overall 14% of children 6-59 months were stunted (≤ 2 SD HAZ).
Conclusions: There is a high burden of micronutrient deficiencies in Kuria Island and probably elsewhere in Kiribati. Given the very limited potential for improved dietary diversity, supplementation should be considered during the first 1,000 days (pregnant women and children 6-24 months). Food fortification with multiple micronutrients should be considered but the choice of food vehicle and fortificant level must be carefully considered.
Funding: World Health Organization, South Australia Health and Medical Research Institute, and The University of Otago

DISEASE CHARACTERISTICS AND TREATMENT OF PATIENTS WITH DIABETES MELLITUS ATTENDING GOVERNMENT HEALTH SERVICES IN INDONESIA, PERU, ROMANIA AND SOUTH AFRICA

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Background: Diabetes mellitus (DM) is rising globally yet relatively little is known about the characteristics and management of DM patients from low- and middle-income countries (LMIC).
Methods: We characterized DM patients attending public health services in urban settings in Indonesia, Peru, Romania and South Africa, collecting data on DM treatment history, complications, drug treatment, obesity, HbA1c, and cardiovascular risk profile; and assessing treatment gaps against relevant national guidelines.
Results: Patients (median 59 years, 63% female) mostly had type 2 diabetes. Obesity (46%) and central obesity (females 85%; males 63%) were common. The median HbA1c was 8.7%. Anti-diabetes treatment included metformin (63%), insulin (38%), and other oral glucose-lowering drugs (35%). Disease complications included eyesight problems (50%), EGFR <60 ml/min (19%), heart disease (17%), and proteinuria (15%). Many had an elevated cardiovascular risk with elevated blood pressure (36%), LDL (71%), and smoking (13%), but few were taking anti-hypertensives (47%), statins (29%) or aspirin (30%) when indicated. Few patients on insulin (8%), statins (8%) and anti-hypertensives (40%) reached treatment targets.
Conclusion: DM patients in four LMIC have insufficient glycaemic control, frequent macrovascular and other complications, and insufficient preventive measures for cardiovascular disease. These findings underline the need to identify treatment barriers and secure optimal DM care in such settings.

BREAST MILK VOLUME AND MICRONUTRIENT COMPOSITION, THE ASSOCIATION OF MATERNAL DIET AND ADEQUACY OF MICRONUTRIENT INTAKE OF EXCLUSIVELY BREASTFED INDONESIAN INFANTS

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Background: Few studies have performed concurrent measurements of breast milk volume and micronutrient concentrations in light of maternal diet and subsequent micronutrient intakes of the infant. We evaluated the adequacy of micronutrient intakes of exclusively breastfed (EBF) Indonesian infants by measuring milk volume and micronutrient concentrations and assessed maternal micronutrient intakes and their relationship with milk concentrations.
Methods: Mother-infant (2 to 5.3 months) dyads (n=113) participated in this cross-sectional study. Volume of breastmilk intake was assessed using deuterium dose-to-mother technique and micronutrient concentrations analysed to assess infant micronutrient intakes. Associations between maternal micronutrient intakes from three-day weighed food records and milk micronutrient concentrations were examined via multivariate analyses.
Results: Mean±SD breastmilk intake was 787±148 mL/day. Median daily infant intakes of iron, zinc, selenium, magnesium, sodium, and six B-vitamins were below their respective Adequate Intakes (AIs). Significant positive associations existed between maternal intakes of vitamin A, niacin and riboflavin and milk retinol, nicotinamide, and free riboflavin concentrations in both the unadjusted and adjusted (for infant age, milk volume, and parity) analyses ($P<0.05$).
Conclusions: Intakes of most micronutrients for these EBF infants fell below AIs, with three associations found between maternal intakes and breastmilk concentrations. A better understanding

on micronutrient requirements of EBF infants, the influence of maternal nutritional status on milk micronutrient concentrations and its impact on the breastfed infant is needed.
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BREASTMILK INTAKE AMONG EXCLUSIVELY BREASTFED INDONESIAN INFANTS IS NEGATIVELY ASSOCIATED WITH MATERNAL FAT MASS

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Background: Excessive fat mass may impair lactogenesis and lead to shorter breastfeeding duration. However, most studies to date have defined excessive fat mass using body mass index (BMI) as calculated from self-reported pre-pregnancy maternal weight and height. We investigated the relationship between breastmilk intake and maternal fat mass measured by either stable isotope method, bioelectrical impedance analysis (BIA), or BMI.
Methods: Rural Indonesian mother-infant (2 to 5.3 months) dyads (n=112) were recruited for this cross-sectional study. Breastmilk intake of exclusively breastfed infants and maternal fat mass were each assessed via deuterium oxide dose-to-mother technique (DDMT) over 14 days. Maternal fat mass was also measured using BIA (Tanita SC-240MA). BMI was calculated after collecting maternal weight and height. Multivariate regression analyses were used to examine potential predictors of BM volume (socio-economic status, maternal fat mass, maternal age, infant age, and infant sex).
Results: Negative significant relationship existed between breastmilk intake and fat mass as measured by DDMT (β = -4.88, 95% CI: -9.59, -0.18, P=0.042), and a non-significant negative trend for BIA and BMI (P>0.05).
Conclusions: Obesity may lead to lower breastmilk volume intake, however, this is only apparent with the use of stable isotope measured body composition. Further work is needed to explore the underlying mechanism of fat mass and lactation.

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SAMOAN, NEW ZEALAND AND NEPALESE MEDICAL STUDENT PERSPECTIVES AND IDEAS REGARDING GLOBAL HEALTH WITHIN MEDICAL CURRICULA

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Background: Global health is increasingly recognised as a core component of medical curricula. However, few studies that have explored why, how and what medical students would like to learn about global health. This study aimed to explore the perspectives of medical students in New Zealand, Samoa and Nepal regarding their interest in learning about global health.
Methods: A mixed-method study was conducted with questionnaires and semi-structured interviews. Medical students from New Zealand, Samoa and Nepal were invited to participate. The data were thematically analysed using a triangulation approach.
Results: Overall, 120/161 (75%) of students responded, of whom 73% of students were 'interested' or 'very interested' in learning about global health in their medical curriculum. Key themes that motivated their learning were value for global citizenship and their role in addressing national and global healthcare challenges.
Conclusions: There is a strong interest and motivation among medical students to learn global health. Students value global health due to their role as global citizens and desire to address health inequities by becoming competent doctors, change agents and advocates.

WEIGHTING THE HUMAN DEVELOPMENT INDEX: HEALTH MATTERS MOST

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The UNDP Human Development Index (HDI) is a very widely-used and influential international development indicator. It combines information on three development dimensions - health, education and income – and arbitrarily assigns weights of one-third to each. Assigning equal weights to these dimensions has long been a matter of great controversy. This paper uses a discrete choice experiment administered in an online survey of 2500 members of the UK public to scrutinise these weights. Part-worth utilities that represent the relative importance of the three dimensions to this group as a whole are obtained and interpreted as weights. This exercise assigns the highest weight to the health dimension and the lowest to education. These weights are all statistically significantly different to the one-third weights used in the HDI. The UK's HDI for recent years is recalculated using these weights and compared to that reported by the UNDP, which is lower. The paper concludes with consideration of the implications of these findings for global health in low- and middle-income countries.

PRIORITY LIST OF CHRONIC NON-COMMUNICABLE DISEASES TO GUIDE R&D INITIATIVES AND SPENDING: RESULTS FROM NEW ZEALAND

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Background: A priority list of 18 non-communicable diseases (NCDs) was created to guide research and development (R&D) spending into NCDs in New Zealand (NZ), for the purpose of increasing scientific, political and public awareness in support of innovation and policy initiatives.
Methods: The literature was surveyed to inform the specification of five prioritisation criteria. Ceiteria weights were determined via a Discrete Choice Experiment (DCE) administered in an online survey involving 490 adults from various sectors of the NZ health system. Health vignettes were created for assessing and ultimately ranking the NCDs. Expert opinion was also sought to assist with this rating exercise. A sample of 40 people completed the survey twice in order to check the DCE's retest reliability.
Results: The five prioritisation criteria, in decreasing order of importance, are: 'reduced life expectancy', 'loss of quality-of-life', 'cost to patients', 'cost to the health system', and 'disproportionately affects vulnerable groups'. Consistent with the terminology recently used by the World Health Organisation for its priority list of antibiotic-resistant bacteria, the NCDs to guide R&D spending were categorised into three tiers of priority for short, medium and long-term policy-making.
Conclusions: The prioritisation exercise and the methodology used in this study could be implemented in other settings and at broader levels to identify evidence-informed R&D priorities.

SMOKELESS TOBACCO – A BARRIER TO ACHIEVE SUSTAINABILITY DEVELOPMENT GOAL IN INDIA.

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Tobacco is an established etiological factor for most non-communicable diseases. Unlike elsewhere, unique to India are the bidis and smokeless tobacco (SLT) use. According to Global Adult Tobacco Survey – India, both 2010 and 2017, SLT was the highest form of tobacco consumed and bidis were the highest smoking form. However, the regulations and awareness on them are too poor to discourage their use. SLT is available in myriad of forms and are obdurate to tobacco control policies. Moreover, they are perceived as harmless and also regarded to have medicinal properties. The use of these products, especially SLT has made India an epicentre of oral cancer. It is the leading cancer in many cancer registries in India. Mortality due to oral cancer is the highest among Indian men globally, making SLT as a factor for global burden of diseases. However, this is covered, in the pretext of cultural issue and the regional diversity prevents uniform policy. This will have a huge impact on India's target towards Sustainable Development Goals – one and three. As SLT is cheaper and easily accessible, its consumption is high among the poor, making them vulnerable to oral cancer. In India healthcare

expenditure is mostly out of pocket, thus the high expenditure towards cancer treatment forces them to further poverty. SLT use and poverty are a vicious cycle and detrimental in achieving SDG 1 and 3. In this paper, we discuss about use of bidis, SLT, oral cancer and their relationship with SDGs in India.

USE OF CLINICAL OUTCOME MEASURES IN DEVELOPING COUNTRIES: ARE WE USING THE RIGHT SCALES?

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Background: Although routine use of standard outcome measures (OM) is highly recommended, it is less common than desired. This is particularly so in developing countries where lack of culturally-relevant OMs that patients can understand create additional barriers. Here, we sought to identify patient preferences among four commonly used pain intensity scales in a developing country.
Methods: Two hundred and two participants from Nepal with musculoskeletal pain rated their average and worst pain intensity in the past week on four pain scales (verbal, numeric, facial and visual analogue scale). They then indicated which scale they preferred out of the four. In addition, their response to each scale was classified as correct or incorrect.
Results: The facial scale was most preferred, followed by the verbal scale. The numeric scale was least preferred and also had the highest rate of incorrect responses. Older and lesser educated participants were significantly less likely to prefer numeric scales.
Conclusions: Based on the current findings, and in light of the findings from other studies, it would seem that the most useful measure of pain intensity in Nepal—and perhaps in other non-western countries with low literacy rates—may be the faces scale, followed by the verbal scale.

EXPERIENCING SMALLPOX – A DISEASE OF CHILDHOOD IN NEPAL IN THE 1960S

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For older people in Nepal today, smallpox was one of many childhood diseases, and was much feared. Like its neighbour India, Nepal had the *variola major* form of the virus which had a high mortality rate. As part of a wider historical study into the Himalayan roots of the global eradication programme, in-depth interviews were carried out with people who had either contracted smallpox or had cared for people (predominantly children) with smallpox. Most were nursed at home, especially by mothers. Smallpox had no cure; symptoms were relieved as the disease took its course. Spiritual offerings were often important. As a preventive, some people moved elsewhere if smallpox occurred in their community; some were inoculated earlier with fluid from smallpox pustules or the dried scabs (variolation); some were vaccinated (inoculation with the milder vaccinia). Access to vaccination in the 1960s for most Nepalese was limited and attitudes were influenced by the presence of the disease at the time.

GLOBAL TYPHOID FEVER INCIDENCE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background. Contemporary incidence estimates of typhoid fever are needed to guide policy decisions, control measures, and improve future epidemiological studies.
Methods. We systematically reviewed three databases (Ovid MEDLINE, PubMed, and Scopus) without restriction on age, country, language, or time for studies reporting the incidence blood culture-confirmed typhoid fever. We performed a meta-analysis in MetaXL using a random effects model to calculate estimates of pooled incidence, stratifying by studies that reported the incidence of typhoid fever and those that estimated incidence by using multipliers.
Results. Thirty-three studies were included in the analysis. There were 25 sites from 17 countries reporting typhoid cases from active, population-

based incidence studies; 17 sites in 9 countries used multipliers to adjust sentinel surveillance data for under-ascertainment. Among active, population-based studies the overall pooled estimate of incidence (95% CI) was 159.8 (119.7-205.6) typhoid cases per 100,000 per year and was highest in Asia (270.2, 182.8-368.2). Among multiplier studies, the overall pooled incidence estimate was 141.8 (85.3-212.2) typhoid cases per 100,000 per year.
Conclusions. Typhoid fever incidence remains high at many sites. Additional and more accurate epidemiological studies are needed to support country decisions about typhoid conjugate vaccine use.

MOLECULAR MECHANISMS OF ANTIMICROBIAL RESISTANCE AND PHYLOGENETIC RELATIONSHIP OF *SALMONELLA ENTERICA* SEROVARS TYPHI AND PARATYPHI A FROM FEBRILE PATIENTS IN YANGON, MYANMAR

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Background: Data on circulating *Salmonella enterica* serovars in Myanmar and their antimicrobial resistance patterns are limited. We sought to describe their phenotypic and genotypic patterns of antimicrobial resistance and to determine their phylogenetic relatedness to each other and to regional strains.
Methods: From 5 October 2015 through 4 October 2016, we performed aerobic blood culture for adult febrile patients attending 2 hospitals in Yangon, Myanmar. We tested antimicrobial susceptibility, and performed whole-genome sequencing to determine resistance mechanisms among *S. enterica* isolates. We identified *S. enterica* Typhi strain type using *genotyphi*.
Results: Of 1,583 blood cultures, we isolated 153 (9.7%) pathogens. Among pathogens, 73 (47.7%) were *S. enterica,* of which 39 (53%) were serovar Typhi and 34 (47%) were Paratyphi A. All *S. enterica* were susceptible to all antimicrobial classes except fluoroquinolones. Mutations in *gyrA*, *gyrB,* and *parC* of the quinolone-resistance-determining-region (QRDR) were responsible for resistance. *S. enterica* Typhi belonged to 4.3.1 (formerly H58) subclade and formed 2 clusters.
Conclusion: While susceptible to other classes, *S. enterica* were resistant to fluoroquinolones, mediated by QRDR mutations. Two strains of *S. enterica* Typhi subclade 4.3.1 are circulating in Yangon. The phylogenetic data will form the basis for future surveillance and epidemiological studies of enteric fever in Myanmar.

INCIDENCE OF TYPHOID AND PARATYPHOID FEVERS AMONG ADOLESCENTS AND ADULTSIN YANGON, MYANMAR

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Background: Accurate estimates of typhoid disease burden are needed to guide policy decisions, including on vaccine use in Myanmar, as data are scarce.
Methods: We conducted a population-based household healthcare utilization survey in the Yangon Region 12 March through 5 April 2018. Multipliers derived from this survey were applied to hospital-based surveillance of *Salmonella* Typhi and Paratyphi A bloodstream infections from 5 October 2015 through 4 October 2016 at Yangon General Hospital (YGH). This study was approved by Ethics Committee of Medical Research Myanmar and the University of Otago Human Ethics Committee.
Results: A total of 336 households representing 1,598 persons were enrolled in the healthcare

utilization survey and multipliers were derived based on responses to questions about healthcare seeking in the event of febrile illness. Of 671 patients over 12 years of age enrolled at YGH, 33 were identified with *Salmonella* Typhi and 9 with *Salmonella* Paratyphi A bloodstream infection. After applying multipliers, we estimated that the annual incidence of typhoid was 391 per 100,000 and paratyphoid was 107 per 100,000 populations.
Conclusions: Enteric fever incidence is high in Yangon, Myanmar, warranting increased attention on prevention and control, including consideration of typhoid conjugate vaccine use as well as non-vaccine control measures.

COMMUNITY-BASED INTERVENTION FOR LIVER FLUKE IN NAKHON RATCHASIMA, NORTHEAST, THAILAND.

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Background: A quasi-experimental study compared the effectiveness of a community based intervention derived from qualitative work in rural community, to usual care for the risk people of liver fluke disease in Nakhon Ratchasima province, Thailand.
Methods: 80 participants (40 intervention; 40 control) were recruited. The 3-month intervention consisted of stool examination, education, and empowerment. Usual care for participants in the control group was provided by community health centers. The primary outcome was change in behaviors and liver fluke eggs, compared between and within groups.
Results: Participants were 51.25% female, age rank 41 to 50 years old, and 6.25% were liver fluke infection. After the intervention, the interventional groups had mean score of knowledge higher more than before the experiment)p-value = 0.001(, and the control group)p-value = 0.001(. The experimental groups had mean score of attitude higher more than before the experiment)p-value = 0.001(, and the control group)p-value = 0.001(. The experimental groups had mean score of practices higher more than before the experiment)p-value = 0.001(, and the control group)p-value = 0.001(. Liver fluke infection had been differed between groups.
Conclusions: This program may useful in the other communities that have problems with liver fluke diseases.

SURVEILANCE OF INTESTINAL HELMINTHIC INFECTION IN VILLAGE LEVEL IN NORTHEAST THAILAND

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Background: intestinal helminthic infections (IHIs) is still a health problem in Southeast Asia. Surveillance is needed to eradicate IHIs in rural areas. This study was aimed to determine the prevalence of IHIs among rural villagers of Waeng Noi district, Khon Kaen province, Thailand.
Methods: A cross-sectional study was conducted between March 1 and July 30, 2018 among 30 rural villages. The participants were randomly selected from village enrolment list after proportional allocation of the total sample size. IHIs were prepared by the mini parasep sf faecal concentrator; and then were detected using light microscope. Data were analyzed using STATA for windows version 13.
Results: Of the total 400 faecal specimens examined, 23 were positive for IH making the prevalence 5.75%. The most prevalent helminthes were *Taenia spp.* (2.50%) and followed by

Hookworm (1.25%), *Trichuris trichiura* (1.0%), *Ascaris lumbricoides* (0.50%), and *Opisthorchis viverrini* (0.25%). Gender (Adjusted OR=5.2; 95% CI=1.20–2.33; P =0.020) and location (Adjusted OR=2.0; 95% CI=0.15–0.25; P =0.003) showed a significant association between the prevalence of intestinal helminthes.
Conclusions: This study reveals that IHIs are prevalent in adults in rural villages. A greater focus on intervention is required by improving personal hygiene and sanitation to prevent the spread of IHIs.

PREVALENCE OF POSITIVE TUBERCULIN SKIN TEST AND ASSOCIATED RISK FACTORS IN HEALTH CARE WORKERS AT A GENERAL HOSPITAL IN BANDUNG, INDONESIA

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Background: Health care workers (HCWs) in high tuberculosis (TB) incidence countries are at risk for *Mycobacterium tuberculosis* infection and TB disease. We undertook a study to estimate tuberculin skin test (TST) positivity for latent TB infection (LTBI) and to identify associated risk factors in HCWs in Bandung, Indonesia.
Methods: A cross-sectional study was conducted at Hasan Sadikin Hospital between April-August 2018. A stratified sample of the HCWs were recruited, screened by TST, and were assessed for symptoms of TB disease. A questionnaire was used to identify the associated risk factors.
Results: Of the 455 HCWs, 40 had a history of TB treatment, one was on TB treatment, one was found to have TB disease, and 413 had no TB disease. Of those with no TB disease, 395 were tested by TST and 18 refused. Of those who had TST, 298 were TST positive and 97 were TST negative. The prevalence of positive TST was 75.1%, 95% CI 69.4-80.0%. Compared to HCWs working for less than 7 years, HCWs working longer was positively associated with TST positivity (7.0 to 12.0 years: OR=1.76, 95% CI 1.17-2.66, p-value 0.007; 12.1-20.1 years: OR= 2.76, 95% CI 1.21-6.26, p-value 0.02; and more than 20.1 years: OR=5.54, 95% CI 1.29-23.79, p-value 0.02).
Conclusions: Three quarter of workers were positive for LTBI and showed concordance with the occupational exposure. An effective program for TB infection control will need to be implemented to help protect HCWs from acquiring TB infection in health care facilities.

TUBERCULOSIS KNOWLEDGE AMONG PRISONERS AND CORRECTIONAL OFFICERS IN A PRISON WITH HIGH TUBERCULOSIS BURDEN IN MALAYSIA

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Background: Limited access to timely healthcare services and the passive nature of tuberculosis (TB) case detection in most prisons in low- and middle-income countries convert these settings into “hotbeds” for TB, posing risk to both prisoners and the general population. Knowledge about the nature of TB and, most importantly, about the related symptoms is crucial to early diagnose the disease and to limit the transmission to others, particularly in closed settings, like prisons. This study was conducted to assess knowledge about TB in a sample of prisoners and correctional officers in the largest prison in Malaysia.
Methods: The study was conducted from 15 March to 2 November 2017 in Kajang, a 4,000-inmate prison. Recent survey in the prison revealed a TB prevalence of 8.5% with 71% of TB cases were undiagnosed at the time of the survey. We estimated that a sample of 250 prisoners and 250 officers will give an estimate of proportions with a 6% margin of error. The sample was randomly selected from the prison records using a randomiser software. A written informed consent was sought from participants. Prisoners were interviewed individually in a private room, but each recruited officer was provided with complete information, consent form and the questionnaire for individual self-filling due to work schedule constrains. The WHO’s KAP survey tools were utilised to develop the questionnaire. Answers were reported in frequencies and the association of the knowledge parameters among prisoners and officers was assessed using chi square test with significance levels.

Results: A total of 521 (265 prisoners and 256 officers) were recruited. All participants were men, almost half (43.8%) were in the age group of 31-40 and 92.5% had a minimum of secondary education. Most of prisoners and correctional officers thought that TB is a serious disease (74.3% and 75.4%, respectively, p=0.78), while 12.1% and 50.8% answered that TB is caused solely by a germ (p=0.01), 18.1% and 87.9% knew that TB is transmitted from a TB patient through cough (p=0.01), 9.1% and 72.7% thought that covering mouth and nose by mask protects from TB (p=0.01), 72.8% and 79.3% mentioned that anyone can get TB (p=0.08), 21.1% and 42.6% knew the correct TB-related symptoms (p=0.01), 80.7% and 94.5% mentioned that TB can be cured (p=0.01), 32.4% and 69.1% mentioned that they can get TB treatment free of charge, 33.6% and 89.8% mentioned that special treatment is needed to treat TB, 32.8% and 76.9% mentioned the correct duration of TB treatment, and 85.3% and 97.3% answered that one may get sick or die if TB is not treated (p=0.01).
Conclusion: Knowledge about TB remains generally limited, particularly among prisoners compared to correctional officers in Malaysia. There is a need to establish educational programmes in prisons in order to improve case detection and adherence to treatment.

INHALED RIFAMPICIN FOR THE TREATMENT OF TUBERCULOSIS

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Drug delivery via the lung is advantageous in treating both local and systemic diseases. It can be utilized in treating tuberculosis (TB), which mainly localises in the lungs. Rifampicin, a first-line anti-TB drug, is currently administered orally as a part of a multi-drug regimen. When given orally, only a small fraction of the drug dose reaches the lung, concentrations fail to reach bactericidal levels at target sites, and contribute to the development of multi-drug resistant pulmonary TB. In our laboratory, we have developed rifampicin particles for inhalation using different techniques and have evaluated their aerosolization efficiency using Next Generation Impactor (NGI). The prepared rifampicin particles were within the inhalable size range and showed good aerosolization behaviour *in vitro* and therefore have potential to be delivered via inhalation route for TB treatment. This delivery approach can achieve high rifampicin concentrations in lungs which may kill bacteria efficiently and reduce the development of drug resistance. We aim to translate current research into a clinical study to evaluate the safety of inhaled rifampicin and determine its dose. The opportunities and challenges to clinical studies of inhaled rifampicin have been identified.

COCRYSTAL APPROACH TO IMPROVING TREATMENT OF PULMONARY TUBERCULOSIS

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The treatment of tuberculosis through the pulmonary delivery of drugs can be improved by increasing the residence time of drugs in the lung so that the drug particles are available for alveolar macrophage uptake. To prolong the residence time of an anti-tubercular drug, moxifloxacin in the lungs by reducing its solubility and dissolution rate, a cocrystal of moxifloxacin with trans-cinnamic acid at 1:1 molar ratio ($MCA_{1:1}$) was prepared using a solution cocrystallization technique. Equilibrium solubility and intrinsic dissolution rate measurements for the cocrystal $MCA_{1:1}$ in phosphate buffered saline (PBS, pH 7.4) revealed a significant decrease in the solubility of moxifloxacin (from 17.68 ± 0.85 to 6.10 ± 0.05 mg/mL) and intrinsic dissolution rate (from 0.469 ± 0.04 to 0.139 ± 0.03 mg/cm^2/min) compared to the supplied moxifloxacin. Further, the dissolution behaviour of a fine particle dose of respirable particles was assessed in a small volume of stationary mucus fluid using a custom-made dissolution apparatus. The respirable particles of the cocrystal also showed lower dissolution (microscopic observation), and permeation rate (0.045 ± 0.004 µg/cm^2/min) compared to the supplied moxifloxacin (0.091 ± 0.009 µg/cm^2/min). This study concluded that $MCA_{1:1}$ had a lower solubility and dissolution rate than moxifloxacin

with potential to improve the local residence time and therapeutic action in the lungs.

IMPETIGO AND SCABIES AMONG SCHOOL CHILDREN IN RURAL SAMOA.

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Background: Group A streptococcus (GAS) and Staphylococcus aureus (*S. aureus*) infections are common in Pacific Island countries causing impetigo (skin infections), with an autoimmune reaction to GAS pharyngitis causing rheumatic fever (RF). However, some tropical countries, such as Samoa, have a low GAS pharyngitis prevalence but high rates of RF. Researchers have proposed that GAS skin infections may 'prime' the body for RF. We aim to describe the prevalence of impetigo and scabies; nasal and throat carriage, and skin infection microbiological features of GAS and *S. aureus* among school-aged children in Samoa.
Methods: Cross sectional survey of children aged 5–14 years attending primary schools in rural areas of Upolu Island, Samoa. Information was given to schools, children and their families and consent sought. Basic demographic data was recorded including presence of impetigo and scabies. Each child had swabs taken from the nose and throat, and from infected skin lesions from exposed skin (arms and legs).
Results: Demographic data and prevalence of skin infections (impetigo and scabies), and the prevalence of the detection of GAS and *S. aureus* from throat, nose and skin swabs will be presented. Preliminary results indicate a high prevalence of impetigo and some scabies.
Conclusions: TBC

MCKINLAY ORATION

ASSESSMENT AND CONTROL OF VITAMIN AND MINERAL DEFICIENCIES GLOBALLY: GENERATING BETTER DATA FOR MORE COHERENT PUBLIC HEALTH PROGRAMS

Kenneth H Brown, MD

According to the Lancet Nutrition Series (Black, 2013), childhood undernutrition accounts for ~3.1 million child deaths annually (45% of total, globally), of which >425,000 deaths are due to vitamin and mineral (micronutrient, MN) deficiencies. This figure likely underestimates of the full burden of MN deficiencies because poor data availability prevents accurate estimates of the true prevalence of these conditions, and the effects of some MN deficiencies were not considered in the Lancet report (Brown, 2015). This presentation will provide updated information on folate deficiency and related neural tube defects and will summarize the conclusions of recently convened expert groups that focused on thiamine and vitamin D deficiencies. The need for better data on MN status to motivate and execute MN deficiency control programs will be emphasized, and the latest efforts to improve data availability will be described. These efforts include both the use of unconventional data (like national food balance sheets, infant mortality patterns, and others), as well as efforts to expand the availability of reliable information based on MN status biomarkers. These latter activities include achieving consensus on which biomarkers to use and how best to interpret them, and simplifying methods for specimen collection, processing, transport and laboratory analysis. Finally, new bioeconomic simulation models will be described that allow for more coherent program planning and cost-effectiveness when relevant information is available on MN status and program costs.

PREVALENCE OF OBESITY AND OVERWEIGHT AND ITS ASSOCIATED FACTORS AMONG THE RESIDENTS OF SOUTH TARAWA, KIRIBATI

Paul Eme**

Background: Obesity in the Pacific is a public health concern and the leading cause of preventable deaths in the Pacific Rim. Few surveys have been conducted in South Tarawa to determine the magnitude of obesity and its associated risk factors. The aim of this study was to assess obesity and overweight prevalence and its associated factors among the adult population in South Tarawa, Kiribati.
Methods: A cross-sectional community-based study composed of 161 households that were randomly selected from Betio, Bikenibeu and Teaorereke was conducted. Ethical approval and informed consents forms were obtained from the respected authority and subjects respectively. A structured and validated questionnaire was used to obtain socio-demographic information and feeding practices of the subjects. Each patient was subjected to weight, height and body fat percentage measurements using standard methods. Physical activity level (PAL) was determined by using the standards of International Physical Activity Questionnaire Research Committee (2005). Descriptive statistics of frequencies, percentages, mean, and standard deviation were used to examine the gender-specific anthropometric indices. Chi-square and independent t test were also applied to determine the differences between the parameters or variables of the genders at P< .05.
Results: About three-quarters of the subjects (73.2%) were obese, 22.5% were overweight and only 0.6% was underweight. Greater than half of the subjects (68.4%) had very high body fat (BF), 22.2% had high BF, 8.8% had normal BF and 0.6% had low BF. Majority of the subjects were sedentary, 13.1% were moderately active while 6.3% were vigorously active. Age, education levels and PAL of the subjects had significant (P<0.05) relationship with obesity prevalence.
Conclusion: Nearly all the subjects were either obese or overweight and also had high body fat percent. Recommendation: Effective public health intervention strategies are needed to combat this menace.

A STUDY OF THE EFFECT OF MARKETING STRATEGY ON PURCHASE INTENTION BY MEDIATING VARIABLES IN HEALTHCARE (CASE STUDY: COSMETIC SURGERY CLINICS IN ISFAHAN)

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The research intends studying the effect of digital marketing on purchase intention by mediating variables in healthcare, a conceptual model was developed and tested. In order to this, a conceptual model was developed and tested. For this purpose, a main hypothesis and eight secondary hypotheses were developed and tested. This study, from the purpose point of view can be considered as an applicable study and survey in terms of method of execution with correlation approach. The population includes cosmetic surgery clinic's customer in Isfahan. Because of limitless of study's sample, 198 samples were selected using simple random sampling method Data collection tool in this study is 20 question questionnaire designed by researcher and its validity was acknowledged by supervisor and advisors professors and management experts. The reliability of questionnaire was also confirmed by the Alpha index of 89%. The questions of questionnaire are divided into demographic and main questions for testing hypotheses. Collected data were analyzed by SmartPLS. The findings revealed that all of the research hypotheses were supported except assumptions of the Sixth.

IDENTIFYING THE EFFECTIVE FACTORS OF CUSTOMER EMPOWERMENT FOR HEALTH INSURANCE DEVELOPMENT

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Considering the various dimensions of customer requirements is the main motivation factor of organizations to provide new products or services. Most organizations found their need for the optimal process of new product development, and have done a great deal of effort to have such a successful process and incur huge costs. But many of them have not succeeded in using it. There are many reasons for this problem, while one of the most important one is the lack of attention to the

costumers' needs, ideas and comments in the process of developing new products. Health Insurance is an efficient insurance, which provides affordable treatment coverage for families' members and reduce the cost of treatment for the families and consequently for the government. This study aims to identify the factors affecting customer empowerment on the development of Family Health Insurance in an Insurance Company. In this research, Delphi method has been used to identify the factors affecting the empowerment of clients in the Company. The results of the Delphi method show the most effective factors of customer empowerment in the development of Health Insurance: information technology, motivation and knowledge.

CAUSE OF SURGERY CANCELLATION: A SYSTEMATIC LITERATURE REVIEW

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Increasing costs of healthcare system and allocating a huge amount of government and family budget to itself has let more attention to reduce the cost of treatment, while increasing the patients' satisfaction. Hospitals account for the biggest part of health care costs, while Operation Theatre (OT) is one of the most critical and expensive resources. Cancellation of elective and emergency surgeries is a common problem which waste valuable Operation Theatre (OT) time, imposing significant economic costs and adds inconveniencing patients and their families. Rate of cancellation of elective operations on day of surgery varies in hospitals, between 5 to 40%. As a consequence, numerous papers on this topic exist. The goal of this paper is to provide a systematic literature review on the reasons of surgeries cancellation to find the principle and common reasons of cancellation among different hospitals and countries. I start by finding the reasons of cancellation and then classifying them in two main clusters: 1- patients' causes and 2- hospital causes. Finally, based on the common reasons of cancellation among various kinds of hospitals, I explaining some efficient solution to solve these problems.

FORMULATING ANTIMICROBIAL REDUCTION STRATEGIES USING FARMER-LED PARTICIPATORY DEVELOPMENT

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Background: Participatory development (PD) has been used to help facilitate farmer projects previously (Reyher, 2016). This paper reports on the interim results of a three- year project using PD in farmer- led groups to help formulate AMU reduction strategies in New Zealand.
Methods: This project is currently active in Southland and South Otago. Farmers from a range of sectors were invited to participate in 4 strategic farmer groups in Year 1.
Each group was facilitated, and had a goal of developing farmer AMU reduction strategies. These were taken to broader farming groups in Year 2 for developing and testing. In year 3, further extension will be coupled with analysis to determine outcomes.
Results: At this stage, 12 separate AMU reduction strategies have been developed by the groups. These have been rolled out to further farmers during the season as applicable.
At the end of the second year, the strategies deemed successful at a farm level will be socialized further with a broader group of farms, and their success will be measured quantitatively.
Conclusions: Facilitating farmers to determine their own pathways is recognized as a more successful approach than a typical 'top-down' process. This paper will report on progress and pitfalls to date.

HORIZONTAL TRANSFER OF ANTIBIOTIC RESISTANCE GENES: A CRISPR CONNECTION?

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Background: CRISPR-Cas systems hinder the uptake of potentially beneficial genes (e.g. antibiotic resistance genes) in bacteria. They are inhibited by anti-CRISPR genes. We hypothesized that the selection for antibiotic resistance might have resulted in an accumulation of anti-CRISPR genes in genomes that have CRISPR-Cas systems and acquired antibiotic resistance genes.

Methods: To assess the hypothesis, we took over 100,000 genomes of bacteria from the publicly available databases and analysed the CRISPR-Cas, anti-CRISPR and acquired antibiotic resistance genes by using different computational methods. Only 19% (20,014 of 104,947) of RefSeq genomes contained ARGs that would confer resistance to at least one of the 15 major drug classes. The association of CRISPR-Cas with ARG classes was tested for 39 species.
Results: In certain species of bacteria, the presence of CRISPR-Cas can either positively or negatively correlate with acquired antibiotic resistance genes. However, in most cases, there is no relationship between CRISPR-Cas and acquired resistance. Only in *Pseudomonas aeruginosa*, we found anti-CRISPRs associated with horizontally transferred antibiotic resistance genes.
Conclusions: Our analysis indicates that the role of CRISPR -Cas and anti -CRISPRs in the spread of antibiotic resistance, is likely to be very different in particular pathogenic species and clinical environments.

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