

Health Research Systems in Six Pacific Island Countries and Territories

Alec J. Ekeroma^{1*}, Sharon Biribo², Josephine Herman³, Andrew Hill⁴ and Tim Kenealy⁴

¹Pacific Women's Health Research Unit, South Auckland Clinical Campus, University of Auckland, Middlemore Hospital, Auckland, New Zealand

²Acting Director Research, Research Unit, Office of the Dean, College of Medicine, Nursing & Health Sciences, Fiji National University, Suva, Fiji

³Epidemiology and Biostatistics, School of Population Health, University of Auckland, New Zealand

⁴South Auckland Clinical Campus, University of Auckland, Middlemore Hospital, Auckland, New Zealand

*Corresponding author: Alec Joseph Ekeroma, Senior Lecturer, Department of Obstetrics & Gynaecology, University of Auckland, New Zealand, Tel: +64 212767975; E-mail: alec.ekeroma@auckland.ac.nz

Rec date: Jan 29, 2016; Acc date: Mar 04, 2016; Pub date: Mar 16, 2016

Copyright: © 2016 Ekeroma AJ, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background

Evaluating national health research systems (NHRS) in six Pacific Island states - Fiji, Solomon Islands, Vanuatu, Samoa, Tonga and the Cook Islands - is a key step in determining whether their systems, infrastructure and processes are in place to effectively manage health research resources and facilitate conduct of research and its implementation.

Methods

The COHRED questionnaire used in a 2007 mapping of the Pacific Islands was utilised to survey informants from the six countries.

Results

Fiji had a more developed NHRS followed by the Cook Islands and the Solomon Islands. There was no correlation between the degree of NHRS development and population size, level of GDP or SCImago ranking for research output. All the six countries had a research structure accompanied by a satisfactory level of coordination. However, there was not always dedicated personnel assigned and there was a lack of research policies and legislation in all jurisdictions. With the exception of Fiji and the Solomon Islands, the countries had weak ethics processes and there were no monitoring and evaluation systems with the exception of Samoa.

Conclusions

The NHRS in six Pacific Island states vary from less developed in Vanuatu to more developed in Fiji. The development of the various components of a NHRS in small Island states is sensitive to political, funding and human resource pressures. There is room for improvement; nevertheless, there is no need in developing all the components of a NHRS in a resource-constrained setting as long as the various countries develop a Pacific solution that includes research collaborations and resource sharing with other Pacific and Pacific-rim countries.

Keywords: Pacific island countries; Health research systems; Clinician researchers; Research capacity building

Introduction

In 1990, the independent Commission on Health Research for Development drew attention to the disparate burden of disease in developing countries (93%) with global health research investment to address these limited to only five percent [1]. This set in motion a range of global commitments with the establishment of the Council on Health Research for Development (COHRED), tasked to support the development of health research systems capacity with a focus on low- and middle-income countries (LMIC) [2]. In 2005, the World Health Assembly adopted resolution WHA58.34, which acknowledged the critical role of research in realising global development goals and

equitable health, urging member states and the global scientific community and relevant stakeholders to work towards strengthening national and global health research systems.

The Pacific region discussion on health research systems in Pacific Island countries and territories in 2007 began with a presentation on the status of health research in the Pacific based on the use of a mapping tool devised by COHRED [3]. This tool comprised 18 questions modified for the Pacific context seeking health research information through structured interviews with key informants from 15 Pacific Island countries and territories. The mapping tool investigated four key health research areas; governance, policies and priorities, communication dissemination and utilization, and routine health information systems, as well as health research stakeholders. Results suggested that health research systems in the Pacific were

poorly resourced and structured. A set of 19 recommendations from the meeting proposed a range of strategies to bridge the health research systems gap including the ring-fencing of research funds by member countries (2% health budget) and international partners (5% health development aid) [4].

It was estimated that up to 85% of maternal and neonatal deaths in LMIC could have been prevented if only current research evidence was implemented [5]. The lack of utilization of research evidence, let alone the lack of evidence generation, is a result of a limited or non-functioning health research system, where research producers, consumers and other stakeholder partners in utilizing research to achieve national development and health equity [6-8]. Whereas there has been an increase in research capacity building (RCB) in LMIC over the last three decades, the World Health Organization (WHO) since 2005 preferred strengthening national health research system (NHRS) as a way of developing capacity from top down [9]. The concept was formed on the basis that health research could only be performed where there was a living health system. The top down approach includes amongst other values, building governance and management skills, research policy development, legislation and ethics processes and research utilization procedures [2].

The aim of this study was to map and compare the NHRS of six Pacific countries to determine whether there had been any changes in the NHRS of six of the 15 Pacific countries since the WHO mapping in 2007. Countries selected as part of the building reproductive health research and audit capacity and activity in the Pacific Islands (BRRACAP) study [10], were included (Cook Islands, Fiji, Solomon Islands, Samoa, Tonga and Vanuatu). The secondary aim of the study was to determine if there was any correlation to selected economic indicators. The study should inform whether the six countries had a NHRS that would be supportive of researchers and research.

Methods

Quantitative data was collected and analyzed utilizing similar research methodologies used to investigate the status of Pacific health research systems in 2007, based on the COHRED structured questionnaire [4]. The COHRED questionnaire was sent by email to senior representatives of the Ministries of Health and/or senior researchers of the six countries in 2012, inviting them to participate in the study. An updated version was completed in 2015 to verify health research system status.

Table 1: Responses to mapping questionnaire from the six countries.

Components of NHRS/countries	Melanesian countries			Polynesian countries		
	Fiji	Solomon Islands	Vanuatu	Samoa	Tonga	Cook Islands
Structure	National Health Research Committee (NHRC); Fiji National Research Ethics Review Committee (FNRERC)	National Health Research and Ethics Committee (NHREC). The National Health Research and Training Institute (NHTRI) Research Unit helps facilitate health research.	Vanuatu National Health Research Ethics Committee (VNHREC)	National Health Research Committee (NHRC)	Technical sub-committee chaired by the director; then to National Health Development Committee.	Research Office (RO) within the Office of the Prime Minister with research director
Management & coordination	Director Health Information & Research Analysis (DHIRA)	All health research proposals have to go through the NHERC. The NHERC chairman and secretary are from the	Applications to VNHREC	Director General is the Chair of the NHRC	Secretary and chair of Ethics Committee.	Applications to RO or relevant Ministry for comments and recommendations – National Research Committee (NRC)–

No attempt was made to verify the accuracy of the data given so the information, as with that of the 2007 mapping, should be considered indicative. One of the authors (AE) provided additional information with a subjective score for each of the 18 questions in the governance and management section based on the scoring scheme as outlined in the 2007 mapping study [4]. The scoring scheme assigned zero (0) if the response was no or none, one (1) if there was some development, and two (2) if the area was well developed. As with the previous study, each question carried equal value and they were not ranked for importance.

Two informants who were senior or appointed representatives/senior researchers from Samoa, Fiji and the Cook Islands completed the questionnaire. Only one informant from the Ethics Committees and Ministry of Health completed the questionnaires for Vanuatu and the Solomon Islands respectively. In the case of Tonga, the questionnaire was completed by one of the authors (AE) during an interview with five members of Tonga's Ethics Committee.

To determine if there was a correlation between a country's NHRS score and selected demographic measures in population size, gross national product (GDP) per capita, government expenditure on health per capita in international dollars, number of physicians per 1,000 population and a SCImago country ranking [11] for research output were used. A Pearson chi square test was used to test for association (IBM SPSS Version 23).

Ethics approval was obtained from the University of Auckland Human Participants Ethics Committee.

Results

Study results suggest that Fiji has the most developed NHRS among the Pacific Island countries assessed followed by the Cook Islands, Solomon Islands and Samoa (Table 1). All countries were more developed in the areas of research structures, health priorities, a responsible party for Monitoring and Evaluation of policy/intervention, systems to collect/analyse/report routine health information, health care institutions, international research partners, and engaging key stakeholders. Less developed areas were those relating to research plans and policies, formulating research priorities, research legislation, stated values and aims, actual monitoring and evaluation, engagement of other ministries, other research organisations and media active in dissemination of research evidence.

		Ministry of Health (MOH) and the NHTRI.				research permit (if approved)
Dedicated personnel	Full time MOH research officer coordinates and facilitates health research in Fiji and serves as a secretariat to both NHRC and FNRERC	Coordinated by NHTRI which has a director who oversees administrative matters. However, at present NHTRI only has 3 staff.	None. The Health Information Systems (HIS) manager has been assigned the role of the VNHREC focal person	Yes, the MOH Research Unit is Secretariat	None	MOH has a Health Research Committee that advises the RO
Plan/policy	In draft for MOH approvals	In draft	We have a protocol in place but we don't have a policy.	ToR for NHRC Draft Research Guidelines	None	None
Active national health priorities	Defined in MOH strategic plans for HIV/AIDS, NCDs, and risk factors, nutrition, environmental health, systems research, programme evaluation, health promotion	Maternal and child health, HIV/AIDS, TB, Malaria, clean and sustainable water supply. Millennium Development Goals (MDGs) - these are health issues that receive external funding.	Strategic Plan 2011 – 2016. 1. Reduce Child mortality 2. Improve maternal health 3. Equitable access to quality health services etc.	Health Systems Strengthening, Primary Health care, E-health, Diseases Prevention and Control, NCDs, Cancer/maternal and child health, Cervical cancer – screening, HIV Vaccination, etc	MDGs	MOH new strategic plan 2015-2019
Active national health research priorities	Same as national health priorities	No	No	Yes, from the Health Sector Plan	No	Reference to the health priorities on research website
Research legislation	In draft	None	None	Under consideration	Ethics committee – goes to cabinet	None
Stated values	In draft	None	None	NHRC ToR, Guidelines	None	None
Stated aims	In draft	To provide quality research carried out in an ethical manner. Ensure capacity building within the field of health research.	None	Manage sound external research that benefits Samoa	None	None
Monitoring and evaluation (M&E)	Not done formally. With the web-portal, there is potential for monitoring and evaluation.	No	No	NHRC assesses proposals, Provide feedback to researchers, provide stance in relation to findings and review final manuscript before approval	No	Minimal, only through submission and presumed review of reports
Ethical review process and structure	Yes, FNRERC with regular meetings and standard procedure forms	Ethical reviews are done by NHERC. NHRC chairman or secretary along with an ethics review application form. Following review the submitting investigator will be informed of the outcome.	Corporate services under the MOH	Under review	As above Last meeting was last year	No committee for ethical review; ethical process relies on overseas Ethical Review Committees, also gets advice from the Health Research Council of NZ or HRCP as needed.
How use of research increased	Mainly through information brought to the MOH Executive Committee that is translated into policy action; efforts at evidence-based programme	The MOH holds a yearly national health conference in which research results can be presented. All analysis is encouraged to be done within the country.	NA	Research results passed to Executive Management for implementation of recommendations	Annual recordings Annual reports	Increasing work with policy makers with research findings to provide evidence-based policy and decision making

	development (e.g. NCDs)					
How policy-makers informed of advances	New requirement for return of research reports to the MOH especially if ethics approvals are granted by the NHRC or FNRERC	Overseas meetings and the national health conference	NA	Internet and CME are available	None Visiting speakers Paid for up-to-date for clinicians	WHO, South Pacific Commission (SPC) meetings; overseas conferences; annual Cook Islands health conference; visiting consultants; MOU with NZ health provider for support; training attachments through National Human Resources Department
Responsible party for result dissemination	Researchers via the Health Research portal (HRP)	NHTRI has taken on the responsibility but the policy is still in draft form.	No specific mechanism – it happens by meetings or attending conferences.	NHRC puts copy of research in library	Annual reports released to public e.g. life expectancy.	RO requires 3 reports: RO, National Library, relevant ministry, different ministries with individual dissemination strategies
Responsible party for M&E of policy/intervention	At the discretion of the MOH Executive Committee and responsible directors	The Director of Health Policy and Planning for the Ministry of Health.	The Health Planning Unit in conjunction with the Health Sector Analyst in the M&E unit under the Prime Minister's Office.	Strategic division (MOH) Policy and Planning Unit	DOH through the clinicians	Relevant ministry or organisation, usually in the form of a review or report
System to collect/analyse/report routine health information	Through Patient Information System, HRP, regular reports from other service sites, some disease based registries (e.g. cancer)	Provinces and National Health Divisions submit information and reports to the National Health Information System at the Ministry of Health's Health Statistics Unit.	Health Information System – a routine monthly health activities and morbidity reporting from the 6 administrative provinces. Provincial morbidity reports, hospital reports, Annual HIS reports are produced on an annual basis.	Health Information System (HIS), paper info is entered electronically, community-based HIS for public funded services, Annual Health Report	Monthly report form the Islands Quarterly reports and immediate notification	Routine data through the MOH (e.g. NCDs, immunisations, water quality, etc) MOH with Statistics Unit that publishes an annual health statistics bulletin with some separate reports
Regulation of new health technologies, including drugs	National Drugs and Therapeutics Committee, National Equipment Committee, National Training Committee	National Drug and Therapeutics Committee regulates the introduction of new drugs. New health technologies are regulated by the Department of Planning and Policies.	NA	National Medicines and drug Policy and action Plan 2008; National Food and Nutrition Policy 2013 – 2018; National Infection Control Policy 2011 – 2016; National Tobacco Control Policy 2010 – 2015; National alcohol Policy; Food Act 2015	Drug committee – National committee determines drug list. No approval for procedures - approved by clinicians in weekly meetings	No specific mechanism: some regulatory bodies – Public Health CODEX Committee, Cook Islands Medical and Dental Council
Non-health ministries with officials dealing with health	Collaboration with local universities, MoE, Department of Immigration and Ministry of I-Taukei affairs for inclusion of members into health research discussions and on the FNRERC.	No	No	NA	Certain people from finance designated to health	Minimal Statistics Office in Ministry of Finance – census, expenditure survey with some health questions

Institutions engaged in research for health						
Government departments/agencies	MOH, MOE Department of Immigration, I- Taukei affairs	NHRTI, National Vector-borne Disease and Control Program	No	Composition of NHRC Membership is under review	No	MOH, Ministry of Marine Resources, National Environment Service, National Statistics and MoE, Ministry of Agriculture
Health care system institutions	Divisional hospitals	NRH Honiara	Vanuatu Hospital	National Referral Hospital in Upolu and Savaii Teaching Hospital	No	Rarotonga Hospital
Higher education institutions/national research institutes/laboratories	College of Medicine, Nursing & Health Sciences; Fiji National University, University of the South Pacific and University of Fiji.	No	No	Collaborative working relationship	No	University of the South Pacific
Private non-profit organizations	Fiji Medical Association, SPC/Pacific Islands AIDS Foundation, South Pacific Applied GeoScience Commission Medical Services Pacific (MSP), IFPP (International foundation for planned parenthood), IFRC (red cross),	No	No	NA	No	Cook Islands Family Welfare Association
Business enterprise or industry	Tebbutt Research	No	No	Not yet	No	None
International research and development sponsors/partners	WHO, UNDP, UNICEF And JICA, AUSAID, EU, NIH, NHMRC (Aus, NZ), Global Fund	WHO International Center of Excellence for Malaria Research	No	WHO, Government of Samoa, SPC,	WHO, UNFPA, Japan, AUSAID	Institute of Environmental Science and research (NZ), WHO, SPC, NZ National Institute of Water and Atmospheric research, Pacific Islands Geoscience Commission, Australian Agency for International Development, Asian Development Bank
Media organizations active in dissemination	Health Promotion flyers and brochures through media and National Centre for Health Promotion, media releases and health warnings, one TV station, talk back radio and health talks on radio, 3 newspapers, several Fiji-based internet sites, Fiji One, Mai TV	None	No	NA	Newspapers, radio and TYV station	TV (1), national radio (1), FM radio (3), newspapers, international radio and TV, SPC media production
Key stakeholders	MOH, WHO, Fiji School of Medicine Also, Ministry of Immigration and Ministry of Education (MoE).	MOH and Medical Services, NHTRI	WHO, SPC, Unicef	National University of Samoa, Oceania School of Medicine, regional institutions, MOH	Funders	WHO, SPC

Sources for previous analysis, reports or information	MOH with strategic plan, corporate plan, annual reports; other reports in priority areas (e.g. HIV/AIDS, NCDs); National Health Research guide in 1999; Flyers and brochures with information on HR system; WHO reports, country surveys, and national demographic reports.	Demographic Surveys Annual National Health Reports of MHMS - contains reports from the various departments of the Ministry of Health.	NA	International journals, WHO and World Bank publications	Annual reports	MOH Bulletin, Publications/updates, population census, MOH health surveys/reports	Statistics WHO Publications/updates, population census, MOH health surveys/reports
---	---	---	----	---	----------------	---	--

The scoring of the various responses are presented in Table 2 and are ranked by highest total score (Fiji) to the lowest (Vanuatu). All the countries had a reasonably well-developed research structure except Tonga and Vanuatu. No country had published research policy or plans. However, while all countries had systems to collect and analyse data, we were unable to ascertain the integrity and usefulness for clinical practice. There was no statistically significant association between the NHRS scores and any of the demographic and economic variables listed in Table 3. A comparison between the WHO score and the BRRACAP Study score of the six NHRS was made (Table 4) and a difference was found ($p < 0.005$).

Table 2: Scores for components of NHRS governance and management.

Components of NHRS/countries	Fiji	Cook Islands	Solomon Islands	Samoa	Tonga	Vanuatu	Total (out of 12)
Structure	2	2	2	2	1	1	10
Coordination	2	2	2	1	1	1	9
Dedicated personnel	2	2	2	1	0	0	7
Plan/Policy	0	0	0	0	0	0	0
Health priorities	2	2	2	2	1	2	11
Research priorities	1	1	0	1	0	0	3
Legislation	1	0	0	1	1	0	3
Stated values	1	0	0	1	0	0	2
Stated aims	1	0	2	2	0	0	5
M&E	0	0	0	2	0	0	2
Ethical review process/structure	2	1	2	1	1	1	8
Utilisation of research	2	2	2	2	1	0	9
Info for policy-makers	2	2	1	1	0	0	6
Dissemination	2	2	1	0	1	0	6
Responsible party for M&E of policy/intervention	2	2	2	2	1	2	11
System to collect/analyse/report	2	2	2	2	2	2	12

routine health information							
Regulation of new health technologies	2	1	2	2	1	0	8
Non-health ministries with officials dealing with health	2	1	0	0	1	0	4
Government departments/agencies engages in research	2	2	2	1	0	0	7
Health care system institutions	2	2	2	2	1	2	11
Private non-profit organizations	2	1	0	0	0	0	3
Business enterprise or industry	1	0	0	0	0	0	1
International research and development sponsors/partners	2	2	2	2	2	1	11
Media organizations active in dissemination	2	2	0	0	1	0	5
Key stakeholders	2	2	2	2	2	2	12
Sources for previous analysis, reports or information	2	2	2	2	1	0	9
Total (out of 52)	43	35	32	31	20	14	

Table 3: Countries with their demographic/economic variables.

	Fiji	Cook Islands	Solomon Islands	Samoa	Tonga	Vanuatu
NHRS score	43	35	32	31	20	14
Population (1000) in 2008	844	20	511	179	104	234
†GDP per capita	8,200	9,100	1,900	5,200	4,900	3,300

Ĥ Govt expenditure on health per capita in international \$	199	518	99	188	216	90
Ĥ No. of physicians per 1,000 pop.	0.5	1.1	0.1	0.3	0.3	0.1
Ÿ SCImago world ranking	125 (1st)	214 (6th)	184 (2nd)	187 (4th)	203 (5th)	185 (3rd)
† https://en.wikipedia.org/wiki/List_of_Oceanian_countries_by_population (most are official estimates and current to 2016) (Last accessed 10 Jan 2016)						
Ĥ Statistical Yearbook for Asia and the Pacific 2009. http://www.unescap.org/stat/data/syb2009/ESCAP-SYB2009.pdf (Last accessed 20 Jan 2016).						
Ÿ SCImago world ranking. http://www.scimagojr.com/countryrank.php (Last accessed 20 Jan 2016)						

the country’s health research infrastructure and systems. Factors favouring improvements in NHRS were political stability, health research leaders and a collaboration with a well-developed NHRS as in the case of the Cook Islands.

In contrast, Tonga and Vanuatu seemed to have had a reversal in earlier gains as shown in the 2007 mapping. The political instability in Vanuatu for the past 5 years had seen a change of health management personnel, which led to a reversal of earlier infrastructural stability. There was a period when there was no ethics committee in Vanuatu as they had been dismissed as part of the political instability. Health researchers and research skills are lacking in most Island states. In the case of Tonga, the departure of a key health researcher and a lack in research leadership led to a stagnation in the monitoring and evaluation of research. The ethics committee had not met for a year and there were research projects that the ethics committee were aware of that had been conducted without ethics approval. Health research structures in small Pacific states are prone to collapse, as systems are dependent on a few health personnel with the expertise, enthusiasm and research leadership skills. The same challenges were reported from Africa when there was a high turnover of staff [12].

In addition, local research funding is either non-existent or limited [3]. In order to attract international funding to build local capacity, there needs to be a local researcher or a functioning research system [13]. Pacific countries, such as Fiji, with researchers, a tertiary medical institution and a more developed NHRS are better placed to attract these funds than the countries without these. There has been significant investment into research capacity building (RCB) in the Pacific Islands by ways of funding and in international research collaborations [3,14-16]. For example, the WHO programme, STEP-wise approach to surveillance of chronic diseases, was designed to assist capacity building, but this aim was not realized in most Pacific Island states [10]. The Solomon Islands have however been successful in utilizing a well-funded malaria research programme to develop a wider research capability [17] and other research capacity initiatives [18].

There are Pacific solutions to some of the challenges. The Cook Islands is reliant on NZ institutions for ethics advice. Collaborations across borders between well developed research systems and the not so well developed may provide the capacity needed. Fiji, although lacking in areas, has shown leadership in sharing research expertise between its medical school/research institutions with other Pacific nations. Not all components of a health system need to be developed where resources are constrained. Countries however need to be aware of where the gaps lie and identify areas where they can share expertise with other Pacific countries and Pacific-rim countries such as Australia and NZ. Since all six countries have health plans, they should be encouraged to add a section entitled “health research plan”. The lack of a health research plan with research priorities jeopardizes a country’s ability to control the direction of research relevant to its priorities and may hinder its ability to attract necessary research funding [19]. The Pacific Health Research Council, which has been inactive since 2007, needs to be revived to coordinate assistance where needed. An alternative to developing a NHRS is to set up research or tertiary institutions, which can be encouraged to lead the development of a “micro-health research system” [13] which could evolve into a NHRS when the country’s research capacity improves.

A limitation of our study is that the informants may not have been aware of research developments that had not been communicated by a few policymakers. There is also the possibility that the informants may

Table 4: Scores for all components of the NHRS (using COHRED components and tool) and comparisons between the WHO Study and this study for six countries. (calculation using a paired sample test, SPSS 23).

Country	WHO 2007 Study Score (rank)	BRRACAP Study Score (rank)
Fiji	75 (1)	43 (1)
Cook Islands	44 (6)	35 (2)
Solomon Islands	56 (5)	32 (3)
Samoa	58 (4)	31 (4)
Tonga	69 (2)	20 (5)
Vanuatu	67 (3)	14 (6)
TOTAL (mean, SD)	369 (61.5 +/-11.1)	175 (29.2 +/- 10.5)

Discussion

Fiji has the most developed NHRS of the six countries with Vanuatu and Tonga having the least developed systems. All six countries had research governance structures although there was a lack of health research planning, policies, research prioritisation and legislation. It would be difficult to have stated research aims and values without a legal or policy framework underpinning them. Although ethical frameworks could be strengthened in four of the countries, what was clearly lacking was the monitoring and evaluation of research. All the countries have health plans and systems for collecting and collating health data. They also had a structure for health service delivery and they had to strategically engage with stakeholders who were in the main, a funding partner of health services. The Cook Islands is the smallest and yet it had a NHRS second only to Fiji. There was no correlation between how well developed a country’s NHRS was with selected demographic and economic indicators.

Compared to the 2007 mapping by WHO [4], there have been improvements in the research governance and management in Fiji, Samoa, Solomon Islands and the Cook Islands with some of them being significant. The political stability following the coupe *detat* of 2006 has seen major re-investment across the Fijian economy and health sectors which is the most likely reason for the improvement in

have “overplayed” their country’s capability in an area. Some of the questions may not have been well understood e.g. media organizations active in dissemination was recorded as none in the Solomon Islands and Samoa. A difference in the scoring system between the two studies may explain the changes in the scores with scores in this study being lower than that of the WHO study. There was a significant difference between the scores of the two studies and a limitation is that the scoring system for both studies were not standardised. The methods used to collect the data also differed with the investigator interviewing informants from all the six Islands in addition to the data sent by questionnaire. By interviewing informants, the investigator was better informed of the NHRS capability and nuances of the six countries that one would have otherwise received from questionnaires alone. Despite the differences in methods, the investigator was confident to conclude that there had been improvements in the NHRS of Fiji, Cook Islands and the Solomon Islands. A weakness is that there was no comparison with all the other Island states of the Pacific, especially Papua New Guinea, which has the largest population and several academic institutions.

A further research systems mapping in the Pacific should be repeated within ten years to monitor progress, considering the fragile nature of research workforce numbers. However, the use of the COHRED tool or other more extensive tools, which are onerous to complete, may not be necessary. The experience of researchers and clinicians, the end-users, maybe more relevant, in addition to research systems with components defined by Pacific countries.

The paucity of quality data along with competing social and economic priorities in Pacific Island countries and territories are barriers to prioritizing scarce resources for interventions. The lack of health research in Pacific Island countries and territories reflects a wider systemic failure to develop research capacity in the Pacific region [20,21]. Recent research investment in the Pacific has relied on overseas-based funding from the Health Research Council of New Zealand and the Wellcome Trust (United Kingdom) for the Obesity Prevention in the Community (Fiji, Tonga) and the Traffic Related Injury in the Pacific (Fiji, Republic of Palau, Samoa) research projects. With a range of Pacific-relevant solutions and cadre of Pacific researchers identified, non-sustainable research funds place research initiatives to address the specific needs in the region at risk. Global investment in health research has been significant, for example the Global Fund for AIDS, TB and Malaria. The contribution of health research to the achievement of the Sustainable Development Goals is established [22].

Acknowledging resource limitations, the competing use of those resources [23] and the paucity of research activity, most Pacific Island countries do not have to develop all the components of a NHRS themselves. They can decide to devolve some or most of the functions to internal academic or/and regional institutions through collaborative arrangements. The Pacific Way using principles of flexible consensus and open regionalism [24] may present the best solutions and way forward in building the capacity of NHRS.

Conclusion

Better developed NHRS in Pacific Island states are associated with political stability, research leaders and associations with other more developed NHRS. There is no need in developing all the components of a NHRS in a resource-constrained setting as long as the various countries develop a Pacific solution that includes research

collaborations and resource sharing with other Pacific and Pacific-rim countries.

References

1. Commission on Health Research for Development (1990) Health research: essential link to equity in development. Oxford University Press, New York.
2. COHRED (2006) Supporting national health research systems in low and middle income countries. Annual Report 2005, Geneva.
3. World Health Organization. Consultation on strengthening health research capacity in the Pacific.
4. World Health Organization (2009) National health research systems in Pacific Island countries. WHO Library, Geneva.
5. Kinney M, Lawn J, Kerber K (2009) Science in Action: Saving the lives of Africa’s mothers, newborns, and children. African Science Academy Development Initiative, Cape Town.
6. Jacobs M, de Haan S (2003) Health research systems: an evolving framework. *Bulletin of the World Health Organization* 81: 624.
7. Kennedy A, IJsselmuiden C (2006) Building and strengthening national health research systems. Council on Health Research for Development, Geneva.
8. World Health Organization (2001) National health research systems: report of an international workshop. Report of an international workshop, Geneva.
9. Pang T, Sadana R, Hanney S, Bhutta ZA, Hyder AA, et al. (2003) Knowledge for better health - a conceptual framework and foundation for health research systems. *Bulletin World Health Organization* 81: 815-820.
10. Ekeroma AJ, Kenealy T, Shulruf B, McCowan L, Hill A (2014) Building reproductive health research and audit capacity and activity in the Pacific islands (BRRACAP) study: methods, rationale and baseline results. *BMC Med Educ* 14: 121.
11. SCImago (2016) SCImago Journal and Country Rank.
12. Bates I, Taegtmeier M, Squire SB, Ansong D, Nhlama-Simwaka B, et al. (2011) Indicators of sustainable capacity building for health research: analysis of four African case studies. *Health research policy and systems* 9: 14.
13. Ekeroma AJ, Pollock T, Kenealy T, Shulruf B, Sopoaga F, et al. (2013) Pacific Island publications in the reproductive health literature 2000–2011: With New Zealand as a reference. *Aust N Z J Obstet Gynaecol* 53: 197-202.
14. Rankine J (1996) History of HRC support for Pacific health research. *Pac Health Dialog* 4: 166-169.
15. National Health Medical Research Council (2011) International Research Collaboration Allocates Millions for Asia-Pacific Health. NHMRC, Australia.
16. Ekeroma AJ, Pollock T, Kenealy T, Shulruf B, Sopoaga F, et al. (2013) Pacific Island publications in the reproductive health literature 2000–2011: With New Zealand as a reference. *Aust N Z J Obstet Gynaecol* 53: 197-202.
17. Barnish G (1999) Transactions of the Royal Society of Tropical Medicine and Hygiene Tokyo: Inter Group Corporation.
18. MacLaren D, Asugeni J, Redman-MacLaren M, AH Group (2015) Strengthening research capacity in the Pacific: an example from the Atoifi Health Research Group, Solomon Islands. *Australas Psychiatry* 23: 42–44.
19. Ali N, Hill C, Kennedy A, IJsselmuiden C (2006) What factors influence national health research agendas in low and middle income countries?. COHRED, Geneva.
20. Reeder JC (2004) Papua New Guinea: targeting research to things that matter. *Med J Aust* 181: 610-611.
21. Cuboni HD, Finau SA, Wainiqolo I, Cuboni G (2004) Fijian participation in health research: analysis of Medline publications 1965-2002. *Pac Health Dialog* 11: 59-78.
22. Beaglehole R, Bonita R (2015) Development with values: lessons from Bhutan. *The Lancet* 385: 848-9.

23. COHRED (1999) *When the poor need food, who needs research? How Essential National Health Research can lead to better health, greater equity*, Geneva.
24. Acharya A (1997) Ideas, identity, and institution-building: From the 'ASEAN way' to the 'Asia-Pacific way'? *The Pacific Review* 10: 319-46.