



Diarrhoea: focus on young children



Working in the dangerous pathogens laboratory, Dr Kevin Soli extracts DNA from samples.

In Papua New Guinea, diarrhoeal diseases in children under five years of age are one of the greatest causes of hospital admissions and deaths.

Identifying the intestinal bugs that like to live in PNG's children can be tricky, but IMR is developing modern and sensitive methods for speedy and accurate diagnosis, said Dr Kevin Soli, a senior postdoctoral research fellow with IMR in Goroka.

"We are building on previous studies in PNG where a broad range of virus and bacteria have been detected and are associated with intestinal diseases," Dr Soli said.

"Our collection and preparation of samples before analysis may seem unpleasant to some, as the best way to analyse the bugs is to work on faeces," he said.

"We collected samples from children already in Goroka Base hospital with acute gastroenteritis, then ran a series of tests in which we compared different

diagnostic methods, including the Immuno Probe Rapid Diagnostic Test (RDT), real-time Polymerase Chain Reaction (PCR) and loop-mediated isothermal amplification (LAMP) assays.

"Our tests revealed that a broad range of causes are associated with acute watery diarrhoea in children in Goroka, with *Campylobacter jejuni* (4%), *Shigella* (12%), Enteropathogenic *Escherichia coli* (7%) and rotavirus (26%), to name just a few.

"We found that the Immuno Probe RDT provided sensitive (88%) and specific (99%) detection of rotavirus compared to norovirus and adenovirus but its suitability for primary health care clinics needs evaluation.

"Real-time PCR and LAMP assays are very sensitive techniques, but can only be used in diagnostic laboratories with considerable resources and therefore unsuited to primary health care clinics," Dr Soli said.

Our collection and preparation of samples before analysis may seem unpleasant to some.

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Director's Message

New section will focus on tuberculosis

PNG has the highest burden of the tuberculosis (TB) cases in the Pacific region and with multi-drug resistance cases on the rise, the need for effective monitoring and intervention programs is significant.

Realising the need for research, IMR has created a new TB research section to look at TB in the country.

The rise in TB cases in PNG has now become a serious concern for the PNG Government and the World Health Organisation.

Being a research organization, IMR is obliged to conduct research into TB in PNG.

Until now, IMR's TB research was conducted on an ad hoc basis, however we knew that more had to be done.

Most of the TB research was based on clinical diagnosis and treatment monitoring and surveillance and was part of collaborative studies.

The new TB section is part of the Infection and Immunity Unit and will be headed initially by Dr Suparat Phuanukoonoon while a search is conducted for a permanent head.

With the set up of the TB section, the Institute is hoping that this will pave way for more studies on TB and collaboration with



Professor Peter Siba

relevant institutions fighting TB in PNG.

This strategic move is also part of the Institute's realignment of its research priorities to meet the increasing health problems in PNG.

A toast for the director



After signing the contract at State House, left to right: John Kali, Secretary, Department of Personnel Management, Sir Michael Ogio, Governor General of PNG, Professor Peter Siba, Director, PNGIMR and Professor Sir Isi Kevau, Acting Chairman, PNGIMR Council. Photo courtesy of Media Team, Office of the Governor General.

Director Peter Siba has signed for another term with IMR, with a new contract that extends until 19 October 2015. The contract was signed at State House in Port Moresby on 4 September 2012, in the presence of the Governor General, Sir Michael Ogio.

Avian influenza: checking its path in PNG

Avian influenza (HPAI) A subtype has been devastating domestic poultry populations in Asia, Europe and Africa since 2002.

To guard against potential threats to Papua New Guinea, the PNG Institute of Medical Research (IMR) is studying the locations, frequency and strains of avian influenza here.

Marinjho Jonduo is working on the study with IMR in Goroka as part of her University of PNG Honours program.

"Our teams collected samples from 13 locations across different geographical areas in PNG, looking at three biosecurity settings for exposure of poultry to wild birds," Ms Jonduo said.

"A high setting indicates poultry have little or no exposure to wild birds, while low means frequent exposure," she said.

"This wide range of sites tells us about the distribution of avian influenza viruses and will help us work out which strains of avian influenza are present here.

"Animal and human health authorities will use this data for prevention and control of this disease that kills poultry and severely reduces the income of poultry farmers," she said.

"Avian influenza (HPAI) A subtype is highly in-



Marinjho Jonduo grows intestinal pathogens in a solid jelly in the lab at Goroka.

fectious. It has a very high death rate among infected domesticated poultry and could cause a pandemic if humans could easily transmit it to each other," Ms Jonduo said.

Waterfowls are natural reservoirs for influenza A viruses. Infected birds rarely show symptoms and can infect other birds by contaminating shared feed or water or surfaces.

Sample swabs are taken from the middle part of the throat (oropharangeal), posterior opening (cloacal) and from the blood (sera) of poultry. Samples are analysed at IMR in Goroka and at St Jude Children's Research Hospital, Memphis, USA.

Pulmonary tuberculosis: predicting outcomes

Sputum culture is the gold standard for diagnosing and monitoring pulmonary tuberculosis (PTB)," said Dr Paul Harino, a researcher with IMR in Goroka.

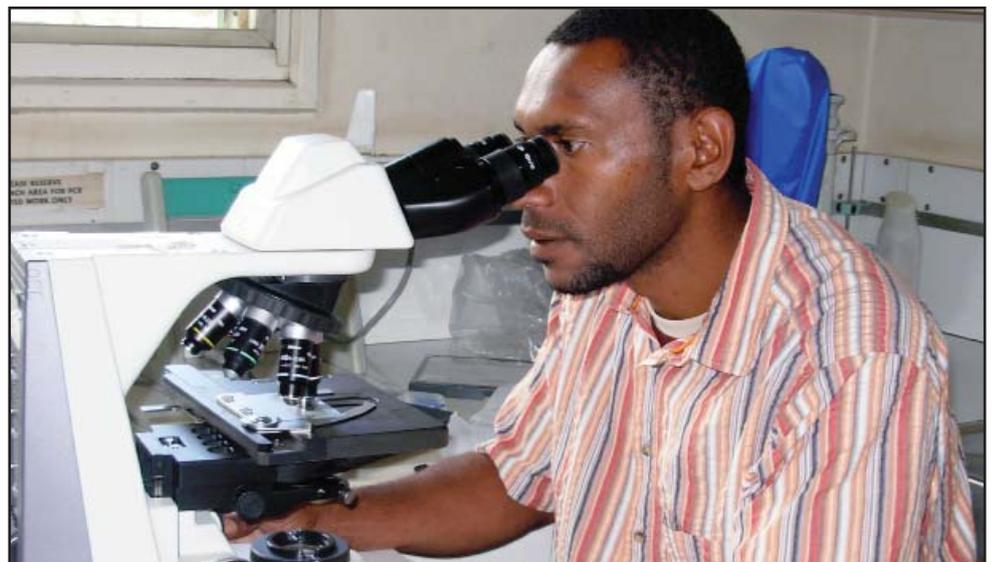
"Here in PNG, using sputum culture with the most recent diagnostic tools is very expensive and therefore a cheaper and more reliable tool is required," Dr Harino said.

"To assist with finding a cheap, reliable diagnostic tool, we studied predictors of PTB treatment outcome in HIV positive and HIV negative patients in Madang Province," he said.

"We enrolled 270 people aged 15 and over through the TB clinic at the Modilon General Hospital, Madang Province.

"The study included both HIV positive and HIV negative people and we looked at the time it took for the sputum to be free of TB germ, weight gain and other clinical markers to predict the results of treatment.

"Only minor side effects of TB treatment and the TB/HIV combined treatments were observed. However, persisting symptoms and signs at two months, positive sputum



A microscopist studying a TB sample.

microscopy for TB at five months and failure to gain at least 5% of body weight at the end of treatment were independent predictors of poor PTB treatment outcome.

"We recommend that a combination of clinical evaluation on routine monthly follow up,

sputum smear microscopy results and evaluation of body weight gain during the PTB treatment be used to predict PTB treatment outcome. Where sputum culture is available, it should be done to complement these predictors," Dr Harino said.

IMR research on show at 2012 PNG Medical Symposium

More than 30 papers were presented by IMR researchers during the 2012 PNG Medical Symposium held in Port Moresby from 3-6 September.

This year's medical symposium theme was Natural Resources Development and its impact on PNG Health.

The IMR papers ranged from studies conducted on malaria, pneumonia, sexually transmitted infections, maternal health, population health surveillance as well as the evaluation of the several health intervention programs underway in PNG.

Major research findings from some of these studies as well as recommendations were presented during the symposium.

Several major research papers were presented at the main symposium while the majority of the presentations at the subsequent Biomedical and Social Sciences Society Specialty (BSSS) Meeting were from junior scientific officers.

Dr Hebe Gouda, a post doctoral research fellow from the University of Queensland, discussed a study she is working on with IMR that looks at lifestyle changes in communities that are home to the PNG Liquefied Natural Gas (LNG) project, which is led by Esso Highlands Limited.

"Anticipating major changes in Hides in Southern Highlands Province and Hiri West in Central Province, the Partnership in Health



Researchers at the 2012 BSSS meeting.

(PiH) project is monitoring the impact on health and well-being of people living around the two sites and comparing them to communities in Asaro in Eastern Highlands Province and Karkar Island, Madang Province," Dr Gouda said.

"The study allows us to look for trends, changes and issues in these four sites, primarily in health, and will help us guide further research and to inform future policy and interventions" she said.

"To gather our data, we monitor and compare 10,000 to 20,000 people through an annual

census, and follow up to record births, deaths, people coming and going, changes in marital status, address, education and employment." "Preliminary results indicate that some populations are growing rapidly and in some places, there are many more men than women, but no conclusions can be drawn yet. Levels of education and employment vary between sites," she said.

Dr Gouda's work reflects the cutting-edge quality of research at IMR that will continue to inform health policy and treatments in PNG in the decades to come.

Call our expert for biomedical equipment repair

Biomedical equipment can be both robust and delicate, sturdy and sensitive.

Keeping these complex pieces of modern technology is vital for any modern medical research laboratory.

IMR biomedical equipment technician Jason Maiasa recently attended a six-month course on biomedical equipment repair at the Medisend Global Education Centre in Dallas, USA.

The course was funded by Esso Highlands Limited and covered a range of topics, including biomedical sensors and transducers, clinical centrifuges and microscopes, aspirators and suction pumps, biomedical troubleshooting, spectrometry, haematology instrumentation and ancillary equipment for clinical laboratories.

Jason said that the course targeted biomedical technicians from developing countries so they can inspect, install calibrate and ensure safe use of health care and diagnostic equipment as well as medical research equipment. "We were ten in total, five from Nigeria, two from Kazakhstan,

one from Peru, one from Haiti and me the sole one from PNG.

Theory and practical training was connected wonderfully through use of a functioning lab, with lab instructors complementing theory classes. The lab had all the instruments covered in the training, making it possible to put theory into practice. I was particularly excited to be trained on the Philips US2011 Sonos Ultra Sound Machine. Another aspect I found not only beneficial but heartwarming on humanitarian grounds was the time we spent refurbishing donated medical equipment, which was checked by the trainees and lab instructors in preparation for sending to countries in need."

Jason has already put his new skills into use with IMR and in providing assistance to Goroka General Hospital when necessary.

"The training has empowered me so that I can communicate with my clients in greater confidence and understand the elements of their requirements," Jason said.



Jason Maiasa (centre, wearing a tie) with fellow trainees in Dallas, USA.

Malaria: testing treated plastic sheets for PNG

Insecticide treated plastic sheeting (ITPS) is a new malaria control intervention recently trialled in Papua New Guinea.

ITPS is a wall covering that kills indoor resting mosquitoes, a function very similar to indoor residual spraying (IRS), but unlike the six to 12 month lifespan of the spray, the sheets remain effective for three to five years.

Researchers at the PNG Institute of Medical Research conducted a feasibility and acceptability study of ITPS early in 2012.

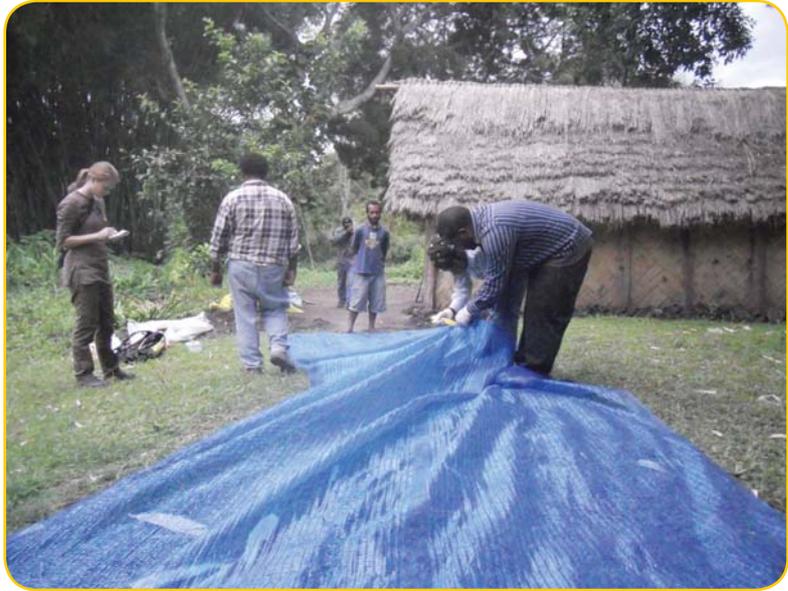
“The aim of this study was to investigate whether it was possible to hang the insecticide treated sheets in a range of homes across PNG and whether, once hung, householders liked it,” said Brown Kaupa, an IMR Scientific Officer attached to the study.

The sheets were installed in 40 homes (10 per site) in four distinct settings across PNG in Eastern Highlands, Madang and New Ireland Provinces. These homes ranged from modern low cost housing to various styles of traditional dwellings.

“The study findings suggest that ITPS installation is feasible in a range of different housing styles in PNG and is acceptable to householders,” Mr Kaupa said.

“However, the installation process was time consuming and a number of householders were concerned about the durability of the ITPS product. Further trials are needed before insecticide treated plastic sheets could be considered for use on a wider scale,” he said.

This study was funded by IMR’s Internal Competitive Research Award scheme (ICRAS), a scheme that is set up by the Institute with support from the Government of PNG to train and improve the capacity building of national scientists in scientific research.



Preparing treated plastic sheeting in Masumave, Eastern Highlands Province.



Many hands make light work of installing plastic sheeting in a home in Masumave, Eastern Highlands Province.



A resident inspects sheeting installed in his home at Lokuwitua, New Ireland Province.

Why some bednet owners don't take cover

In PNG, even a child knows that using an insecticide treated mosquito net (ITN) can protect against malaria if used regularly.

A recent countrywide survey by IMR revealed that over 80% of surveyed households had at least one ITN available, yet fewer than 50% of those surveyed reported sleeping under a treated net the night before the survey.

Programs to distribute treated nets are well supported by the PNGIMR and well received around the country.

So why do some Papua New Guineans living in areas where malaria is common, choose not to use a mosquito net when it is available?

An IMR team led by Dr Justin Pulford carried out an investigation by conducting surveys in the urban, highland and lowland areas of the National Capital District, Western Highlands, East Sepik and Morobe province.

"We found multiple reasons why people did not use their nets, but it was indifference rather than lack of understanding that was a highlight," Dr Pulford told a recent international conference in Rio de Janeiro, Brazil.



In Madang Province, a young drug study participant and his mother receive a treated mosquito net from an IMR nurse at the end of the study.

"Some seemed indifferent to malaria infection due to their life experience," he said.

"Where malaria is seen as an inevitable illness rather than a preventable illness, some people become resigned to it and showed a general lack of concern about

protecting themselves. Nets were too difficult to hang or too hot, or made the sleeping space too small, some said. Some urban residents only used their nets in the bush where there were lots of mosquitoes, while some bush residents said they preferred sleeping by the fire as a preventive, then admitted that they still got bitten.

Dr. Pulford said the vast majority were aware that malaria could be caused by a single mosquito bite and that nets were an effective protection against such bites.

"Behavioural change campaigns may promote greater net usage, especially if it involves health workers broaching net usage during fever-related consultations," Dr Pulford said.

Study findings were presented by Dr Pulford at the XVIII International Congress for Tropical Medicine and Malaria held in Rio de Janeiro, Brazil from 24-28 September 2012.

The study is published in the Social Science and Medicine Journal and dedicated to IMR scientist Tania Oakiva, who was working on the study when she disappeared at sea with four other IMR scientists in August 2011.

Memorial for our missing scientists

Wednesday 1st August marked 12 months since our five IMR scientists went missing in Talasea waters off West New Britain Province.

A memorial service for the scientists was held on 10 August at IMR's Adolf Saweri Lecture Theatre in Goroka and a plaque was unveiled in their honour.

"On this, the saddest of anniversaries, we again offer a reward of K30, 000 for reliable information that leads to their whereabouts," said Professor Peter Siba, Director, PNG Institute of Medical Research.

"If you know something, or know someone who does, we urge you to contact Kimbe Police on 983 5075 or IMR on 532 2800," he said.

The team of five -- Gibson Gideon, Leonard Vavana, Tania Oakiva, George Dogoya and Lydia Petrus -- was travelling from the Milimata sub-health centre in Kaliyai-Kove on West New Britain mainland to the outer Bali Islands, as part of a countrywide malaria survey

for the National Malaria Control Programme.

But their 23-foot fibreglass dinghy (Bineve 2) with a 60 horsepower engine, arranged by the Provincial Health Office, never arrived, nor did the IMR team of five or three person crew.

Despite an intensive search, financed by IMR and led by the West New Britain Provincial Disaster Office, Provincial Health Office and provincial police force, in collaboration with with the National Maritime Safety Authority and Disaster Offices in neighbouring provinces.

Their boat was later discovered, empty of people and cargo, floating far away near Koil Island, East Sepik Province.

"All evidence suggests that the five scientists and three crew members were attacked by criminals who are still at large," said Professor Siba.

"Unfortunately, the police investigation came to a halt last year due to a lack of funds and since then we have been

waiting in vain for any conclusive report. We constantly follow-up with authorities but without any success, he said.

"In April 2012, former Police Minister John Boito agreed to assist but to date, nothing has eventuated. I call on the new O'Neill-Dion Government to fulfil their commitment to assist with the investigations into the missing researchers," Professor Siba said.



The plaque at IMR, Goroka.

Professor Siba elected as Vice President of MSPNG

Professor Peter Siba is the new vice president of the Medical Society of PNG. He was voted in by absolute majority in the elections held during the society's annual general meeting at the Gateway Hotel in September 2012.

Describing his election as a success for the society as well as the Institute, Professor Siba thanked the society members for having trust in him and supporting him for the position.

"I thank all the members of the society who voted me in, and I look forward to working closely with President Professor Nakapi Tefuarani and the executive members to move the society forward," he said.

As a member of the society for more than 25 years, Professor Siba brings with him a wealth of experience in medical re-



Director Peter Siba gives his official speech after appointment as Vice President of the Medical Society of Papua New Guinea.

search and management. He has served as an advisor to the society, chief editor of the Medical Journal and chair of the 2005 Medical Symposium. One of the areas Professor Siba will

focus on during his term is improving the research and clinical capacities of Medical Society members with the aim of producing more publications in both local and international medical journals.

Rai's poster a winner

A poster by IMR researcher Glennis Rai won the prize at the 13th International Union against Sexually Transmitted Infections (IUSTI) World Congress in Melbourne in October.

The poster looked at the prevalence of sexually transmitted infections, including human papilloma virus, among antenatal clinic attendees in Asaro, PNG.



From left: Dr Claire Ryan (IMR/Burnet), prize winner Glennis Rai (IMR), Dr Greg Law, Pamela Toliman (IMR), Dr Andrew Valley (IMR).

The prevalence of sexually transmitted infections, including HPV, among antenatal clinic attendees in Asaro, Papua New Guinea

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Introduction

In Papua New Guinea (PNG) there is a high prevalence of sexually transmitted infections (STIs), in particular human papillomavirus (HPV), among pregnant women. Infection with high risk types of HPV is necessary for the development of cervical cancer.

High risk HPV types 16 and 18 are present in 70% of cervical cancer cases in the world (1). However, little is known about the prevalence of HPV among pregnant women in PNG.

HPV vaccines prevent about 90% of all HPV infections, however are not available in the public health system in PNG.

Results

A total of 140 participants have been enrolled in the Asaro study site to date (August 2012). The mean age of participants was 24. HPV testing has been performed for the first 108 participants (Table 1).

Table 1. Prevalence of STIs among 108 ANC attendees

STI	n (%)
C. trachomatis	20 (18.5)
G. gonorrhoeae	7 (6.5)
T. vaginalis	17 (15.7)
Syphilis	5 (4.5)
HSV-2	51 (47.2)

The prevalence of C. trachomatis (18.5%) is similar to that previously reported from other Pacific Island Countries and Territories (10-20%) (2,3). HPV prevalence (25.0%) was higher than that reported in the 2009 PNG National ANC surveillance (12.5%) for rural areas, and is also higher than that reported in the Pacific Ocean (2.0%). WHO considers PNG a priority for the elimination of congenital syphilis.

The high HSV-2 prevalence in this study (47.2%) was higher than estimates from similar populations in other areas in the Pacific (10%) (4). Human papillomavirus (HPV) is a common STI, and is similar to that observed in high-risk populations in PNG (5-6). However, HPV-2 treatment is not available in the public health system.

Study rationale

To contribute to the national task required to formulate a national HPV vaccine policy, this study aimed to collect the first ever HPV type prevalence data among pregnant women in the Asaro District in the Eastern Highlands Province, PNG. In addition, the prevalence of STIs including Chlamydia trachomatis, Neisseria gonorrhoeae, Trichomonas vaginalis, herpes simplex virus type-1 and 2 and syphilis was determined for the population.

Conclusions

High rates of STIs were observed in this study, with half the women having at least one STI.

High rates of C. trachomatis and syphilis may require intervention programs to protect the health of mother and child participants with the aim of eliminating congenital syphilis.

HPV 16 is the most common HPV type in this population and is vaccine preventable.

The authors gratefully acknowledge Partnership in Health research funding through Centre Model and the IUSTI World Congress Director of Gender and Women's Health for their support. We also thank the dedicated PNG staff members, Asaro, and our contacts, and finally, the study participants without whom this work would not be possible.

Methods

A cross-sectional, sero-epidemiological survey in Asaro, PNG, investigated the seroprevalence of HPV and other STIs among 2009 pregnant women attending antenatal clinics (ANC) in this province. Asaro is a rural district in the Eastern Highlands Province, PNG, including the Asaro District, Eastern Highlands Province. Following the completion of informed consent, pregnant participants were asked to take part in a face-to-face interview in which serological, cervical, laboratory and clinical information were collected. To arrange an antenatal clinic appointment, participants were invited to the antenatal clinic and a single self-collected vaginal swab. Serological specimens were tested for syphilis (RPR and TPPA) and HIV-1 and HIV-2 (ELISA, Western Blotting). DNA extracted from self-collected vaginal swabs was tested for C. trachomatis, G. gonorrhoeae and T. vaginalis by real-time PCR, and HPV genotyping was performed using the Linear Array Genotyping kit (Shine Biotechnology).

Table 2. HPV infection according to age in 100 ANC attendees

Age	n	No. HPV infection	Single HPV 16	Multiple HPV 16	HPV 16
<20	22	9	7	6	2
20-24	40	27	10	23	11
25-29	18	12	6	2	4
30-34	1	0	0	0	0
35-39	1	0	0	0	0
TOTAL	100	44	25	31	18

Figure 1. HPV type distribution in 122 infections among 100 ANC attendees

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6. World Health Organization. *Sexually Transmitted Infections: HIV and STI Management Guidelines for Health-care Providers*. Geneva: WHO Press; 2010.

Keywords: HPV, STIs, PNG, Asaro, pregnant women.

Conflict of interest: None.

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The winning poster.

Glittering prizes for Honours students at symposium

Each year, University of Papua New Guinea Honours students who are working at IMR are required to present their research at the PNG Medical Symposium. They make both an oral presentation and prepare a poster of their work, together counting for ten per cent of their Honours mark.

This year we were lucky to have two students accepted for the main Symposium - Marinjho Jonduo (Goroka) and Tamarah Koleala (Madang), while Elvin Lufele and Rebecca Vinit (both Madang) and Diana Timbi (Goroka) presented at the Biomedical Sciences Social Sciences meeting. Our prize winners are:

- Best Oral Presentation - Marinjho Jonduo
- Runner-up Best Oral Presentation - Tamarah Koleala
- Best Poster Presentation - Diana Timbi
- Runner-up Best Poster Presentation - Elvin Lufele
- Most Improved Student - Rebecca Vinit

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Training Nius

Post graduate intake 2012-13

Once again, we will host the 2012-13 students from University of PNG School of Medicine and Health Sciences and School of Natural and Physical Sciences.

There will be 10 interns, five Honours students and two Masters students. This will complete the three year funding from Esso Highlands Limited, although it is subject to renewal.

Supervisors from different scientific units and sections will supervise one or two students. The intern program lasts 6-8 weeks, Honours 12-13 months and Masters 18-24 months, with all course fees paid by the sponsor.

Journal-writing workshop

In Goroka, 12 staff attended an in-house journal skills writing workshop in September 2012.

The workshop aimed to assist young scientists from different units of the Institute to present their research for publication in the PNG Medical Journal or other journals.

The workshop was presented by Dr Wendy Levy and Cynthea Leahy in conjunction with the Training Office.

Need some training?

All staff interested in any training, short or long, internal or external, should discuss with their immediate supervisors and

submit a training application to the Training Committee.

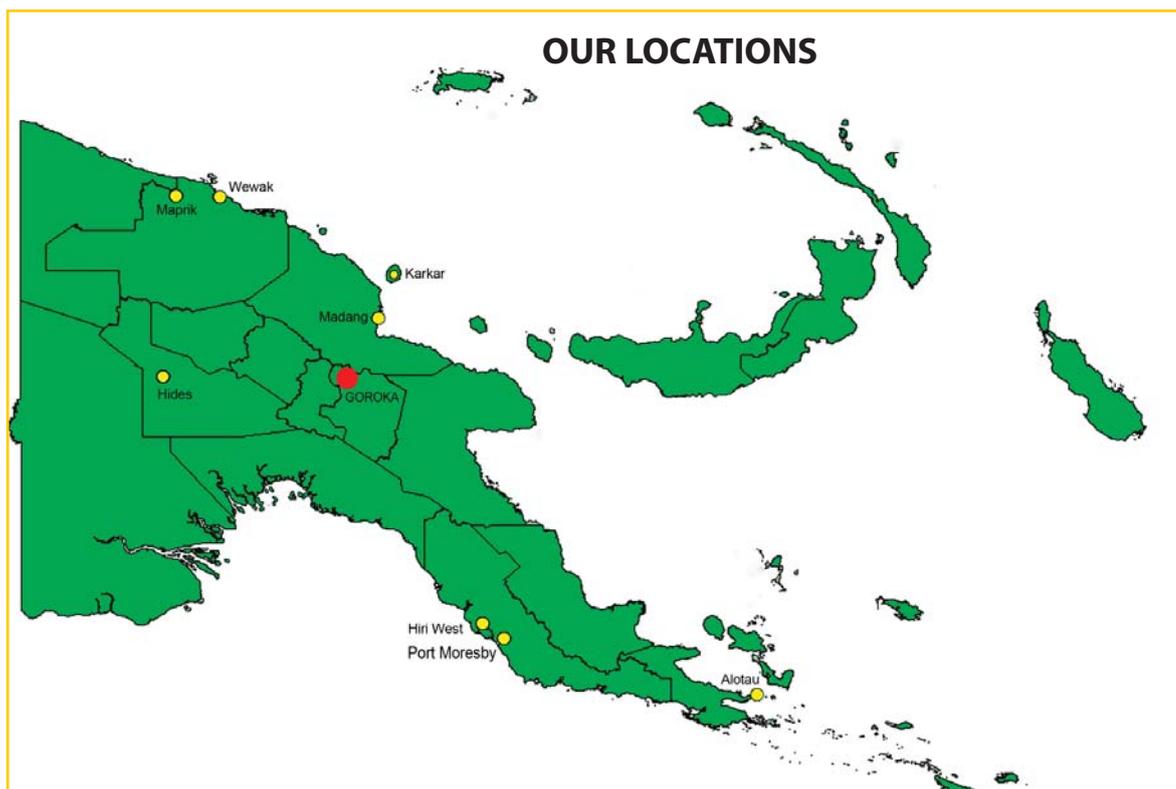
Staff looking at the University of PNG and PNGIMR student program or other scholarships should seek approval from the Training Committee before they apply for the scholarship.

Staff attending in-country or overseas seminars and conferences, including job attachments, must present their reports at an IMR seminar and provide a copy to the Training Committee.

Staff must serve at least two years with IMR before attending training that is more than six months long.

The Training Office encourages staff to attend IMR staff inductions and read our online policies to avoid confusion in their line of duty.

Training Nius is compiled by Dickson Kuvi (Training Officer) and John Yogiyo (Assistant Training Officer). Phone: +675-531 4259.



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