Tropical **H**ealth **Solutions** THS

SHORT COURSE AT
PACIFIC ADVENTIST UNIVERSITY
QUANTITATIVE ANALYSIS I:
BASIC STATISTICS AND SPSS

PAU Campus, 24th to 28th of June 2013

Group Photo on the Pacific Adventist Univeristy Campus (Photo credit: Chris Sohenalo'e)

Facilitated by Tropical Health Solutions Pty Ltd

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This report can also be downloaded at: http://tropicalhealthsolutions.com/publications

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Background

Pacific Adventist University (PAU) is one of Papua New Guinea's (PNG) leading universities. PAU attracts students from across PNG and the Pacific Islands Countries and Territories to study a range of undergraduate and postgraduate programs. PAU is rapidly expanding and in recent years has committed to fostering a research culture at the university. This has involved increased research collaboration with a range of national and international partners. One such major international research collaboration is the 'Acceptability of Male Circumcision for HIV Prevention in PNG' study between PAU and James Cook University (JCU) in Australia. During 2011 PAU researchers on this study attended a Data Analysis and Academic Writing workshop at JCU in Cairns, Australia. Associate Professor Petra Buttner, from the Anton Breinl Centre for Public Health and Tropical Medicine at JCU, and a Director of Tropical Health Solutions, conducted the week long statistics and SPSS (Statistical Package for Social Sciences) course and assisted with quantitative analysis of study data. At the completion of the course, PAU researchers expressed a desire for further ongoing training in data analysis using SPSS.

In 2012 the joint PAU-JCU 'Seventh day Adventist Responses to HIV in Papua New Guinea' study commenced. During 2013 assistance was sought from Tropical Health Solutions to develop a quantitative questionnaire and to strengthen capacity in the study team to analyse data collected in the study.

With this background Tropical Health Solutions was formally invited by PAU to conduct a 1 week course on basic statistics and analysis using SPSS. The course was designed for staff and postgraduate students from across the university involved in research projects with a specific focus on strengthening capacity with research leaders at PAU. This was not only to learn SPSS for their own data analysis but also to increase the capacity of these leaders to teach and mentor other PAU staff and students.

The Facilitator

Tropical Health Solutions Pty Ltd (ACN 152580679) is a private company that aims to improve health in the tropics through applied research and through building capacity in local researchers. For THS the Pacific Island Countries and Territories (PICTs) are its major geographic focus for building research capacity.

THS is officially based in Townsville and the Directors of THS are Prof Rick Speare, Assoc Prof Ray Muller, Assoc Prof Petra Buttner and Dr Kerry Kelly. The first three Directors are researchers with the Anton Breinl Centre for Public Health and Tropical Medicine at James Cook University while Kerry Kelly is a highly skilled clinician with experience in tropical medicine. Rick Speare, Ray Muller and Petra Petra are currently in a transition phase from JCU to full time employment with THS.

THS's approach to building capacity is to be extremely flexible and to use a tailor made delivery, not a "one size fits all" approach. We initially determine what the current skills and knowledge of the researchers are, what skills they need and what skills they want to acquire to achieve their goals. So our training is highly specific. The expertise of our facilitators is such that training can be modified before short courses and even during short courses to meet the needs of the participants.

The long term aim of THS' research capacity building is for the trainers to become redundant. Hence, THS uses essentially a "teach the teachers" approach with the aim of the participants passing on the knowledge and skills gained.

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The Teaching Team

For this short course, the facilitators were Ray Muller and David MacLaren. The team is highly experienced in research capacity building in general and also in Melanesia.

Ray Muller has done extensive workforce development since 1995 through his teaching of Masters of Public Health subjects in biostatistics and epidemiology and through undergraduate teaching in research methods. He is very experienced in advising individual researchers and research teams on project design and in analysis, interpretation, and publication of health related research data, mainly but not exclusively in the tropics. Ray together with his partner Petra are the authors of the new Oxford Press textbook on Epidemiology, released in 2012. Ray has been been working with PNG researchers for some years and has also been teaching as well as capacity building experience in the country. His most recent course in PNG was a tremendously successful two-week intense course on quantitative and qualitative analysis and interpretation of HIV data in Port Moresby on invitation by NACS in 2012; the full report of this course can be found at http://tropicalhealthsolutions.com/publications . In 2005, he also conducted a successful week long SPSS workshop for participants based at Divine Word University in Madang.

David MacLaren has been involved in research capacity building in PNG through the Acceptability of Male Circumcision for HIV Prevention in PNG study. This project uses mixed methods and collaborates with a number of local PNG researchers from Pacific Adventist University and Divine Word University. An important component of this HIV project has been research capacity building workshops held in PNG (Port Moresby, Madang, Popondetta) and in Cairns. These have been very successful; see http://www.jcu.edu.au/phtmrs/abc/publications/JCUPRD1_060921.html.

In addition David has been involved in building research capacity in health researchers in the Solomon Islands since 2009, specifically at Atoifi Adventist Hospital, Malaita. This has been very successful with local Atoifi researchers completing four applied research projects (one on HIV) in April 2011 during the second capacity building workshop. Additional capacity building workshops were facilitated at Atoifi in October, 2011 and in April 2012. The research capacity building at Atoifi has already resulted in several grant submissions from the local research team and a marked increase in competence and confidence in the local researchers.

Short CV's of the Teaching Team Members

Assoc Prof Ray Muller (PhD)

Dr. Muller is an applied epidemiologist and biostatistician specialised in quantitative research methods in the health sciences. Since 2011, Dr Muller is director and consultant with THS. Dr Muller has an extensive international teaching portfolio (Canada, Germany, Australia, PNG) covering more than two decades of teaching quantitative research methodology including quantitative epidemiology (especially infectious diseases including HIV and other STI's, and development, implementation, conduct and publication of observational and experimental studies), applied biostatistics (especially interpretation of effect measures in statistics and CART (classification and regression trees)) and a variety of software packages (including SPSS, Stata, BMDP, EpiInfo etc.).

Dr Muller has been chief investigator of a wide range of international and national competitive and industrial grants totalling more than $6 million. His publication record encompasses more than 200 peer-reviewed scientific publications, several book chapters and three textbooks. His international reputation in quantitative research methodology is especially highlighted by the invitation of high-ranked scientific journals for reviews and by Oxford University Press to write an epidemiology textbook (ISBN 9780195573893; 2012). Together with international and national collaborators and (PhD and other) students, he is currently conducting several major research projects mainly in STI's (Australia, Solomon Islands) and cardiology (Europe, USA and Australia).

Dr David MacLaren (PhD)

Dr MacLaren is a public health researcher specialising in Melanesia (PNG and Solomon Islands) and committed to collaborative research to build research capacity. Dr MacLaren has lectured in research methods at James Cook University at both undergraduate and postgraduate levels. Dr MacLaren is currently the lead investigator of the 'Acceptability of Male Circumcision for HIV Prevention in PNG' study, a 3 year interdisciplinary study between JCU, DWU and PAU.

Research capacity building is central to this study with workshops conducted both in PNG and Australia. AusAID have granted 10 Australian Leadership Award Fellowships to PNG researchers on this study to travel to JCU Cairns for 4 weeks in Oct/Nov 2011 to build capacity in both quantitative and qualitative data analysis. Dr MacLaren is also at the forefront of research capacity building with Atoifi Hospital and College of Nursing in Solomon Islands. Dr MacLaren is also co-principal investigator of the NACS funded, JCU/PAU collaborative 2012-2014 project on "SDA Response to HIV in PNG". This study has considerable capacity building components throughout including the training and supervision of 3 PNG Master of Philosophy students.

Participants

The following participants from the Pacific Adventist University attended the short course:

Participant	School at PAU
Dr Jennifer Litau	Arts and Humanities
Aketa Tiaon-Ientake	Health Science
Esther Koski	Mphil student/GTA/SoHS
McKenzie Masivo	Health Science
Esther Batia	Health Science
Hennah Steven	Mphil student/GTA/SoAH
Thomas Kossie	Mphil student
Clare Kokinai	Mphil student
Orelle Pinor	Science and Technology/GTA/SoST
Linta Aquillah-Qalopui	Science and Technology/GTA/SoST
Valerie-Losi Rence	Mphil//GTA/SoB
Diane Kono	Health Science
Christopher Max Sohenalo'e	Mphil student
Unia Kaise Api	Theology
Reeves Billy	Science and Technology
Andrew Jacob Kenn	MPhil student
Judy Elisha	Arts and Humanities
Ellen Faisi	Postgraduate Dept
Lester Asugeni	Health Science

GTA=Graduate Teaching Assistant;

SoAH=School of Arts and Humanities; SoB School of Business;

SoHS=School of Health Science; SoST=School of Science and Technology

Training and Learning Objectives

The following learning objectives were set for the course:

After the short course, the successful participant will:

- ✓ Understand the link between research question and research design;
- ✓ Be able to understand and differentiate the types of research questions suited to qualitative research and quantitative research;
- ✓ Choose the correct statistical summary measure for any given data;
- ✓ Choose the correct statistical test for any bivariate situation;
- ✓ Understand and interpret results of bivariate statistical analyses correctly;
- ✓ Understand how the statistical results link in a final publication or report;
- ✓ Be able to enter and clean data in SPSS;
- ✓ Be able to summarise data with SPSS;
- ✓ Be able to conduct some bivariate analyses with SPSS.

Teaching Plan and Methods

Teaching Plan

The teaching plan was focussing on an integration between statistical theory (morning sessions) and statistical practice (afternoon sessions) including training in the statistical software package SPSS (Statistical Package for the Social Sciences; IBM SPSS Inc. Version 19 or above; Chicago, Illinois, will be used).

SPSS is a user friendly package which allows statistical analysis without demanding to understand fully the software's syntax. An introductory guide to SPSS written by the facilitators was also part of the teaching material.

The course started with a session on the link between research question and research design and how the research question influences the choice of an optimal research design and analysis (quantitative and qualitative). The research question also determines the kind of data that is collected for a study. The topics of data collection, data entry and data cleaning followed directly on and allowed us to integrate the application of SPSS in data entry and data manipulation. The remaing four days of the week focused on the description of quantitative data and its presentation

in tables and graphs, followed by an introduction to statistical testing. Throughout the lectures and exercises on statistical analysis, the main focus was on the three questions of "when to use what statistical procedure", "how to interpret the results", and "how to present the results".

Teaching Methods

The workshop was delivered based on a mixture of teaching methods: We started with theoretical sessions in the morning as lectures – interrupted by guided discussions. These discussions were used to allow the participants to discuss the learnt topics in the context of their research.

After lunch, practical sessions were conducted during which participants were asked to solve exercise questions that relate to the theoretical morning sessions - initially in small groups by themselves. After that, answers to questions were discussed in the group. The SPSS sessions were a mixture of frontal presentations and participants working on the computer on tasks posed by the facilitators. During this time the facilitators were helping individual participants to deal with computer related questions.

How Competency and Achievement was Measured

Tropical Health Solutions issued certificates at two levels:
Certificate of Attendance for those participants that attend all five days of the course; **Certificate of Achievement** (**Successful Completion**) for those participants who submit and pass the course assessments as detailed below.

Participants' progress and achievements were measured by
(1) individual electronic journals where participants work through self-learning exercises and (2) a practical assignment where participants enter, analyse and interpret a short data example using SPSS.

Time Table

Monday	Tuesday	Wednesday	Thursday	Friday
General introduction Participants' experience & interest in quantitative research.	Summary statistics: How to describe data	Confidence interval for mean, proportion, odds ratio and relative risk	Classification of bivariate statistical tests: when to use which test	Bivariate linear regression analysis with SPSS; interpretation of results
Link between research question, study design, and statistics	Graphical display and presentation of univariate results	Theory of statistical tests: alpha and beta errors, p-value, sample size	Bivariate linear regression analysis	Identification of on appropriate bivariate statistical tests procedure: Additional Exercises
Data collection, data entry, and data cleaning	Practical session of summary statistics and display	Practical session of confidence intervals	Practical session of statistical tests	
Introduction to SPSS (statistical software)	Summary statistics in SPSS	Practical session of theoretical topics of statistical testing	Bivariate statistical tests with SPSS.	
Data entry in SPSS and data manipulation with SPSS	Graphical display in SPSS; Presentation of results	Confidence intervals in SPSS		

Course Evaluation - Participant Feedback

Methods

Detailed feedback at the end of the course was obtained in paper form where people were asked for

  (i)   ticking a matrix of 11 Likert scales reflecting their perceptions of the content, speed, relevance etc of the presented material
  (ii)   open ended "Comments on the current workshop and suggestions for future workshops" with the additional qualifier: "e.g. please add/delete topics; add/delete specific lectures; specific comments referring to the lectures / practicals; what about the facilitators?..."
  (iii) ticking a visual rating scale ranging from 1 to 10 with the qualifiers "Poor" marked under 1 and "Excellent" stated beneath 10.

Results

The most striking result of the detailed feedback for the short course was an **average overall rating score of 8.9 out of 10** on the rating scale from 1 (poor) to 10 (excellent). It is also noteworthy that the minimum rating was a single 6 out of 10; otherwise only 8's or higher markings were scored out of 10!

This reflects quite an outstanding success especially when considering
(1) that this was a short course on generic analytical research skills (statistics!);
(2) that many participants were relative beginners in quantitative research; and
(3) that the level of prior knowledge differed widely between the participants.

This result also reflects the extreme enthusiasm and willingness of the participants to study and to learn as well as the fact that the facilitators were very successful in engaging the participants and delivering a tailor-made course at the right level, pace and with relevant content.

These overall findings were corroborated by the more detailed feedback gathered by the anonymous **matrix of Likert scales** as detailed in the table on the next page (n=16):

Evaluation Results as assessed by the Likert Scale Matrix

Please tick one box per question (row)

Question	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
What I learned will be useful in my work.				43.8%	56.3%
What I learned expanded my knowledge of statistical analysis.					100%
The subject material was generally given in sufficient depth.				31.3%	68.8%
The explanations given by the facilitators were clear.			6.3%	25.0%	68.8%
The workshop was more work than others I have done.	12.5%	18.8%	12.5%	12.5%	43.8%
The interaction with other participants helped my understanding.			6.3%	25.0%	68.8%
The facilitators were approachable and gave individual help.				12.5%	87.5%
The practicals were useful to understand the subject material.				6.3%	93.8%
The workshop was well organised and structured.				31.3%	68.8%
Notes and readings were a useful resource.				6.3%	93.8%
I enjoyed the workshop.				6.3%	93.8%

It is interesting to note that more than half the participants (56.3%) rated the workload of this first course as above what they've experienced in other workshops. This indicates that the pace and content was very close to the maximum that can be delivered without overburdening the participants.

It is also noteworthy that ALL participants (100%) agreed / strongly agreed that what they've learned during this week will be useful for their work. This reflects that it is definitely worthy to create a tailor-made course (as opposed to engaging in the delivery of a 'one-size-fits-all' approach).

The other Likert scale items speak for themthelves with course content, organisation, course material etc exclusively being rated positive!

The open-ended written (and also anonymous) evaluation of the course consisted of answers to the prompt: "Comments on the current workshop and suggestions for future workshops" with the additional qualifier: "e.g. please add/delete topics; add/delete specific lectures; specific comments referring to the lectures / practicals; what about the facilitators?..."

As expected with an overall rating score of 8.9 out of 10, the comments here were overwhelmingly positive. Typical answers included:

"The workshop was excellent. I thoroughly enjoyed the sessions as they broadened my knowledge…".

"The practicals were excellent because they really helped me to make sense of what has been taught."

"The facilitators were very knowledgable about the content so they were able to guide us effectively when we got lost along the way."

"Excellent facilitators!"

"Overall this workshop was very helpful."

"The lecturers were excellent."

"Interactions in classes were exceptional"

"The sessions on descriptive statistics were well done; I understood everything"

"Ray and David did a fantastic job, especially when they helped each student during the practical exercises – Thanks a lot!"

The time constraints / amount of information in such an intense course were repeatedly mentioned:

"It would have been nice to slow down a little..."

"The lessons on bivariate tests are tough and I need a little more readings to understand..."

"The workshop is useful; I've justed needed a bit more time to get used to the technical terms..."

"This SPSS course should be two weeks"

Overall however, the participants appreciated the information presented and the pace, though - as already mentioned in the analysis of the Likert sacales - the amount of content was surely at the upper limit. But so it should be in a tailor-made intense course!

Participants also acknowledged that this course should not remain a one-off exercise but that further courses / training is necessary to foster research at PAU:

" This course was very important and useful in research and therefore we need more and regular refresher courses and training to help reseqarchers to conduct research studies effectively."

"I would very much appreciate if similar workshops continue to enhance the research culture in PAU".

Acknowledgements

Morninglight at the PAU Campus (Photo credit: Christopher Max Sohenalo'e)