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Maternal and Child Health in the Western Pacific Region: A Closer Look at the Lower and Middle Income Countries

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ABSTRACT

This study explored the progress in the achievement of the Millennium Development Goals 4 and five (5) fifteen years after it was agreed upon as health targets among member countries of the United Nations. Through literature review and data mining process, the following data of the Western Pacific Region's lower and middle-income countries were scrutinized: 1) infant and child health situation in terms of percentage reduction in both infant and under-five mortality rates for the past 25 years and proportion of one-year-old children immunized against measles; 2) maternal health situation in terms of current maternal mortality ratio and its percentage reduction, proportion of births attended by skilled health personnel and percentage of antenatal care coverage; and 3) health care delivery system in terms of health expenditure as percentage of the country's gross domestic products, presence of health infrastructures, and members of the health workforce. Results revealed that for infant mortality, those countries with a population of more than 250,000 fared well as compared to the smaller Pacific islands with a population of less than 250,000. For under-5 mortality rate, almost all of the LMICs did not meet the target. However, the majority of these countries met the target on the provision of measles immunization on time. For maternal health, the smaller Pacific islands fared well compared to the bigger countries. The majority of the LMICs performed poorly in this variable. Thus, most of the Region's LMICs somehow almost achieved MDG4 (infant and child health) but are still far from achieving MDG5 (maternal health) on time.

Lastly, the smaller Pacific islands again had a better status in all indicators of the healthcare delivery system (health expenditure, number of hospitals and health worker density ratio) as compared to the bigger countries. These indicators are considered crucial towards achieving the MDG targets and must, therefore, be addressed if they want to improve maternal health in the Region.

Keywords: Infant and child health, maternal health, healthcare delivery system, Western Pacific Region

INTRODUCTION

Fifteen years have passed after 189 nations have agreed during the United Nations Millennium Summit in September 2000 to achieve what is known as the Millennium Development Goals (hereafter, MDGs). Currently, everyone wants to know the world's progress and the progress in our local region, the Western Pacific. MDGs consist of 8 goals with indicators to measure progress and achieve specific targets by 2015. The MDGs have been a significant force in the fight to reduce poverty and inequity at a time of competing for international interests, while placing health center stage in the development agenda. This paper only looked into two MDGs, particularly that of MDG4 (reducing child mortality) and MDG5 (improving maternal health).

The Western Pacific Region (hereafter, the Region) comprised of 37 countries, 21 of which are classified by the World Bank as LMICs (low- and middle-income countries) or have Gross Domestic Product values of less than 10,000 USD. The Region is a mix of diverse countries with some of the world's highest or largest economies, as well as countries with the smallest economies (WHO, 2005). It has been documented that progress among LMICs was much slower compared to the Region's high- income countries like Australia, New Zealand, Japan, Brunei Darussalam, South Korea and Singapore (WHO, 2010). Various studies have established a strong link between health status and the countries' socioeconomic development (Ying, Lininger, Ung and Ying, 2015; Lomazzi, Theisling, Tapia, Borisch and Laaser, 2013). As expected, the high-income nations are fairing well with these two MDGs. Hence, this paper focused and included only data from the Region's LMICs.

Back in 2009, the World Health Organization (hereafter, WHO) has recorded about 40 million to 50 million pregnancies with up to 50,000 maternal and 300,000 newborn deaths each year in the Region. Moreover, more than 70

percent of deaths among children under five are children under one year of age (WHO, 2009). In 2010 WHO- Western Pacific Regional Office reports, the Region is said to be making better progress towards the health MDGs than other WHO regions. Furthermore, the World Health Statistics (2010) revealed that child mortality has reduced significantly in the Region. The overall estimated under-five and infant mortality rates reduced by half and the estimated total number of deaths among children under the age of five years decreased by two-thirds between 1990 and 2009.

Despite this, however, around 527,000 children under five years old died in 2009 from preventable and treatable causes. More than 95 percent of those deaths occurred in six countries in the Region (Cambodia, China, the Lao People's Democratic Republic, Papua New Guinea, the Philippines and Viet Nam), with huge disparities in mortality across and within countries. At least 65 % of all child deaths in the Region are caused by neonatal conditions, pneumonia and diarrhea, with an increasing proportion occurring in the neonatal period (45.5% overall in the Region). Measles vaccination prevents deaths from measles and complications like pneumonia, and diarrhea. As a result of measles elimination efforts in this decade, the estimated number of measles- related deaths decreased by 92 percent from 2000 to 2008, and is currently estimated at less than 2,000 per year.

On the other hand, in terms of maternal health, WHO Global Database on Maternal Health Indicators (2011) indicated that approximately 13,000 maternal deaths occur annually in the Region, with huge disparities across and within countries (urban-rural, rich-poor). Despite the improved situation in some countries, almost 96 percent of these deaths are estimated to take place in 6 countries with the highest burden of maternal and child deaths in the Region, namely Cambodia, China, Lao People's Democratic Republic, Papua New Guinea, the Philippines, and Viet Nam. Maternal deaths are clustered around labor, delivery and the immediate postpartum period, with obstetric hemorrhage being the main cause of death. Other important direct causes include hypertensive diseases, sepsis/infection, and obstructed labor. Maternal mortality remains unacceptably high in Cambodia, the Lao People's Democratic Republic and Papua New Guinea and among marginalized and underserved groups within many countries. The maternal mortality ratios in Fiji and Malaysia were estimated below 100 per 100,000 in 1990 and had each made progress reducing these ratios further. However, available data on maternal deaths in developing countries of the Region are likely to be underestimated for many

reasons, including systematic under-reporting and under-recording of deaths due to various prevailing constraints.

In May of 2015, WHO already published their progress report for the Millennium Development Goals at their website (http://www.who.int/mediacentre/factsheets/fs290/en/). At this point, it is critical to examine the various variables which play significant roles in reducing both child and maternal mortality, as well as in improving their health statuses, particularly among LMICs.

FRAMEWORK

This study utilized the United Nations' MDGs as a framework. Specifically, indicators for child health or MDG4 included: infant and under-five mortality rates, percentage reduction of both infant and under-five mortality rates, and the proportion of one-year-old children immunized against measles. Indicators for maternal health or MDG5 comprised of the following: maternal mortality ratio and its percentage reduction, proportion of births attended by skilled health personnel, and antenatal care coverage. Moreover, health services delivery was measured by these indicators: health workforce, infrastructure and health expenditure.

The Committee of the Western Pacific in 2005 outlined a unified direction towards the achievement of the MDG4 targets in order to reduce inequities in child survival in the Region. Several Pacific island countries have translated it into country-specific actions. The strategy defines an essential package of child survival interventions which included the following: skilled attendance during pregnancy, delivery and immediate postpartum; newborn care; breastfeeding and complementary feeding; micronutrient supplementation; immunization of mothers and children; and management of sick children at all levels of the health system. These evidence-based and scientifically proven cost-effective interventions could prevent most of the childhood deaths in the Region.

Moreover, in November 2008, 14 ministers of health signed the Pacific Policy Framework for Achieving Universal Access to Reproductive Health Services and Commodities, an important policy guide for countries to develop national plans of actions. In March 2009, a joint WHO/UNFPA/UNICEF meeting was held in the Region to review progress in achieving reduction of maternal and newborn mortality and universal access to reproductive health, addressing several issues and developing country plans.

The World Health Statistics (2010) shows that there have been improvements

in the coverage of interventions to reduce maternal mortality, including ensuring that all women have access to skilled care during pregnancy, childbirth and the postpartum period. Although 80 percent of pregnant women received antenatal care at least once during the period 2000–2010, only 53 % received the WHO-recommended minimum of four antenatal visits. The proportion of deliveries attended by skilled health personnel rose from 58 % in 1990 to 68 % in 2008.

The WHO report (2009) particularly mentioned the healthcare delivery systems as a significant determinant of maternal and child health. Some healthcare systems are fragile because of lack of resources, especially human resources for health, in addition to physical and cultural barriers. A weak or malfunctioning healthcare system considerably compromises maternal, newborn and child health. Of all the components of a healthcare system, human resources for health remain a priority need in the Region (WHO, 2012; Nyunt-u, Salmela and Fabricant, 2008).

OBJECTIVES OF THE STUDY

Generally, the study looked into the maternal and child health situation as well as the health care delivery systems in the Western Pacific Region. Specifically, the study pursued the following: first, to describe the child health situation in terms of percentage reduction in infant and under five mortality rates for the past 25 years (1990 to 2015) and the proportion of one-year-old children immunized against measles. Second, to assess the maternal health situation in terms of the current maternal mortality ratio, percentage reduction in maternal mortality rate for the past 25 years (1990 to 2015), proportion of births attended by skilled health personnel, and percentage of antenatal care coverage. Lastly, the study described the health care delivery system in terms of health expenditure as a percentage of the country's gross domestic products, presence of health infrastructure (hospitals), and health workforce (number of physicians, nurses, and midwives).

METHODOLOGY

The study, which is descriptive in nature, considered the variables on maternal and child health situation in the Western Pacific Region through literature review and data mining. Literature review progressed from subject identification, limiting the search, sources of data and search techniques, and critical analysis of

the gathered data. The Western Pacific Region's maternal and child statistics, as well as the healthcare delivery system statistics, were gathered through the data mining process following the procedure of Padua (2008).

Subject Identification

At the start of the literature search, vital keywords were identified to facilitate location of related literature. The main keywords are: "infant and child health", "maternal health", and "Western Pacific Region". Further searches were conducted covering the specific variables of the study such as "infant mortality rate", "under 5 mortality rate", "measles immunization", "skilled birth attendants", "antenatal care coverage", "maternal mortality ratio", "health expenditure as percentage of the country's GDP", "health infrastructures", and "healthcare workers". The use of these keywords were very essential in the search of the appropriate available literature for this review.

Limiting the Search

The searched articles were limited to those published in 2005 up to the present. The databases of Proquest and even Google Scholar have ample amounts of studies related to maternal and child health in the Region. However, there was no limit as to the number of articles to be reviewed. According to Polit and Beck (2008) and Nieswiadomy (2008), the search for qualitative data may stop when data about the topic have been exhaustively searched. One will know that it is already "exhaustively searched" when data found are the same and are already repeated many times, or the same authors, articles, themes, patterns, and references are seen (Polit and Beck, 2008; Nieswiadomy, 2008).

Sources of Data and Search Techniques

An electronic search of the related literature was mainly employed. Sources of data were the databases of the World Health Organization in Geneva, Switzerland, the WHO regional office in the Western Pacific Region, the United Nations, and World Bank. These search engines and websites belong to official organizations, and their data are considered factual and accurately documented.

Data Analysis

The data collected were then subjected to descriptive statistics (frequency and ranking). Results were then supported by related literature and studies.

RESULTS AND DISCUSSION

Relevant statistics related to MDG4 have reportedly attained significant global progress, specifically the under-five mortality rate and immunization coverage (WHO, 2015). Between 1990 and 2015, under-5 mortality declined by 49 percent from 90 deaths per 1000 live births to 46. Also, 66 percent of United Nations member states have reached at least 90 percent of immunization coverage, thereby reducing the measles-related deaths by 74 percent.

The Region's Infant and Child Health Status

Table 1 presents the percentage and ranking of the Infant Mortality Reduction among the LMICs of the Region. The mean average among the 21 countries is almost 62 percent of infant mortality reduction from 1990 to 2015 (25 years). The top 5 performers were China, Mongolia, Cambodia, Cook Islands and Malaysia. China and Mongolia both met the target of at least 67 percent reduction in the infant mortality rate in 2012, while nine countries met the target in 2015. The majority (12) of the LMICs were not able to meet the target, including the Philippines. The five least performers were Niue, Solomon Islands, Marshall Islands, Micronesia and Papua New Guinea. Nevertheless, it is poignant to mention that majority of the countries have more than 50 percent in the decrease of deaths among one-year-olds and below.

Table 1. Percentage and Ranking of the Infant Mortality Reduction among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) REDUCTION OF INFANT MORTALITY RATE	RANKING
China	117	1
Mongolia	108	2
Cambodia	82	3
Cook Islands	78	4
Malaysia	71	5
Lao People's Democratic Republic	69	6
Palau	67	7
Vanuatu	67	7

Viet Nam	67	7
Tonga	64	8
Tuvalu	60	9
Philippines	58	10
Samoa	53	11
Kiribati	50	12
Nauru	50	12
Fiji	47	13
Papua New Guinea	46	14
Micronesia (Federal States of)	45	15
Marshall Islands	42	16
Solomon Islands	38	17
Niue	19	18
MEAN	**61.8**	

* Target is at least 67%

Table 2 shows the percentage and ranking of under-five mortality reduction among the 21 LMICs. There was a mean average of about 65 % in the reduction of deaths among children under five years of age for a span of 25 years from 1990 to 2015. The same top 3 countries in the infant mortality reduction performed well in this category which includes China, Mongolia, and Cambodia. Nine of the LMICs, including the Philippines, were able to reach the target of at least 67 % in the under-five mortality rate. However, the majority (12) are still below the target. Almost the same poor performing countries in the infant mortality reduction were also noted such as Niue, Solomon Islands, Micronesia and Papua New Guinea. Added to the poor performers was Fiji, which was also part of the poor performers in the infant mortality reduction. Still, it is good to note that at least all of these countries demonstrated a continuous decrease, albeit slow, in the number of deaths among children below five years old.

Table 2. Percentage and Ranking of Children Under 5 Mortality Reductions among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) REDUCTION OF UNDER 5 MORTALITY RATE	RANKING
China	128	1
Mongolia	128	1
Cambodia	98	2
Lao People's Democratic Republic	75	3
Viet Nam	74	4
Cook Islands	73	5
Malaysia	67	6
Philippines	67	6
Vanuatu	67	6
Tuvalu	63	7
Tonga	62	8
Marshall Islands	57	9
Samoa	56	10
Kiribati	52	11
Palau	52	11
Nauru	51	12
Papua New Guinea	48	13
Micronesia (Federal States of)	46	14
Fiji	45	15
Solomon Islands	42	16
Niue	20	17
MEAN	**65.3**	

* Target is at least 67%

Lastly, it can be gleaned from Table 3 that most (16) of the Region's LMICs, including the Philippines, reached the target of at least 90 % in measles immunization coverage. The top 5 performers were China, Niue, Palau, Samoa, Tonga and Viet Nam. On the other hand, those who were not able to reach the 90 % measles immunization coverage were Vanuatu, Papua New Guinea, Marshall Islands, Solomon Islands, and Lao People's Democratic Republic.

Table 3. Percentage and Ranking of Measles Immunization Coverage among 1 Year Olds of Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) OF MEASLES IMMUNIZATION COVERAGE AMONG 1 YEAR OLDS	RANKING
China	99	1
Niue	99	1
Palau	99	1
Samoa	99	1
Tonga	99	1
Viet Nam	98	2
Cook Islands	97	3
Mongolia	97	3
Nauru	96	4
Tuvalu	96	4
Malaysia	95	5
Fiji	94	6
Kiribati	91	7
Micronesia (Federal States of)	91	7
Cambodia	90	8
Philippines	90	8
Lao People's Democratic Republic	82	9
Solomon Islands	76	10
Marshall Islands	70	11
Papua New Guinea	70	11
Vanuatu	52	12
MEAN	**89.5**	

* Target is at least 90%

With the three variables measuring MDG4 (reducing infant and child mortality), China was consistently on top of the rank. These data show that China was able to achieve MDG4 earlier than the 2015 target date. According to the study of Xi, Zhou, Wang and Xu (2014), these reductions in child mortality are due to China's booming economy and improved healthcare services which started 20 years ago. Aside from increasing the budget for health expenditure to ¥2.89 trillion in 2012, they also advanced services related to antenatal care, hospital delivery, neonatal visits and management of children below five years old.

Likewise, Mongolia has performed well in both infant and child mortality reduction. According to their country health brief in 2015, Mongolia has also started their health reform over the last two decades (http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_mng_en.pdf). Despite not being able to meet the target for immunization coverage, their government has continued to achieve the target goal of 90 percent coverage. Government leaders have fully endorsed and supported their National Development Strategy (2000-2020) based on the MDGs. However, they have noted disparities between rural and urban areas in terms of child and maternal mortality rates.

Thirty-five years ago, Cambodia had the worst health conditions among children and mothers and was one of those countries with the highest infant, child and maternal mortality rates (Ying *et al.*, 2015). Between 2000 and 2010, the countries worked hard for healthcare reforms and were able to be on track for MDG4, with a notable decline from 95 to 45 deaths per 1,000 live births (UNICEF, n.d.). Improvements were attributed to the expansion of immunization coverage, breastfeeding programs, and related social developments such as poverty reduction, improved literacy rate and better roads (Ministry of Health Cambodia, 2014).

Similarly, countries which performed poorly, such as Niue, Solomon Islands, Marshall Islands, Micronesia were consistent in both infant and under-five mortality. Except for Solomon Islands, these are very small Pacific islands with a population of less than 200 000. Niue has had good maternal and child health care program, but the island was devastated by a very strong cyclone in January 2004. After that and until now, the country is still trying to get back to its previous state. Hence, the Niue Strategic Health Plan 2011-2021 was produced in close collaboration with New Zealand Ministry of Foreign Affairs and Trade, WHO, UNFPA, and the Secretary of the Pacific Community (WHO, 2015). As for the Marshall Islands and Micronesia, both are colonies of the United States, thus have intensive ongoing healthcare programs to improve maternal and child health. The performance was improved from the 1990 baseline but was not enough to meet MDG4 targets in 2015.

The Region's Maternal Health Status

Globally, there was a 55 % decreased of maternal deaths in 2013. However, this is still short of the MDG5 target of at least 75 % reduction for 2015. About 83 % of pregnant women received care only once during the course of pregnancy, short of the recommended visit of at least four times.

For the Region, Table 4 shows the frequency and ranking of maternal deaths per 100 000 live births among the LMICs. Cambodia, Lao People's Democratic Republic, and Papua New Guinea got the highest number of maternal deaths between 1990 to 2015. Countries with the least number of maternal deaths were Malaysia, Tonga, Fiji, China, Mongolia and the Philippines. However, certain Pacific islands with less than 250 000 population do not have any data for maternal mortality rate. According to the United Nations, the countries of Cook Islands, Nauru, Niue, Palau and Tuvalu have poor monitoring systems, thus preventing them from getting accurate and timely data.

Table 4. Frequency and Ranking of Maternal Mortality Rate/100 000 Live Births among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	MATERNAL MORTALITY RATE /100 000 LIVE BIRTHS	RANKING
Cambodia	300	1
Lao People's Democratic Republic	275	2
Papua New Guinea	118	3
Marshall Islands	96	4
Solomon Islands	80	5
Kiribati	63	6
Viet Nam	49	7
Micronesia (Federal States of)	43	8
Vanuatu	43	8
Samoa	38	9
Philippines	28	10
Mongolia	25	11
China	24	12
Fiji	22	13
Tonga	18	14
Malaysia	14	15
MEAN	**77.25**	

* No data for Cook Islands, Nauru, Niue, Palau, Tuvalu

Table 5. Percentage and Ranking of Maternal Mortality Reduction among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) OF MATERNAL MORTALITY REDUCTION	RANKING
Cambodia	86	1
Lao People's Democratic Republic	80	2
China	67	3
Viet Nam	65	4
Samoa	61	5
Solomon Islands	59	6
Papua New Guinea	53	7
Vanuatu	49	8
Kiribati	48	9
Malaysia	48	9
Micronesia (Federal States of)	44	10
Fiji	34	11
Mongolia	32	12
Philippines	22	13
Tonga	18	14
MEAN	**51**	

* Target is at least 75%
* No data for Cook Islands, Marshall Islands, Nauru, Niue, Palau, Tuvalu

Despite the increased efforts of reducing maternal mortality rate, only Cambodia and Lao met the target reduction of at least 75 %. The rest of the 13 countries, including China and the Philippines, fell below the target, garnering only a mean of 51 % reduction. Some small Pacific islands again do not have data, which include Cook Islands, Marshall Islands, Nauru, Niue, Palau, and Tuvalu.

In terms of antenatal care coverage (refer to Table 6), only Niue is on track, with 100 % of its pregnant women receiving care throughout the course of pregnancy. Thirteen countries were able to provide antenatal care to at least 90 % of pregnant women. Trailing behind are Laos, Papua New Guinea, Vanuatu, Micronesia, and the Cook Islands, with less than 85 % antenatal care coverage.

A qualitative study by Sychareun, Phommachanh, Soysouvanh, Lee, Kang, Oh and Durham in 2013, documented that Laos has a well-defined maternal and child health program. However, there are three classified concerns (supply, demand and contextual) of the healthcare providers in terms of the implementation of the program. Some of the constraints identified related to supply were inadequate

human resources, poor remuneration, weak technical guidance, minimal supervision, and limited equipment. Constraints related to demand were the cost, limited access to transport, cultural practices, and language. Contextual constraints were poor education, women's status in the society, poor transport conditions and lack of communications networks. All of these constraints have affected the effectiveness, as well as the scale-up of the implementation process.

For the case of Papua New Guinea, which ranked second in the least coverage of antenatal care, it is clear that it was not able to meet the MDG5 goal. Ironically, WHO (n.d.) has documented that the maternal health status has deteriorated while the population as increased over the last 20 years. Its most common maternal mortality causes are all preventable such as antepartum and postpartum hemorrhage, puerperal sepsis and eclampsia, with more than 60 percent of deliveries occurring outside the hospitals (Jimenez Soto, La Vincente, Clark, Firth, Morgan, 2012).

Third in rank with the least antenatal coverage is Vanuatu, a small Pacific island of less than 250 000 population. Its poor performance for MDG5 is attributed to its poor social development, limited financial capacity, wealth inequality, underutilization of health services, and a shortage of healthcare providers (UNICEF, 2013; Rahman, Haque, Mostofa, Tarivonda, Shuaib, 2011).

Table 6. Percentage and Ranking of Antenatal Care Coverage among Lower and Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) OF ANTENATAL CARE COVERAGE	RANKING
Niue	100	1
Mongolia	99	2
Tonga	99	2
Fiji	98	3
Malaysia	97	4
Viet Nam	96	5
Philippines	95	6
China	95	6
Nauru	94	7
Samoa	93	8
Tuvalu	93	8
Marshall Islands	92	9
Solomon Islands	91	10
Palau	90	11
Cambodia	89	12
Kiribati	88	13
Cook Islands	85	14

Micronesia (Federal States of)	80	15
Vanuatu	76	16
Papua New Guinea	66	17
Lao People's Democratic Republic	53	18
MEAN	**89**	

* Target is 100%

Table 7 presents the percentage and ranking of births attended by trained healthcare providers among LMICs in the Region. The target is at least 90 %, and the majority (13 countries) met this goal. Among the eight countries which did not meet the goal is the Philippines. This is a surprising phenomenon as the Philippines is the number one supplier of nurses and midwives across the world. According to the Philippines Equity Report in 2012, there is a disparity in the distribution of health services between urban and rural areas and rich and poor constituents, as well as the disconnect between local and national health systems and providers. Currently, the Department of Health in the Philippines has committed to improving and expanding health services for women and children, particularly among the poorest of the poor through the implementation of the Universal Health Care and other pertinent health services.

Four LMICs (China, Cook Islands, Micronesia, and Niue) got 100 % in trained health personnel attendance during childbirth. With China's intensified efforts and expanded budget for healthcare services (Xi *et al.*, 2014), it was able to keep on track with MDG5's goal ahead of schedule. The three small Pacific islands of Niue (population: 14 000), Micronesia (population: 103 000), and Cook Islands (population: 15 000) also had perfect scores for the attendance of skilled health personnel during childbirth. Their success is said to be attributed to the improved health services and the strong financial support and guidance of high income countries like the United States, Australia and New Zealand (UNICEF, 2013, WHO, 2012).

Table 7. Percentage and Ranking of Births Attended by Skilled Health Personnel among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	PERCENTAGE (%) OF BIRTHS ATTENDED BY SKILLED HEALTH PERSONNEL	RANKING
China	100	1
Cook Islands	100	1
Micronesia (Federal States of)	100	1
Niue	100	1
Fiji	99	2
Malaysia	99	2
Mongolia	99	2
Palau	99	2
Nauru	97	3
Tonga	96	4
Viet Nam	94	5
Tuvalu	93	6
Marshall Islands	90	7
Vanuatu	89	8
Solomon Islands	86	9
Samoa	81	10
Kiribati	80	11
Philippines	73	12
Cambodia	71	13
Papua New Guinea	44	14
Lao People's Democratic Republic	40	15
MEAN	**87.1**	

* Target is at least 90%

The Region's Healthcare Delivery System

According to Dr. Shin Young-soo, as cited by WHO (2010), the Western Pacific Region's health system in under stress because many developing countries, particularly in poorer regions, still have low healthcare budget (WHO, 2010). To be able to gain sustainable health outcomes, strong and effective health systems are required. Table 8 presents the percentage of health expenditures based on the gross domestic products of the LMICs in the region.

Health expenditure, as defined by the World Bank (n.d.), is the total sum of public and private spending for healthcare programs and services as a ratio of the total population. It covers the provision of healthcare facilities, personnel, capability building, medications, and other related logistics for the

implementation of preventive and curative healthcare delivery system. This is usually expressed in US dollars.

As shown in Table 8, the Pacific islands, which composed of less than 250,000 population have higher budgets for health compared to those with bigger populations (more than 250,000 population). The Marshall Islands, which is a colony of the USA, along with Tuvalu, Micronesia (another island under the USA), and Kiribati, have the highest health expenditures. However, the LMICs with the lowest health expenditure percentage are Lao, Cook Islands, Vanuatu, Fiji, Malaysia, Papua New Guinea and the Philippines. The result for Malaysia is quite surprising as it is considered a second world country and ranks third in terms of having the highest GDP among these LMICs. China, on the other hand, is the GDP and population top grosser, with more than 9 trillion USD and more than 1.3 billion people, is one of those having the lowest health expenditure at only 5.4 percentage of their GDP.

Table 8. Percentage and Ranking of Health Expenditure as GDP % among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	POPULATION (2013)	GDP (in USD)	HEALTH EXPENDITURE AS GDP (%)	RANKING
LMICs with population < 250 000				
Marshall Islands	52,634	190.9 million	15.6	1
Tuvalu	9,876	38.32 million	15.0	2
Micronesia (Federal States of)	103,549	316.2 million	12.8	3
Kiribati	102,351	169 million	10.2	4
Palau	20,918	247 million	9.5	5
Niue	1,190	10.01 million	7.1	7
Nauru	10,000	153 million	7.0	8
Samoa	190,372	801.9 million	6.7	9
Tonga	105,323	466.3 million	4.4	14
Cook Islands	10,900	183 million	3.3	17
LMICs with population ≥ 250 000				
Cambodia	15.14 million	15.24 billion	7.3	6
Mongolia	2.839 million	11.52 billion	6.3	10
Vietnam	89.71 million	171.4 billion	6.0	11
Solomon Islands	561,231	1.096 billion	5.5	12
China	1.357 billion	9.24 trillion	5.4	13
Papua New Guinea	7.321 million	15.29 billion	4.4	14
Philippines	98.39 million	272.1 billion	4.4	14
Fiji	881,065	3.855 billion	4.0	15
Malaysia	29.72 million	313.2 billion	4.0	15
Vanuatu	252,763	828.2 million	3.6	16
Lao People's Democratic Republic	6.77 million	11.24 billion	1.9	18
			Mean = 6.6	

When implementing health programs and services, the provision of the appropriate and adequate budget is considered very crucial towards attaining success and sustainability. This is supported by the study of Novignon, Olakojo, and Nonvignon (2012). Their findings provided evidence of the importance of increasing healthcare expenditure towards achieving the MDGs, particularly of establishing effective public and private institutions/ agencies' partnership in properly allocating healthcare budgets.

Another variable considered in the study for healthcare delivery system is the number of hospitals per 100,000 population. This is illustrated in Table 9. Consistently, the results show that LMICs with less than 250,000 population have more hospitals or healthcare institutions, both public and private, to provide for the healthcare needs of the people. It can be further observed that the small islands of Tuvalu and Nauru have the most number of hospitals. The countries with the least number of hospitals are Malaysia, Cambodia, Papua New Guinea and the Philippines. However, there are those LMICS, which do not have data with regard to this variable. Lastly, it can be noted that those countries with higher health expenditures also have more healthcare facilities or institutions compared to those with lesser healthcare spending.

Table 9. Frequency and Ranking of Hospitals/100 000 Population among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	NUMBER OF HOSPITALS/ 100 000 POPULATION	RANKING
LMICs with population < 250 000		
Tuvalu	10.1	1
Nauru	9.9	2
Micronesia (Federal States of)	4.8	3
Samoa	4.2	4
Marshall Islands	3.8	5
Tonga	3.8	5
*Cook Islands		
*Kiribati	*No data	
*Niue		
*Palau		

LMICs with population ≥ 250 000		
Mongolia	2.5	6
Vanuatu	2.4	7
Lao People's Democratic Republic	2.2	8
Philippines	1.8	9
Papua New Guinea	1.6	10
Cambodia	0.6	11
Malaysia	0.5	12
*China		
*Fiji		
*Solomon Islands	*No data	
*Vietnam		

The final variable considered for the healthcare delivery system is the number of healthcare personnel according to the number of population in a country. This indicator is termed *"health worker density ratio."* The World Health Organization (n.d.) has established the standard minimum number of 23 healthcare personnel per 10,000 population. This health workforce consists of all people involved in the provision of health services such as doctors, nurses, midwives, pharmacists, community health workers, as well as the management and support workers such as hospital administrators and social workers.

Table 10 shows the frequency distribution of the number of doctors, nurses and midwives per 10,000 population in a country. It can be gleaned from the table that most of the Pacific islands with less than 250,000 population have met the minimum standard threshold of 23 health personnel needed to provide health services adequately especially for women and children. Among these small islands, only Marshall Islands did not meet the minimum standard, with only 21.8 total health personnel per 10,000 population.

On the other hand, 5 LMICs in the Region, with more than 250,000 population, did not meet the standard number of 23 health personnel. Currently, 57 low economy countries worldwide have been prioritized by the UN Global Strategy for Women's and Children's Health. Papua New Guinea, followed by Cambodia and Laos have the least number of the health personnel. These three third world countries belong to the identified priority countries having critical shortages of health workforce. The shortage is even worsened by the inadequate skills of the healthcare providers themselves and the uneven geographical distribution of these health personnel (WHO Global Atlas of the Health Workforce, n.d.).

Table 10. Frequency Distribution of Doctors and Nurses/Midwives per 10 000 Population among Lower & Middle-Income Countries (LMICs) in the Western Pacific Region

COUNTRIES (n = 21)	NUMBER OF DOCTORS/ 10 000 POPULATION	NUMBER OF NURSES & MIDWIVES/10 000 POPULATION	TOTAL HEALTH PERSONNEL
LMICs with population < 250 000			
Cook Islands	13.3	***64.4**	77.7
Kiribati	***38**	37.1	75.1
Marshall Islands	4.4	17.4	**21.8**
Micronesia (Federal States of)	1.8	33.2	35
Niue	***30**	***160**	190
Nauru	7.1	40.3	47.4
Palau	13.8	57.1	70.9
Samoa	4.5	18.5	23
Tonga	5.6	38.8	44.4
Tuvalu	10.9	58.2	69.1
LMICs with population ≥ 250 000			
Cambodia	1.7	7.9	**9.6**
China	14.9	16.6	31.5
Fiji	4.3	22.4	26.7
Lao People's Democratic Republic	1.8	8.8	**10.6**
Malaysia	12	32.8	44.8
Mongolia	***28.4**	36.2	64.6
Papua New Guinea	0.6	5.7	**6.3**
Philippines	12	***61**	73
Solomon Islands	2.2	20.5	**22.7**
Vanuatu	1.2	17	**18.2**
Vietnam	11.4	12.4	23.8

According to the study of Pacque-Margolis, Muntifering, Ng and Noronha (2011), there is an estimated global shortage of 4 million healthcare providers, and this is considered as the greatest constraint for countries striving to achieve the MDGs. Their study recommended the need to address the increase of healthcare worker production and the need to stabilize population growth to at least reach the standard health worker density ratio.

Moreover, WHO (n.d.) highlighted that countries which fell below the standard threshold of health workforce will result in poor implementation and delivery of health services and may have negative outcomes in relation to reducing maternal and child morbidity and mortality rates.

WHO further identified migration as the most common reason for the critical shortage of the health workforce. Most of the healthcare workers migrate

to another country (external migration) to find better-working conditions and career opportunities. There are also those who migrate internally, from the rural areas to urban cities in search for bigger salaries and better opportunities personally and professionally. With the implementation of the 2010 Code of Practice on the International Recruitment of Health Personnel, WHO is serious in addressing the problem of health worker migration (Siyam and Dal Poz, 2014). The health workforce is considered as the largest expenditure within a health system and thus, is one of the most important variables in the healthcare delivery performance. Improvement in this aspect of the health system is therefore expected to produce a positive impact in attaining MDGs 4 and five on time.

CONCLUSIONS

The Western Pacific Region is composed of the most diverse countries in terms of the economy, population, and culture. In this study, only 21 countries which are identified as lower-middle income countries were scrutinized as to their performance in achieving MDGs 4 and 5. For the first variable on infant mortality, it was observed from the data gathered that those countries with a population of more than 250,000 fared well as compared to the smaller Pacific islands with a population of less than 250,000. For the under-5 mortality rate variable, almost all of these LMICs did not meet the target. However, the majority of these countries met the target on the provision of measles immunization on time. For maternal health, the smaller Pacific islands fared well compared to the bigger countries. The majority of the LMICs performed poorly in this variable. Thus, most of the Region's LMICs somehow almost achieved MDG4 (infant and child health) but are still far from achieving MDG5 (maternal health) on time. For the last variable on the healthcare delivery system, the smaller Pacific islands again had a better status in all indicators (health expenditure, the number of hospitals and health worker density ratio) as compared to the bigger countries. These indicators of the health system are considered as crucial components toward achieving the targets of the MDGs and must, therefore, be addressed if they want to improve maternal health in the Region.

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