REVIEW ARTICLE

ISLAND HEALTH REVIEW, PROGRESS AND THE WAY FORWARD IN THE WESTERN PACIFIC REGION

Thant Zin[1], Than Myint[2], Kyaw Htay[3], Shamsul B. S.[4]

1 Community and Family Medicine Department, School of Medicine, University Malaysia Sabah, 88400 UMS Road, Kota Kinabalu, Sabah, Malaysia
2 Rural Medicine Research Unit, School of Medicine, University Malaysia Sabah, 88400 UMS Road, Kotakinabalu, Sabah, Malaysia
3 Surgical Base Department, School of Medicine, University Malaysia Sabah, 88400 UMS Road, Kota Kinabalu, Sabah, Malaysia
4 Occupational Safety and Health Center, University Malaysia Sabah, 88400 UMS Road, Kotakinabalu, Sabah, Malaysia

ABSTRACT

Island health differs from other health care systems, particularly in that there are limited resources and referral faculties available. With globalisation and climate change, island populations have become increasingly vulnerable to natural disasters and global pandemics. This study will identify, explore, compare and report on island health issues facing in the western Pacific, before making appropriate recommendations. A review of selected health indicators in Pacific islands was collected from the World Health Organization (WHO) and other publicly available resources. In the Pacific region, 15 islands saw lower health expenditure (<US $500), one physician and two to six nurses per 1,000 people (fall below WHO recommendation), lower life expectancy (60-70 years), higher fertility rates (2.5 to 6.4 children per women, excepting Palau), and higher adolescent fertility rates (23 to 88 children per 1,000 girls, excepting Tonga). Island populations also suffer a higher disease burden per 100,000 people, with TB, malaria, and non-communicable diseases contributing to elevated mortality rates throughout much of the region. This article highlights four areas: the sustainable development of the health workforce, improved maternal and antenatal health care provisioning, and selective communicable and non-communicable disease control. However, there are some limitations especially under reporting of maternal health data and generalization effect of reported data.
***Keywords**: island health, Pacific, public health review*

INTRODUCTION

Island health differs from other health care systems, in large part due to the limited health manpower available, and infrastructure, financing and referral facilities that are best described as lacking. In the face of increasing globalisation and accelerating climate change, island populations are becoming more vulnerable to natural disasters and global pandemics. Islands are physically isolated, rendering them more vulnerable to natural disaster and climate change, a finding highlighted at a 2009 Pacific Health Ministers meeting[1]. The Pacific islanders live in coastal zones and they are more susceptible to storm surges, coastal erosion, flooding, droughts, high tides and saltwater intrusion—the frequency and intensity of which are all expected to continue to increase, potentially resulting in growing numbers of "climate refugees" and increased damage to health infrastructure[1]. Globalisation continues to threat the health of non-immune island populations, exposing them to a range of communicable and non-communicable diseases (NCD), such as pandemic influenza[1-3], tobacco use—as high as 70% among the adult male population in Pacific island nations, unhealthy diet and obesity—more than 80% of the adult Pacific population are described as obese, diabetes and tuberculosis (TB)—Pacific island nations have higher rates of TB morbidity than the Western Pacific regional average[4,5].

The "Healthy Island" concept by the World Health Organization (WHO) and the Secretariat of the Pacific Community (SPC), involved the continuous identification and resolution of high-priority issues related to public health, development and well-being of the island population, achieved through advocacy, facilitation and the enabling of local health care practitioners and officials[6]. The successful healthy island policy will require integrated works along a broad continuum. Human resource development was the core element in the healthy island concept[6]. Health work force development is time consuming and can be easily lost. Health workers are an essential part of a functioning health system; weak health systems jeopardize the sustainability of achievements

attained with the increased funding allocated toward public health. The two key challenges for health work force in Pacific island nations are; the shortage of health workers and the out-migration of skilled professionals[1]. An undersized health workforce will contribute to poor quality care and improper utilisation of health services by population. There is strong evidence that health worker numbers and quality are positively associated with immunisation coverage, outreach, provisioning of primary care, and infant, child and maternal survival[7]. As the Pacific island populations are more rural and remote, they are suffering a double burden: not only are health workers available in insufficient numbers, the infrastructure and referral facilities which would allow for their internal replenishment are largely absent.

On the other hand, improved health outcomes are, the result of health systems and services which include various components operating harmoniously, and are further influenced by disease burdens, the relative health of the population, and socioeconomic status. Every effort to improve health systems must be balanced and potentially sustainable.

Although island populations are increasingly vulnerable to natural disaster and global pandemic, only a few studies have been done on island health. This study was carried out to explore facts germane to the promotion of island health. Population for most Pacific island nations are small, and access to transportation, communication and other social services are limited as compared with other countries—most Pacific island nations possess population levels below 150,000 (Table 1). NCDs have become increasingly prevalent among island populations, as evidenced by the Diabetes Atlas[9]—which reported that Nauru, the Marshall Islands and Kiribati all registered diabetes rates in excess of 20% in 2011—as well as the fact that more than 80% of adults in Pacific island nations were reported to be overweight[4.] This study will compare health outcome data between the comparatively better off Pacific nations with small and medium islands against the resource-limited Pacific islands. The study will highlight the comparative health statuses—life expectancy, health work force, health care expenditure, population health and diseases burden—of the relevant populations, and identify those strategic areas most in need of improvement if Pacific island nations are to improve health outcomes for their populations. Further analysis will explore any significant differences within or between the Pacific region and global norms.

REVIEW PLAN AND METHODOLOGY

Reviews of health- and development-related topics in island nations were collected from the WHO, SPC, The World Bank, PubMed, Medline, University Malaysia Sabah library, and various online resources. Country-specific health data as reported by World Bank and WHO statistics were reviewed. WHO health statistics chosen for select indicators relevant to the study of health expenditure—per capita total expenditure, proportion of government contribution, health work force—doctors, nurses, midwives—and disease burden and population health as measured by maternal, infant and under-five mortality rates, TB prevalence and malaria mortality. Health outcome indicators—life expectancy at birth and proxy indicators for maternal health, such as skilled birth-attendant (SBA) rates and antenatal care (ANC) coverage—were reported on, as well. To measure population health, adolescent fertility and total fertility rate (TFR) data were collected. Another category important in health improvement is economy and basic social infrastructure. With limited data available for this category and difficulty encountered in trying to draw comparisons between data from diverse sources, this study opted to analyse gross national income (GNI), improved access to clean water supplies and sanitation coverage.

Two selection criteria for inclusion in the study were data availability in WHO statistics and Western Pacific Regional Office (WPRO) countries with majority of island population. Data analyses included 24 countries; Australia (largest country), Japan (biggest population), Brunei Darussalam, New Zealand, Singapore, the Philippines, and the Republic of Korea, Malaysia, and Vietnam (peninsular), small island nations—Fiji, the Cook Islands, Kiribati, the Marshall Islands, Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, the Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu. Data from all countries were collected from WHO statistics available through the WHO global health observatory[8]. Data were analysed with the SPSS statistical package.

RESULTS

Infant mortality rate (IMR) per 1,000 live births (LB) in 2010 were varies between 2 and 47—lower in bigger, more developed countries except the Philippines (23) and highest in Papua New Guinea (47) and Timor-Leste (46). Under-five mortality per 1,000 LB ranged between 5 and 61, again being highest in Papua New Guinea (61) and Timor-Leste (55). Maternal mortality rate (MMR) per 100,000 LB varied from 5 to 56. Skilled Birth Attendant SBA coverage was greater than 90% throughout the region, except in Timor-Leste (29%), Papua New Guinea (53%), Kiribati (65%) and the Philippines (62%). ANC data was incompletely tabulated in the WHO source data, although all countries for which such data was available boasted ANC rates in excess of 70%[8]. (Table 1)

Table 1: Population, Maternal and Child Health in Pacific Countries

Countries in Pacific	Population (1,000s)	IMR per (1,000 LB), 2010	MMR (per 100,000 LB), 2008	ANC (at least one visit), 2005-8	SBA coverage, 2005-8	AFR (per 1,000 girls aged 15-19), 2005-9	TFR (per woman), 2009
Australia	21,293	4	5	98	99	18	1.8
Brunei Darussalam	400	6	21	99	99.9	31	2.1
Japan	127,156	2	6	.	100	5	1.3
Malaysia	27,468	5	31	79	100	12	2.5
New Zealand	4,230	5	14	.	95.7	32	2
Philippines	91,983	23	94	91	62.2	53	3
Republic of Korea	48,333	4	18	.	100	2	1.2
Singapore	4,737	2	9	.	99.7	5	1.3
Vietnam	88,069	19	56	91	88	35	2
Cook Islands	20	8	.	100	98	47	2.5
Fiji	849	15	26	100	98.5	30	2.7
Kiribati	98	39	.	100	65	39	3
Marshall Islands	62	22	.	81	94	88	3.6
Micronesia, Federated States	111	34	.	80	92	51	3.5
Nauru	10	32	.	95	97	84	3.3
Niue	1	19	.	100	100	53	.
Palau	20	15	.	100	100	29	1.8
Papua New Guinea	6,732	47	250	79	53	70	4
Samoa	179	17	.	93	80.8	29	3.9
Solomon Islands	523	23	100	74	85.5	.	3.8
Timor-Leste	1,134	46	370	84	29.6	59	6.4
Tonga	104	13	.	99	98	16	3.9
Tuvalu	10	27	.	97	97.9	23	3.2
Vanuatu	240	12	.	84	74	.	3.9
Total Countries	24	24	13	20	24	22	23

Data source: WHO: 1. Population - Tuberculosis Control in Western Pacific WHO 2008 Report-data recorded for 2006, 2. World Health Statistics 2011-recorded between 2005 and 2010; a. ANC/MMR/SBA/Adolescent Fertility - Health MDG Maternal Health, b. Infant Mortality Rate-Health MDG IMR 2, c. Total Fertility—equity social determinant population characteristics, "data not available (.)" Total 24 countries counted; MMR 13 countries, ANC 20 countries, Adolescent and Total fertility 22 and 23 countries data available.

Per capital health expenditure as measured in purchasing power parity (PPP) international dollars for the Pacific can be sorted into three groups: countries spending more than US $1,500—Australia, Niue, Japan, New Zealand, Singapore and Korea; countries spending US $500–US $1,500—Brunei Darussalam, Malaysia and Palau; and the

remaining 13 nations with per capita health expenditure levels below US $500. Total health expenditure expressed as a percentage of GDP ranged from a low of 2.9%—in Brunei Darussalam—to a high of approximately 16% in Niue and the Marshall Islands. Reviewing health workforce composition in the Pacific, density per 1,000 varied widely: physicians, 0.05 to 4.0, and nurse/midwife, 0.51 to 15. The skill mix of health workers—the nurse-midwife to physician ratio—in Pacific island nations skews toward a greater number of nurses at the expense of fully-trained and qualified physicians, with nation-specific proportions ranging from 0.8 to 14.6[8].

Table 2: Health Expenditure and Gross National Income and Health Workers Distribution in (24) Pacific Countries

Countries in Pacific WPRO	Per capita (PPP USD) Health Expenditure	Health Expenditure as % of GDP	Government Proportion in Health Expenditure	GNI per capita 2009a	Physician per 1000 Population	Nurse/Midwife per 1000 population	Ratio
Australia	3382	8.5	70.1	37250	2.99	9.59	3.2
Brunei Darussalam	1439	2.9	87.7	50802	1.42	4.88	3.4
Japan	2713	8.3	80	35190	2.06	4.14	2
Malaysia	677	4.8	44.8	13740	0.94	2.73	2.9
New Zealand	2662	9.7	80.4	25200	2.38	10.87	4.6
Philippines	134	3.8	35.3	3900	1.15	6	5.2
Republic of Korea	1829	6.5	54.1	27840	1.97	5.29	2.7
Singapore	2069	3.9	41.5	47970	1.83	5.9	3.2
Vietnam	213	7.2	38.7	2700	1.22	1.01	0.8
Cook Islands	389	4.5	93.8	.	1.18	4.71	4
Fiji	162	3.6	73.1	4320	0.45	1.98	4.4
Kiribati	296	12.2	84.7	3620	0.3	3.02	10.2
Marshall Islands	300	16.4	97	.	0.56	2.53	4.5
Micronesia, Federated States of	386	13.8	90.7	3270	0.56	2.26	4
Nauru	248	10.9	70.5	.	0.71	4.93	6.9
Niue	3376	16.9	99.2	.	4	15	3.8
Palau	893	9.9	76.4	.	1.3	5.9	4.5
Papua New Guinea	81	3.5	69.3	2030	0.05	0.51	9.6
Samoa	312	7	87.3	4410	0.27	0.94	3.5
Solomon Islands	151	5.4	91.1	2230	0.19	1.45	7.8
Timor-Leste	120	12.3	71	4690	0.1	.	-
Tonga	236	5.3	78.8	3980	0.29	2.93	10.1
Tuvalu	279	10.5	99.8	.	0.64	5.82	9.1
Vanuatu	148	3.3	87.1	3480	0.12	1.7	14.6
Total Countries	24	24	24	18	24	23	23

Source: WHO World Health Statistics 2011, data recorded between 2004 and 2009. GNI data for six countries— the Cook Islands, the Marshall Islands, Nauru, Niue, Palau and Tuvalu— and nurse/midwife— Timor-Leste— are absent for that period.

Life expectancy in Pacific falls between 61 and 81 years of age, although four countries boast greater life expectancy—Japan (83), Australia and Singapore (82) and New Zealand (81). The percentage of Pacific populations with improved access to drinking water and improved sanitation was high, around 90% to 100%, with the lowest coverage rates of water and sanitation found in Fiji (61%, 31%), Palau (41%, 45%) and Samoa (69%, 29%). However, WHO UNICEF JMP Report[12] gave different indicators for 2010 water and sanitation condition for Fiji (98%, 83%), Palau (85%, 100%) and Papua New Guinea (40%,45%).

Table 3: Life Expectancy and Burden of Disease, Water Sanitation in Pacific

Countries in Pacific WPRO	Life Expectancy at Birth 2009	Malaria Mortality[a]	TB Prevalence[a]	Total NCD Death	NCD Mortality Rate[a]	Improved drinking-water sources %[b]	Improved sanitation %[b]
Australia	82	0	5.8	126,641	594.8	100	100
Brunei Darussalam	77	0	91	1,003	250.8	.	.
Japan	83	0	27	908,766	714.7	100	100
Malaysia	73	0.1	107	89,492	325.8	100	96
New Zealand	81	0	9.3	25,956	613.6	100	.
Philippines	70	0.2	502	309,530	336.5	91	76
Republic of Korea	80	0	151	208,957	432.3	98	100
Singapore	82	0	44	17,904	378	100	100
Vietnam	72	0.1	344	430,068	488.3	94	75
Cook Islands	76	0	5.5	64	320	.	.
Fiji	69	0	40	4,145	488.2	61	31
Kiribati	68	2.6	550	490	500	94	72
Marshall Islands	59	1.1	831	543	875.8	.	.
Micronesia, Federated States of	69	0.3	320	439	395.5	90	50
Nauru	60	0	52	78	780	100	100
Niue	72	0	0	6	600	.	.
Palau	72	0	179	79	395	41	45
Papua New Guinea	63	45	465	20,214	300.3	88	100
Samoa	70	0.9	16	777	434.1	69	29
Solomon Islands	71	30	178	1,387	265.2	100	96
Timor-Leste	67	83	643	2,425	213.8	69	50
Tonga	71	0.8	29	497	477.9	97	.
Tuvalu	64	0	366	73	730	82	51
Vanuatu	71	8.5	78	778	324.2	.	.
Total Countries	24	24	24	24	24	19	17

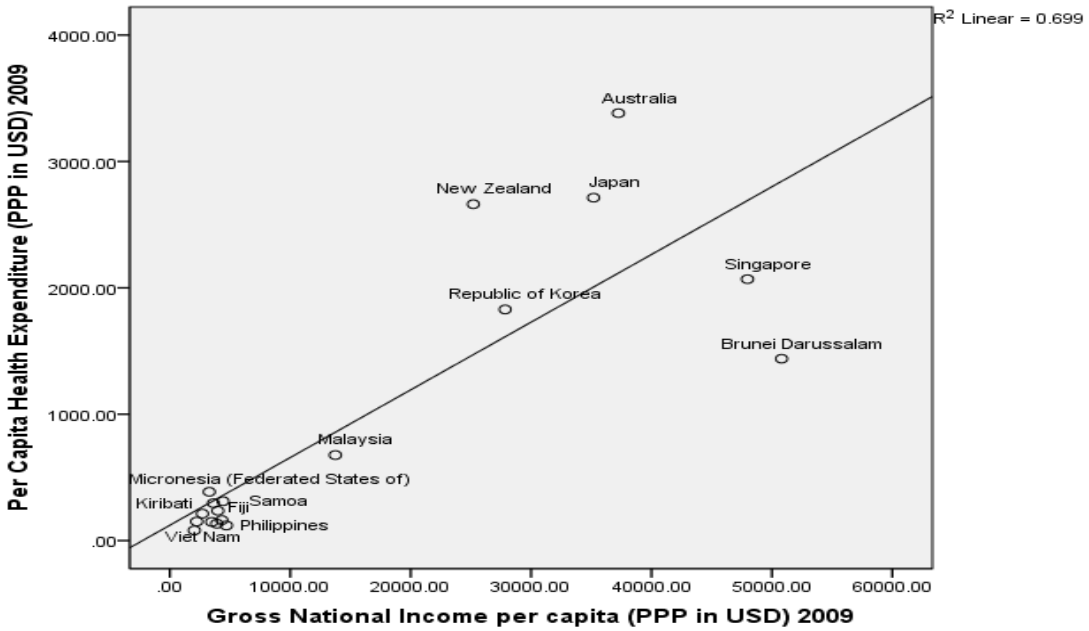
Data source: WHO World Health Statistics 2011 recorded country data between 2007 and 2009: life expectancy-mortality and burden of disease, TB, Malaria, health-related MDG, NCD, water sanitation-equity/social determinants/water sanitation data not universally available.
a. per 100,000 population
b. urban-rural combine

The three most common diseases, as measured per 100,000 people, were[8];

1. Malaria, with a mortality rate (0-2.6) except Timor-Leste (83), Papua New Guinea (45), Samoa (30) and Vanuatu (8.5).
2. TB, with prevalence rates ranging between 5.5 and 831, the lowest being attested in Niue, Australia and the Cook Islands (<6), the highest in the Marshall Islands (831), Timor-Leste (643), Kiribati (550), the Philippines (500) and Papua New Guinea (465).
3. NCD with mortality being highest in the Marshall Islands (875), Nauru (780), Tuvalu (730) and Japan (715), and lowest in Timor-Leste (214), Brunei Darussalam (250) and the Solomon Islands (265).

Health expenditure was plotted against GNI (Figure 1). The health expenditures of Pacific nations were clustered along the most-fitted line, representing the proportion of income spent on health. Three countries—Australia, New Zealand and Japan—spent a greater percentage than expected, while one—Brunei Darussalam—under-spent expectations. Three separate maternal health indicators—MMR, ANC and SBA coverage—were reported on, as well (Figure 2). Although MMR data was not complete, lower SBA% corresponded with greater MMR in both the countries—e.g., the Philippines, SBA 62%, MMR 94—group and islands group—e.g., Timor-Leste, SBA 30%, MMR 350; and Papua New Guinea, SBA 53%, MM270.

Figure 1: Health Expenditure and Gross National Income Plot



Source: WHO World Health Statistics 2011.[8] Country data recorded for 2007-2009; six countries—Cook Islands, Marshall Islands, Nauru, Niue, Palau and Tuvalu—have no GNI data for period and are excluded

DISCUSSION

"Health" is defined by the WHO as a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity[10]. Consequently, efforts to investigate health development require that multiple factors be input. The WHO's Health Impact Assessment reported on the groups of factors which individually and collectively affect population health, such as the socio-economic environment, physical environment, individual characteristics and behaviour and access to health services[11].

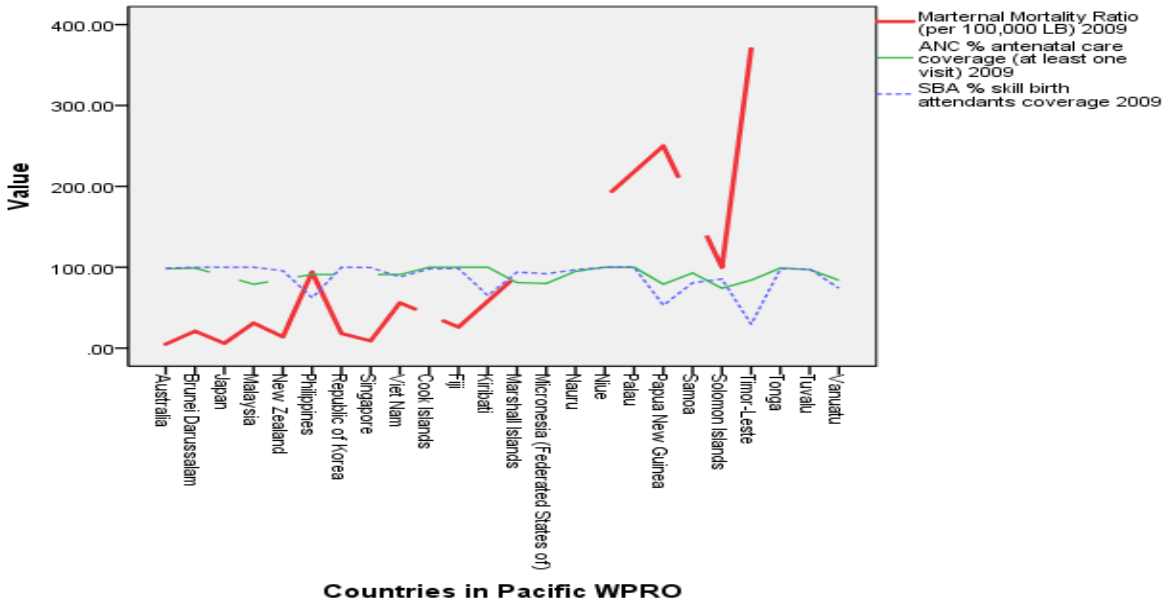
Health Expenditure and Gross National Income

Health expenditure is an important investment in the health of a nation's population. Various social and environmental factors play important roles in promoting the health of not only the individual, but of entire nations. The World Bank identified three priorities for health: foster an environment which enables households to improve their health, as a means of socio-economic development; increase government spending on health; and, promote diversity and competition among health service providers[13].

Average annual per capita health expenditure for the 24 countries included in this analysis is US $937.29, although the range has a low of US $81 and a high of US $3,382. Per capita health expenditure among Pacific is higher in bigger nation and lower in small islands, except Niue and Palau, 13 small islands health expenditure is lower than the global average of US $639[14]. The five nations with the lowest health expenditures—the Philippines, Papua New Guinea, the Solomon Islands, Timor-Leste and Vanuatu—spent US $81–150 per capita.

The proportion of health expenditure coming from government budgets in Pacific island nations varied from 35% in the Philippines to nearly 100% in Niue and Tuvalu; most Pacific islands reported greater government spending on health, meaning lower out of pocket payments for individuals.

Figure 2: Maternal Mortality, Antenatal Care (at least one visit) and Skill Birth Attendant in Pacific



Source: WHO World Health Statistics 2011.[8] Country data recorded for 2005-2009; MMR/ANC/ SBA - Health MDG Maternal Health (MMR data absent for multiple nations).

Health, Social Infrastructure and Disease Burden

As a metric, healthy life expectancy estimates the years an individual can be expected to live in full health. The figure is calculated with current mortality rates and the prevalence and distribution of health concerns across the relevant population as inputs. Globally, life expectancy at birth increased from 46.5 years in 1950-55[15] to 68 years in 2009[16]. Although, higher life expectancy in the region (WPRO 75), Pacific islanders' life expectancy currently falls within a range of 59–72 except for the Cook Islands[8]. Life expectancy could be related to the outcomes of socio-economic and health conditions. However, analysis showed that life expectancy increased when health expenditure and income rise.

Progress in maternal and child health can be attributed to a range of factors, but particularly to the general strength of the health system in providing reproductive health services, alleviating poverty and improving the nutrition and diet of both mother and child, and childhood immunisation. A meeting of Pacific Health Ministers held in 2009[1] suggested the adoption of integrated health services models, with health programmes centred on mother and child. Except Fiji, all reporting islands countries exceeded the WPRO's average MMR of 51. The percentages of SBA access and utilisation have proven to be important in reducing MMR; SBA coverage has increased globally as a result, with the expected significant reduction in MMR[17]. Illustratively, the two Pacific island nations with the highest MMR, Timor-Leste and Papua New Guinea, also have the lowest SBA access, at 30% and 53%, respectively. Adolescent fertility and total fertility are also important metrics for maternal and child health. Japan, Korea and Singapore have the lowest adolescent fertility rates, at less than five. However, the highest AFR to be found in three island nations—the Marshall Islands (88), Nauru (84) and Papua New Guinea (70)[8]. The WPRO meeting of Health Ministers advised that the elevated adolescent and teen pregnancy rates in some Pacific islands could serve as a barrier to achieving specific UN Millennium Development Goals (MDG)[18]. Total fertility was lower in the more populated countries (<2) and higher in the islands (2–6). The data indicate an immediate and pressing need for improved maternal and child health support in the region.

Whereas the rates of occurrence for a range of communicable diseases—including malaria and TB, as discussed above—were unevenly distributed but below global averages for the WPRO as a whole, NCD rates continue to be well above global averages. Within those general NCD mortality rate figures, the prevalence of diabetes remains the most

alarming, as Nauru, the Marshall Islands and Kiribati suffer rates among the most extreme in the world, with over 20% of the population having been diagnosed[9]. NCD have been a major disease burden in the Pacific for years, with ten among fifteen Pacific Islands countries had incidence of three types of NCD—diabetes, circulatory disease and malignant neoplasm—5,000 to 65,000 individuals per 100,000[19]. Similar findings in earlier reports showed that 70%-75% of all deaths in the WPRO could be related to non-communicable diseases[1]. On the other hand, tuberculosis prevalence is three to eight time higher than WPRO average (320-831 vs. 93) in Philippines, Vietnam, Kiribati, Marshall Islands, Federated States of Micronesia, Papua New Guinea, Timor-Leste and Tuvalu.

These findings illustrate the immediate need for a health system response aimed at NCD and TB control and prevention in the region. Pacific island Health Ministers had previously committed to the implementation of Healthy Island concept for controlling NCD and the Pacific Strategic Plan to Stop TB—which called for 100% enrolment of new smear-positive cases detected in the Pacific island nations under DOTS programme by 2005[5].

Health Work Force and Health System

Health workers perform best when the number and proportionate skill mix is appropriate to the population served. The WHO reported that a minimum of 2.3 health workers per 1,000 people is required to "attain adequate coverage of some essential health interventions and core MDG-related health services indicators" [20,21]. The report also found out that a density of about 1.5 workers per 1,000 people equates to roughly 80% coverage of measles immunisation, while a level of 2.5 per 1,000 people is associated with 80% of the population having access to an SBA[21]. Human resources for health (HRH) in the Pacific faces two key challenges—the shortage of health workers and the out-migration of skilled professionals. These challenges are influenced by multiple factors, including the lack of effective and cohesive planning and management, an inadequate number of trainees to replace out-going professionals, costly overseas training and poor retention rates.[1]

The numbers of health workers per 1,000 people—physician, 0.05 to 4.0; nurse/midwife, 0.51 to 15—was greater than the WHO's minimum requirements for essential health services—2.3 per 1,000—excepting Papua New Guinea, Samoa, the Solomon Islands and Vanuatu. Hall has reported that two nurses per physician are required for optimal health worker performance[22]; the overall average ratio of nurse/midwife to physician for all Pacific nations and islands, however, was 5.0. The best skill mix is to be found in Japan; Japan also had a higher number of physicians—2.06—and more health workers—6.74. For the islands, the nurse/midwife to doctor ratio was relatively high—ranging from 3.5 to 14.6—due in large part to the fact that many island nations have fewer physicians to begin with. The larger countries do exhibit a better skill mix—less than 3.5—excepting the Philippines (5) and New Zealand (4.5). Pacific island Health Ministers reported that multi-skilled nurses and mid-level health practitioners with the capacity to provide basic but comprehensive primary health care services—both curative and preventive—would be suitable and appropriate for most Pacific island nations with small populations, limited health technology, a general scarcity of equipment and supplies, and the lack of support services for the delivery of clinical specialized care in many areas[2].

CONCLUSION

In the Pacific, each of 15 island nations posted lower health expenditures—<US $500—except Niue and allocated a proportionately greater percentage of GDP to health services—5% to 17%. Health workforce capacity for most Pacific islands was less than one physician and two to six nurses per 1,000 people, a figure which is lower than the optimal skill mix recommended by both Hall and the WHO, although nine Pacific nations did exceed the optimal levels. Life expectancy among Pacific island populations, at 59 to 72 years, was lower than the WPRO average of 68 years, although Pacific nations in general can boast higher life expectancy (70 to 80 years). The 15 islands showed both higher TFR per woman—2.5 to 6.4—and AFR—23 to 88 per 1,000 girls aged 15-19. Disease burdens—of TB and malaria in particular—remain high compared to WPRO averages. Given the limitations imposed by the differential availability and standardisation of health data for the islands, WHO statistics were the most appropriate source for reporting. However, complex analysis of retrospective country data from various sources still has a weakness for this analysis.

Promoting sustainable health development and holistic approaches to health systems is essential, with further corrective actions seeking to balance each aspect of the health system. Health worker shortages—in terms of both number and skill mix—were common to most Pacific islands, where small populations and a lack of support services for the delivery of clinical, specialized care should be considered in future health workforce development. The Healthy Island approach would be wholly appropriate for these sparsely populated, resource-constrained islands. This paper has highlighted four key areas: development of an appropriate strategy for sustainable health workforce development, improved maternal health services, selective communicable disease control (tuberculosis and malaria) and non-communicable disease control. To achieve this, continuing healthy island policy with relevant targets should be set. Generally, NCD is relevant to all islands, however, communicable disease—TB and Malaria—is countries specific. For improvement in maternal health services, it is very important to promote adolescent reproductive health services in Pacific islands.

ACKNOWLEDGMENT

I would like thank Professor Dr Osman Ali (former Dean of the School of Medicine, University Malaysia Sabah), Professor Dr. D Kamaruddin D. Mudin, Dean of the School of Medicine, University Malaysia Sabah, and for his support in writing this paper. I also extend my special thanks to Dr. Wendy Diana Shoesmith, School of Medicine, University Malaysia Sabah, for her discussion and support related to this paper.

Funding: None

Conflicts of interest: None declared

REFERENCES

1. World Health Organization and Secretrait of Pacific Community, Madang Committment, 2009.
2. World Health Organization and Secretrait of Pacific Community, Vanuatu commitment, 2007.
3. World Health Organization and Secretrait of Pacific Community, Samoa commitment 2005 - Achieving Healthy Islands, 2005.
4. World Health Organization and Secretrait of Pacific Community, Tonga commitment to promote healthy lifestyles and supportive environment, 2003.
5. World Health Organization and Secretrait of Pacific Community, Madang Commitment towards Healthy Islands, 2001.
6. World Health Organization and Secretrait of Pacific Community, The Palau Action Statement on Healthy Island, 1999.
7. World Health Organization. World Health Report 2006 - Working together for Health, 2006.
8. World Health Organization, Data and Statistics; http://www.who.int/research/en/ or (http://apps.who.int/ghodata/). (Access between 02/2012 and 08/2012, best data and latest update are used).
9. International Diabetes Federation. IDF 5th Edition Diabetes Atlas, 2011. World Health Organization. Health Promotion Glossary, Geneva, 1998.
10. World health Organization. Health Impact Assessment – The determinants of health, 2006. http://www.who.int/hia/evidence/doh/en/index.html. (accessible between 01/2012 and 06/2012).
11. UNICEF and World Health Organization. Progress on Drinking Water and Sanitation Report, 2012.
12. The World Bank. World Development Report – Investing in Health, 1993. World health Organization. Spending on Health, A Global Overview - Fact sheet N° 319 / Health Financing / February 2007s. (Available from http://www.who.int/mediacentre/factsheets/fs319.pdf , access between 01/2012-06/2012).
13. Kath Moser, Valdmir Shkolnikov, David A. Leon; World Mortality 1950-2000: divergence replace convergence from late 1980s, Bulletin of World Health Organization, March 2005; 83 (3): 202-209.

14. WHO Global Health Observatory (GHO) on line report. Life expectancy; http://www.who.int/gho/mortality_burden_disease/life_tables/en/ (Access between 01/2012 and 06/2012).

15. WHO, UNICEF, UNFPA and the World Bank. Trends in Maternal Mortality - 1990 to 2008 Report, 2010.

16. World Health Organization. Eighth Meeting of Ministers of Health for The Pacific Island Countries Report 2009. WHO, Manila, 2010.

17. Secretariat of the Pacific Community. 2010 NCD Statistics for the Pacific Islands Countries and Territories, 2011.

18. World health Organization. World health Report - Human Resource for Health, Overcoming the Crisis, 2004.

19. Thomas et al. Assessing Financing, Education, Management and Policy Context for Strategic Planning of Human Resources for Health, World health Organization, 2007.

20. Hall T (2001). HRH data: guidelines and data requirements for a human resources for health information system, World Health Organization, 2001.

21. World Health Organization and Secretrait of Pacific Community, Vanuatu Commitment, 2007.

ANNEX

Table 4: Life Expectancy, Tuberculosis Prevalence and Maternal Mortality within WHO Region

Region	Life Expectancy at Birth 2009	Prevalence of tuberculosis (per 100,000 people)	Malaria mortality (per 100,000 people per year)
Africa	54	276 [256-296]	94 [70-121]
Americas	76	29.0 [27.0-30.0]	0.1 [0.1-0.2]
Eastern Mediterranean	66	109 [97.0-122]	2.5 [1.1-5.3]
Europe	75	47.0 [44.0-50.0]	0.0 [0.0-0.0]
South-East Asia	65	193 [179-207]	2.9 [1.6-4.4]
Western Pacific	75	93.0 [85.0-102]	0.2 [0.1-0.4]
Global	68	128 [123-133]	12 [9.0-16]

Data source: WHO World Health Statistics 2010-11, data recorded for 2009

Table 5: Maternal and Child Health Indicators within WHO Region

WHO Region	Infant Mortality Rate per 1,000	Maternal Mortality Rate per 100,000	Adolescent Fertility Rate per 1,000 girls (age 15-19) (2006)
Africa	85	620	117
Americas	16	66	63
Eastern Mediterranean	57	320	41
Europe	13	21	24
South-East Asia	46	240	54
Western Pacific	16	51	11
Global	44	260	48

Data source: WHO: 1. World Health Statistics 2010-11; a. MMR /Adolescent Fertility - Health MDG Maternal Health, data recorded for 2005-9; b. Infant Mortality Rate-Health MDG IMR 2010