



Digital Health Literacy in Commonwealth Pacific Nations



COMMONWEALTH of LEARNING

Digital Health Literacy in Commonwealth Pacific Nations

PALE SAUNI AND TERRY NEAL

OPEN POLYTECHNIC OF NEW ZEALAND

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The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to encourage the development and sharing of open learning and distance education knowledge, resources and technologies.



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Digital Health Literacy in Commonwealth Pacific Nations

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Executive summary

This research had two aims:

- To provide a broad overview of current initiatives in digital literacy in the health sector focusing on Papua New Guinea, Solomon Islands, Nauru, Kiribati, Tuvalu, Vanuatu, Samoa and Tonga
- To identify possible gaps in or needs for capability building where the Commonwealth of Learning (COL) may be able to add value

The research methodology is best described as “Partnership” within the New Zealand Health Research Council’s framework. The research used a shared leadership model, seeking to maximise the skills of both researchers, and sought to be mindful of the council’s guiding principles for forming and maintaining ethical research relationships with Pacific peoples. The four phases were:

- definition of scope and terms;
- literature review;
- interviews with the Pacific Open Learning Health Net (POLHN), health specialists and community health workers; and
- analysis and report writing.

The research focused on the digital health literacy of community health workers — that is, their ability to access, understand, compare, evaluate, apply, share, reproduce and enhance digital information on health, so that individual and community health improves.

The research team determined that community health workers work through three steps in using digital information to improve health: 1) accessing technology, 2) learning from and connecting with others, and 3) filtering, translating and applying the information in their community. Each step requires a different balance of digital, health and cultural literacy.

Community health workers play a crucial role in effective primary healthcare models. Pacific countries have been pursuing these initiatives since the late 1970s, with demonstrable health benefits. However, ensuring adequate financial and human resources is an ongoing challenge, especially once donor support disappears. Another challenge is developing and maintaining the capability of community health workers, with supervision promoted as an important strategy. Capability challenges are likely to increase in response to changing health needs, such as the increase in non-communicable diseases and in urban health needs. Each Pacific country needs culturally appropriate solutions, developed with communities, including community leaders. Distance learning is likely to be part of the solution to capability-building challenges. Communities also need to be empowered to evaluate and continuously improve these co-developed solutions.

Technology infrastructure in the Pacific is limited. Electricity, standard mail and the use of printers and photocopiers are still challenging in some places. Internet use is limited, unequal and expensive, and there is no indication that this situation will change soon. However, mobile phone use is growing markedly, with Samoa, Vanuatu and Fiji having levels comparable to developed countries. This suggests that piloting the use of mobile phones to improve health outcomes in countries with high mobile phone use may be a good place to start.

The research reviewed four regional initiatives that involve digital health — the Secretariat for the Pacific Community’s Public Health Programme Strategic Plan, Pacific Public Health Surveillance Network, Pacific Digital Strategy, and POLHN — as well as national policies relevant to community health and information and communication technology (ICT). The eight countries that the research focused on, plus Fiji, can be grouped into three categories:

- ICT potential but not community workers included in national health plans (Nauru)
- Community workers but not ICT potential included in national health plans (Fiji, Samoa, Tuvalu and Vanuatu)
- Community workers and ICT potential included in national health plans (Kiribati, Papua New Guinea, Solomon Islands and Tonga)

ICT is believed to have significant potential to improve health through better informing health professionals and the public, and improving data sharing and therefore decision-making. However, the proposed benefits, such as decreased costs and mitigation of health workforce shortages, are yet to be proved. In the Pacific, the Internet and mobile phones offer the potential to reduce the physical and professional isolation of community health workers. ICT-supported distance learning has the potential to help meet the demand for training community support workers in the Pacific through increasing access, being affordable and supporting work-based learning. POLHN is already offering short online courses to community health workers. However, research into distance learning in the Pacific shows a number of barriers to be overcome.

Community health workers in the Pacific appear to have low digital literacy. A significant factor contributing to this appears to be the cost of, and difficulty accessing, the Internet. A second factor is the reliance of community health workers on local indigenous holistic health information, which is perceived as more important in the context of the community’s health, welfare and spirituality. This type of knowledge appears to be unavailable on the Internet. Another factor is the lack of appropriate and available training in the use of technology.

Health literacy in the Pacific is low, which lowers demands on community health workers to increase their own health literacy. When community health workers are unable to answer a health question, they tend to approach others in their communities with greater health literacy first, including those with traditional knowledge. However, they may seek information online. The dominance of English as the language of the Internet limits the Internet’s potential in the Pacific, but this barrier may be overcome through the development of local content. Any attempts to use ICT to improve health outcomes in the Pacific need to be co-designed and developed with the community to meet their felt needs and build on the use of technology with which they are already comfortable.

The Samoan community case study, undertaken as part of this research, shows that for digital health to enable community health workers do their job better, the following elements need to be present:

- adequate resourcing, which depends on long-term relationships between various staff and funders;
- appropriate infrastructure, including funding to build and sustain the infrastructure;
- a model that recognises and builds on traditional and village ways of knowing and learning; and
- training of staff.

Finally, the research considers the implications of the findings for COL, recommending a distance learning project informed by the findings of the study, which include:

- the importance of activities being relevant to, and supported by, the community;

- the potential of distance learning to meet the need to train community health workers for the Pacific and other developing countries;
- mobile phones, rather than the Internet, as the currently dominant technology in the Pacific;
- the need for innovative models of supervision that can work over distance; and
- the potential of local content development to address cultural and language challenges in communicating health messages effectively in the Pacific.

List of abbreviations

AusAID	Australian Government Overseas Aid Programme
CAP	Communication Action Plan
CHW	Community Health Workers
CSW	Community Support Workers
COL	Commonwealth of Learning
DVD	Digital Versatile Disk, or Digital Video Disk — An optical disk storage media format
EpiNet	Pacific Public Health Surveillance Network's national and regional multi-disciplinary teams that investigate and respond to disease outbreaks
HealthEd	New Zealand Ministry of Health's website
HF	High-Frequency (short wave) radios with modems, used in Solomon Islands
HRCNZ	Health Research Council of New Zealand
ICT	Information and Communication Technology
IT	Information Technology
LabNet	Pacific Public Health Surveillance Network's three-tier network of public health laboratory services that confirm and identify disease outbreaks
mDhil	Indian company that provides basic healthcare information to Indian consumers via text messaging, a mobile web browser, and interactive digital content
MoH	Ministry of Health
NZAID	New Zealand Aid Programme
ODL	Open and Distance Learning
OPIC	Pacific Obesity Prevention in Communities Project
PacNet	Pacific Public Health Surveillance Network's listserv, which provides an early warning system and communication tool for epidemic threats
pdf	Portable Document Format
PFNet	People First Network (Solomon Islands)
PIIPP	Pacific Islands Information and Communications Technologies Policy and Strategic Plan
POLHN	Pacific Open Learning Health Net
RIC	Remote Island Communication
SMS	Short Message Service
SPC	Secretariat of the Pacific Community
VHW	Village Health Workers

Introduction

The Commonwealth of Learning (COL) engaged the Open Polytechnic of New Zealand to conduct a research study on current initiatives in digital health literacy in the community health sector. The study focused primarily on the digital health literacy of community health workers in the Pacific. The research did not include the digital health literacy of:

- formally trained health practitioners (e.g., nurses, doctors and health specialists who may use technology to access health information and communities or to deliver health services); or
- individuals who access online information or communities to better understand their own health.

The research aimed to provide a broad overview of current initiatives in digital health literacy of community health workers in the Pacific, focusing on Papua New Guinea, Solomon Islands, Nauru, Kiribati, Tuvalu, Vanuatu, Samoa and Tonga, and to identify possible gaps in or needs for capability building where the Commonwealth of Learning may be able to add value.

Research methodology

PACIFIC METHODOLOGY

The research team sought to use an appropriate Pacific research methodology. The Health Research Council of New Zealand (HRCNZ) provides four models for health research involving Pacific practitioners and communities in New Zealand (Health Research Council of New Zealand, 2011). The council defines three as “Pacific.” The models are summarised in Table 1.

Table 1: Models of Pacific research

	GOVERNANCE	PARTNERSHIP	RELEVANCE	NOT PACIFIC
Researchers	Pacific-led (first named investigator)	Shared leadership	Pacific researcher on team	None
Capacity-building opportunities	Advanced and relevant training opportunities (e.g., Pacific formal post-graduate qualification)	Training opportunities for Pacific researchers	Training opportunities (e.g., training Pacific interviewers)	None
Consultation	Ongoing consultation (infrastructure)	Engages Pacific community	Demonstrated consultation	None
Participants	Pacific priority population	Pacific cohort	Pacific cohort	None

Data design and analysis	Pacific frameworks, models, methodologies re: design and analysis of data	Pacific-specific considerations with some Pacific frameworks or methodologies	Pacific-specific considerations re: design and analysis	Standard
Dissemination	Outstanding, culturally appropriate, targeted and effective dissemination	Culturally appropriate dissemination to Pacific communities	Adequate dissemination to Pacific communities	No effort; formal publication assumed as only route

The first model for working within the Pacific is “Pacific Governance,” in which the research is Pacific-led, requires the active participation of Pacific people as agents of research, and does not limit Pacific people to the role of research participants or potential end-users, and the community owns the intrinsic value of the research.

The third model, “Pacific Relevance,” is significant to the Pacific community, aims to improve Pacific health outcomes, adds to the general body of Pacific health research knowledge, involves some Pacific participants — preferably a significant Pacific cohort that will allow for ethnic-specific analysis of data — and modifies standard research practice to ensure cultural safety and cultural competence.

The “Pacific Partnership” model, which sits between “Pacific Relevance” and “Pacific Governance,” is the methodology used in this research.

The research team consisted of one Pacific and one non-Pacific researcher who used a shared leadership model to make the most of their combined skills and experience. From the outset, the team agreed on areas in which the Pacific researcher’s capability would be maximised and further developed. He was the primary interviewer in the study.

Travelling to each country to consult would have created the most engagement. However, this was not possible. Instead, the Pacific researcher used a relational approach to maximise engagement. Through his networks in the New Zealand ministries of Pacific Island Affairs, Health and Education, and the Pacific embassies in New Zealand, he engaged with government leaders in each country. The purpose was not to interview these people for the study, but to follow the appropriate protocols and to introduce the study to them.

The study did not make use of any statistical selection methods, but rather worked on relationship trails to identify a relevant population for the study. The Pacific researcher invested significant time in following relationship trails to find suitable people to interview. To find community health workers, he moved from initial contacts to those they recommended, being passed to a next person for as many steps as it took, until he was able to contact a community health worker in a village. The team also interviewed medical practitioners and representatives from the Pacific Open Learning Health Net (POLHN), to understand their views on the potential for online information and tools to help community health workers to do their job. Towards the end of the study, the Pacific researcher visited Samoa to interview Samoan medical practitioners as a specific case study.

The research focused on eight countries: Papua New Guinea, Solomon Islands, Nauru, Kiribati, Tuvalu, Vanuatu, Samoa and Tonga. However, the team also included Melanesia, Micronesia and Polynesia to extend the research to more remote Pacific countries. The team sought to avoid a “one-size-fits-all” approach.

Both team members developed the framework for analysing the data, with the participation of the Pacific researcher ensuring that it was informed by a Pacific village lens. At all times, the team sought to be mindful of the HRCNZ's guiding principles for forming and maintaining ethical research relationships with Pacific people. These include respect, cultural competency, meaningful engagement, reciprocity, utility, rights, balance, protection, capacity building and participation (Health Research Council of New Zealand, 2005).

The team selected appropriate dissemination methods, based on previous research experiences. Specifically, they took into account interviewees' fears of not being aware of outcomes from the research, and the Pacific researcher was able to work through these concerns along the relationship trail. The team reached agreement with COL on suitable dissemination approaches for the research, once it is completed.

COL and the Open Polytechnic are both committed to the Pacific for the long term. It was important to both organisations that the research team work with significant people in the Pacific and build lasting relationships, to enable ongoing and relevant outcomes as defined by Pacific people.

PHASES

The research project consisted of four phases:

- Definition of scope and terms
- Literature review
- Interviews
- Analysis and report writing

Definition of scope and terms

The COL sponsor and the research team met to agree on what was meant by "digital literacy in the health sector" and the scope of the project. After the literature review, the team further refined their definitions of the terms.

Literature review

The literature review searched for publicly available information related to digital health literacy in the Pacific, including:

- regional health and digital strategies;
- national health strategies from the eight countries of focus, as well as that of Fiji (although not part of the Commonwealth, a leader in the Pacific); and
- online resources that may offer relevant information for Pacific community health workers.

The team also searched peer-reviewed literature, including:

- the PubMed database, searching for the terms ("online health information" OR "health literacy") AND (pacific OR africa OR "developing countries" OR "developing nations" OR "developing world" OR "less developed");
- the EBSCOHost and PubMed databases, searching for the terms ("community work*" OR "social work*") AND "health" AND (Fiji OR Papua New Guinea OR Solomon Islands OR Nauru OR Kiribati OR Tuvalu OR Vanuatu OR Tonga OR Western Samoa); and
- the PubMed database, searching for the terms "primary health care" AND (community OR health) AND (Fiji OR Papua New Guinea OR Solomon Islands OR Nauru OR Kiribati OR Tuvalu

OR Vanuatu OR Tonga OR Western Samoa), and for the terms primary healthcare (organisation AND administration) subject heading AND (Fiji OR Papua New Guinea OR Solomon Islands OR Nauru OR Kiribati OR Tuvalu OR Vanuatu OR Tonga OR Western Samoa).

Interviews

The team developed an initial framework to represent the factors affecting the digital health literacy of community health workers. The team also assessed gaps in the information from the initial literature review. They then developed the interview schedule for community health workers (Appendix 1). The team overcame the challenge of contacting community health workers by working through existing relationships, as discussed above.

The response from those initially approached was that the research was relevant and important, but that interviewing community health workers in their villages would have been a more appropriate way to work. They believed that a face-to-face process would have better met local expectations of how to gain information, and would have allowed the researchers to understand community health worker roles in their own contexts and relationships, which would have been more effective. Also, the team struggled to find community health workers they could contact by phone or email from New Zealand, especially in the remote villages of Kiribati, Nauru, Solomon Islands and Tuvalu. Finally, visiting villages would have enabled the team to begin to build long-term strategic and solid relationships.

Because it proved difficult to find community health workers, the team, in consultation with COL, decided to interview other medical professionals and educators to gather their views on the research questions. The team developed a second questionnaire for other health workers (Appendix 2).

The Pacific researcher contacted each interviewee by email or phone or in person (for some in Samoa) to clarify the context. All interviewees then chose to reply to the questionnaire in writing or by email, rather than by phone.

The use of email and telephones to explain the context exposed a number of side issues — for example, language and definition difficulties, challenges finding a time when people were free to engage, the time it took to find the “right person,” and the time it took to explain the context of the research. Because interviewees chose to answer the questionnaire in writing, the research did not capture nuances and emotions and it was not possible to correct any misunderstandings of the questions. However, an advantage was that respondents had more time to consider their answers. Some respondents took the opportunity to dialogue with the researcher and other community members for clarity or to give more information.

POLHN is a key player in building the capability of health professionals by distance in the Pacific. The team interviewed the POLHN director, based in Fiji, to understand his perspective on the research questions and the issues in the Pacific.

Finally, the team interviewed members of a community health initiative in Samoa (building on the Pacific researcher’s experience in Samoa) to more deeply understand the perceived potential of, and barriers to, the use of technology and online resources and communities by community health workers.

Analysis and report writing

The team used an iterative process to continually refine their initial framework as they reviewed literature and analysed survey results. The final framework provided the structure of the report.

Definition of scope and terms

In seeking to understand “digital literacy in the health sector,” the research team decided to focus on the “digital health literacy” of “community health workers.” These two terms are defined below.

DEFINING “DIGITAL HEALTH LITERACY”

In defining “digital health literacy,” it is necessary to first understand “digital literacy” and “health literacy.”

Digital literacy

There are many definitions of the term “digital literacy,” and these definitions overlap with other similar terms, such as information literacy, reproduction literacy and visual literacy. It is generally agreed that digital literacy is more than the ability to use computers and access information (Gilster, 1997; Jones-Kavalier & Flannigan, 2006; Buckingham, 2006).

Gilster (1997) suggested that because the Internet is “unfiltered by editors and open to the contributions of all,” the most important skill in digital literacy is the ability to critically assess what one finds online. He also noted the importance of targeting one’s activity and of search skills, because the myriad hyperlinks on the Web give users many choices, leading to interrupted flow and, therefore, interrupted comprehension.

In describing digital and visual literacy, Jones-Kavalier and Flannigan (2006) concluded that digital literacy is the ability to work within a digital environment. This is more than reading and interpreting digital information. It is the ability to reproduce data and images, and to evaluate and apply new-found knowledge. Similarly, visual literacy is more than sorting and interpreting visual actions and symbols. It is “the imaginative ability to create, amend and reproduce images, digital or not” (and thus communicate information visually).

Buckingham (2006) suggested that the term “literacy” needs to mean more than skill or competence. He agreed with others who include within digital literacy an ability to search information, compare various sources and assess their relevance and authority. However, he added four more abilities:

- Representation: An ability to recognise that the digital material is only a representation rather than a direct reproduction of the world, and therefore, the user needs to evaluate the material by assessing the motivations of the creator, comparing it with others’, considering whose voices are present and not present, questioning its authority and reviewing it against the user’s own experience;
- Language: An awareness of how language works, including, for digital material, how web-sites are structured and linked, and the rules of online interactions;
- Production: Understanding who is communicating online, who their audience is and who their communication targets are, whether commercial bodies, interest groups or individuals; and
- Audience: Understanding how users are guided to, and within, sites, as well as the different types of audiences and how they use and respond to the information.

Thus, for the purposes of this study, digital literacy can be defined as the ability to access, understand, compare, evaluate, apply, share, reproduce and enhance digital information, using the full range of digital formats and tools available. The ultimate aim is communication — to both understand and effectively pass on others’ knowledge, so that it might be evaluated and applied.

Health literacy

There is a link between health and literacy levels, particularly between women’s literacy and the health of families (Kickbusch, 2011). Kickbusch argued for “health literacy” as a specific form of literacy: “While education and literacy are important determinants of health, health literacy as a discrete form of literacy is becoming increasingly important for social and economic development.”

Kickbusch (2011) quoted two definitions of health literacy. The first focuses on the “ability to perform basic reading and numerical skills required to function in the healthcare environment.” The second is more relevant to this study: “the capacity to obtain, interpret and understand basic health information and services and the competence to use such information and services to enhance health.”

In its definition of health literacy, Workbase (2011) illustrated what this might mean:

Health literacy includes how an individual navigates and interacts with our complex health system. Health literacy includes people’s expectations about health and well-being, and their understanding of health messages, medicine labels and nutrition information, as well as their ability to fill out medical forms and talk with their doctor.

Nutbeam (2000), like Kickbusch, saw health literacy as a key to empowerment: “Health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health.” He suggested that health literacy includes two other forms of literacy: interactive and critical literacies. Interactive literacy is the ability to combine reading and writing skills with social skills to gain meaning from different forms of communication and apply this meaning to various and changing situations. Critical literacy, the ability to analyse information and use it to have greater control over one’s life, also relies on reading and writing and social skills.

As with digital literacy, health literacy is more than understanding. It requires an ability to apply understanding so that one’s health improves and, for women in particular, so that one’s family’s health improves.

Digital health

As with other new fields, digital health terminology is still evolving. The World Health Organization uses the term “e-Health,” defined as “the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research” (World Health Assembly, 2005).

Tele-medicine or tele-health is the use of information and communication technology (ICT) to diagnose, treat and care for patients, and to promote global health, control disease and educate about, manage and undertake research on health. Technologies used include satellite links, dedicated line connections, interactive television systems and Internet connections, to deliver voice, images, elements of a medical record, commands to a surgical robot and so on. Increased access through covering distance is a feature of the various definitions (American College of Nurse Practitioners, 2011).

Technologies offer tremendous potential to enhance health services, including increasing access without building traditional physical infrastructure. However, according to Lewis, Hodge, Gamage and Whittaker (2011), it is important to understand the needs, culture and technology limitations of specific communities in order to be able to design solutions that meet their needs:

When designed and implemented effectively, ICT can improve access for geographically isolated communities; provide support for healthcare workers; aid in data sharing; provide visual tools linking population and environmental information with disease outbreaks; and is an effective electronic means for data capture, storage, interpretation and management. In this context, ICT for health refers to any tool that facilitates the communication, processing or transmission of information by electronic means for the purpose of improving human health.

Thus we can conclude that digital health is a broad term that describes the way in which ICT can enhance various parts of health systems.

Digital health literacy

Based on the above definitions of digital and health literacies and digital health, we can define digital health literacy as the ability to access, understand, compare, evaluate, apply, share, reproduce and enhance digital information on health, so that individual and community health improves.

In a practical sense, this is the ability of health practitioners to:

- understand the potential of online health services to support them in doing their job better;
- use various technological tools to:
 - access and understand online health information in a range of multimedia formats;
 - search for, prioritise and bookmark relevant online resources;
 - search for, learn from and participate in online communities, whether one-to-one, one-to-many or many-to-many; and
 - reproduce and share existing online health resources to build others' understanding;
- evaluate the appropriateness of what they find for their community;
- apply selected, relevant information in their community to improve health outcomes; and
- develop or modify existing online health resources to make these easier for their community to apply, and to share with the wider Pacific and global health community.

For each of these skills, individuals may have beginner, intermediate or advanced abilities.

DEFINING “COMMUNITY HEALTH WORKERS”

The Global Health Workforce Alliance (2008) defined community health workers as:

. . . a variety of health agents selected, trained and working in their own communities, performing a diverse range of roles and activities. The main advantages are that community health workers can be trained and deployed relatively quickly (in one year), they understand the community's health needs and they give otherwise unserved communities access to the health system.

Typical roles are promoting immunisation and providing antenatal care; medical assistance at birth; family planning services; vaccinations; treatment for acute respiratory infections, malaria and tuberculosis; and case management of childhood illness.

There are two different types of community health workers. There are those who are formally recognised within the national health system and are trained, typically, for one year. And there are voluntary, part-time workers who can play a valuable health-promoting role and assist other community-based workers.

The Global Health Workforce Alliance (2008) stated that fully volunteer programmes have proved unsustainable. It also recognised a trend in developing countries for health workers to be delegated to perform tasks usually carried out by others with higher qualifications. This makes it more difficult to build a shared understanding among countries of what someone called a community health worker may be doing.

Consistent with the Global Workforce Alliance definition above, within Pacific community health programmes, community health workers may be formally trained or voluntary and part-time. They work in a wide range of ways to ensure effective primary healthcare (Jones, 1993).

In Vanuatu, for example, health workers approach the chiefs first, which helps any programme succeed. The health workers meet with key community members, such as pastors, councillors and representatives of women's groups, to discuss health needs and related issues, and agree priorities and action plans. As one health worker, quoted by Jones (1993), said, "We sit under the banyan tree. We need time to absorb and do something with the people while living with them. Listening skills are important for health workers. We work and move with the community where they are." As part of workshops for mothers and children, some Vanuatu health workers were using innovative methods, such as drama, songs and games. Others were using community theatre, actively supported by the Department of Health.

In Kiribati, community workers were offering workshops to help communities understand nutrition and improve food production and cultivation. In the Solomon Islands, another nutrition project was training community workers about nutrition, cooking and gardening, at a special training centre in Honiara with a village kitchen and gardens. The community workers could then work with their communities to identify and solve nutritional issues.

Garner and Thomason (1993) outlined standards set by the Papua New Guinea Ministry of Health to ensure quality of primary healthcare. These standards included aspects of the community health worker role, such as the number of people each worker should support (e.g., 500–1,000). The health worker's working day was defined as outpatient care from 08:00 to 13:00, care of acute minor illnesses evenings from 18:00 to 20:00, and being on call for serious illness at all times. Health workers were also to follow up on mothers and children seen at the maternal and child health clinic, promote family planning and provide oral contraceptives and injections. The standards also defined the physical infrastructure for the aid post (e.g., sink, water supply, pharmacy and sterilizer) and for the community health worker's house (e.g., tin roof, external tank, and latrine).

Based on the above literature and the Pacific researcher's experience in the Pacific, this research defines community health workers as those who:

- are in the community, committed to working with families and providing health and psychosocial/cultural interventions for better health outcomes;
- have had informal training (sometimes formal in common special areas, such as diabetes and stroke);
- have expertise in the culture of their community (i.e., language, health knowledge);

- are well linked to health and education providers, such as traditional healers, ministers of churches, people of status, school principals and teachers; and
- are sometimes paid but are often voluntary.

This research does not include the digital health literacy of:

- formally trained health practitioners (e.g., nurses, doctors and health specialists who may use technology to access health information and communities or to deliver health services); or
- individuals who access online information or communities to better understand their own health.

SCOPE

This research aimed primarily to:

- give a broad overview of current digital health literacy initiatives for community health workers in the Pacific, focusing on Papua New Guinea, Solomon Islands, Nauru, Kiribati, Tuvalu, Vanuatu, Samoa and Tonga; and
- identify possible gaps in or needs for capability building, where COL may be able to add value.

Having decided to interpret the original expression “digital literacy in the health sector” as “digital health literacy of community health workers” and having defined these terms, the team identified the sub-aims of the research as understanding:

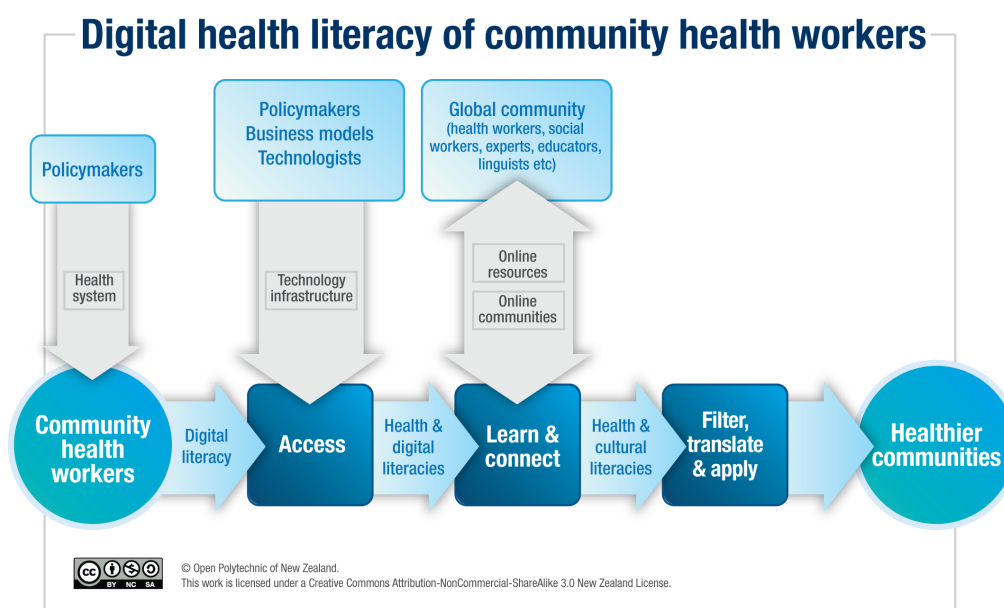
- government policies to recognise the potential of online health services to benefit community health workers;
- community health workers’ and traditional healers’ access to online information and communities;
- existing Pacific online health services — specifically:
 - reasons for putting health information online;
 - the volume of information and number of communities available online or being put online;
 - the suitability of online material and communities for each Pacific group, in terms of language and cultural appropriateness; and
- whether there is any evidence of online health information or communities being effective for community health workers and traditional healers.

A conceptual framework

The researchers developed a conceptual framework for presenting the results of the literature review and the analysis of the interviews. The framework, shown in Diagram 1, outlines the complex interplay of factors and players affecting the digital health literacy of community health workers.

Community health workers work within a health system that determines what their job is. This same system provides levels of support and their training and upskilling. This has a huge impact on their motivation and satisfaction within the job.

Diagram 1: Framework for digital health literacy of community health workers



Community health workers move through three steps on their way to digital health literacy (i.e., being able to access, understand, compare, evaluate, apply, share, reproduce and enhance digital information on health so that individual and community health improve). The three steps, each requiring a different balance of literacies, are:

- Gain access to technology and information
- Learn and connect
- Filter, translate and apply

First, health workers need “access” to suitable technology and information; second, they need to understand and use it to “learn and connect” with others; and finally, they need to be able to take what they have learned and “filter, translate and apply” it in a way that will improve health outcomes for their communities.

For the first step, “access,” community health workers need a certain level of digital literacy to be able to use various technologies and access the online world — both resources and communities. They also need to understand how linking to this online world might help them do their job better, and therefore be motivated to do it.

For this step to be possible, a suitable technology infrastructure needs to be in place. In part, this infrastructure relies on national policies, and in the Pacific, this includes the priorities and policies of intergovernmental agencies. It also requires sustainable business models operated by business people who can make them work, and supported by capable technologists.

For the second step, “learn and connect,” the digital literacy level of community health workers remains important. In the first step, “access,” the knowledge and skills for accessing technologies and information are necessary for motivation. In the second step, “learn and connect,” health workers experience both the value of using the technology and a level of success (i.e., they are able to search for and find relevant resources and bookmark them for ongoing use, and to find and participate in relevant communities). Ideally, this level of digital literacy can extend to using various tools that support online resource creation, such as blogging and video or image sharing, to contribute Pacific-specific resources to the global community, which can then be available for other Pacific workers.

However, “learn and connect” also requires a basic level of health literacy, so that community health workers can assess the relevance of and prioritise the resources and communities available online, and then determine how to apply the learning in their communities. Health literacy also allows health workers to confidently engage with, and contribute to, online communities. Potentially, the health worker could also help others in the community learn and connect.

Finally, “learn and connect” relies on the global community having created relevant online resources and active online communities. In this context, the framework uses the term “online,” recognising that the resources and communities may be created for and accessed by other devices, such as radio, television and mobile phones, rather than being limited to the Internet. The Internet increasingly intersects with these devices — for example, through electronic files developed for radio and television also being made available on the Internet to enable user control over time and place of access, and mobile devices enabling users to be informed and communicate via the Internet.

The final step is “filter, translate and apply.” Community health workers play a crucial role in filtering out irrelevant learning from the global community, and translating and applying the relevant learning in their local context. To do this, they need health literacy in order to understand health-specific information and how to apply it from a health perspective, and cultural literacy in order to apply it appropriately to the health needs in their community. They also need cultural literacy to translate the predominantly English and Western content for their communities, especially until their technology infrastructure and digital literacy enable them to create culturally appropriate materials in their own languages.

An assumption, supported by the literature reviewed by the researchers, is that community health workers who are better informed and better connected will contribute to enhanced health outcomes — in other words, healthier communities.

Community health workers in the Pacific

CRUCIAL ROLE

For low- and middle-income countries, including those in the Pacific, increasing the number of competent community health workers is the key to achieving improved health outcomes as quickly as possible (Global Health Workforce Alliance, 2008).

In 1977, a series of South Pacific seminars promoted a village-based approach to primary healthcare (World Health Organization, 2008). In Fiji, community health workers were perceived to be integral to the success of such a model, and the Ministry of Health established these roles and associated training programmes (Negin, Roberts, & Lingam, 2011).

A major component of the village-based model was the training of Community Health Workers (CHW) in mixed Indo-Fijian communities and Village Health Workers (VHWs) in every Fijian village. Communities nominated a local person to become the CHW/VHW and that person was then trained by the Ministry of Health through an intensive six-week programme followed by organised in-service training; in many cases, the community committed to supporting the CHW/VHW either with cash or with in-kind contributions, such as planting or fishing on his or her behalf. Interviewees affirmed that the CHW/VHW were “the backbone of [primary health-care], the interface between health and the community” (Negin et al., 2011). Health outcomes

significantly improved. The infant mortality rate and maternal mortality ratio declined dramatically and immunisation rates increased.

Despite this success, in the late 1980s, the use of rural health centres in Fiji dropped markedly. Contributing factors were a perception that primary healthcare “had been accomplished successfully,” the end of external funding, lack of government strategy and commitment, domestic instability, and changing culture in Fijian villages. Spending on rural nursing stations was halved between 1983 and 1991, and in 1997 the Fijian Ministry of Health stopped reporting spending on rural nursing stations as a separate budget line item. Since 1990, the maternal mortality ratio in Fiji has increased and there has been no progress against other key health indicators. In 2007, interviewees estimated that only 60–70 per cent of Fijian villages now have a village health worker (Negin et al., 2011).

In 2008, a visit by one of the researchers to Natogadravu, the first village in Fiji to adopt community health initiatives, which had remained committed to primary healthcare, identified ongoing progress 20 years after the initiative began (World Health Organization, 2008). Those interviewed commented that fewer people were sick or dying, and villagers could be treated for minor ailments locally, rather than having to travel to Suva. The role of health workers was also seen as important: “There are health workers in almost every village but those places that don’t have village health workers are left behind because they are the ones who educate people on primary health care” (World Health Organization, 2008).

KEYS TO SUCCESS

However, the Fijian story also showed some challenges for the model. A community health worker’s impact was affected by the level of operational support from the community, enthusiasm for training of the local doctor, and the Ministry of Health’s ongoing provision of medical supplies. Without this support, community health workers tended to fall away or lose commitment.

Two keys to the success of Natogadravu’s high-quality primary healthcare were perceived to be strong leadership and active participation by all community members. Natogadravu chief Semi Matalau talked about the role of the village development committee in achieving improved health and living conditions:

If the committee comes up with a suitable development idea for the village, we discuss it and then call a village meeting where everyone can take part, including our elders who have the final say on most occasions. So it is more of a community decision than the committee taking the decision themselves.
...

Sometimes the development of primary healthcare is not sustainable in villages, when the village chief might move away for employment. So they have to pick another village head and it slows the development of primary healthcare in the village. . . .

We found many of the villages we went to have no village committees and they are left with very poor health standards compared to the villages that have proper committees to make decisions and manage their village. . . .
(World Health Organization, 2008)

Negin et al. (2011) proposed several other factors as being key for Fiji returning to an effective primary healthcare model and the associated improved health outcomes. The first echoes the experience of Natogadravu — that is, community models appropriate for Fiji rather than imported external models. Secondly, Fiji needs new models that consider the non-communicable

disease challenges facing it and that can meet the continuing rural health needs as well as growing urban health needs. Finally, adequate financial and human resources are required.

A Solomon Islands study investigated why many who had been trained as village health workers to provide part-time basic healthcare were leaving their jobs (Chevalier, Lapo, O'Brien, & Wierzbica, 1993). Between 1978 and 1993, nearly half the workers had left their jobs. The two greatest contributing factors were training before the age of 20 and irregular payment. Older, married trainees were more likely to stay in the role. Other reasons for leaving were the level of remuneration, community pressure to have a nurse's aid rather than a village health worker in the role, and changing family commitments following marriage. The health worker training enabled some to then train to be a nurse.

Another study sought to understand the clinical competency of community health workers in a remote province of Papua New Guinea one to four years after they completed their basic training (Ashwell & Freeman, 1995). After this relatively short period, only one third of the graduates (24) were still working in the province. Nearly all of them maintained their knowledge competency, but only 62 per cent maintained their clinical competency. The study showed that community health workers employed at a health subcentre used 40–50 per cent of their skills, whereas those employed at a district health centre or hospital used only 20–30 per cent of their skills. The authors concluded that the community health workers were not being fully utilised and were not being given the opportunity to practise their clinical skills. The authors recommended ongoing clinical supervision and in-service training to achieve the original goal of improved access to primary healthcare for rural communities.

A review of an in-service training for community health nurses project in Fiji also noted that the community nurses, despite being in their roles for a combined mean range of four to six years, were all at the lowest level of the nursing profession (Fiji Ministry of Health, 2011). The report expressed concern that community nurses who wish to progress in their careers may believe that they need to leave the community health profession to achieve this.

Another study in Papua New Guinea examined the competence of nurses and village health workers to accurately assess acute respiratory infection (Brewster, Pyakalyia, & O'Connell, 1993). Health workers were significantly less able than nurses to accurately assess the infection. The health workers relied more on guidelines given during training (i.e., respiratory rate and rigid protocols) than on clinical sense, as the nurses did. The authors suggested regular on-site clinical supervision of nurses and community health workers at health centres to ensure the success of the acute respiratory infection programme.

Similarly, Garner and Thomason (1993) concluded that the key elements for enabling primary health workers in Papua New Guinea to support high-quality healthcare were clear performance guidelines, appropriate resources and training, and supportive supervision.

Clearly, in 1993, supervision of community health workers was seen as an important way to improve primary healthcare in Papua New Guinea. Ten years later, very little supervision was being provided in Papua New Guinea. Clements, Streefland and Malau (2007) attributed this to "a deep cultural and/or attitudinal discomfort with the process, for both supervisor and supervisee. When supervision occurred, it was not effective in improving staff performance." They concluded that the traditional and supportive models are not working and suggested the development of culturally appropriate solutions. They also noted that in the West, there tends to be a "supervisor" who is onsite at a rural health centre and has the necessary skills, in contrast to an external supervisor visit, which is likely to be seen as threatening and lacking the necessary understanding. (In the context of this research, it is interesting to consider the potential of technology to enable a new model of supervision, which may be culturally appropriate and may enable more connection without requiring a more skilled person to be onsite full-time.)

In a review of an in-service training for community health nurses project in Fiji, nurses and their supervisors were interviewed (Fiji Ministry of Health, 2011). A large percentage of supervisors had not encouraged their supervisees to assess their own training needs, promoted the in-service training opportunities to them, discussed topics with them, or offered them any training. The nurses and their supervisors agreed that the present supervision and coaching approach was not working well, for reasons including lack of transportation for visits, lack of radio telephones for communication, and lack of training in supervision and coaching for the supervisors. However, nurses believed that their supervisors had the necessary professional knowledge. While the survey results indicated an average of three to four visits by supervisors during 2010, the visits were not necessarily focused on supervision and coaching, and nurses close to supervisors had four visits, while some remote nurses had none.

Finally, the report concluded that both nurses and supervisors needed a better understanding of their roles in the supervision and coaching process, specifically for supervisors to learn how to create an atmosphere of trust to be able to talk openly without seeming overly critical, and for nurses to understand that the aims of supervision and coaching are support and assessing and meeting training needs, rather than performance review (Fiji Ministry of Health, 2011).

The Global Health Workforce Alliance (2008) identified three elements essential to the effectiveness of community workers: being paid, having proper supervision, and being embedded in the health system. The authors suggested that mid-level workers supervise community workers, and noted the Brazilian ratio in which one nurse supervises six community health workers, but did not give details of successful models outside of formal training situations. Joynes (2011) also recognised the importance of building the capability of community health workers, suggesting distance learning, mediated by technology, as a solution.

A model for evaluating and then improving primary healthcare has proven effective in diabetes treatment in remote parts of Australia (Gardner et al., 2011). Three Fijian rural centres have been informally trialling it and Gardner et al. (2011) suggest that it may prove effective in Pacific countries. Keys to success for this continuous quality improvement model are similar to those for other change management approaches: clear internal vision, supportive leadership, a stable team, proven gains, autonomy to make decisions, and ongoing team discussions.

THE INTERVIEWEES

The community health workers interviewed for this research demonstrate the diverse backgrounds and roles covered by the term. It was not possible to classify them as paid or voluntary, as several spanned both those categories, echoing the comments about the importance of paying for this work if it is to be sustainable:

“I am a Community Support Worker with the mental health service. I have been working in the service for one year, but I have been working as a volunteer for about five years in the community. I have been doing things like running around for different families when they want medicines, transport, assistance with English words and church/family matters.” (Taiai, Samoa)

“I work in the development field as a project officer.” (Mowenna, Samoa)

“I work in a home for disabled and elderly people. These people have no family to take care of them and the home is funded by the Catholic Church.” (Naomi, Tonga)

“I am a Community Health Worker. Sometimes I do voluntary work for the village and the church. But some of the time I am paid.” (Martha, Papua New Guinea)

“[My current role is] visiting community voluntarily as part of my pastor work. I have lots of areas to cover. I mainly connect people with the services they are wanting to connect with. I mix in my pastor work with their enquiries. I also work with other community health people in the community. There are health doctors and community nurses. I also talk to traditional healers where I meet up with them in the community. These are very private people and are effective in helping our communities with their health.” (Dona, Fiji)

“I am currently a Volunteer Community Support Worker. I work through the village very day and have no fixed hours. People contact me through other people. I generally work from my home base.” (Teni, Vanuatu)

The responses show the interplay of different roles and relationships in the communities in which they work:

“People contact me through other people.” (Teni, Vanuatu)

“I mainly connect people with the services they are wanting to connect with . . . work with other community health people . . . also talk to traditional healers where I meet up with them in the community.” (Dona, Fiji)

“I have been doing things like running around for different families when they want medicines, transport, assistance with English words and church/family matters.” (Taiai, Samoa)

Other interviewees who gave their views on digital health for community health workers were a clinical co-ordinator (Tonga), a high school principal (Samoa), a doctor (Samoa), a nurse (Samoa), and an education manager (Tokelau). Their answers also provide insight into the role of community health workers in the Pacific:

“. . . we have a number of these health workers that work throughout the school as staff members and also as volunteers. They are linked to us from the community initiatives in health and through the various government organisations for the sake of the health and wellbeing of development of our students.” (High school principal, Samoa)

“I work closely with a number of CSW [community support workers] who are people from this community. I’m not sure if we call them CSW as they are not formally qualified like say the nurses or doctors but they are in the community and make links between our work and the needs of the people.” (Doctor, Samoa)

“My thoughts are that CSW do a wonderful work in our communities. Our communities’ needs would not be complete without their work.” (Clinical co-ordinator, Tonga)

“I work alongside many CSW in my work both in the hospital and the community.” (Nurse, Samoa)

The Tongan clinical co-ordinator described a Tongan model of supervision for community health workers:

“We also spend a lot of time doing one-to-one mentoring to assist the CSW in their work. The issues that are challenging are time and expense. Time in this context is about finding time in the very busy schedule that all community people experience. Travel into the villages is more than just travel. It’s the locating, finding, seeking out of significant contacts and family members

in order to engage in the interventions. This is not a technology thing. It is clearly a face-to-face relationship with the community that makes this work. So clinically, we have to make time and allow for this engagement and it can take hours, days or weeks.”

Technology infrastructure and access in the Pacific

It is easy to think of “the technology infrastructure” as being all about ICT. However, Pacific countries also face challenges with other parts of their infrastructure, especially on remote islands and in rural villages. For example, ordinary mail systems can be unreliable and uncertain for remote islands in the Pacific (Hughes et al., 2005). Similarly, when describing Vanuatu media outlets, Herman (2010) says, “Newsprint is expensive, heavy to transport and susceptible to heat and humidity. All these factors tend to mean that the Pacific print media is an urban medium. . . . Television viewers, like newspaper readers, are more likely to be town and city dwellers rather than rural villagers or remote islanders.”

TECHNOLOGY STATISTICS

Table 2 presents statistics on the use of various technologies by country. Fiji, Australia and New Zealand are included for comparison, the former being a leading Pacific country, and the latter two being the more developed Commonwealth countries in the Pacific.

Table 2: ICT use by country

COUNTRY	INTERNET USERS PER 100 INHABITANTS		FIXED BROADBAND SUBSCRIPTIONS PER 100 INHABITANTS		FIXED TELEPHONE LINES PER 100 INHABITANTS		MOBILE CELLULAR SUBSCRIPTIONS PER 100 INHABITANTS	
	2001	2010	2001	2010	2001	2010	2000	2010
Kiribati	1.8	9.0	0	1	4	4	0.4	10
Nauru	-	6.0	-	4	18	18	12	60
PNG	0.8	1.3	0	0.1	1	2	0.2	28
Samoa	0.6	7.0	0	0.1	5	19	1	91
Solomon Islands	0.5	5.0	0	0.4	2	2	0.3	6
Tonga	2.4	12.0	0	1	10	30	0.2	52
Tuvalu	5.2	25.0	0	3	7	16	0	25
Vanuatu	2.1	8.0	0	0.1	4	2	0.2	119
Australia	46.8	76.0	0.6	23	52	39	45	101
New Zealand	47.4	83.0	0.1	25	47	43	40	115
Fiji	1.5	14.8	0	2	11	16	7	116

Source: International Telecommunications Union, <http://www.itu.int/ITU-D/ict/statistics/index.html>, downloaded 17 August 2011

Note: (-) indicates no data.

Internet use is growing in all countries. However, the levels of Internet use in the eight Pacific countries that are the focus of this research, as measured by number of Internet users and by fixed broadband subscriptions, are low. They are not yet close to the level that the more developed Pacific countries demonstrated ten years ago. Internet use in Tuvalu is increasing faster than in the other Pacific countries, whereas Papua New Guinea has made very little progress in ten years.

Telephone use is also increasing. In Australia and New Zealand, the number of fixed telephone lines per 100 inhabitants is decreasing, presumably as a result of the increasing use of mobile phones. This is also happening in Vanuatu. Fixed telephone line use has increased markedly in Samoa, Tonga and Tuvalu and to a lesser extent in Fiji. However, in Kiribati, Nauru, Papua New Guinea and Solomon Islands, fixed telephone use has changed very little in the last decade.

Mobile phone use has increased in every country over the same period. In Samoa, Vanuatu and Fiji, 2010 usage is comparable to Australian and New Zealand levels, despite being markedly different in 2000. Nauru and Tonga also have significant mobile phone use. Over time, if data on the extent of smartphone use become available, they may expose differences between the less and more developed countries.

The rapid rise in mobile phone use can partly be attributed to a Digicel initiative, launched in 2010 (Devi, 2010). This initiative enables families in New Zealand to send remittances (the highest source of income in many Pacific countries) to relatives in Samoa, Tonga, Fiji, Vanuatu, Papua New Guinea and Nauru. Digicel partnered with Ezi-pay to offer Top Up credit at thousands of dairies and convenience stores throughout New Zealand. The New Zealand Pacific Island customers buy Digicel mobile Top Up vouchers (available in NZD 15, 20, 30 or 50 denominations) from their local prepaid outlet, and then send the Top Up credit to any Digicel prepaid phone in the Pacific. It automatically works out the amount in the local currency at no fee.

VARIABLE ACCESS TO TECHNOLOGY

A 2007 survey of educational technologists by the Pacific eLearning Observatory at the University of the South Pacific showed tertiary-level access to ICT across the region of 70 per cent, but access between one and 11 per cent for primary and secondary students, with overall access estimated to be 17 per cent (Whelan, 2008). The survey showed a digital divide between urban and rural Pacific populations. Among the most commonly perceived challenges were lack of adequate financing, lack of skilled personnel, poor access to infrastructure and ICT equipment, and low connectivity speeds.

A 2009 study in Papua New Guinea showed that Internet use was primarily in urban centres, mines and petroleum companies, with only 15 per cent of the population having access to the Internet. Unreliable electricity further limited Internet access for those who were theoretically connected. While most of the health workers surveyed worked in hospitals, only 14 per cent had access to the Internet at work. Just under half of the workers had never used a computer, and the majority who had accessed it at home (Au, 2009).

Lewis et al. (2011) identified telecommunications infrastructure as one of four challenges to implementing ICT initiatives in the Pacific, the other three being human capacity and training, affordability and appropriateness. The telecommunications infrastructure tends to be of lower quality, as is observed in rural and remote communities in developing countries. The authors found that overall, "limited and unequal access, the high costs involved with both purchasing equipment and accessing its services, insufficient bandwidth, and an overall low investment in infrastructure networks make it extremely difficult to implement effective ICT projects."

The Solomon Islands People First Network (PFNet) began in 2001 as an activity of the Rural Development Volunteers Association, a partner agency of the Department of Provincial Government and Constituency Development. It was a community-based non-profit network of some 30 or more rural “email stations” run by the communities, using shortwave (HF) radios with modems to exchange emails with the base station in Honiara and outward to the Internet. Various information-sharing services operated over the network (Lemming, 2007). However, in 2011, the project appears to have stopped, as the PFNet website is no longer operational. An evaluation of the impact of PFNet on rural development noted that six per cent of those surveyed used PFNet’s services for health-related issues. The main users were doctors, nurses and health workers from different parts of Solomon Islands, who used email to communicate with each other regarding medical results of rural patients, diagnoses, advice on treatment, medicines to be given to patients, and ordering of medicines (Chand, Leeming, Stork, Agassi, & Biliki, 2005).

A pilot tele-health project in Kiribati demonstrated that ensuring an affordable and sustainable technology infrastructure was a major challenge (Khazei, Jarvis-Selinger, Ho, & Lee, 2005). Pacific communities distributed across many small islands with small populations require innovative technological and business solutions specific to their contexts.

When interviewed, community support workers identified limited access to technology, including electricity, as a major barrier to use of technology:

“The access issues are because the many areas where we work are remote areas and are also without electricity. The people here are not bothered at all about the Internet.” (Nurse, Samoa)

“The only restriction is access. Samoa has lots of interruptions in some places where I try to access online.” (Taiai, Samoa)

In some cases, there is also the barrier of unequal access, where the limited service available is used by the doctors and registrars. As a result, the community health workers and the community do not experience the service and become aware of its potential benefits:

“However, it is very hard for a community health worker to have access to Internet or to have access to up to date online information as the online environment is not accessible. We are far too isolated and it is very costly to be involved with this. There is some difficulty with who owns the equipment and therefore access is restricted to special people like doctors and registrars. I find this access not really relevant to my work. Our villages are really isolated from connection with Internet and there is very little talk in the community about how this access might happen if at all. Sometimes there is news on the radio about what the government is doing on Internet services, but it seems to just go over their heads.” (Martha, Papua New Guinea)

Others understand the benefits but their jobs do not provide the necessary infrastructure, so they do what they can to access the Web, often through their relationships:

“My friend goes into the hospital and we sit together while she logs on as she has the password. I then do what I need and then log off when I finish. Sometimes I take an hour, sometimes I take 15 minutes, depending what I need. I have heard that other workers use the Internet cafés in the town to do similar work so I am lucky that I get to use the hospital’s for free.” (Taiai, Samoa)

“If families do not have access to the Internet, there are services available such as libraries, Internet cafés or family members.” (Education manager, Tokelau)

“When I need to use the Internet, I use the university online facilities. I do this for my pastor work and so it is easy to attach my community work to this facility. I use Google and other websites through the university.” (Dona, Fiji)

POLHN is trialling innovative ways of overcoming limited access to the Internet:

“In places where there is difficult access to the Internet we have looked at the type of resource. This is basically a hard drive that is loaded. It requires a laptop or a computer to run but can get computers to remote locations, just need [a] satellite for about USD 85 or a solar recharger to generate power for laptop battery. It will take 12 hours overnight but it will do it. A satellite had an interesting project in Africa that actually did work in getting remote access into remote areas; they found that once they introduced the people in the village to technology, they took advantage of it. However, I am fully convinced that we should not push technology where it’s not appropriate.” (Director, POLHN)

BUSINESS MODELS AND TECHNOLOGISTS

Along with telecommunications infrastructure, Lewis et al. (2011) identified human capacity and training, affordability and appropriateness as challenges to implementing ICT initiatives in the Pacific.

Pacific countries have little human capacity in both the use of ICT and the set-up and maintenance of ICT, and as a result must rely on expensive external contractors to fill the skill gap. This can then lead to a second skill gap — poor understanding of the local context in which the ICT solutions are being implemented (Lewis et al., 2011). Higa (2007) suggests that the ICT skill gaps are across every level in the Pacific region, in the public and private sectors, “those that design, develop, implement, operate, and manage networks and systems, and those that are responsible for policy decisions and regulation of the ICT sector.” She also notes the need to decrease reliance on expensive foreign ICT consultants.

Lack of competition among ICT service providers, whether state- or government-owned, slows development and keeps prices high, thus limiting uptake and use. This also means that projects struggle to be sustainable once external funding ceases (Lewis et al., 2011).

Most interviewees noted the cost of Internet access as a major barrier to use. No other issue was mentioned as much. This affected them in different ways, including having no access, having limited access, choosing to limit access because of concern about perceptions of it being only for the rich, and using alternative information sources instead. Organisations try to work together to decrease costs:

“Online is expensive and people in roles like mine often work as volunteers, so we need to have our own computer and online access.” (Naomi, Tonga)

“I know that the CSW have quite a good relationship with all our staff and students and that they access the Internet through the school system that is available in a very limited way through the school programmes and study programmes. Each teacher is responsible for managing the Internet access and each one has control of managing the budget for the year. It is very expensive and I know that we could do with more updates in all our Internet functions . . . We try not to discourage people who want to use it. But as I said before, it can be expensive and we have to limit this use . . . A few years ago we didn’t even have computers so this is also a new learning curve for us.” (High school principal, Samoa)

“Sometimes I am a bit shy to take my laptop into the villages as there is a[n] assumption that if you own one then you are rich, or have many things. This assumption can get in the way of the intervention or visit. So we have to be humble with the CSW and play it down. Most people know how expensive it is to have access. Perhaps as a nurse I could leave the laptop behind when I go on visits so that I am not clutter[re]d by technology. Money money money. That is the key. No money, no access.” (Nurse, Samoa)

“Expense is a major consideration. Each service and community has a definition of what this might be and look like. Where we can, we have shared resources with allied services or like-mind[ed] service providers so that we can share what we both have. For example, in one of our units, we share the printer and photocopier machines. We also share the cost of the paper and maintenance of the machines. Again traditional workers and village people do not necessar[il]ly participate in this as they are distanced from the administration side of the service.” (Clinical coordinator, Tonga)

“I go to the university library. There is also some information that the church provides. Sometimes I search the Internet, but this is expensive.” (Naomi, Tonga)

“One of the challenges to rolling out and to making Internet access more available in the communities is the high cost. It is still pretty high cost in most of the countries. One of the things that SPC had [a] difficult time doing was their RIC [Remote Island Communication] system. That provides the Internet access almost anywhere but the monthly cost is USD 300 for 256k of service. So what is happening is that although they had two years funding from AusAID and they have been pushing for community support and for sustainability and advocating for different segments of the community to come together, not just education but health and others to support, chip into that monthly recurring cost. That has potential, but it’s still in resource poor communities. USD 300 a month is a lot of money.” (Director, POLHN)

The POLHN director also talked about the relatively new option in Fiji of using mobile phones to access the Internet, but again, cost of the phone and the access was a barrier to use:

“In Fiji the mobile phone companies, we have managed to convince them and I’m not just saying [the World Health Organization], but a group of us from across different organisations and entities convinced the mobile phone providers to begin providing Web access as well as data from their mobile phone towers. The challenge in the community is yes you can connect but can you pay for it? The cost of data download can be fairly expensive, plus it requires a higher end mobile phone than most people have. Although I shouldn’t say it, I’m always amazed that people that make very little money invest an awful lot in their mobile phone. Most of the market will be going to the lower end phone rather than higher and that offers an opportunity as well. The challenge is to work on training people on computer and including phone literacy and accessing the Web through phones other than just making phone calls.” (Director, POLHN)

The final challenge identified by Lewis et al. is appropriateness of technology. Software and support materials tend to be written in English. Much of the electronic equipment wears out in the tropical climate and it is difficult to replace worn-out or superseded technology in remote, isolated areas (Lewis et al., 2011).

Community health and ICT policies in the Pacific

Policy affects community health workers' digital health literacy in two ways — through the health system and the technology infrastructure (Diagram 1). This section summarises regional and national policies relevant to ICT or community health in the Pacific countries covered in this study.

REGIONAL DIGITAL HEALTH INITIATIVES

Pacific countries are very aware of the potential of ICT in tackling health challenges they collectively face. There is also a focus on working together to be most efficient and increase the chances of succeeding:

The Pacific has problems caused by large distances, small scale and scattered populations and markets, and a low level of investments in telecommunications and human resources. All these problems can be addressed and the development of ICTs accelerated, by selection of appropriate mechanisms for cooperation, market integration and provision of services on a regional basis. (Pacific Islands Forum Secretariat, 2007)

However, it has proven difficult to successfully implement the promise of ICT:

Numerous studies have highlighted both the potential of, and impediments to, "ICTs for every Pacific Islander." The Communication Action Plan (CAP) and Pacific Islands Information and Communications Technologies Policy and Strategic Plan (PIIPP) have recently made clear recommendations on actions required for ICTs to reach potential in the region. However, countries have been less than successful in following these recommendations due to challenges such as scale, institutional capacity and isolation. (Pacific Islands Forum Secretariat, 2007)

Secretariat of the Pacific Community's Public Health Programme Strategic Plan

The Secretariat of the Pacific Community is a technical and development organisation that provides advice and services to its 22 Pacific Island members. It seeks to achieve sustainable economic development, sustainable natural resource management and development, and sustainable human and social development. It aims to develop the technical, professional, scientific, research, planning and management capability of people and countries across the region.

The Secretariat of the Pacific Community's Public Health Programme Strategic Plan (2005) does not mention community-based initiatives. However, it does identify "maintaining and further developing effective surveillance systems (PacNet), case detection (LabNet) and outbreak response (EpiNet) systems" as a "pivotal concern":

The sustainability of systems used to collate, analyse and disseminate information and evidence for decision making is an important consideration. Ensuring that the sources of new information and evidence are directly

linked with existing surveillance systems will increase the potential for effective use of these data and their longer term sustainability in influencing public health interventions. Further improvements in existing routine surveillance will also enhance information-based decision making.

The plan also recognises that staff will need new skills to be able to use the technology and the information they can access. It therefore includes regional system and staff development, with the aims of improving access to, and quality of, information, particularly countries' statistics to inform decision-making.

Pacific Public Health Surveillance Network

The Pacific Public Health Surveillance Network is a voluntary network of countries and organisations dedicated to the promotion of public health surveillance and appropriate response to the health challenges of 22 Pacific Island countries and territories. Communicable diseases, especially the outbreak diseases, are its top priority at present (Pacific Public Health Surveillance Network, 2011).

One of the Pacific Public Health Surveillance Network's five strategies is "promoting the use of e-mail, and opening the network to new clients, new services and other networks." This strategy relies on the use of email through a moderated listserv called PacNet. The focus of the listserv is "to implement an early warning system, by sharing timely information on outbreaks of disease so that others in the Pacific might take appropriate action when a threat has been identified." The membership of this group includes "health professionals, health related-scientists and health-related decision makers: doctors, medical officers, nurses, biologists, medical statisticians, laboratory specialists, epidemiologists, paramedics, public health decision makers" — it seems to include every health professional except community health workers. There is a second subgroup restricted to higher-level decision makers in each country to communicate non-verified outbreak messages to alert countries to possible risks as soon as possible.

The Network also supports PacNet-Lab, a listserv for LabNet, a network of laboratory providers for identifying and confirming disease outbreaks. EpiNet is a network of national and regional teams to investigate and respond to outbreaks.

Pacific Digital Strategy

The Pacific Islands Forum is a political grouping of 16 countries, including the eight countries that are covered in this study as well as Australia, Fiji and New Zealand. The Forum Secretariat is responsible for implementing the Pacific Plan for Strengthening Regional Cooperation and Integration. The plan (Pacific Islands Forum Secretariat, 2007) states that "countries in the region have been unable to fully utilise this cost-effective mass ICT with its potential to provide high quality education, health and other services, as well as entertainment." It includes in its steps for immediate implementation a digital strategy that recognises the potential of an improved ICT infrastructure to support health services.

However, while the Pacific Digital Strategy grapples with the challenges of establishing a reliable ICT infrastructure in the Pacific, it does not include in its scope how to then use ICT to enhance health services.

Several initiatives within the Pacific Digital Strategy were recognised as being able to support dissemination of health information in rural and remote Pacific communities. These include:

- Pacific Rural Internet Connectivity System — 13 Pacific Island nations;
- Oceania One Laptop per Pacific Child initiative — 22 Pacific Island nations;
- South Pacific Information Network — undersea fibre network.

The Pacific Rural Internet Connectivity System is a satellite Internet service designed especially for rural and remote areas of the Pacific (see <http://www.pacrics.net>). The project provides the infrastructure and fully funds “public good sites.” In December 2009, Kiribati had eight sites, Papua New Guinea two and Samoa three. Papua New Guinea had indicated interest in 40 other units, Tonga ten and Vanuatu 15 to 20. AusAID support ceased at the end of 2009, and in 2010, the existing telecommunications provider and the Secretariat of the Pacific Community agreed on providing coverage for another year.

The One Laptop per Pacific Child initiative, a joint project of the Secretariat of the Pacific Community and the One Laptop per Child Foundation, began in 2007. The project focused on basic education (Hutak & Thomson, 2010). A 2010 external evaluation of the Solomon Islands pilot did not mention use of the technology for health (Australian Council for Educational Research, 2010).

The report concluded that progress on the Pacific Rural Internet Connectivity System and Oceania One Laptop per Pacific Child initiative was encouraging, but recognised the need to seek external funding to maintain the proposed roll-out of pilots (Secretariat of the Pacific Community, 2008). While government delivery of health services was an objective in the first digital strategy, it was not achieved: “most [Pacific Island countries] are struggling to meet basic needs in healthcare, with the result that ICT in health is not a high priority.” The report recommended as a regional activity within the next digital strategy that the region “[d]evelop ICT components for all regional policy (e.g. energy, education, health, the environment etc).”

Pacific Open Learning Health Net

Established in 2003 by the World Health Organization, the Pacific Open Learning Health Net (POLHN) aims to improve the quality of healthcare in the Pacific. To achieve this, it offers online information, and self-paced and instructor-led courses.

POLHN provides open learning centres with the necessary technology and trained staff to enable health professionals to access the Internet near where they live or work. In 2010, POLHN had 25 open learning centres established in 12 countries, including Fiji, Kiribati, Nauru, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. To date, POLHN has delivered 40 courses to over 1,000 participants in the Pacific.

POLHN, with its partners, offers qualifications in medical laboratory technology, public health, health services management, nursing and radiology. Self-paced courses, which POLHN can separately assess to give credit, cover patient safety, computing skills, risk management, classifying diseases, and treatment of Pacific-relevant diseases (e.g., diabetes, mosquito-borne diseases, AIDS, tuberculosis and sexually transmitted infections). POLHN estimates that each course will take 12–26 hours of learning to complete. These self-paced courses, or parts of them, could be relevant for community health workers.

The POLHN website provides links to formal tertiary providers of online health courses, face-to-face short courses in the region, and other organisations using self-paced eLearning to increase access to continuing professional development for health workers. For example, the American Global Health eLearning Center offers online self-paced courses at no charge. Topics include family planning and reproductive health, antenatal and newborn care, child survival, treating HIV/AIDS and infectious diseases, and health systems. Health professionals, including community health workers, can use the learning centres to access these courses.

POLHN works closely with ministries of health in Pacific countries. Designated local POLHN coordinators conduct ongoing needs assessments in the region. As a result of these assessments, new courses are identified for development and current courses are updated. The coordinators also disseminate information on POLHN and provide student support.

In interviews conducted as part of a report to the World Health Organization in 2005 (Hughes et al., 2005), it was noted that Fiji and the Solomon Islands, the only two countries that commented on POLHN, were experiencing problems with the learning centres. In the Solomon Islands the challenge was staffing the centres with individuals who could solve technical problems and train health professionals to use the technology. A 2006 World Health Organization report on eHealth (World Health Organization, 2006) credited POLHN with the high rate of ICT-based training for health professionals in the Western Pacific region.

In the future, subject to raising sufficient funding, POLHN hopes to:

- improve student support services at the country level by hiring and training more POLHN co-ordinators;
- increase the number of courses, including developing pilot courses in physical therapy;
- providing a Pacific Islands package of health materials loaded on hard drives and distributed to health professionals, particularly in rural and remote locations;
- build capacity at medical schools through the development of an adjunct faculty system to increase the number of courses the institutions are able to deliver;
- with their partners, implement a regional continuing professional education programme;
- increase bandwidth at the POLHN centres;
- pilot mobile phone technology for telemedicine and continuing education based on models used in other parts of the world;
- pilot local development and delivery of courses in the Solomon Islands using the telecommunications infrastructure developed by the Solomon Islands People First Network (PFNet).

NATIONAL HEALTH PLANS

A World Bank review (Negin et al., 2011) estimated that most Pacific island countries spend around 70 per cent of their annual health budgets on “curative care and treatment overseas, leaving little for preventative care.” For example, Fiji spent less than three per cent of its health budget on public health between 1982 and 2000.

However, of the eight countries that are the focus of this study, all except Nauru recognise the importance of community health workers in their most recent national health plans. While Nauru identified the potential of ICT to enhance their health system, Samoa, Tuvalu and Vanuatu did not mention the potential of ICT to improve their health systems. Kiribati, Papua New Guinea, Solomon Islands and Tonga identified the importance of community-based health and the potential of ICT but did not link the two. Fiji, which was also included in the review of national health plans, falls in the second group.

Thus, the nine countries can be grouped into three categories:

- ICT potential but not community workers included in national health plans (Nauru);
- community workers but not ICT potential included in national health plans (Fiji, Samoa, Tuvalu and Vanuatu);
- community workers and ICT potential included in national health plans (Kiribati, Papua New Guinea, Solomon Islands and Tonga).

ICT potential but not community workers included in national health plans

Nauru

Nauru's National Sustainable Development Strategy 2005–2025 identified health needs but did not include community-based initiatives as part of the solution to these needs. It also recognised the need to upgrade ICT infrastructure but did not provide details as to how to do this or suggest how this might contribute to improved health (Republic of Nauru and Secretariat of the Pacific Community, 2007).

Community health workers but not the potential of ICT included in national health plans

Fiji

The Fiji Ministry of Health's (2007) Strategy recognises the role of community health workers: "Basic health care is provided to all residents through a hierarchy of village health workers, nursing stations, health centres, sub divisional hospitals and divisional and specialized hospitals." However, the strategy does not outline actions in which these workers will be involved. Also, there is no mention of technology use, even though the first of six strategic goals is to "Maintain an adequate Primary and Preventive Health Care Services and Promotion of Health."

Samoa

The Samoan health sector plan (Samoa Ministry of Health, 2007) acknowledges the importance of collaboration between "government agencies, traditional healers, community based and non-government organisations to promote health and healthy life styles." Under service providers, the plan identifies two traditional health worker roles (traditional healers and traditional birth attendants) and community-based social structures (pule nuu, fanau lalovaoa and tupulaga talavou — village mayors, women's committees, and youth and children). The plan does not mention technology.

Tuvalu

The Tuvalu health strategy does not mention technology. It recognises the potential for community members to make public health projects more efficient, but does not include a specific action (Tuvalu Ministry of Health, 2009).

Vanuatu

The Vanuatu Ministry of Health developed a health services plan through extensive consultation (Vanuatu Ministry of Health, 2004). The plan stresses the important contribution of "aid posts" within the country's health system. There are about 180 aid posts in Vanuatu, 15–41 per province, with an aid post in most villages. The posts provide first aid and community education. Communities, local or provincial governments, or church groups establish and fund the posts. The Ministry of Health provides basic medicines and up to three months of training for village health volunteers who staff the aid posts. The other three types of health facility in Vanuatu are hospital, health centre and dispensary. The ministry is responsible for these.

The plan has an "overarching priority" of giving greater emphasis to primary health and community-based public health services to increase immunisation rates and decrease the incidence of malaria, tuberculosis, diarrhoea and malnutrition. It specifically mentions the aid posts and their ongoing role in education, community development and basic first aid. Community involvement is key to the plan's success:

The essence of the Primary Health Care approach is to engage the staff and the community in improving the health status through cooperative efforts. There was much evidence during the consultation process that strong relationships exist and that the community leaders present at the workshops wished to take on new roles and to be engaged in the process of change. How the Ministry taps into this energy will be the key to the success of this Plan.

The eighth of 14 recommendations was to “give a higher priority to improving transportation and communication links in order to improve access for patients and to reduce the isolation of health workers,” including “progressively expand communication system to Level I—Aid Posts.” However, there was no mention of the potential of ICT to support this communication.

Both community workers and the potential of ICT included in national health plans

Kiribati

One of six strategic objectives within the Kiribati health plan aims to improve public health service delivery (Kiribati Ministry of Health and Medical Services, 2008). A priority action within this objective is to strengthen district health facilities’ infrastructure and management through use of ICT. A key driver for considering technology is increased effectiveness and efficiency. However, the plan does not specify how technology will help achieve these.

The plan recognises the role of community workers in seeking to improve Kiribati’s health status in specific areas, and includes educating healthcare workers as a priority action.

Papua New Guinea

Papua New Guinea’s health plan (Government of Papua New Guinea, 2010) has a strong focus on developing the community health worker role and recognises the potential of ICT to improve communication with health workers. However, technology-relevant actions focus on infrastructure in hospitals.

Specifically, the health plan for the next decade recognises the importance of all health professionals in achieving the goals of the plan, including community health workers. There is a shortage of community health workers, “with low wages and insufficient capacity within training facilities to produce the number of health workers needed.”

The plan aims to progressively introduce community health posts, a relatively recent initiative in place in a few areas, and to strengthen community health posts’ links to communities. Related actions are to increase the number of community health workers and strengthen the village health volunteers programme. Each community health post is to have three staff with skills in “maternal and child health, midwifery, health promotion, and community awareness programs,” including a labour room. In addition:

A new focus for these facilities will be improving the interface between the community and formal health services, ensuring that the community knows how to access the appropriate level of care, as well as equipping them with the necessary skills and knowledge to better take responsibility for their own healthy living. This latter aspect will be enhanced by encouragement of the use of informal healthcare from the community and family level, including, for example, Village Health Volunteers.

In discussing technology, Papua New Guinea's health plan recognises the strong health radio network, linking 1,300 facilities, and the underdeveloped health ICT infrastructure, which has

little or no ICT connectivity between provinces and Port Moresby, within provinces, or even within hospitals and provincial health offices. This is in an environment of a very good, though expensive, telephone system and mobile telephone systems that already have wide coverage and are steadily increasing in coverage and reducing costs to the users.

Solomon Islands

The Solomon Islands Health Strategy (Solomon Islands Ministry of Health, 2006) emphasises community involvement in health solutions:

The Solomon Islands faces some unique challenges in the effective delivery of health service. It is recognised that utilisation of healthcare is on the increase, but communities make decisions in a society that still utilises home care with traditional healers and western medicine. Those factors affecting demand for health services are poorly understood, but the power of the health worker to affect health outcomes is increasingly acknowledged. (p. 15)

The strategy mentions training for community health workers and recognises the need to use ICT to improve communication between the ministry and health providers; however, it also notes the challenge of changing staff attitudes to achieve the potential benefits:

However, technical improvements are still compounded by a culture of information hoarding within the organisation. Staff have had limited exposure to understanding the importance of communication and there is a need to make better use of communication systems by all MoH staff, especially in terms of the radio network. (p. 27)

Tonga

The Tongan Ministry of Health's latest plan (Tonga Ministry of Health, 2008) notes the need to increase the capability of community health centres, and includes the use of ICT to "foster efficient and effective health care delivery, communications, timely and accurate information sharing, security and innovation."

Learn and connect, through ICT, for health

POTENTIAL OF ICT TO ENHANCE HEALTH

The 2006 global eHealth report (World Health Organization, 2006) noted the growth in eHealth from 2000 to 2005, primarily in wealthier countries:

Every day, across the world, people make improvements in health as a direct benefit of information and communication technologies (ICT). eHealth innovations like electronic health records, computer-assisted prescription systems and clinical databases are transforming health today, and hold even greater promise for the future. ICT support clinical care, provide health information to

the general public and scientific information to professionals. They provide a platform for publishing, disseminating health alerts and supporting administrative functions.

In 2006, the main use of ICT in a health context was providing online health information. The report suggested that member countries develop multilingual resources to avoid the duplication of every country creating their own, and encouraged the development of open resources and a move to use eLearning to build ICT skills in health workers. The report also noted the challenges of ensuring the quality of such materials and having interoperable health information systems.

In 2010, the United Nations recognised the potential for technology, especially mobile phones, to improve health in developing countries. The report (United Nations, 2010b) recognised the potential for such technologies to empower community health workers:

Advances in technology provide an opportunity to accelerate poverty reduction through pathways not available to countries that developed earlier. Reducing the technology gap can accelerate leap-frogging to innovative and low-cost development solutions. Such technology facilitates communication and information exchange. Simple access to mobile telephones translates into reductions in mortality rates through provision of information about prevention and treatment and improvement of transport to vital interventions (such as emergency obstetric care), long-distance learning, better chances of survival and adaptation by sharing information on the location of pastures and water using mobile telephony, and empowerment of community health workers and other health personnel.

Dzenowagis (2009) identified the potential for ICT to enhance health provision in all countries by helping, for example, control costs, cover health workforce shortages, meet growing consumer expectations and support changing models of healthcare delivery. She also recognised that for developing countries, further benefits are decreasing the isolation of health workers and supporting locally relevant research. Factors affecting health workers' ability to use ICT to enhance health outcomes are costs, access, Internet speed, technical and digital literacy of users, and cross-border collaboration.

Developed countries are investing significantly in ICT for health. Their use of ICT is evolving as users learn more and technologies advance. There are many theoretical and policy papers discussing how technology enhances health services, but there is no evidence based on actual projects that supports these proposed benefits (Lewis et al., 2011).

Khazei et al. (2005) have also identified possible negative effects of tele-health, including diversion of finite resources into tele-health, increased dependency on third parties rather than empowering local providers, and loss of cultural appropriateness in delivery.

POTENTIAL IN THE PACIFIC

Health outcomes vary for the eight Pacific countries that are the focus of this report. In some countries, infectious diseases continue to be the major health concern. In others, non-communicable diseases are increasingly the major health issue. The countries also vary in geography, populations, culture, languages, history, economics, politics and loyalty to different colonial powers. Therefore, it is not surprising that they also vary in their healthcare systems, which are "inherently socially-based" (Lewis et al., 2011).

These factors then drive ICT in meeting the countries' health needs. In discussing health information systems, Lewis et al. (2011) suggest that a larger country such as Papua New Guinea

requires a relatively complex health information system, in contrast to Tokelau which, with 0.03 per cent of Papua New Guinea's population, can operate its health system effectively with more simple tools. Other countries are between these two extremes; however, "at a certain point in size, there is likely to be an almost quantitative step change in systems requirements for ICT."

Technologies can assist health workers in the Pacific in three ways, by addressing:

- physical isolation "compounded by their populations being widely distributed on hundreds of small islands located in an immense expanse of ocean" (Lewis et al., 2011);
- professional isolation; and
- limitations to the processes of distance consulting and distance education, such as "inadequate professional contacts and excessive communication costs" (Pryor, Baravilala, & Katoanga, 2000).

Pryor et al. (2000) also identified several factors that can encourage the use of technology to improve health in the Pacific, including:

- the use of two regional tele-health networks, PacNet and Western Pacific HealthNet;
- exploiting existing systems and patterns of consultation and referral that link practitioners to Australia, New Zealand or the USA, with the preference depending upon each Pacific nation's historic connections to one of these three countries; and
- increased awareness and interest in tele-health among regional and donor agencies.

In their definition of tele-health, Pryor et al. (2000) include the use of ICT to support health workers over distance. While they focus on the role of specialist health workers, each example could have relevance to a community health worker:

- contacting a more knowledgeable health specialist on the telephone for an opinion;
- communicating with a person on an outer island via high-frequency radio regarding a difficult situation;
- seeking advice from a public health professional through email;
- performing a search of the medical literature through the Internet; and
- taking part in a live audio- or videoconference as part of a professional development opportunity.

With the rapid uptake of mobile phones, more than 100 countries are now investigating the potential of mobile phones to improve health outcomes (United Nations, 2010a):

In Ghana, for instance, nurse midwives use mobile phones to discuss complex cases with their colleagues and supervisors. In India, mDhil sends text messages giving information about various rarely discussed health topics and supporting prevention and patient self-management efforts. Rwanda uses a system of rapid SMS alerts, through which community health workers inform health centres about emergency obstetric and infant cases, enabling the centres to offer advice or call for an ambulance if needed.

Given the low levels of Internet use, technology infrastructure challenges, high uptake of mobile phones in Fiji, Vanuatu and Samoa, and the growth in mobile phone use across all Pacific countries, such mobile solutions seem appropriate for the Pacific.

DISTANCE LEARNING

Joynes (2011) recognised the importance of building the capability of community health workers. This review of formally accredited English courses, including those focused on community health workers, concluded that “there is a real need to develop and evaluate new and innovative ways of training,” especially to meet the demand for community health workers. The report suggested distance learning, on its own or as part of a blend, as a possible solution and noted its growing popularity. Perceived benefits are:

- increased and easier access to training;
- lower cost; and
- potential to learn in the workplace, resulting in greater retention, more relevant learning, better application of learning, and provision of community healthcare maintained during the training period.

As a distance learning provider for the health sector in the Pacific, POLHN’s main focus for distance learning courses is on higher-level health professionals, such as doctors, nurses and laboratory technicians. However, POLHN offers six-week online courses to community health workers:

“It is one of the reasons we set up POLHN. Primarily for health workers, to make access more available because of the cost. We have pretty good usage, but one thing that you and we need to put more thinking into is more training and working with students. When I do computer literacy training it’s not just the standard word processing, web access and that, but asking the students what type of access that they need, and showing them how to access that online. A problem based approach or a project based approach where it looks at what are the needs of the community and then tailoring the training in helping them finding the help that they need. Not to give you the wrong impression but we always work with health workers that I do training for. The range of these [is] community health workers’ courses for mosquito borne diseases, malaria, cardiovascular, HIV/AIDS and tuberculosis. These courses are taught online to community health workers who had previous medical training, not at doctor level but were nurses or above. Six weeks long online. They had to come up with their own presentation to the community. And we did an evaluation in the community as to how well they did. This would show if their intervention was effective. Most of our focus is on nurses, doctors, lab technicians, health professionals, so I don’t want to give you the wrong impression.” (Director, POLHN)

To be effective, distance learning has certain prerequisites. Koloto, Katoanga, and Tatila (2006) interviewed New Zealand-based Pacific eLearners to identify critical success factors for, and barriers to, their learning. Critical success factors were:

- access to and knowing how to use computers and the Internet;
- help from tutors and class members in an environment that is supportive of information technology (IT) use;
- attending class and handing in assignments on time;
- access to information, learning centres and other resources;
- motivation and self-confidence;
- understanding eLearning and course content;
- family support;

- funds for tuition fees;
- individual learning;
- time to work on the course online; and
- good command of English.

Barriers identified were:

- lack of understanding of technology and course content;
- lack of self-confidence and motivation;
- cost and finance;
- lack of access to computers;
- lack of time management skills;
- personal reasons and family commitments;
- lack of writing, communication and English language skills; and
- lack of physical interaction with and support from tutors.

Similarly, a survey of distance learners at the University of the South Pacific identified a number of barriers to the use of ICT for distance learning (Whelan, 2008). Students felt isolated in on-line courses. They lacked the necessary academic skills, such as writing and reading, struggled with English as the main language of instruction when it was their second or third language, lacked ICT skills, had low levels of learner motivation and engagement, and lacked support from family, friends or people in the workplace. Other barriers were the cost of and access to ICT and technical problems while studying.

Suggestions for improving the success of distance learners were forming local, national and regional networks to develop local content; using online tools to support collaboration; translating the learning management system's interface into local languages; and providing induction courses and mentoring, facilitating and coaching support services (Whelan, 2008).

Hogan (2009) studied the effectiveness of distance learning modes used by the University of the South Pacific. Some students preferred correspondence courses and resisted online delivery because they:

- had poor typing skills, especially older learners, although a face-to-face coaching of just 15 minutes led to much greater online interaction;
- felt discomfort in interacting with other cultures, but growing comfort as they found that the online forums allowed them to consider their responses;
- experienced technical problems, such as difficulties logging on, Internet speed (even at University of South Pacific campuses in some countries), Internet access outside urban areas and Internet costs for personal access;
- preferred "Fiji Time, which refers to a very slow way of doing things. . . students said they preferred to take correspondence courses, even when the subject was available in face-to-face or online mode. . . . Fiji Time effect is most evident in older students. . . . This cultural abhorrence toward deadlines, preference to work alone, and reluctance to participate in online discussions are challenges that must be addressed in order to provide quality online courses"; and
- preferred to work alone (it was more common for Indian students to prefer to work alone and for indigenous learners to prefer to work in groups).

However, online delivery offered significant advantages over correspondence in delivery time and the time it took to get feedback on assignments. Remote correspondence students were not receiving their course materials until six weeks into the course, and did not get feedback on assignments until the course was over. Online delivery transformed these turnaround times (Hogan, 2009).

Both online and correspondence course students varied in the level of contact they had with their tutors, often because of budgetary constraints. They had lower pass rates than campus-based students. Students in Vanuatu, Tonga and Solomon Islands said it was difficult to study at home with their extended families present (Hogan, 2009).

A review of an in-service training for community health nurses project in Fiji (Fiji Ministry of Health, 2011) noted the following training priorities: emergency obstetrics and midwifery, accidents and emergencies, mental health, and outbreaks and infectious diseases.

Digital literacy of community health workers in the Pacific

Au (2009) assessed Papua New Guinea health workers' knowledge of, skills in and attitudes towards ICT. The health workers were primarily hospital workers, with only 15 per cent being community health workers. As might be expected, workers who owned gadgets and had experience with ICT had higher skills. This tended to correlate with higher educational qualifications, and being male and younger. Nearly 90 per cent of workers had used cell phones, while only 29 per cent were using landlines. Two-thirds did not know how to send an email and a further six per cent did not know how to send an email with an attachment. Only 17 per cent knew how to search Medline for health information. Nearly 100 per cent of the health workers self-assessed that they needed further computer training, with 90 per cent believing there would be value in increasing their technology skills.

Community health workers in the study being reported on here believed they had a reasonable level of digital literacy. However, some saw the need for training to overcome this barrier for others. They have developed their own skills through a computer course or online study of their own:

“I have had training for computers through my pastor work so that is how I know what to do.” (Dona, Fiji)

“I believe that they should be more independent and seek training and engagement with technology, but I am not sure how this can happen because it is so different in the villages compared to the hospitals . . . I did my training by correspondence and I learnt quickly how to access online. This is why I believe that CSW need to be more savvy in this area.” (Nurse, Samoa)

“Yes, I often go online for emails, Facebook and Google because I have a general interest in the online services offered in Samoa. I sometimes need information for my studies and I just surf when I can.” (Taiai, Samoa)

However, based on his experience training community health workers and with those in the community, the POLHN director indicated a lower level of digital literacy, and the need for ongoing training:

“There is a wide variety of resources available on the Web. I just spent time in the Marshall Islands training community health workers in accessing resources

on the Web and then determining which resources are credible and which aren't and going through that process.

So when you get down to the community level, unless you have somebody who has been in the One Laptop per Child Programme, and that's a primary school programme, and has had experience in computer web-based programmes and accessing information over the Web, unless you have someone who has got some experience in that, and I don't see the bulk of young people having that experience, there really needs to be a lot of computer literacy training, not a one-off, but needs to be incorporated with education in schools. One-off only provides limited experience. And people get caught out, if they need to have continued, when they run into trouble, or access to someone who can help them out, or some way to do that in the online environment. Then they tend to get very frustrated." (Director, POLHN)

Two other respondents suggested appropriate types of training — the need to tailor training to fit the local context, and the potential to train while working:

"who would be providing this [training] and manage it to ensure that it is tailored to the community?" (Education manager, Tokelau)

"We can organise people to train and learn as they work . . . a sort of working in progress." (Clinical co-ordinator, Tonga)

Some respondents' answers to the prompt "Tell me what difference this made to the community you serve" demonstrated digital literacy, with evidence of application in their community:

"It helps me understand their needs in a more big picture way — by seeing what is happening in other places and countries. It helps me see other ways to help and support people." (Naomi, Tonga)

"I am more informed for information sharing. I can give them answers that are research proven etc., etc., and I can give them the latest information. I'm not sure if the information is helpful in the community because it seems all in one lump sum answer. For example, when someone asks me for information say on diabetes, and as a pastor I will pray first with them, then they feel much better about their situation. Then if they enquire more about medication and I don't know the answer, I might have a look online and then let them know the answer. The community are still very simple in their beliefs." (Dona, Fiji)

"It allows me to get up-to-date information and practices used within the field, while also following up on lessons learned from other entities, things that are not readily available in paper form within the country." (Mowenna, Samoa)

When asked "When you hear the words 'digital literacy,' what thoughts come into your mind?", the community support workers did not answer or gave replies that were limited to static content and the computer as the only tool:

"Computer language" (Naomi, Tonga)

"Computer ICT" (Dona, Fiji)

"Reading and learning using books and other literature that is not in paper format, but can be viewed using a computer or eBook reader." (Mowenna, Samoa)

Similarly, when asked to “design a dream of best digital online information and technology support,” the community health workers tended not to answer directly. Other answers to questions indicate that their present use is focused on email, accessing a few websites, and Google searches. Given the ongoing access challenges, it is not surprising that respondents have not experienced the possibilities of non-stop access to the Web, such as searching the Web daily for information, reading RSS feeds, and actively using online communities and social media to find and connect to trusted advisors, and do not aspire to local content creation of multimedia so that Pacific cultures and languages are better represented in health on the Internet.

According to Nabobo-Baba (2007), one of the challenges facing Pacific countries is developing the necessary digital literacy without losing their own culture:

Communication and language changes have occurred because of rapid changes in ICT. There is increased global connectivity but the media are creating a “cartography of difference” in the Pacific. There are increasing disparities in education; some have access to ICT, while some do not. The question to ask is: How do we handle this “digital divide”? A more pertinent question for us, however, is: “How do we decrease the disparities in education in the Pacific that ICT will increasingly create?” Perhaps the most critical issue is what do we have to do to ensure that Pacific children excel in computer or ICT skills while not losing touch with the cultural knowledges of their own people?

HEALTH AND CULTURAL LITERACY IN THE PACIFIC

Low health literacy, cultural barriers and limited English proficiency have been coined the “triple threat” to effective health communication: “The culturally bound beliefs, values, and preferences a person holds influence how a person interprets healthcare messages. Knowing about a patient’s language and culture is key for knowing how health literate the person is in a given situation” (Singleton & Krause, 2009). They recommend that health workers consider all three aspects of effective health communication when communicating with patients, through such actions as being culturally self-aware (including being aware of one’s own health bias), developing appropriate patient forms and educational materials, and working with trained medical interpreters and cultural brokers.

HEALTH LITERACY

A brief analysis of the health literacy levels of New Zealand, Australia, Canada, the United States and the United Kingdom concluded that over half of the adults in each of these countries lack the necessary health literacy (Workbase, 2011). New Zealand and Australia had the highest rates of adults with adequate health literacy, at 44 per cent. The figures also indicate strong differences between ethnic groups, with health literacy levels for Māori in New Zealand being 20–25 per cent lower (and males lower than females) and for black and Hispanic adults in the United States being 29–37 per cent lower than those for white adults in both countries. Canadians for whom French is their first language were also more likely to have lower health literacy.

New Zealand, Australia, Canada, the United States and the United Kingdom perform highly in the United Nations assessment of human development, based on measures of health, education and living standards (United Nations Development Program, 2009). These five countries range from second to 21st on the list. By contrast, the eight countries that are the focus of this report range from 99th to 148th, or are not included in the United Nations ranking. It is

therefore reasonable to assume that the health literacy of the Pacific countries will be significantly lower.

The assumption of low health literacy was supported by comments from some respondents in this research. Low health literacy in turn means that the community health workers are less likely to feel a need to increase their health literacy:

“Most of the time the information that I need is answered for me by some of my friends in the mental health service because the questions that the community ask me are easy to answer. . . . Not too many ask ones that need on-line service.” (Taiai, Samoa)

“We are often just needing to be available to explain things about growing old rather than explaining any medical expertise information.” (Doctor, Samoa)

However, community health workers rely on trusted people in communities perceived to have higher health literacy, as well as doing their own research:

“The community health workers normally get any health-related information that they require for their community health programme through their nearest health information office. Other times we just ask in the community and get answers that way. We have some traditional village people who can help us with traditional advice, but most of the time the information we need is in the community. One time I needed some clinical advice so I asked the local community doctor in the health information service and he just told me verbally. Any information in the villages is done like this. These are remote and isolated from the city. The communities here have no need for online learning at this moment. We also have very knowledgeable influence[r]s in our families who are able to give the community what they need.” (Martha, Papua New Guinea)

“I rely on the experience of my colleagues or I source the information myself using resources that are available to me.” (Teni, Vanuatu)

“I ask for guidance from supervisors or research on the Internet and through books.” (Mowenna, Samoa)

“There is lots of times when I am not sure where to find the answers, but I ask around the community and the health services. I also ask people that are connected with me through church and the mission.” (Dona, Fiji)

“Should the need arise to utilise online information I will; however, I would normally make contact with colleagues ‘in the know’ first to use their expertise.” (Teni, Vanuatu)

Teni (Vanuatu) mentioned using a mobile phone to contact someone. Nobody talked of emailing an expert or other ways of making contact with people over the Internet. They rely on experts whom they know and who are nearby.

LANGUAGE AND CULTURE

Exacerbating these low health literacy levels is the dominance of English as the most common language of online resources and health publications. Estimates are that 80 per cent of online resources are in English, with only 10 per cent of the world’s population speaking English (Kickbusch, 2011). Finau, Dever, Finau, and Yano (2000) noted that even with the multilingual policy

of the *Pacific Health Dialog* journal, which allows authors to write articles in any of the major Pacific languages, every paper had been written in English over the five years of their study. They describe English as “the dominant monolingual medium for regional dialogue.”

A study in Zambia (Underwood, Serlemitsos, & Macwangi, 2007) assessed approximately 2,000 Zambian adults’ ability to understand health information in English and major Zambian languages. Those who had not gone beyond primary school understood Zambian materials better. Those who had studied at level 8 or higher in schools scored equally well on English and Zambian materials. However, all adults understood the level 4 materials better than the level 8 materials. The authors concluded that simpler health information and producing material in patients’ first languages would increase health literacy.

The Pacific has over 800 languages and the number of native speakers is small for many of these languages. Developing language-specific resources to support an even smaller number of community workers is not cost-effective. However, the risk of relying on English resources is that the essence of the message is lost in translation because of the different language and culture. The health message may be difficult to understand for the community health worker, or for the community with whom they then seek to communicate.

One community health worker noted language as a possible reason why those in the community might not seek to access online information.

“But regards to the community, I would be surprised if any of them wanted to use or get information from this service. There are language issues and also ‘need’ issues that might restrict or hinder their wanting to ask.” (Taiai, Samoa)

As well as speaking different languages, non-Western cultures rely less on reading and writing. Eighty per cent of the world’s population lives in oral and visual cultures — cultures that learn through listening and watching, not through reading or writing (Goody, quoted in Kickbusch, 2011). By extension, Kickbusch (2011) sees the oral and visual potential of new technologies:

The new information technologies might provide learning opportunities that are more visual and interactive than pamphlets and older, more didactic forms of health instructions. They can be used individually, in groups and in the classroom. Learning about health by surfing the net, visiting chat rooms, and talking to others thousands of miles away with the same problem is already a reality for some. Maybe, in the future, when you get a pill bottle, you will not be handed an object with a little label that nobody can read let alone understand. Maybe you will get a short video with your pills, or a message sent to your hand-held portable device that will explain what the medication is for and how to take it properly (with an inbuilt reminder).

Pacific countries need content developed by them for them. Media trends increasingly support individuals creating and uploading individually generated content, including multimedia resources.

Robbins (2006) gives examples of how Pacific people can develop culturally relevant educational multimedia: “*decentralised* methods that enable students and teachers to customise educational multimedia themselves, and *dialogic* methods that provide local context through conversation-like interfaces. . . . educational tools include a virtual peer, wiki, self-test, digital scrapbook, and three-tier file structure.”

Harris (2007) reviewed a video production project in Fiji in which rural women produced video stories that were important to them and their communities. Producing the videos meant that the women

visited each others' communities, leading to greater dialog and understanding. The visit created a greater transference of knowledge and cross-cultural understanding. Producing within their local context also allowed the women to integrate the social and cultural values of their own society and develop their own production culture instead of using foreign production values.

The ability of rural Pacific women to produce videos when supported, the knowledge sharing as a result of the production process, and the development of a Fijian production culture could be relevant to health-related projects that rely on culturally relevant knowledge transfer.

Those interviewed for this study did not mention local content production.

A study of Asian patients in the United States found that doctor and patient perceptions of conversations about complementary and alternative medicines were different, even with doctors who were of the same ethnicity as the patients (Nguyen & Bowman, 2007). The authors concluded that training for health professionals needs to "focus on effective communication skills in an increasingly multilingual and multicultural society in which patients frequently have limited English language literacy skills. Examples are the need for education about cultural competency and effective use of medical interpreters". In addition, they believed that health professionals need to "address issues of culture, language, and health literacy when they communicate with these patients so that appropriate questions are asked, and accurate information is exchanged between patients and their providers."

While the Nguyen and Bowman (2007) study targeted doctors, the findings are also relevant for community health workers. In addition, community health workers have a potential role in supporting more effective communication between health professionals and patients, but need to be respected enough to do that:

"I see the need for the CSW [community support worker] to have information online, but I don't see them needing to access this. In fact I have never been asked about online information since I have been working here. I think it is probably not that big a need and I wonder too if this is the case because I am here and the nurses too? . . . There is a strong belief in the medically trained doctor and nurse and there is also a lot of trust invested by the people in us and we are responsible for delivering the right service in their eyes. From time to time monetary gifts are given to us over and above our rate because of their appreciation of our service. I remember one woman inviting me to their toana'i [special meal] with their extended family just as a way to say thank you." (Doctor, Samoa)

COMMUNITY-RELEVANT SOLUTIONS

Another challenge community health workers face in providing culturally appropriate health services is taking their training, often done in another country, and applying it to the culture of the community in which they are working. The social problems they face in their own country tend to be different, in degree and kind, to those in their country of training. Therefore, the skills needed to address them are also different (Mills, 2002).

When discussing ways to build the capacity of mental health workers in the Pacific, Hughes et al. (2005) noted the potential of the Internet and other electronic media to enhance networking between more and less experienced practitioners. However, they stressed the importance of recognising Pacific cultural factors in designing technology-supported approaches:

These provide an opportunity for training and ongoing supervision and are particularly useful for overcoming the isolation of sole practitioners, providing

support and guidance, and for preventing skills depletion over time. However, any involvement of such media needs to consider that those interviewed placed heavy emphasis on the oral culture in Pacific countries, the preference for a face-to-face approach for training, and the need for close engagement with other local countries. Ongoing support and mentoring was recognised as important but the approaches adopted needed to be appropriate and reflect the above factors.

They proposed careful piloting of such approaches and involvement of community and church leaders to ensure buy-in and sustainability of programmes. Similarly, a review of a community-based obesity prevention programme in Tonga concluded that keys to success for community-based interventions were the community understanding and agreeing on the need for interventions, engaging community leaders and influencers, and culturally appropriate implementation (Fotu, Moodie, Mavoia, Pomana, Schultz, & Swinburn, 2011).

Three projects led by the National Telemedicine Centre in the Philippines sought to use ICT to improve health outcomes (Marcelo, 2009). Each began with community involvement. The implementation had three phases:

- The human experience: Start from where the people are;
- The technological opportunity: Identify appropriate, available, accessible and culturally acceptable technologies; and
- The sustenance factor: Embed the technology into the local fabric.

In considering the lessons learned about “the human experience,” Marcelo noted the importance of introducing the technology to enhance existing relationships or to meet a felt need.

The Community Health Information Tracking System “was developed in close consultation with village health workers to best identify their needs” (Marcelo, 2009). The system made community-based health information available to public health agencies requiring community-level information and to the community that generated the information. Village health workers enter information once during patient consultations, which they can then access. Community leaders can also access the data and reports immediately to help them make better, timely decisions.

One lesson learned from the Community Health Information Tracking System project about training was that a fun, game-based method using the existing game Solitaire was more effective than a more structured training programme in teaching health workers how to use the keyboard and mouse, because trainees were more relaxed and less fearful (Marcelo, 2009):

The game orientation removes the fear that they have to perform well in a short period of time. This is what is meant by starting from where the people are. A recognition of the cultural aspects of community life is important in starting them off into a new direction such as computerisation and automation.

The second project, E-Learning for Health, used whatever technologies were available and appropriate to train village health workers by distance (Marcelo, 2009). Most communities have televisions and video players, so the sessions begin with health workers watching a seven-to-ten-minute video developed by the National Telemedicine Centre using non-technical language as much as possible. Experts in Manila then interact with one or more groups of health workers by videoconference, Internet or mobile phones to answer questions:

The E-Learning for Health Project has shown that, by using locally available technology and the best available bandwidth, it is possible to establish

interaction between a group of healthcare volunteers (in a remote community) and an expert (in an urban area). Voice calls were found to be most effective, although participants also appreciated videoconferencing. The community members were keen to accept the new modality, because it employed technologies that were already familiar to them. Pre-tests and post-tests given to participants revealed that they were able to gain knowledge from the e-learning activity.

However, a significant challenge in eHealth is developing sustainable models. Marcelo (2009) asked the question, and provided at least part of the answer:

How, then, do we overlay the technologies (step 2) over the local issues (step 1) to ensure that the technical solution finds a home in the heart of the community? E-health should be considered as another community activity that will need to involve discussions, arguments and deliberations. E-health should thus become the vehicle for more rapid and more structured community development through enhanced communications and process documentation. This becomes more apparent with the use of mobile phones for health-related concerns such as announcements for community meetings, reminders for vaccinations and prenatal check-ups. It also involves gathering the health volunteers and workers regularly to attend e-learning sessions on community health development.

In the third National Telemedicine Centre project studied by Marcelo (2009), ten medical centres were given hardware and Internet access to enable them to contact experts. No doctors used the service. Centre staff analysed the situation from the doctor perspective and understood the complex workflow required and why it was not working for the doctors. They then modified the model to one in which doctors used their existing mobile phones to text queries. The project resources then supplemented the doctors' mobile phone plans to fund voice calls to experts as appropriate. Over a six-month period, more than 300 referrals were received from 44 doctors in remote areas.

The education manager from Tokelau recommended that the research team for this study find out what community leaders see as their role in supporting these types of service. In recognising the potential of the Internet, the Samoan doctor noted the need for a culture change in the villages:

“Yes I see the need for up-to-date information for the onward progress of health work and I also see that Samoa is only a village that is slowly getting to terms with the use of the Internet, especially in the villages. It wasn't so long ago that we still had black boards in our schools and churches. In fact, I think that some schools still have this. In terms of long-term sustainability, the Internet needs to come with a culture change in the villages. The fa'a [The Samoan Way]¹ in Samoa is still a very important method of learning and teaching in every area of health and even the traditional ways of health are upheld in the communities, like the fofo [massage] and the tatalo [prayer]. There is a strong belief in the medically trained doctor and nurse and there is also a lot of trust invested by the people in us and we are responsible for delivering the right service in their eyes.” (Doctor, Samoa)

¹ In Samoa, the fa'a “refers to an all-encompassing traditional system of behaviour and responsibilities that spells out each person's relationship to one another and to persons holding positions of authority” (Wikipedia).

A Samoan community case study

The second part of the research was to seek to understand in more detail a community's needs in regard to digital literacy in health. The research team chose Samoa because of the Pacific team member's strong links to this country, but believe the case study could be relevant in other Pacific nations, which have similar considerations. Goshen Trust Samoa Mental Health Service was chosen for the case study on the basis of personal networks.

Goshen is located a few minutes' drive from the city of Apia. The Goshen Trust Samoa Mental Health Service was established November 2009. This non-governmental organisation supports people who experience mental ill health in Samoa. Ten years ago, Tutogi Savea-To'o, the current managing director, had the vision for the service. She had been part of the team working out of the Pacific Islands mental health service Isa Lei, within the Waitemata Health District Health Service, New Zealand.

Goshen was launched in Samoa by staff from the Penina Health Trust of South Auckland. The Board is made up of a secretary, Dr Sa'ilau Sauni; two psychiatrists, Dr Frances Agnew and Dr Ian Parkins; and two family representatives. Goshen is funded by gifts from the Samoan community. Recently, the Samoan government funded an office block and residential dwellings to assist in the set-up. The Samoa International Finance Association provided a vehicle for the service to use.

Goshen is breaking new ground in two ways: by focusing on mental health, which is not yet a targeted, visible health area in Samoa, and by developing an integrated model that relies on strong, ongoing relationships between existing providers and that values both formal and community-based provision.

The service provides advice to clients and their families on mental health issues, following through with information that is required for their overall health needs. Tutogi believes that the health information that the community needs can be found through community-based and more formal health services across Samoa. Goshen's planned approach is to offer seamless medical care through coordinating these two siloed services presently available in Samoa. She says that you can have almost any type of care in Samoa, if you are prepared to pay for it and know someone close to where it can be bought. Goshen's vision is that government will equally value, and therefore fund, the community health services as well as the more formal medical ones. Goshen has a residential service, which currently has one client, and a service visiting clients, which is currently provided for free. Goshen has six full-time volunteer staff who are committed to the mental health cause.

Tutogi has spent the last year visiting clinical services in Samoa, calling on church organisations, knocking on funders' doors and networking with the Prime Minister and the Head of State of Samoa to introduce the Goshen service and promote its profile and service provision. Although it has been hard, Tutogi's success can be directly attributed to the relationships she has fostered since she first began the service. She believes it is "who you know in Samoa, not what you know." Through her relationship building, she now has high-level support for funding applications from the Prime Minister and the Head of State. For example, Tutogi has now applied to the Ministry of Health and the National Health Service of Samoa for a fairly large amount of funding to assist in the next stage of expanding the service, employing more staff and staff training. Awareness and understanding of medication and its uses are important areas for staff development. She

has approached pharmacies in New Zealand and Australia to support their work. Penina Trust in South Auckland, New Zealand, holds regular fundraising events to assist the service, with high-level support from New Zealand's top advisor in mental health.

Tutogi has presented the National Health Service of Samoa with a draft proposal. She hopes that NZAID and AusAID will be partners. The current Minister of Health in Samoa is keen for Goshen to get off the ground and be sustained into the future. Often it's the track record that has to be visible before a funder will back an initiative. But Tutogi has chosen the Pacific relationship-focused way for her fundraising approach, which she believes is appropriate for the community, the service and the clients.

A lot of emphasis is placed on the traditional knowledge of healers in the community, particularly in regard to mental health. Samoa has its own definitions of things such as schizophrenia, bipolar disorder and stress. Goshen believes in correct diagnosis of the client and that appropriate medication alongside prayer and community support is the right way to offer true care for a client. Where the client needs respite, this is often provided in the family home, with lots of advice from Goshen and support for the family. In contrast, Western models often offer respite in isolation from family, under the watchful eye of an on-duty clinician.

Tutogi believes relationship-building is a universal principle in the Pacific and that face-to-face relating is important when working across any services. Goshen is pioneering this in the mental health area, building upon the integrity and passion of the staff and valuing these skills in all staff, in addition to the formal qualifications of some staff.

Digital literacy is a long way from services like Goshen in the sense that Samoa is, in many parts, still very traditional in its information culture. The indigenous still works and the fa'a Samoa is strong. The practice of fa'a Samoa is based on the village infrastructure of matai (chief) and family relationships. Knowledge and information is passed through this channel of filters and conduits according to the locals in the village.

Tutogi believes that the Internet could be a valuable tool for Goshen in providing access to medication information, hospital records, client histories, illness identification, medical advice, and connections through social networking. Goshen could offer further study through their relationships with education providers in New Zealand and the University of Samoa and University of the South Pacific. Building on her relational approach and existing strong connections with churches, Tutogi sees potential for Goshen workers and volunteers to use pastors' computers. She also believes that the training she received in New Zealand has made the biggest difference in her attitude and application to online tools and recognises the importance of providing training along with the tools.

From this study, we can conclude that for digital health to enable community health workers at Goshen to do their job better, the following elements need to be present:

- adequate resourcing, which depends on long-term relationships between various Goshen staff and funders;
- appropriate infrastructure, including funding to build and sustain the infrastructure;
- a model that recognises and builds on traditional and village ways of knowing and learning; and
- training for staff.

Where international organisations such as COL might add value: Recommendations

As previously stated, this research had two aims:

- to provide a broad overview of current initiatives in digital literacy in the health sector; and
- to identify possible gaps in or needs for capability building where the Commonwealth of Learning (COL) may be able to add value.

The previous sections of this report address the first aim. This section considers the learning from the previous sections to address the second aim: to identify possible gaps in or needs for capability building where international organisations such as COL may be able to add value.

This section proposes five options, based on the opportunities identified in the earlier sections. These options are not mutually exclusive.

Fifteen years ago, Gilster (1997) wrote:

The skills of the digitally literate are becoming as necessary as a driver's license. The Internet is the fastest growing medium in history — like it or not, it will affect you and those around you at home and on the job, from the merging of your television set's images with network data to the emergence of communities of users whose activities will change the shape of commerce and education. The Net's growing universality will create priceless resources for learning and self-advancement. If these won't overwhelm your life overnight, they will change it subtly, continually and with irresistible force.

For many of us in the developed world, these words would not have resonated when Gilster wrote them, but they have proven true in the last decade. However, it is clear that this has not yet happened for community health workers in the Pacific.

This research shows that community health workers in the Pacific play an important role in their countries' health systems, but do so with minimal access to, or use of, online information and support. Instead they rely on traditional indigenous ways of seeking health information and traditional knowledge. The community health workers surveyed were very aware of their difficulty accessing the Internet, which was primarily a result of high cost. However, they appeared less aware of what they might be missing through this lack of access. Their present use of technology centres on irregular searches for online information and visits to trusted websites, which is not surprising given the cost and difficulty of access. The people interviewed did not mention accessing the websites that the research team believes could be relevant for Pacific community health workers.

Regional and national government policies tend to identify the importance of both community health workers and of ICT for health. However, the research team did not find any policy that linked these two priorities.

COMMUNITY-RELEVANT PROJECTS

This research shows very clearly that digital health projects must be relevant to the community and have ongoing buy-in from community leaders to succeed. Pilot approaches need to be co-developed with community health workers and relevant community members, including leaders, building on their felt needs and the technologies with which they are already comfortable, and include training methods that build confidence rather than fear (Marcelo, 2009). Any of the options below need to start with community involvement and continue with community involvement through design, development, implementation and evaluation.

DISTANCE LEARNING

A global focus is on the potential of distance learning to help meet the need to train large numbers of community health workers, including in the Pacific (Global Health Workforce Alliance, 2008; Joynes, 2011). COL exists to “encourage the development and sharing of open learning/distance education knowledge, resources and technologies” (Commonwealth of Learning, n.d.).

A possible role would be for COL to work with POLHN to create, pilot and evaluate a distance learning experience targeting community health workers. Some of POLHN’s courses are already focused on community health workers. The focus in the project would be looking at “what are the needs of the community and then tailoring the training in helping them find the help that they need” (Director, POLHN). This project could use existing resources where possible, to keep costs down. The learning design would need to take into account the existing low levels of digital literacy, the present unreliable and expensive Internet infrastructure, and the research on barriers to successful distance learning in the Pacific. Through its learning centres, POLHN can alleviate some of these factors, but relying solely on POLHN’s centres would significantly decrease access, so the project would need to get the right balance.

The research team believes that it would be important for COL to be involved beyond developing the learning materials, to learn from the implementation phase what an appropriate approach is in rural and remote villages of the Pacific. However, once designed and developed, the resources could be made available online for other countries to customise to meet their community health worker training needs.

MOBILE LEARNING

The lack of reliable or affordable Internet access, especially in rural villages and remote islands, suggests that it may be too soon to consider Internet-based pilot activities. However, as the number of mobile phone users in several countries is comparable to that in Australia and New Zealand, a mobile-based activity seems appropriate. Projects in Ghana, India, Rwanda and the Philippines suggest that this technology has the potential to assist community support workers in their work. Unfortunately, the research team did not identify these projects until late in the research, so did not include a question to understand mobile phone use in the survey.

A possible role for COL is to work with a community provider to co-design, develop, implement and evaluate a project using mobile phones. COL could use its networks to better understand what has and has not worked in other countries with mobile phone projects to enhance health outcomes, as well as its distance learning expertise to design a workable solution in response to the community’s and provider’s felt needs.

The Goshen case study shows that the leader of at least one community provider believes in the potential of technology to improve its service. The study identified that at least four elements would be necessary for a pilot to succeed:

- adequate resourcing, which depends on long-term relationships between various Goshen staff and funders;
- appropriate infrastructure, including funding to build and sustain the infrastructure;
- a model that recognises and builds on traditional and village ways of knowing and learning; and
- training for staff.

Interestingly, Digicel, the innovative mobile phone company mentioned above, sponsors the Digicel Medical Outreach programme, through which 2,000 patients have been screened and offered medical supplies. However, this programme does not appear to use mobile technology. Rather, volunteers run free one-day clinics in remote locations. They may be interested in partnering in a project.

SUPERVISION

Proper supervision is a key to community health worker success. However, it is proving challenging to develop and implement an effective, affordable model for the Pacific. Because ICT supports learning and connection, it offers the potential to be an essential ingredient within an innovative supervision model. Given the low digital literacy of community support workers, it is likely that the model would need to use a blend of face-to-face and online interactions. Community health workers, supervisors and community leaders would need to co-develop this pilot.

LOCAL CONTENT DEVELOPMENT

Appropriate use of language and culture are important for effective communication between health professionals and patients (Singleton & Krause, 2009; Underwood et al., 2007; Nguyen & Bowman, 2007). It is becoming increasingly possible for untrained individuals to create multi-media resources using readily available software and upload them to the “Cloud,” as already demonstrated in projects in the Pacific (Robbins, 2006; Harris, 2007).

A possible role for COL is to lead a local content development project to help meet a need in a Pacific community, such as better understanding of a health issue, which would benefit from resources in a community’s first language, or use of media, such as telling stories by video. Community radio can be explored as part of the solution.

CONCLUSION

COL’s Three-Year Plan for 2009–2012, *Learning for Development* (Commonwealth of Learning, 2009) outlines several initiatives and outcomes relevant to this research:

- Skills development: Training institutions and civil society organisations have the policy frameworks and increased capacity needed to develop and deliver ODL materials for strengthening knowledge and skills in both formal and non-formal learning environments.
- Healthy communities: Community organisations, non-governmental organisations and local public institutions have increased their capacity to create and use ODL materials to improve the health and well-being of their communities.
- Integrating eLearning: Institutions and communities use digital technologies to design and develop learning materials and models that are made available, where possible, as open educational resources and to provide effective and appropriate skills training.

In light of these priorities, the most relevant focus from the list above appears to be open and distance learning. However, it would be important to work with the community in developing this, mobile learning could be a part of it, and it could involve supervision and local content development.

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Appendix 1: Community health workers' Interview Schedule

1. What is your current role?
2. What do you do when you need to find out more information to do your job better?
3. If you use online access for information, tell me how you do this.
4. Tell me what difference this made to the community you serve.
5. If you don't use online for information, tell me why you don't and what you would like to change about this.
6. When you hear the words "digital literacy," what thoughts come into your mind?
7. If you could design a dream of best digital online information and technology support, what would this look like to you?

Appendix 2: Other health workers' Interview Schedule

1. What are your thoughts about Community Support Workers or Community Health Workers using online services for their roles in the community?
2. What in particular do you feel are the issues or challenges around accessibility?
3. What in particular do you think the issues or challenges are around training, equipment and technical support?
4. What suggestions would you make to assist or address these issues and/or challenges?
5. What needs to be done immediately to assist CSW to be able to access online information?
6. What needs to be done in the future to keep this sustainable?
7. How do you see the traditional healers' and community leaders' role in CSW work in information gathering/online information gathering?
8. What other information would help our research?

Appendix 3: Online resources and communities for Pacific health

The research identified the following websites as offering Pacific-specific health information that can be used by community health workers. They are listed alphabetically, with a brief description of what they provide, and comments on how community health workers might use them. It is important to note that this is not an exhaustive list.

Most sites targeted a wide range of health professionals but did not include a role comparable to community health workers in the description of the target group. Every site except one used exclusively English. The New Zealand Ministry of Health's HealthEd website provided some resources in Pacific languages, mainly intended for use in the community.

Generally, the websites do not offer RSS feeds to support users in keeping up to date with changes, or use blogs or other social media to add life to the sites. Again, the New Zealand Ministry of Health's HealthEd site is an exception, providing an RSS feed, inviting sign-up for a newsletter and inviting users to assess the health resources using a five-star voting system. No sites include an online community or Twitter feeds to help visitors engage with the target community.

The websites each offer valuable, relevant information, but the small subset that would be appropriate for community health workers is well hidden and would require a high level of digital and health literacies to discover. Most sites target academics or policy makers and are limited to large reports or articles. Many, but not all, websites provide summaries of articles or publications to help users assess relevance. The only site that focused on providing resources to support those in the community to develop a high level understanding of a range of health issues, and to better communicate this to their communities, was the New Zealand Ministry of Health's HealthEd site.

New Zealand Ministry of Health: HealthEd

www.healthed.govt.nz/home

This website hosts free education resources, some of which are targeted at Pacific communities and are therefore produced in Pacific languages. These resources are listed by topic, with a user-friendly search by language option. The site aims to “help you to make informed decisions for yourself and those you care about.” A wide range of resources beyond PDF documents are included, such as videos, DVDs, posters and stickers. The website offers an RSS feed and uses a five-star resource rating system to gather feedback from registered users.

New Zealand Ministry of Health: Pacific Health: Resources

www.health.govt.nz/our-work/populations/pacific-health/pacific-health-resources

The New Zealand Ministry of Health: Pacific Health: Resources webpage offers two types of resources: publications and health education resources.

The publications section of the web page lists publications by year. Most of these are New Zealand-focused. However, each link has a brief description, which makes it easier to scan the long list to assess relevance. An example of a report that might be relevant for community health workers is *Customary tattooing guidelines for operators* (also available in Samoan).

The education resources section of the webpage provides links to Pacific-focused pamphlets and posters translated into Samoan, Tongan, Niuean, Cook Islands Māori, Tuvalu, Fijian and Tokelauan. The resources are listed on the site by health issue: breastfeeding, breast screening, cervical screening, child health, diabetes, eating/food, immunisation, meningitis, pregnancy and sexual health. Many of these resources, such as immunisation options available, are New Zealand-focused in their advice. However, the relatively simple descriptions and associated diagrams could help community health workers to understand health issues themselves or to explain to others. The resources are the same as those in the New Zealand Ministry of Health's HealthEd website; however, this page provides a Pacific lens from which to find these resources.

Pacific Basin Telehealth Resource Center

<http://pbtrc.org>

The Pacific Basin Telehealth Resource Center aims to advance the development, implementation and integration of tele-health in the Pacific Basin. The centre appears focused on those Pacific countries with links to the United States. While one of the centre's aims is to share information, one author of this report, who is considered highly digitally literate, could not access resources from the website's Resources page. Presentations in the News section highlight community involvement and engagement as a key to success in the use of technology to support health delivery. Given the difficulty accessing resources, it is hard to know how relevant material might be, but the site seems unsuited to community health workers at present.

Pacific Health Dialog

www.pacifichealthdialog.org.fj

Pacific Health Dialog is an online journal published specifically for Pacific countries. It aims to improve health outcomes in the Pacific through better-informed Pacific health professionals, and to engage the global community in dialogue on health in the Pacific. Established in 1994, the journal is published twice a year. All issues are available from the website and each issue covers a different topic. Content includes peer-reviewed original papers, case reports, communications, viewpoints and opinions, reviews, and news from Pacific health institutions contributed by local and international health professionals. In defining the scope of the journal, the site does not mention community health workers, for whom some of the articles would be relevant. However, they would need to sift through a large volume of irrelevant information to find the relevant parts.

Pacific Health Review

<http://pacifichealthreview.co.nz>

The *Pacific Health Review*, supported by the New Zealand Ministry of Health, is a quarterly publication with the tag-line "Making education easy." Each issue is an engaging PDF that can be downloaded free from the site, and is a compilation of recent, relevant Pacific research. For each article, the review gives the title, authors, a two-line summary, commentary from a medical researcher, the formal reference and a link to the full article. The review gives a quick, not overly technical overview of recent research, some of which may be of interest to community health workers (e.g., the effectiveness of storytelling in reducing blood pressure, Samoan peoples' views about antibiotics). The website gives users the option of receiving copies of the review by email when it is published.

Pacific Health Voices

www.pacifichealthvoices.org

Pacific Health Voices is an electronic health journal coordinated by the College of Medicine, Nursing and Health Sciences at the Fiji National University (previously the Fiji School of Medicine). The journal aims to be the hub of health information for the Pacific by identifying and publishing the work of Pacific health workers and making it accessible to the rest of the Pacific and the world. The mission includes improving peoples' health.

Many of the resources appear to be on topics that are less relevant for community health workers. However, some are relevant, such as the *Pacific Obesity Prevention in Communities Project (OPIC) Fiji Country Report* (although one would need to be very interested to read the full 110-page report). Including a brief version, such as a two-page executive summary, along with the full report, would meet the needs of community health workers, particularly if each resource appeared as a well-laid-out webpage rather than a file to download. To make this site accessible to community health workers, the resources would also need to be listed by topic rather than under headings related to their origin (e.g., reports, other journals). This approach is used in the Archives section and makes it easier to find resources on a specific topic. The material is relatively current, with many resources dated 2010.

Pacific Human Resources for Health Alliance

www.phrha.org

The Pacific Human Resources for Health Alliance works within the Pacific region to build human resource capacity for health. It brings together national governments, international agencies and other stakeholders in the health sector. It is a member of the Global Health Workforce Alliance. The alliance focuses on collecting and using reliable data, improving health workforce planning and management, and scaling up education and training of the health workforce to meet current shortages. The site lists vacancies for many health professional roles, but community health worker roles are not included, indicating that such roles are outside the scope of the site.

Pacific Open Learning Health Net (POLHN)

www.polhn.org

This regional initiative is discussed in more detail earlier in the report. The website provides links to the self-paced courses offered within POLHN's learning management system. These could be relevant for community health workers. The courses cover patient safety, computing skills, risk management, classifying diseases, and treatment of Pacific-relevant diseases (e.g., diabetes, mosquito-borne diseases, HIV/AIDS, tuberculosis and sexually transmitted infections). POLHN estimates that each course will take 12–26 hours to complete, and POLHN can separately assess these to give credit. The website homepage has a clear link to helpdesk support for visitors to the site.

The POLHN website also provides links to formal tertiary providers of online health courses, face-to-face short courses in the region, and other organisations using self-paced eLearning to increase access to continuing professional development for health workers. For example, the American Global Health eLearning Center offers online self-paced courses at no charge. Topics include family planning and reproductive health, antenatal and newborn care, child survival, treating HIV/AIDS and infectious diseases, and health systems.

Health professionals can use POLHN's physical learning centres for Internet access and human support.

United Nations Family Planning Association: Pacific Sub-Regional Office

<http://countryoffice.unfpa.org/pacific>

The United Nations Family Planning Association: Pacific Sub-Regional Office website has a Resources page. Many of the resources, arranged by topic in the left-hand navigation bar, are suitable for use by workers in the community. Under "Understand Reproductive Health," for example, resources include a DVD available from the office, evidence-based guidelines, brochures and wall charts, and Pacific country reports. Other topics, with similar resources, include connecting with reproductive health commodity security, talking about gender, and preventing sexually transmitted infections. The single resource for the topic "use behaviour change communication" is a toolkit targeted at programme managers that would also be helpful for those working closely in the community. Each resource has an image and a brief description to help users assess relevance.

World Health Organization: Western Pacific Region

www.wpro.who.int

The Western Pacific Region of the World Health Organization website is well structured, with a wealth of information, publications and resources. The link "Health topics" on the top navigation bar takes users to a page of topic links listed alphabetically. Clicking on a link then takes users to a page of various resources classified under the following headings: general information, fact sheets, news and press releases, relevant publications and documents, policy documents, meetings and events, data, collaborating centres, and links. On the Media centre page, news items have the first line displayed, and publications have an image and a brief description, which also help users assess relevance. The Multimedia link goes to an image bank and a list of videos, which includes an instructional video on hand washing, and advocacy videos on topics such as dengue. However, the information is targeted at policy makers rather than community health workers. For example, the fact sheets give country or regional statistics and comment on policy initiatives. Community health workers would need to sift through a lot of information to find the small amount of information relevant to them and their communities.

