

Experiences and challenges in implementing complex community-based research project: the Pacific Obesity Prevention in Communities project

J. T. Schultz¹, M. Moodie², H. Mavoa³, J. Utter⁴, W. Snowdon⁵, M. P. McCabe⁶, L. Millar^{3*}, P. Kremer⁶ and B. A. Swinburn³

¹National Food and Nutrition Centre, Suva, Fiji; ²Deakin Health Economics, Deakin University, Burwood, Australia; ³WHO Collaborating Centre for Obesity Prevention, Deakin University, Burwood, Australia; ⁴Epidemiology and Biostatistics, School of Population Health, University of Auckland, Auckland, New Zealand; ⁵Pacific Research Centre for the Prevention of Obesity and Non-communicable Diseases (C-POND), Research Unit, Fiji School of Medicine, College of Medicine, Nursing & Health Sciences, Fiji National University, Suva, Fiji; ⁶School of Psychology, Deakin University, Geelong, Australia; *This author is at the Geelong campus

Received 19 April 2011; revised 14 June 2011; accepted 14 June 2011

Address for correspondence: JT Schultz, National Food and Nutrition Centre, PO Box 2450, Government Buildings, Suva, Fiji. E-mail: managernfnc@connect.com.fj

Re-use of this article is permitted in accordance with the Terms and Conditions set out at http://wileyonlinelibrary.com/onlineopen#OnlineOpen_Terms

Summary

Policy makers throughout the world are struggling to find effective ways to prevent the rising trend of obesity globally, particularly among children. The Pacific Obesity Prevention in Communities project was the first large-scale, intervention research project conducted in the Pacific aiming to prevent obesity in adolescents. The project spanned four countries: Australia, New Zealand, Fiji and Tonga. This paper reports on the strengths and challenges experienced from this complex study implemented from 2004 to 2009 across eight cultural groups in different community settings. The key strengths of the project were its holistic collaborative approach, participatory processes and capacity building. The challenges inherent in such a large complex project were underestimated during the project's development. These related to the scale, complexity, duration, low research capacity in some sites and overall coordination across four different countries. Our experiences included the need for a longer lead-in time prior to intervention for training and up-skilling of staff in Fiji and Tonga, investment in overall coordination, data quality management across all sites and the need for realistic capacity building requirements for research staff. The enhanced research capacity and skills across all sites include the development and strengthening of research centres, knowledge translation and new obesity prevention projects.

Keywords: Adolescents, challenges, interventions, obesity.

obesity reviews (2011) **12** (Suppl. 2), 12–19

Introduction

Policy makers throughout the world are struggling in their search for effective strategies to combat the growing prevalence of obesity globally. The Pacific Obesity Prevention in Communities (OPIC) project was a 5-year study undertaken between 2004 and 2009, targeting obesity prevention among adolescents aged 12–18 years in four countries (Australia, New Zealand, Fiji and Tonga) comprising eight cul-

tural groups. Figure 1 shows the relative location of the four countries that participated in the OPIC research study across the Pacific, suggesting the complexity of the project in terms of communication and day-to-day project coordination.

The Pacific OPIC project was a collaborative, community-based intervention project (1–3) that involved over 18,000 participants, 300 stakeholder and partner organizations, 60 research staff and 27 higher degree research students. It delivered interventions in multiple

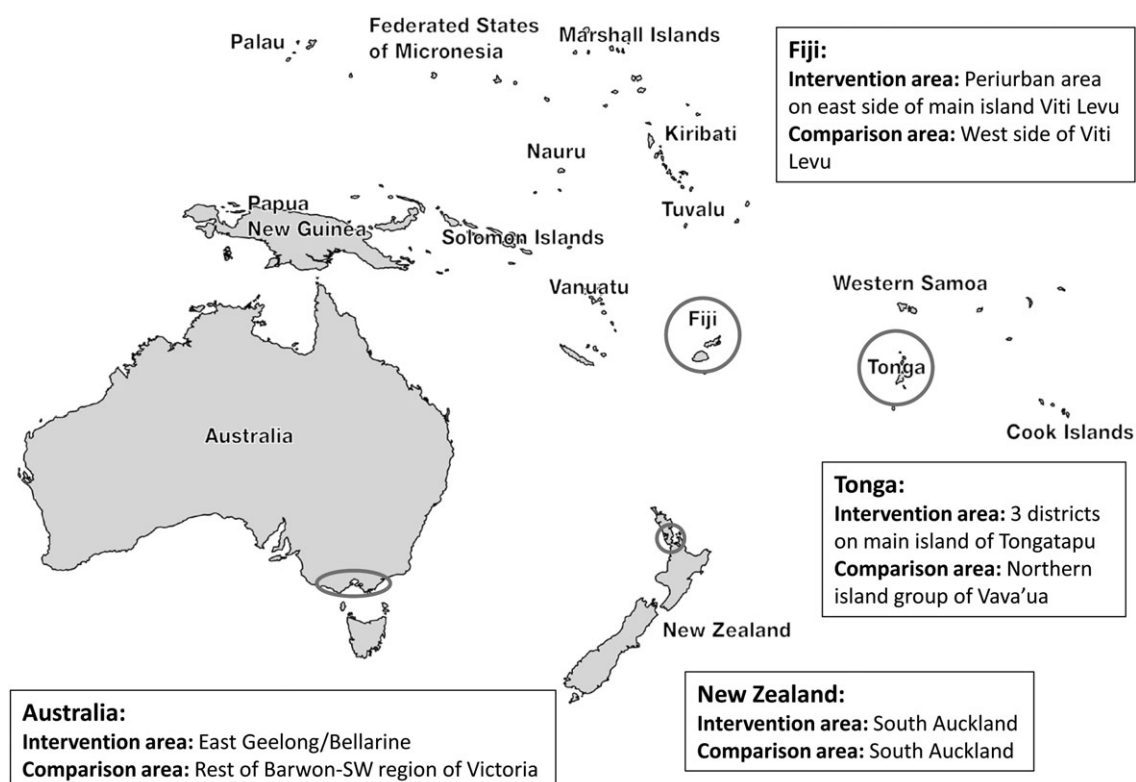


Figure 1 Relative location of participating countries.

settings in communities (schools, religious groups, villages) to address unhealthy weight gain in adolescents, with strong capacity-building and analytical components. The aim of this paper is to reflect on the strengths and major challenges of the Pacific OPIC project, consider issues affecting these types of research and report on the developmental direction for future obesity prevention in the Pacific.

Multi-dimension research: the whole is greater than the sum of its parts

The entire Pacific OPIC project comprised several independent, but related, research components across four countries with markedly different cultures, populations, and food and physical activity environments in order to address adolescent obesity. The research components consisted of sociocultural studies which aimed to establish values, beliefs and attitudes that influence adolescent eating and physical activity (4); interventions targeting diet and physical activity (5–8); economic studies that determined the cost-effectiveness of the intervention studies, in order to inform future decisions on resource allocation for obesity prevention; and policy studies which investigated the impact of potential and implemented food-related policy interventions in Fiji and Tonga (9).

The Pacific OPIC project was an immensely collaborative research project with diverse research teams representing multiple disciplines, points of view and cultural backgrounds. The academic partner institutions (Deakin University, University of Auckland and the Fiji School of Medicine) worked together closely to oversee the planning, conduct and coordination of the whole project. In addition, research staff based in Australia and New Zealand shared their expertise by providing training and supporting the research teams in Fiji and Tonga. In turn, the Fijian and Tongan teams provided valuable local contextual experience and knowledge to the project. Partnership among the four countries was developed through the sharing of experiences, resources and practical support. Research team meetings (held 2–3 times a year) and monthly teleconferences were integral strategies to building collaboration and trust between the researchers. These types of networked studies provide unique opportunities for multidisciplinary collaboration to broaden our understanding of obesity. However, the marked differences in the contexts between countries must be acknowledged in forging these relationships.

The intervention components were designed as four interdependent, quasi-experimental studies to assess the impact of community-based obesity prevention strategies. The studies targeted adolescents in secondary schools, used

common processes, followed similar intervention strategies and time periods, used common measurement instruments and main outcome measures across sites and employed common data management procedures (10). Information about the instruments is provided in the companion manuscript (10). Data management protocols were developed to guide the country teams on data collection and management; OPIC research assistants doubled entered data into local databases, initially using several different programmes, but this was streamlined as capacity was developed across sites. Training of staff in relation to data handling, data entry and data checking, and data security (hard copy and electronic data safely secured) was conducted by the OPIC team in New Zealand and Australia. Data analysis was also streamlined across sites. Countries owned and stored their own data and the data access policy ensured transparency in the use of the data by students for higher degrees as well as for publications. These types of approaches have been used previously (11,12) and are advantageous as they allow for tailoring of the intervention activities to the targeted populations within each site.

Common processes were used across all four intervention sites although the content of specific interventions differed by site depending on local contexts. Allowing flexibility within each of the four intervention sites was important in the Pacific OPIC project for several reasons. First, a participatory process was an integral part of the design throughout the intervention period. The project was initiated and developed through consultation among the principal investigators from each participating country. The community action plans were developed using the Analysis Grid for Elements Linked to Obesity (ANGELO) process for obesity prevention (2) through workshops with local community representatives, including adolescents. Sociocultural factors associated with obesity were initially identified through preliminary interviews with adolescents; these results informed and guided the final action plans (1). If the same intervention package had been used across the four sites, it would have assumed that 'one size fits all' and that the local communities would have had fewer opportunities for meaningful participation in the intervention design and activities. Active collaboration with, and participation of, the local communities and stakeholders encouraged commitment, ownership and sustainability of the project (13).

Second, within each country, strong community partnerships were developed, supported and maintained to ensure the viability of the interventions beyond the project period. Each country engaged with diverse stakeholders including public, private and businesses sectors, local authorities, religious organizations and other non-government groups. These stakeholder collaborations were critical to the implementation of the intervention programmes, especially in non-health sector settings like schools.

Lastly, allowing flexibility within each country's intervention site was crucial given the hugely variable 'cultures of obesity' in each of the four sites. The baseline prevalence of overweight and obesity among the eight major ethnic populations in the four countries ranged from 15% in Indo-Fijians to more than 70% among Pacific young people in New Zealand (14). The local food and physical activity environments, economic situations and public profile of obesity in each of these sites varied as well. Likewise, the sociocultural perspectives of obesity were markedly different in Fiji and Tonga compared with Western countries (15–17). For example, in the Pacific countries there are no vernacular terms for obesity and it is not commonly perceived as a health problem. Moreover, a large body size is valued and reflects love and care (4).

Despite these strengths, the interdependent study design adopted in the Pacific OPIC project raised a number of challenges that require consideration. The most obvious limitation was the inability to generalize each site's study findings to the other sites or to aggregate the findings to determine the impact of the interventions on this age group more generally. Other key challenges included the research capacity and facilities available in low-income countries. For example, handheld computers were used to collect survey data in all countries. Technical support for problems (e.g. malfunctions due to the tropical heat and humidity and frequent power cuts) was more limited in Fiji and Tonga. Consequently, data quality in these sites may have been affected. Likewise, while the project invested in research staff training and capacity building, the resources required for this were underestimated in Fiji and Tonga. These sites lacked a strong research culture and infrastructure (18) as well as the capacity for basic research skills like data collection, record maintenance, intervention delivery and process evaluation, which are necessary for research of this scope. Also, the enormous volume of data collected posed some real challenges to data storage and cleaning, and more centralized data management across all four sites would have been beneficial, particularly in Fiji and Tonga where the data management resources were limited.

With regard to the entire network of the Pacific OPIC project, the main challenges arose as a result of all of the project components being conducted simultaneously. This had a number of implications, the most apparent being that the findings of the sociocultural studies could have greatly informed the interventions had they all been completed beforehand. A full examination of the sociocultural findings would have facilitated the development of more effective, culturally appropriate strategies to address obesity in the Pacific, as well as for similar populations with strong cultural determinants of obesity. However, only preliminary analyses of the sociocultural interview data were available at the time of intervention planning. Furthermore, simultaneously conducting all the study components put a

particularly high strain on the research teams in Fiji and Tonga, where the underlying research capacity was already limited.

Community-based research: balancing feasibility with scientific rigour

The Pacific OPIC project was one of the first large-scale, community-based research projects conducted to address obesity prevention in adolescents. The design of the intervention studies was informed by theories and models drawn from a number of disciplines including health promotion, psychology, anthropology and health economics (19). The interventions within each site were developed after consultation with key stakeholders and with the participation of local communities. The intervention activities in Fiji and Tonga extended beyond the school setting to incorporate local religious groups and villages. Multiple eating and physical activity behaviours were targeted at each site, as well as changes to the local environment and school policies. Thus, the intervention delivery varied considerably by site (20–22).

Evaluation of the effectiveness of the four intervention studies of the Pacific Obesity Prevention in Communities

Project presented a number of challenges. In Australia, the interventions were delivered at the school level only. Although a cluster randomized trial would have been the most robust design for evaluating the interventions at the site, this was not feasible given the major challenges to these types of studies (23) and that the other three sites delivered interventions outside the school settings as well as within schools. Thus, a quasi-experimental design was adopted given the need to achieve a balance of scientific and community-based considerations for implementation (10). Quasi-experimental study designs are acceptable designs for complex interventions, particularly given that the Pacific OPIC project interventions aimed to reach the whole adolescent population (24). However, the interpretation of the study findings must be considered in light of the nature of the design.

The interventions were tailored to the local situation by taking into account the context, cultural appropriateness and stage of readiness in each country. Even within each site, compromises were made during the intervention period as not all intervention activities could be implemented in each of the participating schools/communities as planned. For schools, the priorities are always in teaching the academic curriculum. However, in Fiji and Tonga, the Pacific OPIC project was often seen by the Ministries of Education, the school principals, teachers and parents as unnecessary distraction during academic subject periods.

At all sites, commitment to planned intervention activities between schools was variable and largely dependent on the support of the senior administration. Furthermore, there was often resistance by teachers who viewed involvement in the intervention activities as an additional burden. These competing demands on time at school meant fewer, less intensive and a lower profile for the intervention activities at times. In addition, the interventions became more focused on changing student eating and physical activity behaviours. Promoting food and physical activity seemed relatively easy in practice, compared to implementing school policies, ensuring the availability of healthy foods within the schools and the inclusion of related health promotion topics in the school curriculum.

Interventions in the local communities and schools particularly need to be suitably flexible to meet the needs and expectations. As a result, the evaluation of these interventions was somewhat compromised. The participatory nature of the study design meant that it was difficult to define the boundaries of the interventions since they were tailored to each local population. Likewise, the intervention activities could not always be implemented meaning that the effectiveness of the intervention was heavily dependent on the context in which it was delivered. The intervention activities and their relative successes are also detailed in the published process papers (20–22) and the outcome papers in this supplement (5–8).

Capacity building: the highs and the lows

One of the major aims of the Pacific OPIC project was capacity building, both in the community and academically. In reviewing the complex structure of capacity building, Simmons and colleagues (25) concluded that communities need to define what capacity needs to be built to suit their own contexts and purposes. The overall definition that was used by the Pacific OPIC project came from Smith *et al.* (26) in the WHO glossary:

The development of knowledge, skills, commitment, structures, systems and leadership to enable effective health promotion. It involves actions to improve health at three levels: the advancement of knowledge and skills among practitioners; the expansion of support and infrastructure for health promotion in organisations, and; the development of cohesiveness and partnerships for health in communities (p. 341).

The NSW Health Department framework was also used by the Pacific OPIC project (27,28) as a practical guide. The capacity-building efforts during the project resulted in increased academic research skills and qualifications across all countries with 20 higher-degree completions.

The Pacific OPIC research teams were made up of many members across the four sites, over the duration of the

Table 1 Academic capacity and expertise in the Pacific Obesity Prevention in Communities project (numbers varied over the course of the project)

	Roles	Discipline expertise	Highest degree*
Australia	Inv.: 2–3; RFs: 4–6; Coord.: 1	Medicine, public health, psychology, nutrition, economics, policy, anthropology, epidemiology, education, biostatistics	Doctoral 5–7; PhD students 9; Masters 0; Masters students 2
New Zealand	Inv.: 1; RFs: 2–4; Coord.: 1	Epidemiology, public health, nutrition, Pacific health, biostatistics, education	Doctoral 1–2; PhD students 7; Masters 1; Masters students 3
Fiji	Inv.: 1; RFs: 0; Coord.: 2	Public health, nutrition, nursing	Doctoral 1; PhD students 2; Masters 1; Masters students 3
Tonga	Inv.: 1; RFs: 0; Coord.: 1	Medicine, nursing	Doctoral 1; PhD students 0; Masters 1; Masters students 0

*Each person counted once; doctoral includes medical.

Coord., coordinators; Inv., ongoing roles as principal and associate investigators; RFs, research fellows.

project. The multi-component nature of the project meant that the expertise being brought to obesity prevention within the project came from a number of different disciplines (Table 1). This wide range of expertise within the project team enabled delivery of the necessary training and capacity building inputs for the less experienced project team members as well as the delivery of skills training to community members through short workshops.

Given the differing research cultures and infrastructures across the four sites, capacity-building efforts required a country-specific approach. In Fiji and Tonga, the focus was on providing research skills through both academic coursework and general research skills training, while in New Zealand and Australia, the emphasis was largely on higher degrees. Over the study period, 77 practical workshops were conducted across the four sites to develop and enhance skills in research and obesity prevention; the majority of these were held in Fiji and Tonga. The Pacific OPIC project team also provided professional support and mentoring for team members, particularly the two Pacific countries. This support ensured opportunities for presentation at international conferences and authorship in peer-reviewed publications and increasing opportunities for lead authorship in Tonga and Fiji. These capacity-building activities were important for building the confidence and competency of emerging researchers and were particularly important for the Pacific researchers who had limited research experience.

The emphasis on capacity building through higher degrees was most appropriate for Australia and New Zealand where the pool of eligible candidates was greater and the research infrastructure and culture well established. In New Zealand, there was a particular emphasis on building research skills and capacity for young researchers of Pacific Island ethnicities. At the time of this publication, there were eight completed higher degrees in New Zealand and two in progress. More than half of these students were of Pacific ethnic origin.

In contrast, achieving higher degrees in Fiji and Tonga was more difficult as people working in small Pacific Island countries who had the necessary prerequisites for doctoral studies were often employed in key positions within government. The loss of job security and limited doctoral stipends made it financially untenable, especially for those with families. The limited availability of Pacific personnel with appropriate research skills or qualifications in specific disciplines was particularly evident in the project's economic studies. At the time of this publication, there were two doctoral enrolments in Fiji. Adequate mapping of the skill base (29) is necessary for studies that aim to build research capacity. Importantly, adequate resources are required in order to attract high-quality students.

Capacity building also occurred in the participating communities. Both local and expatriate research team members conducted special training workshops in each country for adolescent and adult community members on obesity prevention, leadership skills and core health promotion approaches. A total of 140 workshops targeting stakeholders were conducted.

In general, the capacity-building component of OPIC was successful, although all project-based funding with a defined lifespan creates some job insecurity and staff turnover, especially in the junior positions. This was particularly problematic in Fiji and Tonga given the already limited number of qualified people available.

Working within the existing funding environment

The Pacific OPIC project was funded over a 5-year period, which is a generous time frame when compared to many major research funding body guidelines. However, to conduct and evaluate complex, community-based intervention studies, a 5-year window was very optimistic. Intervention studies, such as those developed in the Pacific OPIC project, require adequate time for advocacy, consultation

and collaboration between researchers, between researchers and communities as well as within communities, development and implementation of intervention activities that are feasible and acceptable, and the design and analysis of the evaluation framework. As such, the publication of this supplement is appearing some time after the funding ceased.

Successful partnerships require trust, mutual respect and an appreciation of different people's potential roles within the partnerships. Such partnerships can only result from close working relationships between all stakeholders throughout the project (27). The Pacific OPIC project had considerable strengths in terms of strong collaboration across sites and within countries, but there were also areas of weakness. For example, the newness of the collaborative relationship between the three academic institutions meant there was a short lead-in time and relationships were still developing during the project. In Fiji, relationships between the project and major government partners, such as the Ministry of Education and the schools, were more informal.

The objectives of the intervention studies were ambitious given the project's duration, multiple locations and complexity. Because of pressures to commence data collection soon after securing the project grants, there was limited time available to develop, refine and test protocols and guidelines for data collection, processing and analysis before embarking on field work for all the multiple components of the study. In Fiji and Tonga, where researchers were much less experienced, more time for skills training and protocols would have been of great benefit to them and the project. Likewise, organizing data collection at times that was acceptable for schools meant that the planned 3-year intervention had to be reduced for the entire project to be completed during the 5-year window. Ideally, longer lead times or a stepped approach would also help to overcome the difficulties of low research capacity.

While the research funding for all four countries was secured collectively, the broader funding environments of Fiji and Tonga are markedly different from Australia and New Zealand. In the Pacific Island countries, there was very little existing research infrastructure and no mechanisms to cover the indirect costs of research. Thus, the funding for the direct costs and support from the Fiji School of Medicine to cover the substantial total costs of this large project totally relied on project funds. These included costs for office rental, financial services, all community interventions, travel, staff development and conferences, while the Australian and New Zealand projects were able to cover these costs from other sources. In all countries, the local coordinators sought alternative funding sources to cover some of the intervention activities. While this up-skilled the coordinators in the preparation of funding submissions, particularly in Fiji and Tonga, it also diverted them from delivery of all planned interventions. This presented a unique strain in Fiji and Tonga where both

financial and person resources were limited and would have impacted on the intervention outcomes.

'Best Practice' recommendations for multi-centre, community-based participatory research projects

Based on our OPIC experience, the following are recommended for future large multi-centre intervention projects, especially involving low- or middle-income countries:

- Understanding where the community is situated in relation to readiness to change is important so that the interventions can be pitched at the appropriate level.
- It is important that local skills and infrastructure are well understood before designing projects, especially in developing countries, to ensure realistic allocation of resources to address gaps.
- In community-based projects, extensive consultation and planning is needed prior to commencing any interventions and measurements, and sufficient time for this must be allowed in the project plan to ensure and encourage building of trust and confidence with partners for active engagement and commitment.
- Multi-country and multicultural intervention research projects require flexibility in some areas to allow for variations across local and cultural settings.
- Such multi-country and multidimensional research projects require dedicated coordinators at both a country level and a project level.
- Partnerships involved in a research project, including those with government departments, should be backed up by formal signed memoranda of agreement to define a clear programme of work and scope of responsibilities.
- Phased starting times in multi-site studies can reduce managerial and implementation challenges.
- With an emphasis on training and development, there is need for a risk management plan to take into account premature departures of newly trained staff.
- Given limited funding opportunities for many research projects, long-term sustainability of interventions needs careful consideration and planning from the start.
- Sufficient time and funding is needed to ensure that data management protocols are in place prior to commencing projects, and strong coordination needed to ensure adherence to protocols.

Future directions: the Pacific Obesity Prevention in Communities project outcome

While the 5-year Pacific OPIC project was only a first step in the tough battle against obesity, it has provided a firm platform for subsequent research and policy activities. The project was successful in raising the profile of obesity as an

urgent public health issue in the four participating countries, building the evidence on what works and does not work, and building research and community capacity to tackle the problem. The momentum established by the Pacific OPIC project must be maintained, if the obesity epidemic is to be turned around.

One outcome of building Pacific research capacity is that there is increasing local leadership and ownership of public health research in the Pacific. While still drawing on the expertise of external collaborators, local researchers are now more likely to be at the forefront of research, identifying, planning, leading and implementing research projects and disseminating, communicating and acting on their findings.

The Fiji-based Pacific Research Centre for Prevention of Obesity and Non-Communicable Diseases (C-POND) was established in 2009 as a direct result of the Pacific OPIC project. C-POND is a collaboration between Deakin University and the Fiji School of Medicine (within Fiji National University) and is a regional research centre. The Centre provides for ongoing and new projects, initiatives and collaborations for obesity-related research. It has been successful in its first year of operation in attracting considerable funding, consultancies and two regional PhD students. This collaborative effort has the potential to facilitate, support and improve research infrastructure and ongoing research in Pacific Island countries.

In New Zealand, the Pacific Health Research Centre at the University of Auckland continues to develop in terms of research strength, sustained by the postdoctoral researcher capacity developed during the Pacific OPIC project. Another obesity research project is now underway in Auckland, with a focus on the family-based treatment options for child obesity.

The major current focus of the strong international collaboration forged by the Pacific OPIC project is on the embedding of research into policy and practice. In 2009, Deakin University and the Fiji School of Medicine were awarded an AusAID grant to conduct a study titled 'Translational Research for Obesity Prevention in Communities' (TROPIC) in Fiji, a natural extension to the Pacific OPIC project. TROPIC is a knowledge exchange project which involves working with government and non-government agencies to embed the learnings from the Pacific OPIC project research and international research into government policies. It uses a novel 'knowledge broker' approach to develop evidence-informed, decision-making skills and support the production of evidence-informed policy briefs that have the potential to impact on obesity. TROPIC is a promising way of ensuring that public health practice and government policy is driven by local research.

The future directions of obesity research in the Pacific include building on the role of religious groups and their influence on eating patterns of adolescents as determined

from the Pacific OPIC sociocultural studies (30,31). While the Pacific OPIC intervention study in Australia showed significant reductions in overweight and obesity prevalence (7), the other three intervention sites showed no such changes (5,6,8), suggesting that the approaches used were insufficient in terms of duration, intensity, activities or contextualization to prevent unhealthy weight gain in these populations. Thus, the adoption of a more systems-based approach will characterize future work undertaken by the collaboration around obesity prevention (32).

Conclusion

This paper has highlighted the strengths and important challenges experienced when implementing this complex community-based obesity intervention project.

Overall, the Pacific OPIC project met its goals for knowledge creation and building the capacity of researchers and communities to prevent obesity in adolescents. However, we were not so successful in preventing unhealthy weight gain in three of the four sites. The Pacific OPIC project has provided a strong platform for future obesity prevention research. A more strategic systems approach may be needed for future obesity prevention in the Pacific.

Conflict of Interest Statement

M. P. McCabe, P. Kremer, H. Mavoa, B. A. Swinburn, L. Millar and M. Moodie's institutions have received grants from National Health and Medical Research Council. Support was provided to cover the cost of travel to New Zealand and to Investigator meetings. The authors were employed by Deakin University.

J. T. Schultz's institution has received grants, and support to cover the cost of travel to Investigator meetings in the Pacific, from Wellcome Trust Grant. The author was employed by Fiji School of Medicine, Fiji National University.

W. Snowdon's institution has received grants from Wellcome Trust for funding the entire OPIC project. The author also received consulting fee or honorarium, for the concept paper on food policy options for the region, and support for travel to attend meetings to discuss actions to control NCDs in the region, both funded by the World Health Organisation.

J. Utter's institution has received grants from Health Research Council of New Zealand.

Acknowledgements

The authors would like to thank the many people involved in the Pacific OPIC project including other co-investigators, other staff and postgraduate students, partner organizations, and especially the schools, students, parents and communities. The funding for the project was from the

Wellcome Trust (UK) (grant reference number 071637/Z/03/Z), the National Health and Medical Research Council (Australia) and the Health Research Council (New Zealand) through their innovative International Collaborative Research Grant Scheme.

References

- Schultz J, Utter J, Mathews L, Cama T, Mavoa H, Swinburn B. The Pacific OPIC project (Obesity Prevention in Communities): action plans and interventions. *Pac Health Dialog* 2007; **14**: 147–154.
- Simmons A, Mavoa HM, Bell AC, De Courten M, Schaaf D, Schultz J *et al.* Creating community action plans for obesity prevention using the ANGELO (Analysis Grid for Elements Linked to Obesity) Framework. *Health Promot Int* 2009; **24**: 311–324.
- Swinburn B, Pryor J, McCabe MP, Carter R, de Courten M, Schaaf D *et al.* The Pacific OPIC project (Obesity Prevention in Communities) – objectives and designs. *Pac Health Dialog* 2007; **14**: 139–146.
- McCabe MP, Mavoa H, Ricciardelli L, Schultz JT, Waqa G, Fotu KF. Socio-cultural agents and their impact on body image and body change strategies among adolescents in Fiji, Tonga, Tongans in New Zealand and Australia. *Obes Rev* 2011; **12**(Suppl. 2): 61–67.
- Fotu KF, Millar L, Mavoa H, Kremer P, Vivili P, Snowdon W *et al.* Outcome results for the Ma'alahi Youth Project, a Tongan community-based obesity prevention programme for adolescents. *Obes Rev* 2011; **12**(Suppl. 2): 41–50.
- Kremer P, Waqa G, Vanualailai N, Schultz JT, Roberts G, Moodie M *et al.* Reducing unhealthy weight gain in Fijian adolescents: results of the Healthy Youth Healthy Communities study. *Obes Rev* 2011; **12**(Suppl. 2): 29–40.
- Millar L, Kremer P, de Silva-Sanigorski A, McCabe MP, Mavoa H, Moodie M *et al.* Reduction in overweight and obesity from a 3-year community-based intervention in Australia: the 'It's Your Move!' project. *Obes Rev* 2011; **12**(Suppl. 2): 20–28.
- Utter J, Scragg R, Robinson E, Warbrick J, Faeamani G, Foroughian S *et al.* Evaluation of the Living 4 Life project: a youth-led, school-based obesity prevention study. *Obes Rev* 2011; **12**(Suppl. 2): 51–60.
- Thow A, Snowdon W, Schultz JT, Leeder S, Vivili P, Swinburn BA. The role of policy in improving diets: experiences from the Pacific Obesity Prevention in Communities food policy project. *Obes Rev* 2011; **12**(Suppl. 2): 68–74.
- Swinburn BA, Millar L, Utter J, Kremer P, Moodie M, Mavoa H *et al.* The Pacific Obesity Prevention in Communities project: project overview and methods. *Obes Rev* 2011; **12**(Suppl. 2): 3–11.
- Kephart DK, Chinchilli VM, Hurd SS, Cherniack RM. The organization of the asthma clinical research network: a multi-center, multiprotocol clinical trials team. *Control Clin Trials* 2001; **22**: S119–S125.
- Rochon J, Klesges J, Story M, Robinson T, Baranowski T, Obarzanek E *et al.* Common design elements of the Girls health Enrichment Multi-site Studies (GEMS). *Ethn Dis* 2003; **13**: S1–S14.
- Campbell MK, Hudson MA, Resnicow K, Blakeney N, Paxton A, Baskin M. Church-based health promotion interventions: evidence and lessons learned. *Annu Rev Public Health* 2007; **28**: 213–234.
- Utter J, Faeamani G, Malakellis M, Vanualailai V, Kremer P, Scragg R *et al.* *Lifestyle and Obesity in South Pacific Youth: Baseline Results from the Pacific Obesity Prevention in Communities (OPIC) Project in New Zealand, Fiji, Tonga and Australia.* University of Auckland: Auckland, 2008.
- Craig P, Halavatau V, Comino E, Caterson ID. Perception of body size in the Tongan community: differences from and similarities to an Australian sample. *Int J Obes* 1999; **23**: 1288–1294.
- Williams L, Ricciardelli L, McCabe MP, Swinburn B, Waqa G, Bavadra K. Body image attitudes and concerns among indigenous Fijian and European Australian adolescent girls. *Body Image* 2006; **3**: 257–287.
- Williams L, Ricciardelli L, McCabe MP, Swinburn B, Waqa G, Bavadra K. A comparison of the sources and nature of body image messages perceived by indigenous Fijian and European Australian adolescent girls. *Sex Roles* 2006; **55**: 555–566.
- Finau S. Health research in the Pacific: in search of a reality. *N Z Med J* 1995; **108**: 16–19.
- Bell AC, Simmons A, Sanigorski AM, Kremer PJ, Swinburn BA. Preventing childhood obesity: the sentinel site for obesity prevention in Victoria, Australia. *Health Promot Int* 2008; **23**: 328–336.
- Fotu KF, Moodie MM, Mavoa HM, Pomana S, Schultz JT, Swinburn BA. Process evaluation of a community-based intervention: an adolescent obesity prevention project in Tonga. *BMC Public Health* 2011. doi: 10.1186/1471-2458-11-284
- Mathews L, Moodie M, Simmons A, Swinburn B. The process evaluation of It's Your Move!, an Australian adolescent community-based obesity prevention project. *BMC Public Health* 2010. doi: 10.1186/1471-2458-10-448
- Utter J, Warbrick J, Scragg R, Denny S, Schaaf D. The design, development and achievements of a youth-led nutrition and physical activity intervention in a Pacific Community in New Zealand. *J Am Diet Assoc* 2010; **11**: 1634–1637.
- Flay B, Collins L. Historical review of school-based randomized trials for evaluating problem behavior prevention programs. *Ann Am Acad Pol Soc Sci* 2005; **599**: 115–146.
- Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 2008; **337**: a1655.
- Simmons A, Reynolds RC, Swinburn B. Defining community capacity building: is it possible? *Prev Med* 2011; **52**: 193–199.
- Smith BJ, Tang KC, Nutbeam D. WHO health promotion glossary: new terms. *Health Promot Int* 2006; **21**: 340–345.
- Labonte R, Woodard GB, Chad K, Laverack G. Community capacity building: a parallel track for health promotion programs. *Can J Public Health* 2002; **93**: 181–182.
- NSW Health Department. *A Framework for Building Capacity to Improve Health.* NSW Health Department: Sydney, NSW, 2001.
- Lee JE, Perkins J, Barnett ME, Sarpong D, Sung J. Importance of capacity assessment for an early staged-research network designed to eliminate health disparity: lessons from RTRN. *Ethn Dis* 2010; **20**: S1–S150–S1–154.
- McCabe MP, Fotu K, Mavoa H, Faeamani G. Body Image and Body Change Strategies Among Tongan Adolescents in Tonga and New Zealand. *N Z Med J* 2010; **123**: 37–46.
- McCabe MP, Ricciardelli L, Waqa G, Goundar R, Fotu K. Body image and body change strategies among adolescent males and females from Fiji, Tonga and Australia. *Body Image* 2009; **6**: 299–303.
- Huang T, Drewnowski A, Kumanyika S, Glass T. A systems-oriented multilevel framework for addressing obesity in the 21st century. *Prev Chronic Dis* 2009; **6**: A82.