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## Research Article

# The Implications of Aging on the Health Systems of the Pacific Islands: Challenges and Opportunities

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### CONTENTS

**Introduction**

**Materials and Methods**

**Results**

**Discussion**

**Conclusion**

**References**

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**Abstract**—Population aging presents substantial and unique challenges and opportunities to Pacific Island countries. The countries in this region currently have young populations, but the population is rapidly changing. With some of the highest rates of obesity and diabetes in the world, an aging population will—unless urgent action is taken—put additional pressure on all aspects of the health system: leadership and governance; health financing; health workforce, service delivery; drugs and equipment; and information systems. Pacific Island economies face a particular challenge in terms of health financing: government already finances and provides the majority of health services, but most countries have limited fiscal space to expand and deepen health services for growing and aging populations. Most countries cannot rely on a demographic dividend to finance and strengthen their health systems. Increased efficiency, particularly through better targeted primary and secondary prevention of noncommunicable diseases, is a particularly strategic and feasible investment in the Pacific, improving the health and well-being of those who will age and strengthening the effectiveness, efficiency, and affordability of the broader health system.

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### INTRODUCTION

Population aging—by which we mean an increasing proportion of a population aged 60 years or more—affects many aspects of society, including the workforce, pensions, housing, and health care. Our research goal is to use a literature synthesis of peer-reviewed and grey literature to better understand the implications of aging on the health systems of the Pacific Islands.

The Pacific Island countries (PICs) are particularly interesting and important to study in this way because they are at important points in their demographic and epidemiological transitions.<sup>1</sup> They also face significant social and economic

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challenges due to the small, open, remote nature of their economies;<sup>2,3</sup> exposure to natural disasters and climate change;<sup>4,5</sup> and the history of low—or at least volatile—per capita growth in incomes.<sup>6</sup>

The PICs face many challenges in terms of their overall health system. Health systems in the Pacific have been designed primarily to address communicable diseases and maternal and child health. Though the majority of PICs achieved the Millennium Development Goals of reducing child mortality, only seven fully achieved the goal of reducing maternal mortality, and only six achieved the goal of reducing communicable diseases. Papua New Guinea (PNG)—the most populous and resource-rich country in the region—did not achieve any of the Millennium Development Goals, including any of those for health.<sup>7,8</sup>

Health systems have, however, started to evolve to address the extraordinary rise in noncommunicable diseases (NCDs), including diabetes, in much of the Pacific,<sup>9–11</sup> a challenge affecting all parts of the health system as the aging process accelerates. The first five countries in the world with the highest prevalence of diabetes among those aged 20–79 years are all from the Pacific, led by Tokelau with a prevalence of 37.5%.<sup>12</sup> Seven Pacific Island countries are in the top ten worldwide for prevalence of diabetes and are estimated to remain so by 2035 when their aged populations will be larger in numerical terms.<sup>12</sup> Many other countries in the Pacific have high levels of diabetes as well as significant risk factors for diabetes and cardiovascular disease such as obesity.<sup>9,13</sup> Data from the WHO STEPwise approach to Surveillance (or STEPS) for the Federated States of Micronesia (FSM) estimate that 47% of women were obese in 2006.<sup>14</sup> Furthermore, over two thirds of women (67.8%) and more than three quarters (75.5%) of men aged 45 to 64 years had three or more risk factors for acquiring an NCD, including currently smoking; low level of physical activity; low fruit and vegetable intake; overweight; and raised blood pressure. Over half of those aged 22 to 44 years (both sexes combined) had three or more risk factors for acquiring an NCD.<sup>14</sup> Similar trends are found in other PICs.<sup>11</sup> All of these point to a potentially very significant pipeline of complex and often expensive-to-treat NCDs as populations age.

There is some evidence to suggest that the significant rise in NCDs in the Pacific is also slowing the aging process itself, albeit through the unwelcome process of reduced life expectancy. The government of Tonga's *Strategic Development Framework 2015–2025*, for example, specifically refers to “life expectancy falling significantly in recent years as a result of the epidemic of non-communicable diseases.”<sup>15(p32)</sup> Ministry of Health figures cited in that report suggest that

life expectancy for males fell from 70 to 65 years and for females from 72 years to 69 years over the remarkably short period 2007–2010. The effect of NCDs on life expectancy and the aging process in the Pacific continues to be an important area for future research.

## MATERIALS AND METHODS

We define PICs for this article as those 15 low- and middle-income countries that are members of the Pacific Islands Forum regional grouping: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu. We do not include the Pacific territories of France, the UK, or the United States in the analysis. The PICs are generally small in size—just 26 km<sup>2</sup> in Tuvalu—but cover vast distances across the Pacific; it is 7,500 km from Palau in the western Pacific to Kiribati in the east and 4,500 km from the Marshall Islands in the northern hemisphere to Tonga in the south.<sup>2</sup> A common sub-grouping for PICs is Micronesia (smaller islands north of the equator and east of the Philippines); Melanesia (generally larger and often mountainous islands south of the equator and closer to Australia); and Polynesia (generally smaller islands, in the east of the Pacific Ocean).

We examine the implications of aging against what the World Health Organization describes as the six key components of a well-functioning health system: leadership and governance; service delivery; health financing; human resources for health; essential medical products and technologies; and health information systems.<sup>16</sup> We note that these components interact with each other and are not silos.

In focussing on the health system per se, we nevertheless recognize that many social determinants of health—including housing, nutrition and food security, tobacco and alcohol use, and social capital—influence health outcomes, including those for the aged. Data limitations and a desire to focus on what is known about the implications for the health sector per se prevented us from exploring these other multisectoral influences. This remains an important area for future research.

Data limitations and space prevent a detailed study of all 15 countries. We therefore provide an overview of the region but then focus the rest of the discussion using examples from four countries where the data are more robust from each of the main Pacific sub-regions: Fiji and PNG from Melanesia; Tonga from Polynesia; and the FSM from Micronesia. We give particular attention to Fiji because it is the most rapidly aging country in the Pacific. Countries in the Pacific will be therefore watching to see whether policies and programs of a

relatively populous (in Pacific terms) and upper–middle-income country can be made to be affordable, effective, and financially and institutionally sustainable.

Data in the Pacific—specifically regarding older people—are limited. Where necessary, we have therefore formed our judgments regarding how we think the aging process will interact with broader health system constraints are empirical.

## RESULTS

### Population and Aging in the Pacific

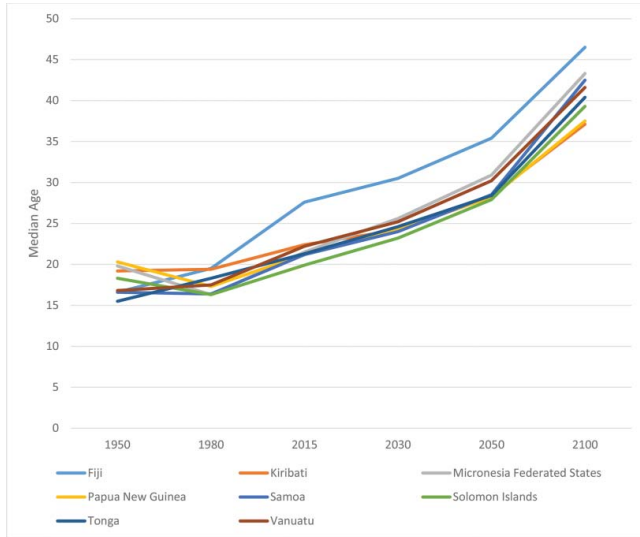
Table 1 summarizes key information about population and aging in the Pacific, drawn from the latest mid-year 2016 estimates from the Secretariat of the Pacific Community, the main regional technical and scientific organization in the region.<sup>17</sup> Three features are clear. First, the region is relatively young, with more than half of the countries having a median age of less than 25 years. The number of people aged 60 years and above is also relatively small in global terms—an estimated 612,500 for the region (not counting Kiribati, where final statistics are still under review). The percentage of older people is also generally low. This is especially clear in more

populous Melanesia, with only 4.4% of the population aged 60 or above in the most populous country, PNG. Second, countries are at different stages in their demographic transition. Fiji and most Polynesian countries are more advanced in reducing the total fertility rate (TFR) and with generally higher life expectancies than the more populous Melanesian countries of PNG, Solomon Islands, and Vanuatu.

A third feature of the Pacific is that outmigration of the working-age population is an important driver of population aging, especially in smaller economies with limited employment opportunities. Table 1 shows that eight countries have a crude net migration rate of –10% or more. The majority of people emigrating are of working age. Permanent outmigration dilutes the national population growth rate: ten of the 15 countries in Table 1 have growth rates less than 1% per annum, despite having a relatively high TFR. Tonga, for example, with a TFR of 4.1, has a population growth rate of 0.1%, partly due to a significant crude net migration rate of –18.7%. High levels of outmigration of the working-age population also skew societies to the very young and elderly, particularly noticeable in rural and outer islands where employment opportunities are often poor. The small island of Niue, with a population of 1,600, has only 300 older

Region/ Country	Estimated Total Population Mid-2016	Median Age	Total Fertility Rate	Population Growth Rate (%)	Crude Net Migration Rate (%)	Number Aged 60+ Years	Percentage Total Population Aged 60+ Years	Life Expectancy at Birth (Male)	Life Expectancy at Birth (Female)
Melanesia	10,250,000					535,200	5.2		
Fiji	880,400	28.5	2.6	0.5	–6.0	85,600	9.7	65.3	69.6
Papua New Guinea	8,151,300	21.8	4.4	2.3	0.0	361,000	4.4	53.7	54.8
Solomon Islands	651,700	19.4	4.4	2.3	–2.5	34,600	5.3	66.7	73.7
Vanuatu	289,700	21.3	4.2	2.5	–0.4	17,600	6.1	69.6	72.7
Micronesia									
Kiribati			3.9					58.0	66.3
Marshall Islands	55,000	19.9	4.1	0.5	–18.2	3,000	5.5	71.3	72.5
Micronesia Federated States	102,843	23.3	3.4	0.3	–15.6	7,600	7.3	68.5	71.6
Nauru	10,800	20.8	3.9	1.1	–11.0	400	4.0	57.8	64.8
Palau	17,800	36.5	2.2 (p)	0.3	–2.8	2,300	13.1	68.1	77.8
Polynesia						64,000	9.7		
Cook Islands	14,974	31.1	2.6	0.2	–7.3	2,200	14.2	71.7	79.6
Niue	1,600	35.6	2.6	–1.1	–12.8	300	20.1	70.1	76.3
Samoa	194,000	20.3	5.1	0.7	–15.5	15,200	7.8	72.7	75.6
Tokelau	1,400	25.6	2.1	0.0	–10.4	200	12.2	68.0	70.0
Tonga	100,600	22.6	4.1	0.1	–18.7	8,600	8.5	68.6	72.7
Tuvalu	10,100	25.1	3.6	0.4	–11.6	1,000	9.9	67.4	71.9

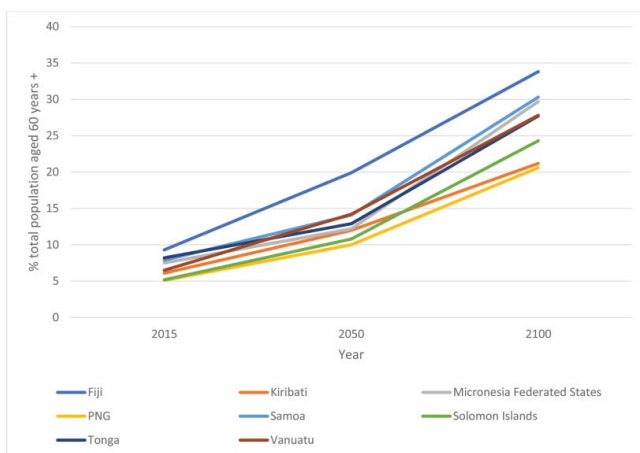
TABLE 1. Population Dynamics in the Pacific Islands. Source: Adapted from Ref. 17



**FIGURE 1.** Median Age for Selected Countries in the Pacific. Source: Adapted from Ref. 18

people (aged 60 years and older).<sup>17</sup> But with a crude net migration rate of  $-12.8\%$  for the country as a whole,<sup>17</sup> mainly involving those of working age, these 300 older people now represent nearly one fifth (18.75%) of the total population.

Figure 1 shows the rise in median age for those countries where data are available. Figure 2 shows the latest United Nation's projections for aging for the Pacific. What is particularly noticeable is that the share of the population aged 60 years and older is projected to increase in all eight countries for which projections are available between 2015 and 2050. The share of the older population at least doubles for three of the eight countries—Fiji, Solomon Islands, and Vanuatu—and nearly doubles in Kiribati and PNG. Vanuatu



**FIGURE 2.** Share of Total Population Aged 60 Years and Above. Source: Adapted from Ref. 18

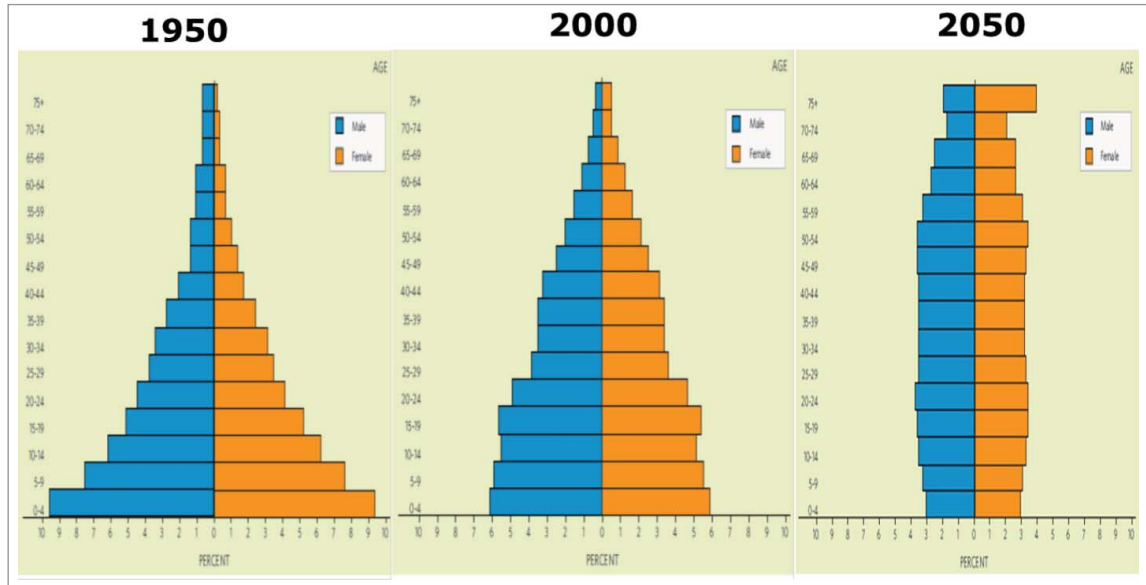
is projected to see the fastest aging, with the share of those aged 60+ increasing from 6.5% of the population to 14.2% over the period. Projections out to 2100 see the aging trend accelerate even further, led by Fiji, which is projected to have over one third (33.8%) of its population aged 60 years and over by 2100, compared to 9.3% in 2015. Figure 3 shows the rapidly changing age pyramid in Fiji.

## Aging and the Health System

### Leadership and Governance

There is little evidence that aging is currently a priority for PIC leaders, hardly surprising given the youthful populations of the region. The “Healthy Islands” statement for the region endorsed by all ministers for health in 1995 does include that “people work and age with dignity”<sup>20(p3)</sup> as one of five core principles for health promotion and protection. Pacific Island leaders also have formally acknowledged they face a “crisis” of noncommunicable diseases,<sup>21</sup> although it is noticeable that the declaration focuses on the “economically active age bracket”<sup>(p7)</sup> and does not mention the aged. A recent study assessing the implementation of the Madrid International Plan of Action on Ageing found that the Cook Islands and Fiji had specific national plans on aging. However, of the six countries in Asia and the Pacific that had no specific plans, four were in the Pacific—Palau, Solomon Islands, Tonga, and Tuvalu; the other countries were Afghanistan and the Maldives.<sup>22</sup>

Fiji was the first PIC to have developed an aging policy, launched in 2011,<sup>23</sup> in recognition of the changing population structure (Figure 3). However—and somewhat surprising for a phenomenon that, by definition, has implications for decades—the original 2011 policy only extended through to 2015. The policy has not been evaluated and there is no specific indication as yet that it will be updated. In 2013, the Fiji government also established the National Council of Older People through a decree.<sup>24</sup> Though this was a move in the right direction in terms of supporting the elderly, the council received only a budget of approximately 200,000 FJD per year (approximately 95,000 USD).<sup>25</sup> This limited the activities that the council could effectively engage in. Government provides a monthly payment of 50 FJD (equivalent to around 24 USD) per month for those aged 66 years and above, although less than one third of those eligible are enrolled. The government also funds three homes for the elderly in different parts of the country, housing around 50 people each. Most elderly are assumed to be cared for using traditional social protection methods such as families, communities, and



**FIGURE 3.** Changes in the Population Pyramid for Fiji. From United Nations Population Fund.<sup>19</sup> © 2009 United Nations Population Fund. Reproduced by permission of United Nations Population Fund. Permission to reuse must be obtained from the rightsholder.

religious groups. There has been no research undertaken to measure the extent of these methods.

Unfortunately, the cost, affordability, and cost-effectiveness of responding to the needs of the growing population of elderly in Fiji are not known. This is an important area of future public policy research for Fiji, which will be of interest to all other countries in the Pacific.

The record on governance in the health system in the Pacific is mixed. For example, the Tonga government and ministry of health are regarded as an exemplar for planning, monitoring, evaluation, and accountability of its overall health system.<sup>26</sup> On the other hand, oversight of the primary health care system is particularly weak in PNG, with less than half (40%) of health clinics receiving a supervision visit in 2012 and less community engagement and oversight than for schools.<sup>7</sup> Decentralization has led to fragmentation of responsibilities, roles, and financing in PNG.<sup>7</sup>

### *Health Financing*

Table 2 summarizes key health financing statistics for the Pacific. Column 2 shows that total health expenditure (THE) is relatively high: all lower–middle-income countries in the Pacific exceed the global average, often by a large margin. Samoa, for example, has a THE of 301 USD per capita, more than three times the global average for lower–middle-income countries of 90 USD per capita.<sup>27</sup> (Adjusting for domestic price differentials—column 3—shows some countries are, however, below the average per capita expenditure for their income group.)

A particularly striking feature is the already high level of government expenditure on health in much of the Pacific. This has implications for the long-term capacity to finance the health consequences of aging. For example, in half of the countries in the Pacific, 90% or more of THE comes from government: in Tuvalu it is 99% (see Table 2, column 4). To put this in perspective, there are only 13 countries worldwide where general government health expenditure is equal to or exceeds 90% of total health expenditure; seven of these countries are in the Pacific.<sup>27</sup>

Not surprisingly, government expenditure on health is now an important component of total government expenditure, potentially squeezing out opportunities for investments in other sectors or pensions for the aged. Government expenditure on health now represents 15% or more of total government expenditure—the notional and somewhat arbitrary goal set out in the Abuja Declaration<sup>29,30</sup>—in six countries in the Pacific, rising to a surprisingly high 24% of total government expenditure in the Marshall Islands and 21% in the Federated States of Micronesia.<sup>27</sup> The share of government expenditure going to the health sector has also been rising quickly for five countries in the Pacific, increasing from 10% of total general government expenditure to 18% in Vanuatu; from 11% to 21% in the Federated States of Micronesia; and from 12% to 18% in Palau over the period 2000 to 2014.<sup>27</sup>

High levels of government expenditure on health mean that out-of-pocket expenditure on health is correspondingly low, at 10% or less of total health expenditure in nine countries in the Pacific and at 5% or less in four countries (Table 1, column 5). The World Health Organization

(WHO) notes that Kiribati has the lowest level of out-of-pocket expenditure on health care in the world: just 0.20 USD per capita per year.<sup>31</sup> Low out-of-pocket expenditure reduces the risk of catastrophic or impoverishing expenditure for individuals, including for the aged: an important issue with the rise of often expensive-to-treat chronic and lifelong noncommunicable diseases such as diabetes. However, it puts continued pressure on government health financing.

The particular challenge for the PICs is that aging increases demands on public health systems but there is limited scope to expand expenditure on health for the aging. More specifically, aging is associated with further increases in NCDs, often with complex comorbidities, and increased length of stay in hospitals. Yet PICs have limited “fiscal space” for health.<sup>32(p75)</sup> That is partly because most Pacific Island economies have small formal private sectors and a

narrow tax revenue base.<sup>33</sup> Vanuatu does not have income tax. Even countries with larger economies and resources may face challenges in expanding expenditure on health: government revenue in PNG in 2016 adjusted for inflation is now the same as it was in 2006 despite a major resources boom.<sup>34</sup> The Pacific is also one of the most vulnerable regions on Earth to natural disasters,<sup>35</sup> reducing economic growth and imposing additional costs on government. Vanuatu and Tonga are listed as the two most “at risk” countries from natural disasters out of 171 countries worldwide.<sup>36</sup>

Several countries are aid dependent and therefore vulnerable to aid volatility and potential skewing of health priorities toward donor preferences, which to date has not included the aged. For example, column 7 of Table 2 shows that external resources for health constitute 20% or more of THE in nine of the 14 PICs, reaching nearly two thirds (65%) of THE in the Federated States of Micronesia. Broader public financial

Country or Classification	THE per Capita in USD in 2014 Source: WDI	THE per Capita in PPP <sup>b</sup> International Dollars (Constant 2011) Source: WDI	GGE on Health as Percentage of THE in 2014 Source: GHO	Out-of-Pocket Expenditure as Percentage of THE in 2014 Source: GHO	GGHE as Percentage of GGE in 2014 Source: GHO	External Resources for Health as Percentage of THE in 2014 Source: GHO
Cook Islands <sup>c</sup>	518	N/A	90	10	6	8
Fiji <sup>d</sup>	204	364	66	23	9	10 (in 2013)
Kiribati <sup>e</sup>	154	184	81	N/A	6	14
Marshall Islands <sup>d</sup>	625	680	84	12	24	33
Micronesia Federated States <sup>e</sup>	415	473	91	9	21	65
Nauru <sup>f</sup>	516	512	86	2	5	24
Niue <sup>c</sup>	1,162	N/A	98	2	6	64
Palau <sup>d</sup>	1,150	1,429	72	15	18	39
Papua New Guinea <sup>e</sup>	92	109	84	10	10	21
Samoa <sup>e</sup>	301	418	91	6	15	24
Solomon Islands <sup>e</sup>	102	108	92	5	13	57
Tonga <sup>e</sup>	213	270	82	12	13	19
Tuvalu <sup>d</sup>	633	N/A	99	1	17	13
Vanuatu <sup>e</sup>	158	150	90	6	18	48
Caribbean small states average	596	891	N/A	N/A		
Pacific Island small states average	211	292	N/A	N/A		
Lower-middle-income countries globally	90	270	N/A			
Upper-middle-income countries globally	518	930	N/A			

<sup>a</sup>THE indicates total health expenditure; PPP, purchasing power parity; GGE, general government expenditure; GGHE, general government health expenditure; N/A, not available.

WDI = World Development Indicators of the World Bank (data from Ref. 27), GHO = Global Health Observatory of the World Health Organization (data from Ref. 28)

<sup>b</sup>PPP is a statistical approach that reflects the overall cost of living in a country and seeks to avoid market-based exchange rate fluctuations.

<sup>c</sup>Classified by the World Bank as lower-middle-income countries (gross national income per capita of 1,026 USD–4,035 USD in 2017).

<sup>d</sup>Classified as upper-middle-income countries (4,036 USD–12,475 USD).

<sup>e</sup>Classified as high income (12,476 USD and above).

<sup>f</sup>Not classified by the World Bank.

**TABLE 2.** Health Financing in the Pacific

management reforms to increase efficiency and accountability in the PICs have had mixed results.<sup>7,37</sup>

### *Human Resources for Health*

Aging presents a challenge on both the demand side and supply side for health workers. As the aging process continues, there is currently increased demand for more specialized services that cannot easily be met in relatively small island societies. There are, for example, currently no trained gerontologists in Fiji. Formal rehabilitation services in Tonga are judged “extremely limited,”<sup>26(p124)</sup> with only one physiotherapist employed by the Tonga Ministry of Health in 2013 available to offer services for those—often elderly—patients suffering stroke or diabetic amputations.

On the supply side, there are no specialized training courses in gerontology for nurses in Fiji, and we could not find any such courses in PNG or FSM. There are, however, some components of general nurse training in the general curriculum, and the Fiji National University provides certificate level training on caring for the aged. Shortage of skills and training facilities in Palau meant that country sent health workers to the Pacific Islands Geriatric Education Center at the University of Hawaii for training.<sup>38</sup> The Pacific Open Learning Health Network has aimed since 2004 to provide continuing and distance education for health workers across the Pacific but does not appear to have provided any courses on health needs of aging. Aging is associated with increasing incidence of dementia: recent estimates suggest that the Pacific region requires 1,330 additional mental health workers by 2050, including 90 additional psychiatrists, 100 psychologists, and 500 nurses in PNG over 2010 targets.<sup>39</sup>

The health workforce is itself aging in most countries, particularly among the most senior and specialized workers. A recent report on the “health workforce crisis” in PNG suggests that almost 50% of the service delivery workforce would retire in a decade, and only 12.3% of staff were less than 35 years of age.<sup>40(pxxv)</sup> Almost one quarter (23%) of the health workforce in Tonga will reach the compulsory retirement age of 60 in ten years, with particular impacts on the most senior and specialized positions.

Another factor affecting the supply side is emigration of health workers from the Pacific, with often permanent loss of scarce skills and personnel.<sup>41</sup> Brown and Connell noted that Pacific Island nurses (especially in Samoa and Tonga) “are choosing nursing as a career precisely because it offers migration” to countries like Australia and New Zealand.<sup>42(p137)</sup> They further noted that nearly one third of all health workers in Fiji, Samoa, and Tonga aimed to

migrate overseas when they first entered the profession.<sup>42</sup> Remaining health workers are often reluctant to work in rural or remote island locations where, coincidentally, children—and the aged—often predominate, with young adults moving to urban areas or overseas.

### *Service Delivery*

The PICs have achieved some important progress in service delivery, particularly with respect to primary prevention of communicable diseases. Despite recent outbreaks of measles in Solomon Islands<sup>43</sup> and Vanuatu, the WHO notes that maternal and neonatal tetanus has been eliminated in all PICs and all PICs have maintained a polio-free status since 2000.<sup>44</sup> The WHO is also supporting the introduction and scaling up of the package of essential noncommunicable disease interventions in the Pacific: a package of “affordable, feasible, and cost-effective ‘best buys’ that aim to help prevent, diagnose and treat NCDs.”<sup>45(para3)</sup> In Samoa, an innovative approach involving a specialized diabetic foot clinic is achieving, on average, better health outcomes than the equivalent treatment in hospital, in shorter periods, and at one eighth of the cost (Samoa Tala 924 per patient or 357 USD compared to Samoa Tala 7,239 per patient or 2801 USD as an in-patient in the nearby hospital).<sup>46</sup>

Having said that, there is a pronounced trend toward urban, in-patient, hospital-based care in much of the Pacific, rather than more cost-effective, accessible, and equitable lower level facilities that would suit chronic NCD patients and the aged. In what the WHO refers to as a “worrying trend,” the average length of stay in a hospital in Tonga has almost doubled for patients with an NCD from 9.2 days in 2003 to 17–18 days in 2010.<sup>26(p84)</sup> Hospitals with relatively high bed numbers and isolation wards that were appropriate when addressing infectious diseases now have low bed occupancy,<sup>26</sup> whereas there are relatively few lower level diabetes, rehabilitation, or nursing homes, especially in the outer islands. Palau had comprehensive aged care facilities for the elderly and caregivers, but funding was phased out when Palau left the compact with the United States. Palau is giving increased attention to home-based care.<sup>38</sup> NCDs—and especially diabetes—increase the need for specialist and surgical services. The director general of the Pacific community notes that “in some Pacific Island countries, up to 69% of people with diabetes have retinopathy and 11% have diabetes related amputations.”<sup>9(para6)</sup>

There is significant variation in the extent and quality of primary health care services—a basic precondition for

healthy aging across the Pacific. The latest WHO report on Tonga concludes that the primary health care system in terms of antenatal care, immunization, and hospital deliveries is “comparable to high income countries.”<sup>26(p141)</sup> However, a study of PNG found “a primary health care system . . . struggling against the odds, and unable to fulfil basic functions,” with almost three quarters (73%) of health clinics surveyed not undertaking regular health patrols; only one third being able to transfer patients to higher level facilities—important for aged patients with mobility difficulties; around one third having TB drugs; and a general decline in the number of patients using health clinics.<sup>7(pix)</sup>

A later study in PNG found that

capacity for essential surgery and anaesthesia services is severely limited . . . due to shortfalls in physical infrastructure, human resources, and basic equipment and supplies; fewer than 30% of hospitals surveyed had uninterrupted access to oxygen. . . . almost none of the non-hospital health centres had uninterrupted access to electricity, running water, oxygen and basic supplies for resuscitation, airway management and obstetric services.<sup>47(p1,p10)</sup>

In the absence of specific data about the aged, it is nevertheless reasonable to think that such constraints—with the exception of obstetric services—may have a disproportionate impact on the aged, who are, in general, more prone to falls and in need of general surgery.

Service delivery in the Pacific is not well equipped to deal with what WHO refers to as “the four giants of geriatrics (memory loss, urinary incontinence, depression and falls/immobility).”<sup>48(p124)</sup> Even in relatively well-off and well-organized Tonga, the National Centre for Diabetes and Cardiovascular Diseases has only one wheelchair and no walking frames.<sup>26</sup> Funding for psychiatric services represents just 1% of the ministry of health’s total expenditure; the main psychiatric unit has just 12 beds as part of the main hospital; and mental health care in outer islands is provided by nonspecialized health workers.<sup>26</sup> Sensory organ disease—loss of hearing or eyesight—which generally increases with aging, is already the second greatest burden of disease in Fiji, FSM, Samoa, Solomon Islands, Tonga, and Vanuatu,<sup>49</sup> but there are limited services. Partly with the aim of providing more affordable care, the Asian Development Bank is piloting a 900,000 USD activity in Tonga that involves local nongovernmental organizations providing home-based care and support (including bathing, meal preparation, and reducing social isolation) to over 500 elderly and poor Tongans and children with disabilities.

### *Essential Medical Products and Technologies*

Aging, especially with NCDs, often involves increased—and daily—use of pharmaceutical drugs, which can be financially unsustainable for Pacific Island health budgets. Recent analysis shows that progression of diabetes and hypertension to more advanced stages in Vanuatu squeezes an already tight government health budget. More specifically,

one patient requiring insulin absorbs the equivalent drug allocation of 76.4 other citizens. Only 1.31% of the total population could be treated with insulin, or 5.3% treated with the full regime of anti-hypertensive drugs, before the total Government drug budget for the country was fully spent.<sup>50(p1)</sup>

This calculation is just the pharmaceutical cost of the insulin product itself and does not include the necessary direct add-on costs—also borne directly by government—such as nursing assistance to inject insulin or the indirect costs of warehousing and other overheads. The affordability to the public health budget of purchasing insulin is a particular challenge when Vanuatu has an estimated diabetes prevalence rate of 24% among those aged 20–70 years.<sup>12</sup>

Small populations combined with the need for expensive and skill-intensive technology means that several PICs needed to send patients overseas for radiography, chemotherapy, cardiac surgery, or other services that particularly affect the aged. This is a major financial burden for the smallest PICs, with overseas referrals representing almost one third (32.3%) of government health expenditure in Tuvalu for the direct benefit of only 100 patients in 2012.<sup>51</sup> Overseas referrals tend to disproportionately favor the aged: 45% of patients referred overseas from Fiji and Cook Islands were aged 50 and above.<sup>51</sup> In other cases, governments have directly funded renal dialysis units and are increasingly under pressure to do so as aging and NCDs increase. However, dialysis raises questions of cost-effectiveness and affordability in the Pacific: the average cost of dialysis treatment per patient in Samoa was more than 12 times the gross national income per capita, and around two thirds of patients had died within two years.<sup>10,52</sup>

The PICs are also not always well equipped for early detection of diseases that can affect the elderly. For example, despite the fact that breast cancer is the leading cause of cancer among women, Tonga received its first mammogram machine for breast cancer screening only in 2014.<sup>26</sup> FSM does not have the capacity to undertake pap smears to detect cervical cancer and thus sends specimens to Hawaii.<sup>53</sup>

The PICs are particularly vulnerable to natural disasters, and this has direct and indirect implications for buildings and facilities used by the aged. Directly, buildings need to be

cyclone resistant with easy access and exits for the aged: more than half of deaths associated with five major natural disasters globally occurred among people aged 60 years and older.<sup>54</sup> Indirectly, natural disasters impose large costs on economies, further constraining fiscal space: the 2009 tsunami cost economies 22% of their gross domestic product over a number of years.<sup>4</sup>

### *Health Information Systems*

The coverage and quality of health information is generally improving across the Pacific, but there are major gaps in the evidence base concerning aging and its implications for the health system. Only three of the 15 PICs routinely produce national health accounts: Fiji, Samoa, and Tonga.<sup>55</sup> All but Palau and Tuvalu have undertaken at least one WHO STEPS estimates of risk factors for NCDs. Nine PICs have undertaken a demographic and health survey. One country (Vanuatu) has a UNICEF Multiple Indicator Cluster Survey.

Though these international survey instruments potentially provide useful insights into the operations and challenges of the health system as a whole, they rarely capture detailed data or evidence that can be used for planning a response to aging. For example, while acknowledging that 16% of the total population in Tonga was aged 50 and above, the latest Tonga demographic and health survey confined its survey sample to men and women aged 15–49.<sup>56</sup> It also devoted a separate 32-page chapter to HIV/AIDS—a total of 19 people had ever been diagnosed with HIV at the time—but did not have a section on aging.<sup>56</sup> STEPS estimates of risk factors for NCDs, including hypertension, smoking, nutrition, and obesity, cover the 15–64 year age group but not older cohorts for whom the incidence of NCDs is usually higher.

There are other information gaps as well that are relevant to planning and health systems for aging, particularly for less populous countries in the Pacific. The United Nations Population Division does not prepare projections for individual countries with a population below 100,000, 12 of which are in the Pacific.<sup>57</sup> The Asia Pacific Observatory, hosted by the WHO, has undertaken comprehensive and independent health system reviews of Fiji, Tonga, and Solomon Islands, but there have been no *Health Systems in Transition* report of any country in Micronesia. FSM tracks 14 indicators in its “Health Sector Progress Report.” Four of the indicators are age specific but relate only to children under five years of age. There is no indicator tracking the aged, although NCDs now account for 75% of all hospital admissions, and curative

care was the largest and fastest increasing share of total health expenditure.<sup>53</sup> Informed planning for aging requires a multiyear approach: few PICs have robust or up-to-date medium-term expenditure frameworks to allocate scarce financial and human resources to best effect. There is not a strong evaluation culture to assess impact and value for money in the Pacific.<sup>58</sup>

### **DISCUSSION**

Pacific Island health systems are not well organized to meet the growing challenges of aging. This is understandable from a political economy perspective. Decision makers are focused on an unfinished agenda of maternal and child health. They are also focused on *premature* mortality and disability, which are higher than global averages for many countries in the Pacific as a result of NCDs. There is a limited political constituency for the aged when their proportion of the population is still relatively small. The benefits of healthy aging and avoidance of chronic diseases may also appear to be too distant in the future, and too invisible politically, to warrant additional investment.

Even if aging were a priority, most countries have low or at least volatile economic growth prospects and limited fiscal space to further invest in health systems further. The World Bank includes six PICs (Kiribati, Marshall Islands, FSM, PNG, Solomon Islands, and Tuvalu) in its *Harmonized List of Fragile Situations* for 2017,<sup>59</sup> and the Asian Development Bank lists Nauru, the Marshall Islands, and Tuvalu as “fragile states.”<sup>60</sup> Tonga, often seen as a reforming country, was reclassified from upper-middle-income (4,036 USD–12,475 USD per capita) to lower-middle-income (1,026 USD–4,035 USD) by the World Bank in 2016.<sup>61</sup>

Yet it is these very characteristics in Pacific Island societies and economies that indicate that countries should now be proactively strengthening public policy and health systems to meet the challenges of aging. Barring a major pandemic, aging is inevitable and unavoidable in all countries in the Pacific; see Figures 1 and 2. The existing pipeline of NCDs and high level of risk factors mean that many PICs already have a disproportionately large share of expensive-to-treat NCDs by global standards, putting additional strain on public health systems as the aging process accelerates. High levels of unemployment, underemployment, informal employment, outward emigration, and informal remittances mean that governments (and society more broadly) are not able to capture the full extent of any demographic dividend potentially available from existing swells in working-age population. Pacific economies—even including PNG—do not have the economic growth prospects, fiscal space, or systems capacity to

respond to the inevitable and predictable rise in aging cohorts. Complacency in public policy about aging and health systems simply because the current numbers and share of the aged population are still relatively small will sow the seeds of significant social, health, and financial problems in the future.

There is a positive alternative. Unlike much of Asia where aging is already an existing and substantive challenge for health systems, Pacific Island governments can plan now how to organize and fund their health systems to promote healthy aging and reduce financial and other burdens on the health system. Shrewd governments will use aging to redouble efforts to prevent and control NCDs, especially through targeted primary and secondary prevention of often chronic, disabling, and expensive diseases such as diabetes. The smaller and poorer the country, the more important it will be to achieve maximum health outcome and value for money from the health system, including through improved efficiency; better information and evaluation; more appropriate training; workforce planning; and better purchasing of/compliance with drugs.

## CONCLUSION

The quality of aging—whether people are healthy or ill in their older years and for how long—affects many aspects of society: health care costs, pension liabilities, housing, savings, and poverty. The quality of aging is determined, in turn and in part, by a country's health system. The PICs do not currently face the health system challenges of aging that much of developing Asia faces. However, PICs face their own unique health system challenges as the aging process accelerates. These challenges include a significant pipeline of chronic and expensive-to-treat NCDs, especially diabetes; high reliance on government health expenditure, yet limited fiscal space for public expenditure increases; and gaps, weaknesses, and inefficiencies in other parts of the health system, including leadership and governance, service delivery, health workforce, drugs, and information systems. The strategic opportunity for the PICs is to use the current period to aggressively focus on primary and secondary prevention of NCDs and improve the overall efficiency of health systems to increase the likelihood of healthy aging for their citizens.

This article brings together—we believe for the first time—the implications of aging on the key components of health systems in PICs and points to the importance of planning now for the aging process. A key limitation in researching this article has been the limited data and published research on key aspects of aging in the Pacific. We hope that this article stimulates further interest in this important issue.

## DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

The authors confirm that they have no conflict of interest.

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