

THE ECONOMIC COSTS OF NON- COMMUNICABLE DISEASES IN THE PACIFIC ISLANDS.

A Rapid Stocktake of the situation in Samoa, Tonga and Vanuatu

*Final Report
November 2012.*

Exchange Rates

Exchange rates at 30 June 2012

1 Samoan Tala = US\$0.41

1 US\$ = Samoan Tala 2.41

1 Tongan Pa'anga (TOP) = US\$0.55

1 \$US = Tongan Pa'anga (TOP) 1.79

1 Vanuatu Vatu (Vt) = US\$0.0107

1 \$US = Vanuatu Vatu (Vt) 93

Currency in \$

All \$ are current United States dollars, unless otherwise specified

Table of Contents

Acknowledgements.....	iv
Abbreviations.....	v
Executive Summary.....	vi
Chapter One: context and purpose of this report	1
NCDs as an international development issue	1
Why NCDs are a development challenge in the South Pacific.....	2
The objective, intended audience and status of this report.....	3
Definitional issues and data limitations in estimating financial and economic costs of NCDs in this report	4
Chapter Two: the overall country context in Samoa, Tonga and Vanuatu.....	7
Economies and per capita income	9
Population and age structure	10
Health indicators.....	10
Health financing	10
Chapter Three: Update on NCDs prevalence and risk factors in the Pacific.....	12
Prevalence of NCDs in Samoa, Tonga and Vanuatu.....	12
NCDs as the major cause of death	12
The role of cardiovascular disease.....	14
High rates of premature NCD deaths.....	15
Specific country data on NCDs.....	17
Underlying Risk Factors for NCDs	17
Obesity and overweight.....	18
Changing diets.....	20
Physical inactivity and urbanisation.....	20
Tobacco and alcohol use.....	21
Combined risk factors	22
Type 2 Diabetes: a particularly significant NCD in the Pacific	25
Country responses to NCDs	27
Chapter Four: Financial and Economic costs of NCDs.	30
Recent estimates of the costs of NCDs from the international literature	30
Estimating economic costs of NCDs in the Pacific.	31
Estimating costs through National Health Accounts	31
Previous estimates of costs of NCDs.	33

Previous studies on the costs of treating Type 2 diabetes in Vanuatu.....	36
New estimates of the cost of drug treatment for diabetes and hypertension in Vanuatu	37
New estimates of the cost of kidney dialysis in Samoa	38
Overseas Treatment Costs	39
Chapter Five: Broad implications for Ministers of Health, and Ministers of Finance and Planning	40
Implications for Ministers of Health	40
Implications for Ministers of Finance, and Planning, and their Ministries.	42
Implications for both Ministers of Health, and Ministers of Finance: a convergence of public health and public expenditure and possible “win wins”	51
Chapter 6: Initial Recommendations and Possible Next Steps	54
Initial recommendations for discussion with Governments and development partners.....	54
Possible next steps.....	56
Annex One: Pacific Islands Indicators of Non-Communicable Diseases and Risk Factors in 2008	57
Annex Two: Health expenditure statistics for Samoa, Tonga and Vanuatu, 2010	58
Annex Three: Health Expenditure Samoa, Tonga and Vanuatu compared to Income Groups	59
Annex Four: Crude death rates from Non-Communicable Diseases in the Pacific Island region.....	60
Annex Five: Recent estimates of the economic costs of NCDs from the international literature.....	61
Annex Six: Financial Cost to Government of Samoa of the National Kidney Foundation	65
Annex Seven: First draft of a possible policy briefing note for a hypothetical Pacific Minister of Health, and Minister of Finance.....	73
References	75

Acknowledgements

This report was prepared by Ian Anderson, independent consultant, under the direction of Dr Eva Jarawan, Lead Health Specialist, East Asia and Pacific Region, The World Bank, and Task Team Leader for this project.

Helpful comments and inputs were received on earlier drafts from several sources. Senior staff of The World Bank including S Chao, S Ivatts, J Langenbrunner, P Marquez, T Palu, and A Yazbeck made numerous constructive suggestions. M Lee of the World Bank assisted in finalization of the report. Helpful comments were also received from C Bell, J McKenzie, and T Waqanivalu of the World Health Organisation, and W Snowden of Deakin University. Consultations were held with senior Government officials, and their development partners, in Samoa, Tonga and Vanuatu during October 2012 that generated valuable comments and suggestions.

This analysis and report were made possible through financial support provided by the Government of Australia and the Government of New Zealand. Such support is greatly appreciated.

Abbreviations

ALOS	Average Length of Stay (in days, in a hospital)
BMI	Body Mass Index. A measure of weight for height, calculated as a person's weight in kilograms divided by the square of the persons height in metres: kg/m ² . WHO define BMI equal to or greater than 25 as overweight, and BMI equal to or greater than 30 as obese. There is ongoing research about how appropriate these cut off points are in the Pacific.
COPD	Chronic Obstructive Pulmonary Disease (i.e. respiratory and lung disease)
CVD	Cardiovascular disease
ICD-10	International Classification of Disease, 10 th series.
IDF	International Diabetes Federation
NKF	National Kidney Foundation of Samoa
MNCH	Maternal, newborn and child health.
NCDs	Non-communicable diseases (see box one)
NHA	National Health Account
OPD	Outpatient Department of a hospital
PEN	Package of Essential Non-communicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings. (And initiative of the WHO)
SAT	Samoan Tala
SNAP	Smoking, Nutrition, Alcohol, Physical inactivity
SPC	Secretariat for the Pacific Community
STEPS	Not an acronym. It is the term used for the WHO stepwise approach to surveillance of risk factors
TOP	Tongan Pa'anga currency
WHO	World Health Organisation

Executive Summary

There are three main messages running throughout this report. First, Non Communicable Diseases (NCDs) can impose large health, financial and economic costs on countries. This is particularly important in the Pacific where Government already finances – and provides – the bulk of health services. Second, risk factors in the Pacific are feeding a pipeline of potentially expensive to treat NCDs, including diabetes and heart disease, but governments are already fiscally constrained in how much more they can provide to the health system. Third, from public health and public finance perspective, many of the NCDs are avoidable - or their health and financial costs can at least be postponed – through good primary and secondary prevention. This will require a more coherent approach to health system financing, and health system operations more generally.

There is increasing recognition that NCDs are an important international and development issue globally, undermining health gains and imposing financial and economic costs on Governments and households. If nothing is done to reduce the risk of chronic disease, an estimated \$ 84 billion¹ of economic production would be lost from heart disease, stroke, and diabetes between 2006 and 2015 in the 23 low and middle income countries accounting for around 80 per cent of chronic disease mortality. Diabetes – an NCD prevalent in the Pacific - caused an estimated \$ 465 billion in health care expenditure globally in 2011, 11 per cent of total health care expenditure of adults. The economic burden of four major NCDs in island economies of the Caribbean reached \$27 million, 2.8 per cent of the island's GDP in 2006.

NCDs are an important health challenge in the Pacific. NCDs are already the leading cause of death in twelve Pacific Island Countries for which data is available, frequently accounting for 70% of all deaths. Life expectancy in Tonga has fallen as a result of NCDs. Cardiovascular disease is the leading cause of death in the Pacific, often occurring at rates twice that of more traditional communicable diseases. Importantly, at least one quarter of NCD deaths are premature in Tonga, Samoa and Vanuatu, proportions that can be much higher than other lower middle income countries. NCDs such as diabetes and stroke can also cause chronic ill health and disability as well as death. The Pacific now has some of the highest rates of diabetes in the world.

Existing risk factors suggest that NCDs will be a major health challenge for the Pacific in coming years. Each of the 10 countries in the Pacific for which data is available have 60% or more of the adult population overweight, and in six countries more than 75% are overweight. In four countries of the Pacific at least half the adult population is obese. Obesity and being overweight often occurs at young ages: nearly one in four boys and one in five girls in Tonga are obese. Other risk factors apart from weight are also significant in the Pacific. Over two thirds of people in Kiribati smoke tobacco daily. Over 70% of people in Cook Islands are physically inactive. Only 5% of adult females, and 10% of adult males, were free of any of the preventable risk factors for acquiring NCDs in Vanuatu. Ageing is likely to be a challenge. Most Pacific countries currently have young populations: the median in Samoa, Tonga and Vanuatu is 21 years of age. But as these populations age NCDs can

¹ All figures in this report are in United States dollars unless otherwise specified.

be expected to increase. This is especially so given the existing level of all the main risk factors for NCDs laid down in younger life in parts of the Pacific, often summarised as Smoking, Nutrition, Alcohol and Physical inactivity (“SNAP”).

Despite data limitations, it is clear NCDs also impose important financial and economic costs especially to Governments in the Pacific. The rise in NCDs has particular relevance to Governments which currently finance the large majority of health expenditure: the Governments of Vanuatu, Samoa, and Tonga, supported by their development partners, provided 90%, 87% and 81% of total expenditure on health respectively in 2010.

Previous studies show that NCDs can impose larger costs than most communicable diseases in the Pacific. An earlier study found that one out of every 10 patients admitted to hospital in Tonga were admitted for a NCD, but resulted in one out of every 5 dollars spent on treatment. NCDs also often require treatment at higher levels of the public health service, thereby increasing costs to Government. Tonga’s National Health Accounts show that expenditure on NCDs more than treble as care goes from health centres to outpatients at the main Hospital, and increases a further nine fold as treatment moves from outpatients to inpatient care.

New estimates show the high cost of treatment as an NCD progresses to more advanced stages and complications arise. The estimated average total cost of dialysis for patients with diabetes related kidney failure to the Government of Samoa was \$ 38,686 per patient per year in 2010/11. While less than the previous approach of sending patients to New Zealand, the cost to Government is still more than twelve times the Gross National Income of Samoa. The cost-effectiveness of dialysis is further undermined by the fact that almost two thirds have died two years after commencing treatment. But even low cost items can impose significant costs to government due to the chronic and long term nature of certain NCDs. Glucose testing strips for a diabetes patient may cost only Vatu 42 (\$ 0.45 cents) per day. But used every day, as is required, amounts to \$ 164 per patient per year, more than the total government expenditure on health per capita. The basic testing strips alone would cost government \$ 1,642 per patient over a ten year period in nominal terms.

There are implications of these findings that are relevant to Ministers of Health. The social determinants of NCDs, and the underlying risk factors, are multi-sectoral and often beyond the health sector, yet the responses and costs will often be borne largely by Ministries of Health. Governments need to increase the resources going to prevention of NCDs, but in doing so, they should be conscious of the challenges in altering lifestyle behaviours (and therefore the risk of wasted expenditure through simplistic “lifestyle messages” and posters). The rise of NCDs has consequences for the overall functioning of the health system, including responding to the double burden of communicable diseases, and NCDs. It would be a mistake for Governments – and their development partners - to “verticalise” the response to individual NCDs. Screening and effective treatment become even more important for NCDs.

There are also implications for Ministers of Finance, because government funds most health care in the Pacific. The paradox is that government expenditure on health is generally low in absolute terms: less than \$0.50 cents per person per day in Samoa, Tonga and Vanuatu. But it is high in relative terms compared to other countries of similar income levels. Per capita government

expenditure on health in Samoa, Tonga and Vanuatu is at least double that of other lower middle income countries globally, and three times the level when local purchasing power is taken into account, partly reflecting the small size of populations in the Pacific. Governments in the Pacific face the challenge of financing the response to a double burden: an unfinished agenda of communicable and reproductive needs while also addressing rising costs for NCDs as populations age. But there are limited prospects for significantly increasing Government expenditure to health in absolute terms due to generally subdued economic growth in the Pacific. Nor is there large scope (“fiscal space”) to increase the share of general government expenditure going to health. This varies from 10% – 24% in Samoa, Tonga and Vanuatu, at least twice the share found in other lower middle income countries globally.

Ministers of Finance, and Planning, should also be aware of broader economic implications of NCDs particularly when they affect working age cohorts. NCDs reduce worker productivity and can diminish household savings. NCDs could dilute one of the strategic benefits open to Samoa, Tonga and Vanuatu: its potential “demographic dividend” of a large working age population. Almost half of all deaths (48%) in Tonga occur below age of 64, particularly amongst men, as a result of cardiovascular disease.

There are several strategic opportunities where the interests of the Ministers of Health, and the Ministers of Finance, would appear to directly coincide in a “win-win” situation. Increasing, and then maintaining, the real price of tobacco taxes has a double benefit: it reduces uptake of tobacco amongst the poor and the young, a major risk factor for NCDs, whilst simultaneously generating extra revenues for Government. Consideration could be also given to increasing taxes on alcohol, “junk food” and soft drinks known to be high in sugars, saturated and trans fats, and / or high salt content. Investing in young female health and antenatal care is also a ‘win-win’. Improved female health is valuable in its own right, but can also help break the inter-generational transfer of metabolic risks and NCDs from mother to her offspring.

Effective primary and secondary prevention also have significant health and financial returns. Every person in Samoa who avoids dialysis saves the government around \$38,700 per year. Every person in Vanuatu who changes their lifestyle through primary prevention, and successfully avoids becoming a newly diagnosed Type 2 diabetes patient, saves the government a minimum of \$ 347 per year: more than twice the annual per capita government expenditure on health. Effective *secondary* prevention also has high pay-off to government. Every diagnosed Type 2 diabetes patient in Vanuatu who is stabilised through secondary prevention, and so avoids progressing to an insulin regime, then saves the government an *additional* \$484 per year over the cost of an oral medication regime.

Governments and their development partners will now need to decide on future responses. This report involved a rapid stocktake of the nature, and selected likely costs, of NCDs with a particular focus on Samoa, Tonga and Vanuatu. This report can serve as a basis for discussion between governments and their development partners about how to respond.

Chapter One: context and purpose of this report.

NCDs as an international development issue

Box One: Definition and main types of Non-communicable Diseases

Non-communicable diseases, also known as chronic diseases, are not passed from person to person. The four main causes of death (mortality) and illness (morbidity) from NCDs are the following:

Cardiovascular disease (CVD) includes heart attacks, stroke, and other heart and blood vessel diseases.

Cancer including neoplasms.

Diabetes rarely kills patients by itself but is a major contributing factor to deaths from heart, circulatory, and kidney failure.

Chronic respiratory diseases including Chronic Obstructive Pulmonary Diseases (COPD), asthma, emphysema and chronic bronchitis.

Mental health, including age related dementia, is not usually included in the definition of NCDs but is an important factor in overall wellbeing . It is a major cost driver in developed countries .

Source: (WHO, Noncommunicable diseases fact sheet, 2011)

It should be noted that NCDs are not the only chronic diseases: infectious diseases such as HIV and AIDS are also chronic. It could also be noted that not all neoplasms are necessarily cancerous or malignant

1.1 Non-communicable diseases (NCDs) are the leading cause of death globally, including in most developing countries.

The World Health Organisation (WHO) estimates that two thirds of global deaths in 2008 were caused by NCDs, more than all other causes combined. Around 80% of these deaths – approximately 29 million - occurred in low and middle income countries. About one fourth of global NCD-related deaths occur prematurely, taking place before the age of 60. (WHO, Global Status Report on NCDs, 2010). (WHO, Noncommunicable Diseases Fact Sheet, 2011). NCDs also account for half of all global disability (Beaglehole R et al, 2011). Almost three quarters of people with hypertension (639 million) live in developing countries (Ibrahim M and Damasceno A, 2012). Several NCDs co-exist and / or exacerbate each other: high blood pressure is reported in over two thirds of patients with type 2 diabetes, and in patients with diabetes hypertension confers an enhanced risk of cardiovascular disease. (Ferrannini E and Cushman W, 2012). There are some links between communicable and non-communicable diseases: rheumatic fever can lead to rheumatic heart disease, and spread of the human papillomavirus through sexual contact can lead to uterine and other cancers.

1.2 There is increasing recognition, both internationally and in the Pacific that NCDs are an important international and development issue.

WHO notes that “the combined burden of these diseases is rising fastest among lower-income countries, populations and communities, where they impose large, avoidable costs in human, social and economic terms.” (WHO, Global Status Report on NCDs, 2010). The UN Secretary General’s report to the UN High Level Meeting on Prevention and Control of NCDs stated the following:

“In 2008, 36 million people died from non-communicable diseases, representing 63 per cent of the 57 million global deaths that year. In 2030, such diseases are projected to claim the lives of 52 million people. However, the demographic of lives lost is not readily apparent; people with non-communicable diseases often die young, with 9 million annual deaths occurring in persons under 60 years of age. The epidemic is fuelled by a combination of rising risk factors, including tobacco use, an unhealthy diet, lack of physical activity and harmful alcohol use. The four main non-communicable diseases that share those risk factors cause almost 80 per cent of all deaths from such diseases.

"Non-communicable diseases affect the developing world and lower-income populations hardest. Strong evidence links poverty, lack of education and other social determinants to such diseases and their risk factors. A vicious cycle is created by the epidemic, whereby non-communicable diseases and their risk factors worsen poverty, while poverty results in rising rates of such diseases. The prevention of non-communicable diseases would reduce poverty, particularly since the majority of expenditures for treatment in low- and middle-income countries are paid privately or from out-of-pocket health-care systems. At the same time, because of the magnitude of the illness, the disabilities and premature deaths they cause and the long-term care required, non-communicable diseases reduce productivity and increase health-care costs, thereby weakening national economic development."

1.3 Many developing countries will face higher levels of NCDs at earlier stages of economic development, with fewer resources, and with less time to respond effectively compared to their higher-income counterparts. This is an important finding from the World Bank in one of its reports prepared prior to the UN High Level Meeting on NCDs. (World Bank, The Growing Danger of Non Communicable Diseases: Acting Now to Reverse Course, 2011).

1.4 The social determinants of NCD incidence and prevalence are also linked to poverty and lack of development. Poorer people tend to have less access to education, health services, and markets for nutritious food. They also tend to consume tobacco more, a major contributor to NCDs and premature death. Poorer people are less likely to seek out preventive and screening services for NCDs. If they are diagnosed with an NCD they are less able to afford medicine and treatment.

Why NCDs are a development challenge in the South Pacific

1.5 NCDs are already a major health challenge in the Pacific. As seen in Annex One, NCDs are the leading cause of death in the Pacific for which data is available. Indeed, in nine out of twelve Pacific countries, NCDs account for 70% or more of all deaths. The most common cause of death in the Pacific is attributed to cardiovascular disease, which accounts for between 29% and 38% of death from all causes: communicable diseases, maternal and perinatal, NCDs and injuries combined. (WHO, Noncommunicable Diseases Country Profiles , 2011). Life expectancy has fallen in Tonga as a result of NCDs. NCDs are also a major source of illness: the Pacific has some of the highest rates of diabetes in the world. (International Diabetes Federation, 2011). Pacific Island countries also have surprisingly high risk factors for acquiring NCDs. As can be seen from Annex One, each of the ten countries in the Pacific for which data is available have 60% or more of the adult population overweight. In six countries more than 75% of the adult population are overweight. In four countries of the Pacific at least half the adult population is obese. Over two thirds of people in Kiribati smoke tobacco daily. Over 70% of people in the Cook Islands are physically inactive. These risk factors feed a pipeline of future NCDs. Yet at the same time, all Pacific Island countries still need to address communicable, maternal, neonatal and nutritional conditions which typically still account for between 20% and 25% of all deaths.²

² "Injuries" typically account for only 5% of all deaths in the Pacific. Refer (WHO, Noncommunicable Diseases Country Profiles , 2011)

1.6 **Governments also realise that the cost of treating NCDs can become unsustainable.** A key characteristic of health financing in Pacific is that governments (supported by development partners) pay for most of health care. Private and out of pocket expenditure is low in absolute and relative terms. Indeed, Kiribati has the lowest out of pocket household spending in the world: just 20 cents per year. (WHO, WHO Global Health Expenditure Atlas , 2012). As Chapter Four of this report makes clear, NCDs can impose costs on governments that are high in absolute and relative terms, especially as a disease progresses or becomes chronic. Yet as Chapter Four also shows, many governments in the Pacific already feel the strain of public health care costs on their national budgets. Many also have only limited scope (“fiscal space”) to increase expenditure further on public health in a way that is sustainable.

1.7 **Not surprisingly therefore, Governments in the Pacific have recognised NCDs as a national priority affecting socio-economic development.** Pacific Islands Forum Leaders have explicitly recognised the link between NCDs and development, declaring the “Pacific is in an NCD Crisis” as part of the 42nd Pacific Islands Forum communiqué of September 2011. They also noted that “an estimated 75% of all adult deaths in the Pacific are due to NCDs, with the majority of deaths occurring in the adults in the economically active age group”. Pacific Health Ministers have similarly made joint statements about the importance of NCDs as a public health and development issue via the *Honiara Communique on the Pacific NCD Crisis* issued on 30 June 2011.

The objective, intended audience and status of this report

1.8 **Against this background, the World Bank was asked to undertake some initial work on clarifying the possible financial and economic costs of NCDs.** This involved fact finding and interviews in May 2012 of around four days in each of Samoa, Tonga and Vanuatu. These two Polynesian (Samoa and Tonga) and one Melanesian (Vanuatu) countries were chosen because they have reasonably similar levels of NCDs, income per capita in PPP terms, population size and structure and health financing arrangements, with Government financing and provision being dominant. This report summarises the main findings from that initial stocktake for the three countries, together with other relevant data from other Pacific Island countries where appropriate.

1.9 **The objective of this report** is to highlight what is currently known about the nature, and costs, of NCDs in these three countries; to suggest some initial policy implications for Ministers of Finance as well as Ministers of Health based on that rapid stocktake; and to serve as a basis for discussion as to any possible future next steps. The intended audience are Government officials in Ministries of Health, Ministries of Finance, and Ministries of Planning, as well as their bilateral and multilateral development partners. A short two page policy note at Annex Seven is intended as an early draft for possible eventual use by Ministers of Health, and Ministers of Finance.

1.10 **This report is a Technical Assistance Report to stimulate discussion.** Given the existing gaps in data and statistics, this report is not part of the World Bank Economic and Sector Work studies.

Definitional issues and data limitations in estimating financial and economic costs of NCDs in this report

1.11 There are several approaches to estimating the financial and economic costs of NCDs. (Chisolm D et al, 2010), (WHO, WHO Guide To Identifying The Economic Consequences Of Disease And Injury, 2009), (Drummond M et al, 2005). Financial (that is, monetary) and economic (that is, resource costs more broadly) costs can involve direct medical care for diagnosis, procedures, drugs and inpatient and outpatient care. They can also impose direct non-medical costs, such as the costs of transportation for treatment and care. Indirect costs include productivity costs related to lost or impaired ability to work. Intangible costs include pain and suffering. Importantly, opportunity costs of NCDs involve the opportunities foregone to allocate those resources to other health, or other national priorities. There can also be non-market social costs: withdrawing of children from school to look after stroke or diabetes patients. Costs can occur at the national (macroeconomic) level, including through reduced labour supply, savings, and capital formation or at the household and individual firm level (loss of income, increased expenditures etc).

1.12 The scope of this study is to identify the financial costs to Government of treating and preventing NCDs. Government has been chosen as the unit of analysis in this paper because the major component of health expenditure in the Pacific Islands comes from Government (rather than private out of pocket payments) as can be seen from Annex One and Two. Governments in the Pacific are also directly interested in knowing how to expand essential health services to their population, whilst simultaneously maintain some level of cost control over health budgets that are putting increasing demands on government budgets. Unfortunately, data limitations have prevented a full economic analysis, including costs to households and productivity losses from NCDs. Limited data on socio-economic status of patients has also prevented an analysis of equity of access and outcomes, another important part of broader economic analysis.

1.13 There are important data gaps concerning the disease profile of the NCDs. Mortality data – a basic starting point - is generally poor. For example, the leading cause of death in Vanuatu, involving 199 cases, or over half (51%) of all recorded deaths, is classified as “unknown”.³ (Government of Vanuatu, Health Information System Annual Report, 2012). Less than half (48.6%) of health facilities provided the expected Health Information System reports in Vanuatu during 2010. Reporting coverage of this basic piece of information had fallen to just 34% in 2011. (Government of Vanuatu, Health Information System Annual Report , 2011). More than 50% of deaths (285/553) of total deaths in Tonga occur outside the health infrastructure system and are vulnerable to having no death certificate unless the family requests it in Tonga. The second highest cause of death in Tonga after diseases of the circulatory system was ‘unknown’ (technically: ‘Symptoms signs and abnormal clinical and laboratory findings not elsewhere classified’). (Government of Tonga, Report of the Minister for Health., 2010). The situation is similar in the other countries.

1.14 Even when vital statistics are recorded, they have been found to be prone to large errors in estimation. For example, a well-conducted study now in the process of publication finds that

³ This is then followed by 35 neonatal deaths, 30 heart related deaths, 25 asthma deaths, 24 stroke related deaths, 20 cancer deaths, 18 hypertension deaths, 18 diabetes deaths, 10 diarrhoea deaths and 9 pneumonia deaths.

there has been substantial under-reporting of diabetes and cancers (neoplasms) as an underlying cause of death in Tonga. Specifically, 47 of 59 (80%) of deaths for which diabetes was actually the underlying cause of death were originally assigned to septicaemia (which is not an NCD) and cardiovascular disease. Similarly, 12 cancer deaths (18%) were originally assigned to other causes. (Carter K et al, Forthcoming publication).

1.15 There are other data limitations. Cancer deaths were not included in NCD deaths in Tonga's National Health Accounts. Data that does exist in the Pacific, and in the international literature, tends to focus on mortality (death) rather than morbidity (illness). Very limited country specific information is available on co-morbidities and the interaction between NCDs, including for diabetes on CVD. Comparable time series panel data on prevalence, and risks, for NCDs is limited. Samoa and Tonga had their first STEPS survey in 2002 and 2004 respectively, and a second STEPS survey will be undertaken in both countries during 2012. Vanuatu had its first STEPS survey in 2011, with a second one planned for 2016. There is also very little publicly available data on trends in mental ill health and dementia⁴: an often overlooked but potentially growing health and cost burden, especially in ageing populations.

1.16 There are important gaps in understanding costs as well. Most countries in the Pacific collect data on health expenditure under their Chart of Accounts by functional headings - salaries and allowances, medicines, etc – rather than by disease group – communicable or NCD. Tonga has taken the welcome initiative of having a chapter on NCDs within its National Health Accounts (NHA), but the most recent NHA is for 2005/6. An updated NHA is being prepared now, but the chapter on NCDs will not be available until the end of 2012. Samoa's latest NHA is for 2006/7 and Vanuatu's is for 2007. Neither Samoa or Vanuatu's NHAs have data on NCDs per se. Budget documents focus on costs to government, and rarely capture survey data on out of pocket private expenditure although this is generally expected to be small, and less than 10 % total health expenditure, in the three countries. Some costs to Government are not routinely captured in budget documents, including the cost (or depreciation) of buildings including hospitals.⁵ The economic resources used by volunteer services, including overseas volunteer medical missions and surgeries, often for NCDs, are not normally captured in budget documents.

1.17 Lack of data has long been recognised as a problem. The first recommendation of a 2003 study on the impact of NCDs on hospital costs for three countries in the Pacific was to improve the quality of statistical data. (Doran C, 2003). The observation about lack of data on NCDs can also be made of many developed countries as well: trend data on expenditure on NCDs over time was only available for 6 of the 13 mainly OECD countries examined recently by WHO. (Garg C and Evans D, 2011).

1.18 There are, however, regional and national efforts to improve data. The Pacific Research Centre for the Prevention of Obesity and NCDs ("C-POND") is a recent initiative of Fiji School of Medicine and Deakin University aimed at generating data on NCDs. The Pacific Vital Statistics Action

⁴ As noted in box one of this report, mental health and dementia is not usually included in the definition of Non-Communicable Diseases. This report, focused specifically on NCDs, follows that practice. However, mental health should clearly be included in broader considerations about public health and public financing.

⁵ Maintenance and cleaning costs are included in all budgets, but this is not the same thing as depreciation of an asset such as a building and its equipment.

Plan 2011-2014 aims to improve vital registration statistics. The Pacific Health Information Network (PHIN) has a six year regional plan for improved health information systems and training in the Pacific. The World Bank has been supporting regional courses on health financing and public financial management. The George Institute for Global Health is interested in working on interventions to reduce salt intake in the Pacific. The “Brisbane Accord Group” involves AusAID, UNICEF, WHO and others in coordinating support for health issues, including better information, in the Pacific.

Chapter Two: the overall country context in Samoa, Tonga and Vanuatu

2.1 This chapter provides a brief summary of the overall country situation and health sector so as to provide broader context for the subsequent discussion on NCDs. Table 2.1 below provides latest available key statistics. Annex Two provides health expenditure statistics for 2010, the latest year available for comparable statistics. Annex Three provides health expenditure statistics for 2009, which then allows comparison with averages for all lower middle income, and upper middle income, countries globally.

2.2 The key message is that Samoa, Tonga, and Vanuatu have distinctive, but similar, characteristics and challenges. All three are lower middle income, relatively small, economies. All three have relatively high fertility rates and a relatively young population (median age 21 years). All three face the challenge of a “double burden” of disease, with 25% of total deaths of all ages occurring through communicable, maternal, perinatal and nutritional conditions, while 70% of total deaths of all ages occurring through NCDs. In all three countries cardiovascular disease – an NCD – is the leading cause of total deaths of all ages, representing more than one third of all deaths. In all three countries, total expenditure on health as a share of Gross Domestic Product, and per capita, is higher than the average for other lower middle income countries globally (Annex Three). In all three countries, Governments are the dominant source of funding for health, reaching 90.6% of total health expenditure (public and private) in Vanuatu in 2010. In all three countries Governments rely on external sources of assistance to fund health at rates at least four times higher than the average for other lower middle income countries. Paragraph 2.3 onwards elaborates.

Table 2.1

Key economic, population, health and health financing indicators

Source: World (World Bank, World Development Indicators, 2012) unless otherwise shown

Indicator	Samoa	Tonga	Vanuatu
<i>Economy and income</i>			
Gross National Income per capita 2011	US\$ 3117	US\$ 3580	US\$ 2870
Gross National Income per capita 2011	I\$ 4430	I\$ 4690	I\$ 4500
Gross Domestic Product in 2011 (US\$ current)	649.4 million	435.5 million	819.2million
<i>Demographics</i>			
Total population 2011	183,874	104,509	245,619
Total fertility rate per woman 2010 (a)	5	5.8	3.5
Annual population growth rate per annum 2010 (a)	3.9%		3.9%

Indicator	Samoa	Tonga	Vanuatu
Population aged 0-14, per cent of total (2011)	37%	37%	37%
Population aged 15-64, per cent of total (2011)	57%	56%	58%
Population aged 65 and above, per cent of total (2011)	5%	5.8%	3%
Population median age (a)	21 years	21 years	21 years
Population in urban setting (% total population) 2010 (a)	20%	23%	26%
<i>Selected Health Indicators (b)</i>			
Life expectancy at birth 2010 (male / female)	69/75	69/75	69/75
Infant mortality rate (a)	17 / 1000 live births	13/1000 live births	12 / 1000 live births
Under five mortality rate (a)	20 / 1000 live births	16/1000 live births	14/ 1000 live births
NCDs as % total deaths, all ages, 2008 (c)	70%	74%	70%
Cardiovascular disease as % of total deaths, all ages, 2008 (c)	37%	38%	36%
Communicable, maternal, perinatal and nutritional conditions as % total deaths, all ages, 2008 (c)	25%	22%	24%
Injuries as % total deaths, all ages, 2008 (c)	5%	4%	5%
<i>Selected Health Resources</i>			
Physicians per 1000 population (2010)	0.47/1000	0.56/1000	0.11/1000
Nurses and midwives per 1000 population (2010)	1.8/1000	3.8/1000	1.7/1000
<i>Health expenditure</i>			
Total Health Expenditure as % GDP 2010 (d)	6.5%	5.1%	5.2%
Private health expenditure as % GDP 2010	0.8%	0.9%	0.5%
General government expenditure on health as % total expenditure on health, 2010 (a)	87.7%	81.5%	90.6%
General government expenditure on health (including external resources) as % total government expenditure 2010 (a)	23.4%	12.9%	18.2%
External resources for health as % total	13.4%	17.4%	23.4%

Indicator	Samoa	Tonga	Vanuatu
health expenditure (a)			
Per capita total health expenditure, current US\$ 2010 (a)	US\$ 204	US\$ 172	US\$ 157
Per capita total health expenditure PPP constant 2005	I\$ 282	I\$ 229	I\$ 239
Per capita government expenditure on health at average exchange rate, 2010, (d)	US\$ 179	\$US 140	\$US 143
Per capita government expenditure on health, 2010, PPP (a)	I\$ 248	I\$187	I\$ 217

Note (a): (WHO, Global Health Observatory, 2012)

Note (b): The Maternal Mortality Rate is prone to estimation distortions given the small size of island populations and is therefore not included

Note (c): (WHO, Noncommunicable Diseases Country Profiles , 2011)

Note (d): WHO NHA Database. Available at:

http://apps.who.int/nha/database/StandardReport.aspx?ID=REP_WEB_MINI_TEMPLATE_WEB_VERSION&COUNTRYKEY=84701

Economies and per capita income

2.3 All three countries are lower middle income countries⁶ with relatively small economies.

All three countries have a similar GNI per capita especially when purchasing power and local costs are taken into account: all three have a GNI per capita of around I\$ 4500 in Purchasing Power Parity terms⁷. All three have volatile but generally relatively low economic growth rates, especially in per capita terms. This reflects the well-known challenges of economic growth in the island economies of the Pacific including smallness, remoteness from markets, vulnerability to external natural (hurricanes and tsunamis) and economic shocks.

⁶ International practice is to divide economies according to 2010 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, \$1,005 or less; lower middle income, \$1,006 - \$3,975; upper middle income, \$3,976 - \$12,275; and high income, \$12,276 or more. (World Bank, How We Classify Countries, 2012).

⁷ In essence, Purchasing Power Parity (PPP) approaches seek to avoid distortions caused by market fluctuations in exchange rates. PPP approaches recognise that actual costs in one country may well be lower in one country compared to another, so that the actual “purchasing power” of local currency may be higher than might otherwise seem to be the case. PPP uses a notional “international dollar” to distinguish it from \$US.

Population and age structure

2.4 All three countries have fast growing, relatively young populations. The median age for Samoa, Tonga and Vanuatu is identical at 21 years. In each country over half their population is of working age (15 – 64). Children under 15 represent just over a third (37%) of the age group. Elderly (65 years and above) currently represent around 5% of the population in Tonga and Samoa, and 3.5% of the total population in Vanuatu. Tonga and Samoa have a relatively high Total Fertility Rate (5.8 and 5 children per woman respectively).

2.5 This has implications for future health outcomes, and future public health financing. NCDs do not usually appear at the median age of 21 years apparent in these three countries. However the risk factors, including being overweight or obese, being sedentary, and using tobacco and alcohol are often in place or are being formed by the median age of 21 years. There is insufficient epidemiological and population health data to make good projections of the possible incidence and prevalence of NCDs as this large cohort of young adults age and move into middle and old age. However given current rates of premature mortality from NCDs (paragraph 3.5 – 3.6) and the high level of existing risk factors amongst adults generally (Chapter 3) the prospects for an increase in NCD related ill health appear somber.

Health indicators

2.6 The three countries have mixed health indicators, and face a “double burden” of communicable and non-communicable diseases. Life expectancy is relatively high, while infant and under-five mortality is relatively low, compared to other lower middle income countries. (The Maternal Mortality Rate is prone to estimation errors given the small size of island populations so has not been included). The three countries still face a “double burden”: communicable, maternal and neonatal deaths still account for around 25% of total deaths of all ages, whilst NCDs account for 70% of total deaths of all ages, most of which are premature (before the age of 60, see Chapter Three for further discussion). Under-nutrition coexists with obesity: UNICEF notes in Vanuatu 20% of children are stunted, 16% are underweight, and 7% wasted (UNICEF, 2012) whilst WHO estimated that 27% of the population is obese. (WHO, Noncommunicable Diseases Country Profiles , 2011)

Health financing

2.7 The small size of Pacific Island countries means health financing statistics should be approached carefully. Total population ranges from 1,468 people in Niue to 860,623 in Fiji. Samoa, Tonga and Vanuatu all have total populations well below 250,000. (Details in Annex One). This means that even relatively modest expenditures, or one-off lumpy expenditures such as building a new hospital, can have large effects in per capita terms. Volatility in aid flows also distorts figures year to year in the Pacific, especially given the relative significance of ODA in health financing in the region. With those caveats in mind, the following observations can be made.

2.8 Per capita financing for health is low in absolute terms. As can be seen from Table 2.1 and Annex Two, the total (i.e. public and private) per capita expenditure on health in 2010 ranged from

\$ 157 per capita per year in Vanuatu to \$ 204 per capita per year in Samoa. (All figures in this report are current US\$ unless otherwise specified). This amounts to between \$0.43 cents and \$0.55 cents per person, per day. Adjusting for often lower prices in the Pacific through purchasing power parity does not significantly alter the situation.⁸ Per capita *government* expenditure is lower, ranging from \$0.38 cents per person per day in Tonga to \$ 0.49 cents in Samoa.

2.9 But per capita financing for health is high relative to other countries. Total per capita expenditure on health in Samoa is nearly two and a half times what other lower middle incomes countries spend. Vanuatu spends almost double what other lower middle income countries do. And *government* expenditure on health per capita is even higher than lower middle income countries globally. Government expenditure on health in Samoa is 5.28 times what other lower middle incomes spend per capita in current US\$, and 3.57 times higher when purchasing power is taken into account. Chapter Four provides further details.

2.10 Government financing for health is dominant in several respects. Government finances between 80% and 90% of total health care in Samoa, Tonga and Vanuatu, more than double the ratio of other lower middle income countries globally (Annex Three). Partly as a corollary, private out of pocket expenditure for health is also low compared to other lower middle income countries. (Annex Three). “Catastrophic expenditure” on health care ⁹ is virtually unknown in the Pacific. To a large degree, the substantial role of Government in financing - and direct provision – of health services reflects the nature of small Pacific Island economies. Even modest absolute levels of expenditure by government (and donors) can be relatively large compared to the population size. The small size of the formal private sector, including in health care, is also a factor. To illustrate, the Vanuatu National Provident Fund had a total of just 23,584 active contributing members as at 31 December 2010 (latest date available) and only 3092 actively contributing employee companies. The Government of Vanuatu Budget document for 2012 confirms that membership of the VNPF can be taken as a proxy for the level of formal employment in Vanuatu. Relatively small and weak NGOs in the Pacific have also contributed to the dominant role of government financing.

2.11 Just as government financing dominates total health expenditure, expenditure on health figures large in government overall budgets. General government expenditure on health, including external financing, was 13%, 18%, and 23% of total government expenditure in Tonga, Vanuatu and Samoa respectively in 2010. (WHO, NHA Database, 2012). This is two to four times higher than the rate in other lower middle income countries. (Annex Three).

2.12 External financing for health is also much larger in relative terms than other lower middle countries. External financing, particularly in the form of ODA, but also from new emerging donors, is a large and important part of health financing. External financing represented 13.4%, 17.4% and 23.4% of total expenditure on health in 2010. (Annex Three). External financing for health in Samoa, Tonga and Vanuatu ranged from 4.7 to 9.7 times higher than the rate in other lower middle income countries in 2009. (Annex Three).

⁸ Footnote 7 describes Purchasing Power Parity (PPP). Total expenditure on health then ranges from Int \$ 0.62 per person per day in Tonga to Int \$ 0.77 per person per day in Samoa.

⁹ “Catastrophic” expenditure on health care has been defined as spending more than 40% of household consumption expenditure, excluding food, on health; spending more than 25% of non-food consumption expenditure of households health; or more than 10% of total household consumption expenditure on health. (Tangcharoensathien V, 2011)

Chapter Three: Update on NCDs prevalence and risk factors in the Pacific

Prevalence of NCDs in Samoa, Tonga and Vanuatu

NCDs as the major cause of death

3.1 It needs to be emphasised that statistics on NCDs in the Pacific should be treated with caution. There are important gaps in health information statistics generally in the Pacific (paragraphs 1.13 – 1.17 refer). This applies to statistics on NCDs as well. Many NCDs, including Type 2 diabetes and CVD, have few visible symptoms until the disease is well advanced and so go undiagnosed, untreated, and unreported. Those NCDs that are reported have found to be often misdiagnosed (paragraph 1.14). Diabetes and Circulatory diseases, while classified separately, often coexist in patients. Many of the estimates are dated, going back to surveys conducted in 2000. Current research suggests that overestimation of life expectancy in the Pacific may have masked the problem of high adult mortality, including from NCDs. (Carter KL forthcoming). With those caveats in mind, the following section summarises latest statistics on what is known about NCDs in the Pacific.

3.2 NCDs are already important contributors to mortality and morbidity in the Pacific. WHO estimate that NCDs accounted for 70% of all deaths in Samoa and Vanuatu, and 74% of all deaths in Tonga in 2008, the latest year for which comparative estimates are available. (WHO, Noncommunicable Diseases Country Profiles , 2011). Deaths from NCDs therefore account for more than twice the contribution of deaths from “communicable, maternal, perinatal and nutritional disorders conditions”, although that category of death is relatively high too at around 25% of all deaths. The key information about NCDs for Samoa, Tonga and Vanuatu is available in Annex One and summarised in Table 3.1 below.

Table 3.1

NCD deaths and risk factors, 2008 estimates

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011).

NCD characteristic	Samoa	Tonga	Vanuatu
NCD mortality			
Total NCD deaths (Male; Female).	400 M; 400 F	200 M; 300 F	500 M; 300 F
NCD deaths under age 60 (per cent of all NCD deaths: Male and Female)	36 % M; 27 % F	25% M; 35%F	37% M; 42% F
Age standardised death rate from all NCDs per 100,000 (Male and Female)	772 M; 583 F	649 M; 672 F	767 M; 576F
Behavioural Risk factors (% adult prevalence)			
Physical inactivity (%)	35% M; 65% F	30% M; 52%F	Not available
Current daily tobacco consumption	53% M; 17% F	36% M; 7% F	21%M; 3%F
Metabolic Risk Factors			
Obesity	43% M; 65% F	46%M; 68%F	21%M; 34%F
Overweight	81% M; 88%F	84% M; 89% F	59%M; 65%F
Raised blood pressure	43% M; 36% F	42% M; 38%F	44%M; 39%F
Raised blood glucose	19% M; 22% F	15% M; 19% F	8%M; 8%F
Elevated cholesterol	31% M. 36% F	52% M; 45% F	Not Available

3.3 The Secretariat for the Pacific Community (SPC) has also collected statistics on crude death rates from NCDs for various years for those countries where statistics are available. These are available at Annex 4. Table 3.2 below summarises the situation by showing those ten Pacific Island countries with the highest crude death rates from NCDs. These are ranked in order, with Fiji clearly having the highest national crude death rate from NCDs at 501 per 100,000 adult population. In most cases, the underlying cause of death in Table 3.2 was circulatory diseases such as heart disease. Diabetes was the principal disease in the sixth and eight ranked countries (Marshall Islands and Fiji respectively). Table 3.2 also shows the often marked difference in crude death rates between men and women. In every case except the Cook Islands, and in Fiji with respect to diabetes, men have higher crude death rates than women, often by a wide margin.

Table 3.2

Crude death rates from NCDs per 100,000 adult population: leading five countries.

Source: (SPC, 2011)

Country	Total for the country (Male and Female)	NCD disease	Male	Female
Fiji	501	Circulatory	599	400
Marshall Islands	374	Circulatory	521	224
Cook Islands	373	Circulatory	349	396
Palau	369	Circulatory	454	264
Tonga	331	Circulatory	442	224
Marshall Islands	327	Diabetes Mellitus	354	299
American Samoa	313	Circulatory	n/a	n/a
Fiji	304	Diabetes Mellitus	293	314
Guam	295	Circulatory	350	237
Tuvalu	295	Circulatory	n/a	n/a

The role of cardiovascular disease

3.4 Cardiovascular disease is the main cause of death. The WHO estimates that cardiovascular disease (including heart attacks, stroke, coronary heart disease and the like) account for over one third of total deaths, of all ages, in Samoa, Tonga and Vanuatu. (WHO, Noncommunicable Diseases Country Profiles , 2011). More people die from cardiovascular disease in these countries than die from all communicable, maternal, perinatal and nutritional conditions, although they are important too, responsible for around one quarter of all deaths. Cancers, chronic respiratory diseases and diabetes are also important contributors of deaths. Latest estimates from WHO are summarised in Table 3.3. It should also be recalled that many NCDs co-exist and interact with each other. For example, globally, 20% or more of people with hypertension have diabetes, and 80% or more of people with diabetes have hypertension. (Schiffrin E, 2012)

Table 3.3

Proportional mortality: % of total deaths, all ages, 2008

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011)

NCD and other, proportion of total deaths all ages	Samoa	Tonga	Vanuatu
<i>NCD</i>			
Cardiovascular disease	37%	38%	36%
Chronic Respiratory Diseases	7%	7%	6%
Cancers	6%	9%	12%
Diabetes	5%	5%	4%
Other NCDs	15%	15%	13%
<i>Total NCDS</i>	70%	74%	70%
<i>Communicable, maternal, perinatal and nutritional conditions</i>	25%	22%	24%
<i>Injuries</i>	5%	4%	5%

High rates of premature NCD deaths

3.5 Importantly, at least one quarter of NCD deaths are premature in Tonga, Samoa and Vanuatu, proportions that can be much higher than other lower middle income countries. The WHO notes that in lower middle income countries the proportion of premature NCD deaths (that is, under age 60) rose to 28% in 2008. (WHO, Noncommunicable Diseases Country Profiles , 2011). This is also around the proportion of premature NCD deaths for males in Tonga and females in Samoa. However, as seen in Table 3.1, around one third of male NCD deaths in Samoa and Vanuatu, and one third of female NCD deaths in Tonga in 2008, were estimated by WHO to be premature. Forty two per cent of female NCD deaths in Vanuatu were premature, 14 percentage points higher than the average for lower middle income countries.

3.6 There is not sufficient evidence to explain the higher rates of premature NCD deaths in Samoa, Tonga and Vanuatu. Nor is it a phenomenon limited to those three countries: Charts 3.1 and 3.2 below show that almost all countries in the Pacific have higher proportions of premature NCD deaths than the lower middle income global average, albeit at different rates for males and females. One could speculate that the high prevalence of risk factors across the population, summarised in Annex One, is a factor. There is also anecdotal evidence that many NCD diseases go unrecognised and undiagnosed, and appear to be occurring in relatively young cohorts. There is also anecdotal evidence of poor compliance with long term medication, underpinned by a sense of fatalism, which allows NCD complications to escalate.

Chart 3.1

Proportion of male premature NCD deaths.

Source (WHO, Noncommunicable Diseases Country Profiles , 2011)

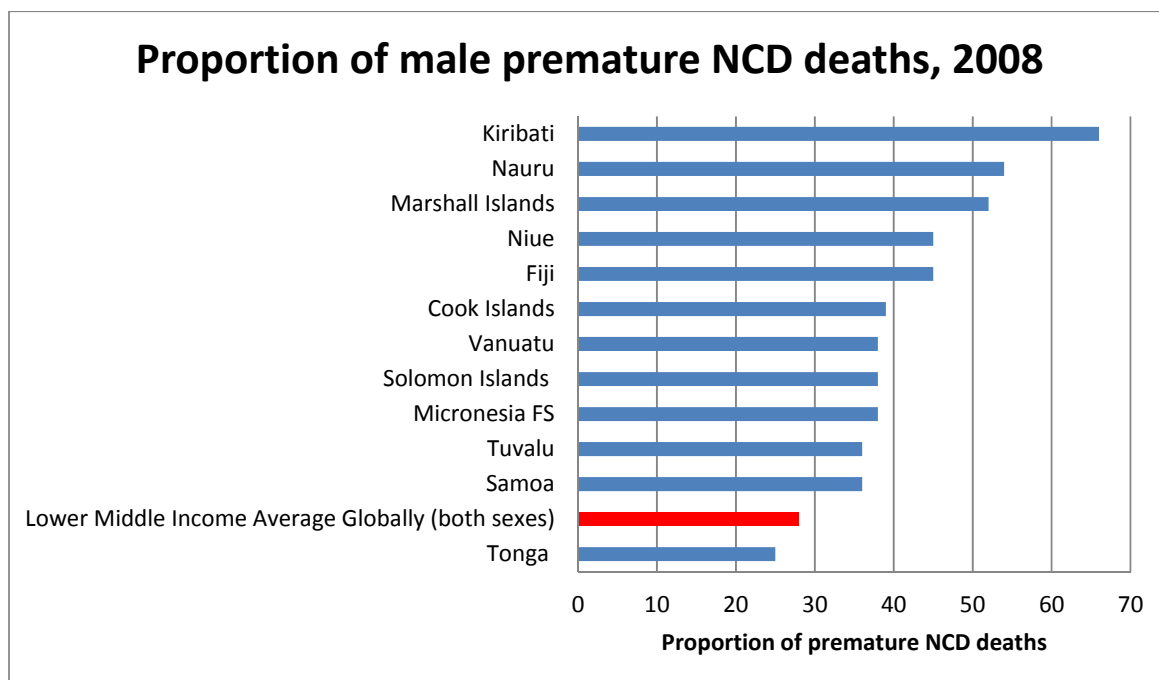
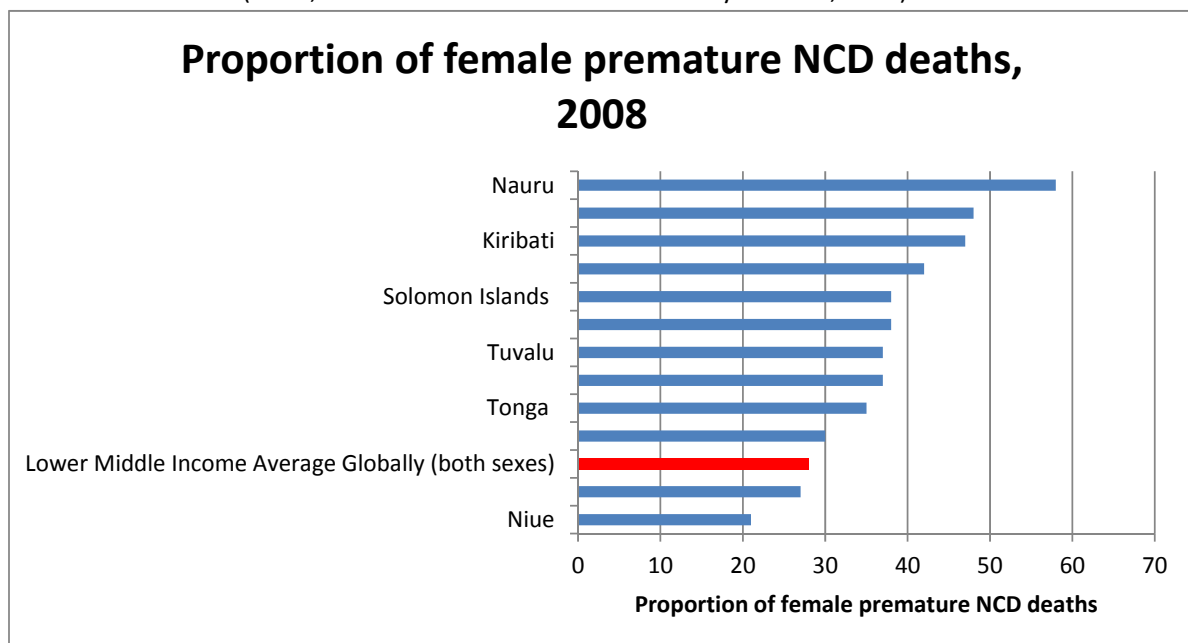


Chart 3.2

Proportion of female premature NCD deaths.

(WHO, Noncommunicable Diseases Country Profiles , 2011)



Specific country data on NCDs

3.7 Specific country data confirms the importance of NCDs. Recent official documents note that the prevalence of NCDs in Tonga has risen from 7% in 1973 to 18% in 2004, and life expectancy appears to have fallen five years for men (from 70 years in 1969 to 65 years in 2010) and three years for women (from 72 to 69). (Government of Tonga, Report of the Minister for Health., 2010). The leading causes of death registered at the hospitals in Tonga are diseases of the circulatory system (29% all deaths) followed by symptoms signs and abnormal clinical findings (102 or 18%) and neoplasms (83 deaths or 15%). (Government of Tonga, Report of the Minister for Health., 2010). In Vanuatu, diabetes vascular disease is the most common reason for admittance to surgery wards in Vanuatu, representing around half of all patients admitted at Vanuatu's Northern District Hospital and one quarter at Vila Central Hospital. (Government of Vanuatu, Public Expenditure Review: Health Sector , 2012). In Samoa, diabetes related admissions to the main tertiary hospital increased from 473 to 649 over the period 2006 to 2008. Diabetes related amputations increased from 49 to 85 over the same period, whilst the median age of such amputations decreased from 64 to 50. NCDs are a primary cause of overseas medical treatment in Samoa, a high cost form of treatment.

Table 3.4

Distribution of mortality by sex and age due to cardiovascular disease in Tonga

Source: (Government of Tonga, Report of the Minister for Health., 2010)

Age group	Female	Male	Total	Percentage of total	Cumulative percentage
< 1	1	3	4	3	3
1-14	0	0	0	0	3
15-24	1	2	3	2	5
25-34	1	2	3	2	7
36-44	1	7	8	5	12
45-54	3	12	15	10	22
55-64	17	24	41	26	48
65-74	11	29	40	25	73
75+	20	25	45	28	100
Total	55	105	160	100	100

Underlying Risk Factors for NCDs

3.8 Many risk factors drive the rise in NCDs. Some risk factors cannot be changed including age, gender, and genetics. Other risk factors are considered wholly or partially modifiable. They include behavioural risk factors (tobacco and alcohol use, diet, and levels of physical activity); metabolic factors (elevated blood pressure, blood glucose levels etc); and broader, underlying, socio-economic trends (including rising urbanisation with its associated sedentary lifestyles and increased access to highly processed foods and salt). WHO notes that the leading risk factor globally for mortality is

raised blood pressure, responsible for 13% of deaths globally. This is then followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%). (WHO, Noncommunicable Diseases Country Profiles, 2011). WHO notes that four risk factors underpin 80% of all NCD deaths globally: smoking, nutrition, alcohol, physical inactivity (SNAP).

Obesity and overweight

3.9 Obesity, and being overweight, are particularly important risk factors for NCDs in the Pacific. The Pacific Islands have some of the highest rates of obesity and overweight in the world. In four countries of the Pacific¹⁰ at least half the adult population is obese (Annex One). As can be seen from Table 3.1, the levels of obesity and overweight in Samoa, Tonga and Vanuatu are also high. Over 80% of males and almost 90% of females are overweight in Tonga and Samoa. Almost half of males and over two thirds of women are also obese. This is important because WHO estimates that, globally, 44% of the diabetes burden, 23% of the ischaemic heart disease burden, and between 7% and 41% of certain cancer burdens are attributable to being overweight or obese. (WHO, Obesity and overweight fact sheet number 311, 2012). The average weight for a woman in Tonga increased by 21.1 kg over 30 years to reach 95 kg, and increased by 17.4 kg to reach 95.7 kg. (Government of Tonga, Second National Millennium Development Goals Report, 2010).

3.10 Obesity and overweight can occur amongst the young. Chart 3.3 below shows the percentage of students aged 13 – 15 years that were overweight¹¹ in the six Pacific countries that reported results. In Tonga, 61 % of boys and 58% of girls aged 13-15 were overweight. Rates of obesity¹² were also high in some instances: 29% of boys aged 13-15 in the Cook Islands were obese, and nearly one in four boys (24.7%) and one in five girls (19.1%) in Tonga were obese. (Global School Based Student Health Survey, 2012). These rates of overweight and obesity are considerably higher than in other WHO regions and are a cause of concern. A recent analysis in *The Lancet* noted that:

Childhood obesity can adversely affect almost every organ system and often has serious consequences, including hypertension, dyslipidaemia, insulin resistance or diabetes, fatty liver disease, and psychosocial complications. Results of one study showed that being overweight or obese between ages 14 and 19 years was associated with increased adult mortality (from age 30 years) from various systemic diseases. (Han JC et al, 2010)

¹⁰ Cook Islands (63% obese); Nauru (71% obese); Samoa (54% obese) and Tonga (57% obese)

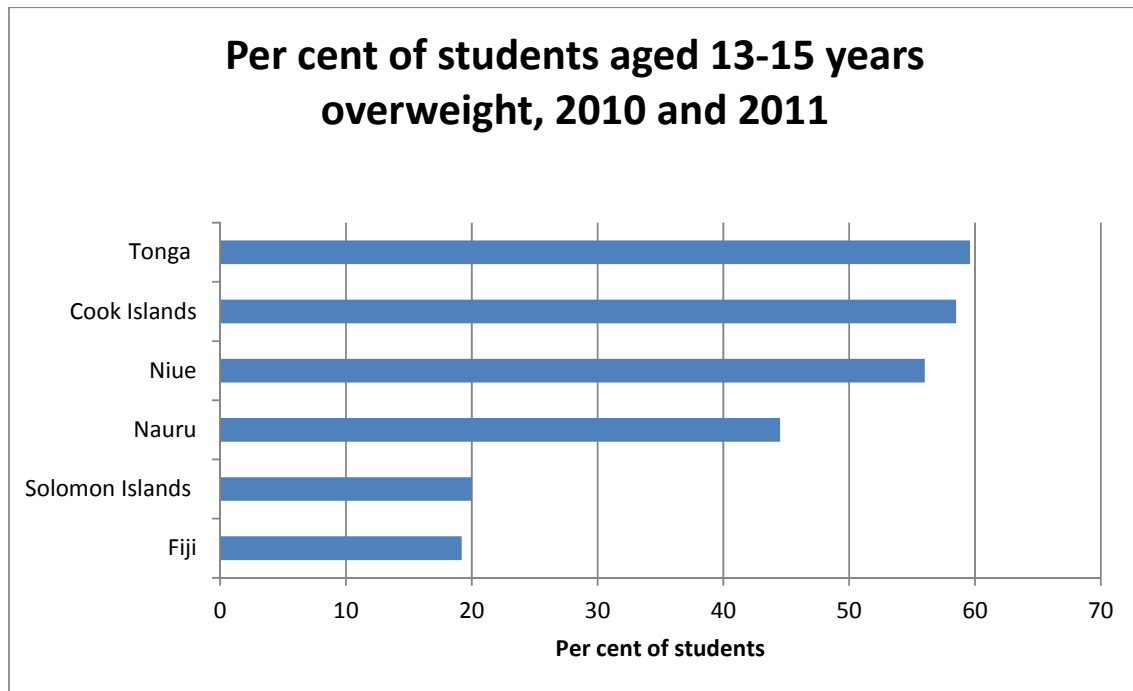
¹¹ Defined in this case as being greater than one standard deviation from the median body mass index for age and sex.

¹² Defined in this case as being greater than two standard deviations from the median body mass index for age and sex.

Chart 3.3

Per cent of students aged 13-15 that were overweight, 2010 and 2011.

Source: (Global School Based Student Health Survey, 2012)



3.11 Obesity and being overweight is relatively recent phenomenon in the Pacific, driven by multiple factors. A study on “lifestyle diseases” in the Pacific makes the point that early explorers were particularly struck by the good health and lean physiques of virtually all Pacific Islanders. (Coyne T, 2000). It is argued this reflected good diets (especially fish), active lifestyles, and the absence of exposure to tobacco, alcohol, and several communicable diseases. The study finds early western contact first brought epidemics of infectious diseases, including influenza and measles. Subsequently, however, the adoption of sedentary lifestyles and changed diets then increased the rates of non-communicable diseases. It is not particularly clear why Pacific Islanders then became some of the most overweight and obese in the world. One explanation involves the “thrifty gene”. This is an hypothesis that certain groups including Pacific Islanders had a gene that increased fat storage: an advantageous feature in times of food insecurity and long ocean voyages, but subsequently increasing rates of obesity and diabetes in the face of plentiful, processed, sugar and salt rich food and sedentary lifestyles. (Joffe B and Zimmet P, 1998). Whatever the explanation, what is noticeable is the relative speed with which obesity and associated NCDs appeared. For example, diabetes was not mentioned as a health problem in a survey conducted in Nauru in 1933. However in 1962 diabetes was reported in 21 Nauruans or 1 per cent of the population, and that by 1975 a full survey of diabetes found over a third (34.4%) of Nauruans aged 15 years and over to be diabetic. (Coyne page 148).

Changing diets

3.12 Changing diets is an underlying risk factor in the Pacific. Diets in the Pacific have changed from predominantly root vegetables, coconuts and fresh fish to ones consisting of bread, rice, tinned fish, sugar and salt and, more recently, Asian packaged noodles. Certain imported foods also increased NCD risks. Coyne cites earlier studies showing people in Vanuatu “were 2.19 times more likely to be overweight and or obese and 1.94 times more likely to be diabetic if they used imported fat sources compared to traditional fat sources such as coconut” (Coyne 2000 page 32). A separate study examining the links between food availability, food prices, and obesity in Samoa found that total energy availability from food increased by 47%, with more than 900 extra calories available per capita per day between 1961 and 2007. Mean Body Mass Index for men and women aged 35-44 also rose 18% between 1980 and 2010 (Seiden A et al, 2012). Another study found modern diets, with high levels of processed foods, was significantly and positively associated with metabolic syndrome in Samoa, an underlying characteristic of cardiovascular disease and type 2 diabetes. (DiBello J et al, 2009). The WHO supported 2011 STEPS survey in Vanuatu found that 65% of women, and 58% of men, did not eat the recommended five portions of fruit and vegetables per day. Estimates collected by the SPC show the surprisingly low intake of fruit and vegetables in much of the Pacific, often exceeding 95% of the total adult population. (SPC, 2011). Unfortunately, there appears to be little reliable public data on salt intake in the Pacific, despite the fact that salt intake is a potentially significant driver of hypertension. (Ibrahim M and Damasceno A, 2012).

Physical inactivity and urbanisation

3.13 Physical inactivity is also an important risk factor in the Pacific. Recent estimates suggest that, worldwide, physical inactivity causes around 10% of breast cancer and colon cancer; 9% of all premature mortality; and 7% of Type 2 diabetes. (Lee I M et al, 2012). A study of lifestyle diseases in Pacific communities found that increasing urbanisation and sedentary work practices contributed to “lifestyles of least effort” (Coyne T, 2000). Around 50% or more of the adult populations are physically inactive in six¹³ of the eight Pacific countries for which data is available. (Annex One).

3.14 Urbanisation is associated with more sedentary lifestyles, as well as greater access to alcohol, tobacco, and imported foods with high sugar, salt, and fat content. In a survey of over 30 developing countries, hypertension (high blood pressure) was always more prevalent in urban and semi-urban regions than in rural areas, with the single exception of Nigeria. Furthermore, prevalence of hypertension in urban India increased by 30 times over 25 years, compared to 10 times over 36 years in rural areas. (Ibrahim M and Damasceno A, 2012). In five Pacific Island countries, more than 50% of the total population now live in urban areas: Nauru (100% of the population in urban areas), Palau (77%), Cook Islands (72%), Marshall Islands (65%) and Fiji (51%). Current population growth rates imply doubling of Pacific urban population within 25 years (ADB, 2012).

¹³ Cook Islands 72 % physically inactive; Kiribati 49%; Marshall Islands 51%; Micronesia Federated States 65%; Nauru 49%; Samoa 49%.

Tobacco and alcohol use

3.15 Tobacco use is a major risk factor for NCDs globally and a contributing factor in the Pacific.

WHO notes that tobacco use is one of four¹⁴ major risk factors for NCDs. WHO also notes that tobacco use causes more deaths globally than HIV and AIDS, tuberculosis, and malaria combined. WHO further notes that “tobacco is the leading behavioural risk factor causing substantially large number of potentially preventable deaths worldwideone death every six seconds.” (WHO, WHO Global Report: Mortality Attributable to Tobacco, 2012). Total prevalence rates of tobacco vary considerably amongst the Pacific from 8% in Fiji to 67% in Kiribati (Annex One). Tobacco use by males and females also varies considerably. In Fiji 15% of males smoke tobacco daily compared to just 1.7% of females, whereas in Kiribati 73% of males and 61% of females smoke daily. (WHO, Noncommunicable Diseases Country Profiles , 2011).

3.16 Up to 10 per cent of NCD deaths are attributable to tobacco use in the Pacific.

WHO has recently estimated the proportion of deaths attributable to tobacco for a range of countries globally. Table 3.5 below summarises key information for Samoa, Tonga and Vanuatu. There are significant variations between the three countries. However it is noticeable that 12% of all deaths aged 30 – 44 years from all causes are attributed to tobacco use in Tonga. Ten per cent of all NCD deaths are attributable to tobacco use in Vanuatu. More than a third and up to two thirds of all trachea, bronchus or lung cancers are attributed to tobacco.

Table 3.5

Proportion of deaths attributable to tobacco, 2004.

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011)

	Samoa	Tonga	Vanuatu
Proportion of all deaths aged 30 and over attributable to tobacco (%)	2%	7%	8%
Proportion of all deaths aged 30-44 attributable to tobacco (%)	2%	12%	6%
Proportion of NCD deaths aged 30 and over attributable to tobacco (%)	3%	9%	10%
Proportion of all trachea, bronchus and lung cancer deaths aged over 30 attributable to tobacco (%)	38%	57%	66%

¹⁴ The four main risk factors are Smoking, Nutrition, Alcohol and Physical inactivity (“SNAP”).

3.17 Compliance with tobacco regulation is generally weak, providing an environment for uptake of tobacco amongst the young, and consequently the risk of addiction. The WHO notes that Samoa, Tonga and Vanuatu each scored 0/5 on key aspects of tobacco regulation: monitoring tobacco use and prevention policies; protecting citizens from tobacco smoke; offering services to help quit, warning of the dangers of tobacco; enforcing bans; and raising taxation on tobacco products.¹⁵ (WHO, Noncommunicable Diseases Country Profiles , 2011). A 2010 survey in Tonga found that access to tobacco was very high: all but one of Tonga's 597 retail store outlets sold tobacco products. This means there is an average of one tobacco outlet for every 29 Tongan households. Roughly speaking, Tongan citizens have more chance of accessing a store selling tobacco than they do of having a screening for diabetes at the Diabetes Centre.¹⁶ Almost two thirds (63%) of retail store outlets were selling tobacco sticks separately, and almost one quarter (23%) were selling tobacco to underage children, both activities in violation of the law. (Government of Tonga, Tobacco Survey for Retail Stores in Tonga, 2010).

3.18 Alcohol use varies across the Pacific, and between genders. Statistics collected from STEPS surveys by SPC show that current alcohol use for men ranges from 95% of the adult population in Tokelau through to 30% in the Marshall Islands. Female use of alcohol is consistently lower across the Pacific. In Samoa, 80% of adult males and 47% of adult females use alcohol. (SPC, 2011). The more recent WHO STEPS survey in Vanuatu found that only 12% of males and 7% of females drank alcohol in the preceding 30 days. Furthermore, 72% of women and 22% of males were "lifetime abstainers" of alcohol. Excessive consumption of alcohol is acknowledged as a major contributing factor in domestic violence (Government of Tonga, Second National Millennium Development Goals Report, 2010).

Combined risk factors

3.19 Of perhaps greater significance to public health officials is the *combined* risk factors as this can amplify the chances of acquiring NCDs. Table 3.6 and Chart 3.4 below shows the combined risk factors for NCDs in Vanuatu based on the latest WHO STEPS survey. As can be seen nearly 20% of males, and 15% of females, aged 25-44 years have three or more risk factors¹⁷ for acquiring NCDs. This increases to over 40% of females, and 25% of males, having three or more risk factors in the 45-64 year age group. Importantly, only 5% of adult females and 10% of adult males were free of any major risk of acquiring NCDs in Vanuatu. Equally importantly, those with three or more risk factors for acquiring NCDs are still – potentially at least – in the working age group of 25-64.

¹⁵ More formally, the WHO noted that Samoa, Tonga, and Vanuatu, along with many other Pacific Island countries, each scored 0 / 5 in terms of the "implementation of anti-tobacco (m) POWER measures at the highest level of achievement ". (m)POWER stands for M: Monitoring tobacco use and prevention policies; P: Protecting people from tobacco smoke; O: Offering help to quit tobacco use; W: Warning about the dangers of tobacco; E: Enforcing bans on tobacco advertising, promotion and sponsorship; and R: Raising taxes on tobacco. WHO notes that each measure reflects one or more provisions of the WHO Framework Convention on Tobacco Control, and the package of six measures is an important entry point for scaling up efforts to reduce the demand for tobacco.

¹⁶ There are 596 retail outlets selling tobacco in Tonga. There were 438 screenings for diabetes at the Diabetes Clinic in 2010.

¹⁷ There are five risk factors: current daily smoker; eating less than 5 servings of fruit and vegetables per day; low level of physical activity; overweight (BMI > 25 kg/m²); and raised blood pressure (systolic blood pressure > 140 and or diastolic >90 mmHg or currently on medication for raised blood pressure).

Table 3.6

Selected Risk Factors for NCDs in Vanuatu

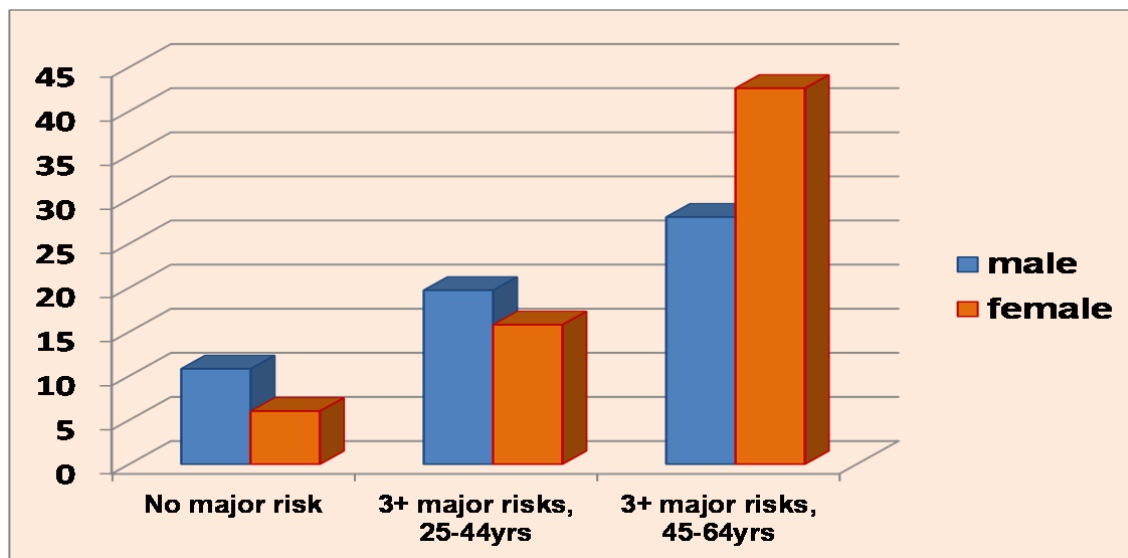
Source: (WHO STEPS Survey 2011)

Selected Risk Factor	Both Sexes	Males	Females
Mean body mass index (kg/m ²)	26.1 (25.9-26.4)	25.5 (25.2-25.8)	26.7 (26.4-27)
Per cent who are overweight (BMI ≥25 kg/m ²)	50.9% (48.8 – 53.1)	45.5% (42.8-48.3)	55.9% (53.2-58.5%)
Per cent who are obese (BMI ≥ 30 kg/m ²)	18.8% (16.9 – 20.8)	13.9% (11.9-15.9)	23.3% (20.7-25.8)
Mean fasting blood glucose, including those currently on medication for raised blood glucose: mmol/L	5.7 (5.6-5.8)	5.7 (5.6-5.8)	5.7 (5.6-5.8)
Percentage with impaired fasting blood glucose defined as follows: capillary whole blood value ≥5.6 mmol/L (100mg/dl) and <6.1 mmol/L (110 mg/dl)	18.8% (17.1-20.5)	19.0% (16.6-21.5)	18.6% (16.6-20.7)
Percentage with impaired fasting blood glucose, defined as capillary whole blood value ≥6.1 mmol/L (110mg/dl) or currently on medication for raised blood glucose	21.2% (19.0-23.3)	21.4% (18.8-24.0)	21.0% (18.5-23.5)
Percentage who ate less than 5 servings of fruit and/or vegetables on average per day	61% (57.9-65.6)	58.2% (53.4-63)	65% (61.2-68.7)
Percentage not engaging in vigorous physical activity	32.4% (28.5-36.3)	20.6% (17-24.1)	43% (38.4-47.7)
<i>Summary of combined risk factors for NCDs (current smokers; less than 5 servings fruit and vegetables per day; low level of physical activity; overweight (BMI ≥25kg /m²); raised blood pressure (SBP ≥140 and/or DBP ≥90 mmHg or currently on medication for raised blood pressure).</i>			
Percentage with none of the above risk factors	9.7% (7.5-11.9)	10.8% (8.2-13.3)	6% (3.6-8.5)
Percentage with three or more of the above risk factors aged 25-44 years	18.7% (15.8-21.6)	19.7% (16.1-23.2)	15.8% (11.3-20.2)
Percentage with three or more of the above risk factors aged 45-64 years.	30.6% (26.0-35.2)	28.0% (23.2-32.8)	42.6% (32.3-53.1)
Percentage with three or more of the above risk factors aged 25 to 64 years	22.3% (19.3-25.2)	22.3% (18.9-25.7)	22.1% (17.2-27.1)

Chart 3.4

Combined Risk Factors: Vanuatu 2011

Source: (WHO STEPS Survey 2012)



3.20 Risk factors, while generally increasing overall, tend to differ between the three countries, and between genders. This is seen in Charts 3.5, 3.6, and 3.7 below. Vanuatu, for example, displays lower levels of BMI for both males and females than in Samoa or Tonga, with narrower (although increasing) differences between males and females.

Chart 3.5

Trends in selected risk factors, 1980 -2008, Samoa

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011)

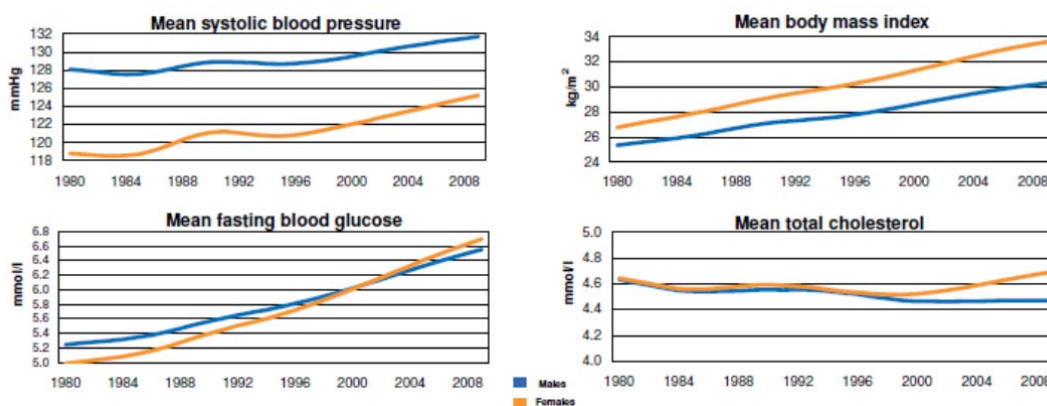


Chart 3.6

Trends in selected risk factors, 1980 -2008, Tonga

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011)

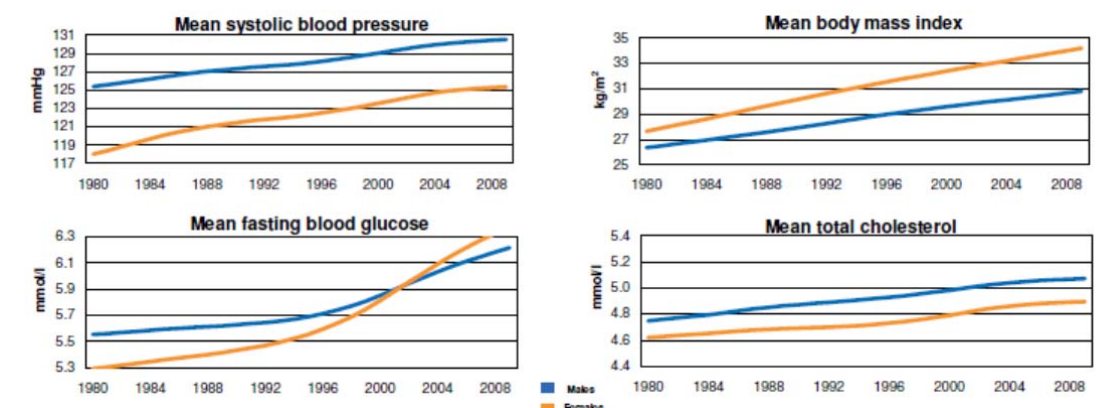
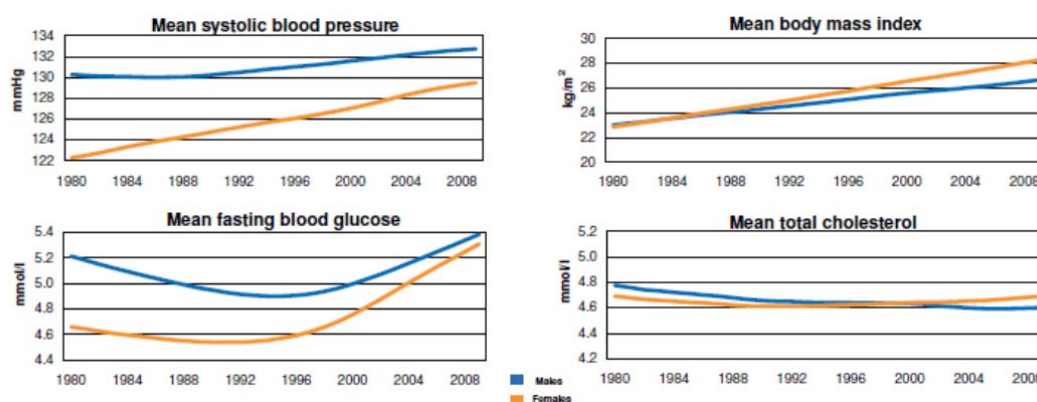


Chart 3.7

Trends in selected risk factors, 1980 -2008, Vanuatu

Source: (WHO, Noncommunicable Diseases Country Profiles , 2011)



Type 2 Diabetes: a particularly significant NCD in the Pacific

3.21 Special attention should be paid to diabetes as this is particularly prevalent in the Pacific. Table 3.7 below shows that 3 of the top 10 countries in the world for diabetes prevalence are in the Pacific: Kiribati, Marshall Islands, and Nauru. Estimates by the International Diabetes Federation suggest that by 2030, four of the five highest prevalence countries in the world for diabetes will be Pacific Island countries: Kiribati, Marshall Islands, Tuvalu and Nauru.

Table 3.7

Top ten countries globally for prevalence (% total population) of diabetes amongst 20-79 years of age, 2011 and 2030.

Source: (International Diabetes Federation, 2011)

Global country ranking in 2011	Prevalence of diabetes in 2011 (% total population)	Estimated Global Country Ranking in 2030	Estimated prevalence of diabetes in 2030 (% total population)
1.Kiribati	25.7	1.Kiribati	26.3
2.Marshall Islands	22.2	2.Marshall Islands	23.0
3.Kuwait	21.1	3.Kuwait	21.2
4.Nauru	20.7	4.Tuvalu	20.8
5.Lebanon	20.2	5.Nauru	20.7
6.Qatar	20.2	6. Saudi Arabia	20.6
7. Saudi Arabia	20	7. Lebanon	20.4
8. Bahrain	19.9	8. Qatar	20.4
9. Tuvalu	19.5	9. Bahrain	20.2
10. United Arab Emirates	19.2	10. United Arab Emirates	19.8

3.31 Diabetes imposes long term health and financial costs. This is partly due to the chronic, life - long nature of diabetes once it is acquired. It is also because diabetes is associated with and / or contributes to cardiovascular, kidney, and eye diseases. (Ferrannini E and Cushman W, 2012). The US Center for Disease Control estimates that a person with diabetes spent \$US 11,744 on health care compared to \$US 5,095 for a person without the disease (CDC, 2008). Latest research also finds that those with Type 2 diabetes double their probability of then also acquiring Alzheimer's disease, and increase their risk of dementia by 175 per cent over a 15 year period. (Matsuzaki T et al, 2011). Diabetes can have an adverse inter-generational effect as well. Pregnant women with diabetes have a higher risk of programming *in- utero* their offspring to obesity and Type 2 diabetes and other metabolic disorders. (Elisaia A et al, 2009).

3.32 Individual country estimates for Samoa, Tonga and Vanuatu confirm diabetes is an important challenge for those countries. Numbers of registered diabetic cases in Tonga have increased from 2000 in 2002 to 4007 in 2010. Large numbers of diabetics are still unrecognised and unregistered. Almost half (46%) of those visiting the Diabetes Centre had some degree of glucose intolerance. Amputations related to diabetes have increased three-fold in the last five years. (Government of Tonga, Report of the Minister for Health., 2010). The numbers of diabetes related amputations was found to have increased from 473 to 649 between 2006 and 2008 in Samoa, whilst the median age of those receiving amputations had decreased from 64 to 50¹⁸. Table 3.8 shows that even though projected prevalence rates do not increase greatly – at least in Samoa and Tonga - absolute numbers of adult diabetics rise noticeably in all three countries due to population growth. Also worth noting are the estimates of Impaired Glucose Tolerance (IGT): a risk factor for developing diabetes and CVD. The policy implication of IGT is that it acts as a proxy indicator of the future pipeline of diabetes and CVD if primary and secondary prevention strategies are not effective.

¹⁸ Care should be taken in interpreting these figures as the two year period in question is not long enough to identify robust or long term trends.

Table 3.8

Estimated prevalence and numbers of adult diabetes cases in 2011 and 2030

Source: (International Diabetes Federation, 2011)

Country	Estimated national prevalence of adult (20-79 years) diabetes in 2011	Estimated number of adult diabetes cases in 2011	Impaired Glucose Tolerance national prevalence (%) 2011 (standardised)	Mean diabetes related expenditure per person with diabetes (\$US) ¹⁹	Estimated adult national prevalence rate (%) in 2030	Estimated number of adult diabetes cases in 2030
Samoa	7.05	6,550	6.67	312	7.62	8,800
Tonga	11.58	6,130	7.85	221	12.14	8,400
Vanuatu	13.75	17,260	8.63	160	16.5	35,200

Country responses to NCDs

3.33 Virtually all governments in the Pacific recognise the importance of NCDs and have various action plans in place, or under discussion. Pacific Islands Forum Leaders have explicitly recognised the link between NCDs and development, declaring the “Pacific is in an NCD Crisis” as part of the 42nd Pacific Islands Forum communiqué of September 2011. Pacific Health Ministers have similarly made joint statements about the importance of NCDs as a public health and development issue via the *Honiara Communique on the Pacific NCD Crisis* issued on 30 June 2011. Virtually all countries in the Pacific were working with WHO and SPC in mid 2012 to develop a “crisis response package” to NCDs, including measures to scale up “best buys” from the WHO *Package of Essential Noncommunicable (PEN) Interventions*. (WHO, *Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings*, 2010). At least four countries in the Pacific have imposed increased taxes or import levies on sugary soft drinks: Fiji, French Polynesia, Nauru and Samoa, with varying results. (Thow A M et al, 2010). The Cook Islands has just increased the import levy on sugary soft drinks.

¹⁹ According to the IDF website (<http://www.idf.org/diabetes-social-and-economic-impact-studies>), these figures were estimated in the following way. “The IDF estimates are created using a special formula which requires information on country estimates of diabetes prevalence by age and sex, population size by age and sex, total healthcare expenditures by age and sex, and the ratio (R) of medical expenditures per person with diabetes to medical expenditures per person without diabetes, matched for age and sex. “R” is the key parameter in the conversion of per capita health spending in the country into estimates of spending caused by diabetes.”

3.34 Samoa has responded to NCDs in various specific ways. The National NCD Policy 2010-2015 envisaged an expenditure of \$ 680,000 over the period of the plan, focusing on six²⁰ main intervention areas. The Government is currently in the process of establishing a Health Promotion Foundation which will have a particular focus on NCDs. Samoa explicitly recognises the challenge of NCDs in its overarching national *Strategy for the Development of Samoa*. WHO notes that Samoa has in place many of the key building blocks of country capacity to respond to NCDs including administrative allocation of responsibility for NCDs, some level of funding support, and key aspects of national health reporting. However WHO also notes that Samoa is yet to establish integrated or topic specific policies or action plans on most specific diseases, including CVD and diabetes. (WHO, Noncommunicable Diseases Country Profiles , 2011). Tobacco control policy could also be improved (see discussion at paragraph 3.17). Samoa has also conducted innovative Village Health Fairs that provide primary level screening of NCDs and follow up referrals and treatment. The Ministry of Health notes that “The Village Health Fairs concept provided a festive fun environment that was supportive of NCD Screening. It was a strategy to translate a unified framework for health promotion and preventive activities that practically realized the Strengthening Health system through revitalizing Primary Health Care. The Village Health Fair Program for NCD Screening is in line with the priority strategies of the NCD Policy 2010-2015 as well as the Health Promotion Policy 2010-2015. All these efforts are aligned to the Alma Ata Declaration on Primary Health Care (1978), the Ottawa Charter on Health Promotion (1986) and the Yanuca Declaration on Health in the Pacific in the 21st Century (1995) of which the Samoa Health Sector Vision of ‘A Healthy Samoa’ derives from” (Government of Samoa, Village Health Fair Report, 2011).

3.35 Tonga has also responded in various ways. It was the first country in the Pacific to have a specific strategic plan to address NCDs.²¹ It was the first country in the Pacific to include a specific chapter on NCDs in its National Health Accounts (Government of Tonga, Report of the Minister for Health., 2010). Tonga has also specifically included reduction of NCDs as part of its own national Millennium Development Goals, aiming to, amongst other things “reduce NCDs by 2% per year by 2015, and reduce prevalence of diabetes by 10%”. (Government of Tonga, Second National Millennium Development Goals Report, 2010). Tonga has also established an autonomous and active Tonga Health Promotion Foundation with the specific aim of “promoting health and reducing harm from NCDs such as heart disease, obesity, diabetes, high blood pressure and smoking-related illnesses”. (Government of Tonga, TongaHealth Annual Report , 2011). WHO notes that Tonga has in place all of its criteria for assessing country capacity to address and respond to NCDs, other than having a national population based cancer registry or policy. Tobacco control policy could also be improved (see discussion at paragraph 3.17).

²⁰ Public policy; reorienting health services; creating a supportive environment (including physical environment); community action; and development of personal skills. It is not clear how much of that envisaged budget has been spent on these initiatives, or to what effect.

²¹ The strategy to prevent and control Non-Communicable Diseases (2010-2015) consists of the following six components: Integrated NCD Activities - ensure better coordinated and integrated NCD activities; Physical Activity - improve proportion of population undertaking physical activity; Alcohol Harm Reduction - reduce binge alcohol drinking by 10% ;Tobacco Control - reduce the prevalence of current tobacco smokers in Tonga; Healthy Eating - improve rate of consumption of fruits and vegetables, reduce saturated fats in diets and increase awareness of appropriate portion control ;Monitoring, Evaluation and Surveillance - strengthen monitoring, evaluation and surveillance of NCDs in Tonga.

3.36 **Vanuatu has also responded.** The Ministry of Health has a wide-ranging *National Policy and Strategy for NCDs 2010-2015* with ten components²². Major items of expenditure include proposed NCD centres at the two main hospitals (Port Vila and Luganville); improved sport facilities to encourage physical activity; and school healthy eating programs. WHO concludes that Vanuatu has in place all of its criteria for assessing country capacity to address and respond to NCDs. (WHO, Noncommunicable Diseases Country Profiles , 2011). However tobacco control policy could be improved (see discussion at paragraph 3.17).

²² Integrated NCD activities; tobacco control; physical activity; healthy nutrition; harmful use of alcohol; drug and substance abuse; dental health; mental health, injury and violence; early detection, treatment and care; research and surveillance.

Chapter Four: Financial and Economic costs of NCDs.

Recent estimates of the costs of NCDs from the international literature

4.1 There are several recent estimates of the economic impact of NCDs internationally. Research presented at the World Economic Forum in 2011 drew on macroeconomic simulations suggesting the four main NCDs, and mental health, would lead to cumulative output losses globally of \$ 47 trillion over the next two decades. Such a loss represented 75 % of global GDP in 2010. It also represented “enough money to eradicate two dollar a day poverty among the 2.5 billion people who live in that state for more than half a century.” (Bloom D et al, 2011). The World Economic Forum also identified NCDs as one of the most serious threats to global prosperity, based on the likelihood and the severity of the impact of NCDs, alongside other high impact risks such as global asset price decline. Underlying these “headline” or cumulative impacts lies several assumptions and estimates about the impact of NCDs on various macroeconomic variables including the labour supply, overall savings rates, and capital accumulation. (Bloom D et al, 2011).

4.2 NCDs are likely to have particular economic costs to developing countries, many of which are still coping with an unfinished agenda of communicable, maternal and neonatal mortality and under-nutrition. Abegunde and colleagues examined 23 low and middle income countries accounting for around 80 per cent of chronic disease mortality. They concluded that if nothing is done to reduce the risk of chronic disease, an estimated \$ 84 billion of economic production would be lost from heart disease, stroke, and diabetes between 2006 and 2015. India would lose the most at \$ 16.6 billion cumulative GDP loss by 2015. Achieving an additional 2 per cent yearly reduction in chronic disease death rates over 10 years would avert 24 million deaths in those countries and save an estimated \$ 8 billion (Abegunde D et al, 2007).

4.3 Of interest to Pacific Island countries are estimates that diabetes caused at least \$ 465 billion in health care expenditure globally in 2011, 11 % of total health care expenditure of adults. (International Diabetes Federation, 2011). The International Diabetes Federation also estimated that the average healthcare spending due to diabetes was \$ 5063 per person per year in high income countries and \$ 271 per person per year in low and middle income countries. The prevalence of diabetes for people of working age (less than 60) is higher in lower and middle income countries than it is in high income countries (International Diabetes Federation, 2011). This suggests that, other things being equal, fewer people are available full time in the work force to generate revenues for services to the very young and the elderly: the dependency ratio worsens.²³ In the United Kingdom, the Government’s National Health Service (NHS) spends around £10 billion in 2011, or around £ 1 million per hour, on diabetes amounting to 10 % of the NHS budget. About 80 % of that NHS spending on diabetes goes into managing avoidable complications. (UK Diabetes, 2012).

²³ This requires further study in the Pacific, where levels of unemployment and under-employment can be quite high to begin with. The study by Falcon (paragraph 5.9) for example found that 40% of patients with diabetes in Vanuatu were not employed.

What Drives Rising Health Expenditure?

Latest research confirms that health care spending has been growing rapidly in most countries globally, both developed and developing. (Clements B et al, 2012). Three population factors explain the growing demand for health expenditure: *growth* in population; changes in the *age structure* of populations (ageing populations as part of the demographic transition) and changes in the *disease profile* of populations (from communicable to NCDs). Rising incomes of individuals and economies is associated with rising expenditure on health care. Technological advancement are important drivers of costs. Tandon notes Wagner's Law: the observation that richer countries on average spend a higher proportion of public funds on health and education (although there is a fair amount of variation around this trend). He notes "This is an important point and needs reiterating: not only do richer countries spend more in absolute levels, they also spend a higher *proportion* of their resources on health and education." (Asian Development Bank, 2006).

4.4 **Also of interest to Pacific Island countries are recent estimates of the impact of NCDs in Caribbean island countries.** Recent World Bank studies estimated that the economic burden of the four major NCDs in the island of St Lucia was estimated at \$27 million, 2.8 % of the island's GDP in 2006. The total average *private* economic burden per patient in the island of St Lucia was estimated at \$ 1320 in 2006. This comprised direct out of pocket costs (\$324 for outpatients' services, \$ 315 for inpatient services, and \$ 440 for medicines) as well as indirect costs (\$ 241 losses through absenteeism and sick leave). The study found that average annual household spending per capita ranged from \$322 per capita in St Vincent and the Grenadines to \$ 769 in Antigua and Barbuda, exceeding the annual per capita spending on health by factor of 1.2 in most countries of the Caribbean. (World Bank, The growing burden of non-communicable diseases in the eastern Caribbean, 2011).

4.5 Additional information on estimates of economic costs of NCDs from the international literature and elsewhere are available in Annex Five.

Estimating economic costs of NCDs in the Pacific.

Estimating costs through National Health Accounts

4.6 **In principle, analysing data from National Health Accounts (NHAs) is the most useful way of understanding NCDs.** That is because NHAs provide a comprehensive overview of the financing flows of the

health system, including both sources and uses of funds. Tonga has specific chapter on NCDs in its NHAs. Unfortunately, the data relates to 2005/6 and so is dated. An updated version is expected at the end of 2012. In the meantime, Table 4.1 shows that even a summary NHA format is a useful way of displaying information about NCDs. It is noticeable that expenditure on NCDs rises at different levels of care, more than trebling as care goes from health centres to outpatients at Vaiola Hospital in the capital, and increases a further nine fold as treatment moves from outpatients to inpatient care.

Table 4.1

NHA Accounts Analysis: NCD sub-analysis 2006: expenditure by government.

Source: (Government of Tonga, Tonga National Health Accounts Financial Year 2005/6, 2008)

Category	Total visits/cases	Of which NCD visits / cases	NCD as per cent of total	Cost per unit (\$Tonga)	Total MOH NCD cost in 2006 (\$ Tonga)	Total MOH NCD cost in 2006 expressed in US\$ using 2012 exchange rate.
<i>Outpatients</i>						
Health Centre Activities	39,562	4,306	10.9%	7	30,142	16,780
Vaiola Hospital Outpatient Clinics	105,348	14,602	13.9%	7	102,211	56,900
<i>Inpatients</i>						
MOH Hospitals	10,380	800	7.7%	1,152	921,600	513,054
Auxilliary services						
Radiology	13,206	2641	20%	57	150,548	83,810
Laboratory	172,455	34,941	20%	7	241,437	134,407
<i>Other services</i>						
NCD Prevention sub program 7					7,984	4,444
Health Promotion sub program 8					10,000	5,567
Overseas Treatment			40%		307,421	171,141
Pharmaceutical (MOH Hospitals)	172,168	68,867	40%	30	2,066,016	1,150,977
<i>Total Cost of NCD to MOH</i>					3,837,359	2,137,792

Previous estimates of costs of NCDs.

4.7 An earlier study estimated the economic impact of NCDs on hospital resources in Tonga, Vanuatu and Kiribati. (Doran C, 2003). The following are some of the key conclusions from that report:

The results indicate that in each of the countries included, Tonga, Vanuatu and Kiribati, NCDs currently account for 10.4%, 5.8% and 8.1% of all admissions, respectively. Patients being admitted for a NCD are much older than those presenting for a non-NCD, 16 years older in Tonga and 10 years older in Kiribati. Patients admitted for a NCD also stay in hospital longer with ALOS for a NCD admission being 9.2 days, 7.5 days and 13.5 days in Tonga, Vanuatu and Kiribati, respectively. This compares with an ALOS for a non-NCD admission of 4.9 days in both Tonga and Vanuatu and 9.3 days in Kiribati. Consistent with this finding, average treatment costs of NCDs are considerably higher than non-NCD admissions. Although NCDs account for a relatively low proportion of all admissions, they account for a disproportionately larger share of all treatment expenditures. In Tonga, Vanuatu and Kiribati NCDs account for 19.6%, 9% and 8.1%, respectively, of all treatment expenditures. To put this in context, in Tonga for example, one out of every 10 (10.4%) patients admitted to hospital are admitted for a NCD, however, for every 5 dollars spent on treating all patients, one of these dollars (20%), is required to treat the patient with a NCD.

4.8 The study also estimated the costs to hospitals of treating NCDs.²⁴ Average costs of treating NCDs were higher than other diseases, particularly because they involved longer lengths of stays as inpatients. For example, Doran finds that in Tonga the most frequent cause of admission was for childbirth in 2002, accounting for 34% of all admissions. The Average Length Of Stay (ALOS) was 3.1 days. With average inpatient cost at TOP 157 per day, this generated an average cost of TOP 481 for a pregnancy admission. On the other hand, diabetes patients had an average length of stay of 14.7 days, therefore averaging TOP 2306 per patient episode, 4.8 times the cost of childbirth.

4.9 Other key points from this study are summarised in Table 4.2 below. This shows that NCDs accounted for 10.4% (911/8776) of all hospital admissions in Tonga in 2002, whereas the *treatment* of these diseases represented almost 19.6% of all inpatient hospital based expenditure (TOP 1.3

²⁴ The process was as follows. Estimates were made of the proportion of hospital admissions accounted for by NCDs. Hospital admission data was analysed and sorted by ICD – 10 code. For example, 911 of the 8776 admissions (10.3%) to hospital in Tonga in 2001 were found to be NCD related. Of these 911 admissions, 403 were diseases of the circulatory system, 273 were diabetes related, 158 were neoplasms (cancers) and 75 were COPD (respiratory). Estimates were also made of the cost of inpatient treatment. This was done in three steps. First, total budgets were separated into inpatient and outpatient stays, and overhead costs apportioned accordingly. Second, total MOH staffing costs actually involved in inpatient care were estimated. These two steps were then combined to generate an estimate of the total expenditure on inpatient care: TOP 6.7 million in the case of Tonga, representing 52% of total MOH budget. The third step involved dividing total inpatient costs by the total inpatient length of stay to get an average inpatient cost per day. In the case of Tonga this was TOP 157 per day. This average inpatient cost per day was then multiplied by the average length of stay for each disease group. Thus, in Tonga the average 4.4 day stay for infectious and parasitic diseases produced an average cost of TOP 693 (TOP 157*4.4) whereas a 14.7 day stay for diabetes produced an average cost of TOP 2306 (TOP 157*14.7).

million / 6.7 million). Similarly, in Vanuatu, NCDs accounted for 5.8% (595 / 10,216) of all hospital admissions, whereas the treatment of NCDs amounted 9% (Vt 43.9 million / Vt 490 million) of all inpatient hospital based expenditures.

Table 4.2

Relative significance of NCDs in hospital admissions, and hospital costs, in Tonga, Vanuatu and Kiribati in 2002.

Source: (Doran C, 2003)

Item	Tonga	Vanuatu	Kiribati
<i>Hospital Data</i>			
Number of admissions	8776	10,216	3872
Number of NCD admissions	911	595	313
% NCD to all admissions	10.4%	5.8%	8.1%
ALOS all admissions (days)	4.9	4.9	9.3
ALOS NCD admissions (days)	9.2	7.5	13.5
<i>Cost data</i>			
Inpatient hospital cost per day in local currency (\$US in 2002)	TOP 157	Vt 9883	K\$133
Average hospital cost per admission (all diseases) in local currency (\$US in 2002)	TOP 768	Vt 48003	K\$ 1238
Average hospital cost per admission per NCD in local currency (\$US in 2002)	TOP 1447	Vt 73799	K\$ 1806
% total cost NCD to total cost all admissions	19.6%	9%	8.1%

4.10 The original cost estimates by Doran from 2002 have been escalated to 2012 prices (using an inflation rate of 6% per annum compounded for Tonga and 4% per annum compounded for Vanuatu, and using current exchange rates. That provides a quick, rough, order of magnitude of possible current costs, using the original methodology. The results are shown in Tables 4.3 and 4.4 below.

Table 4.3

Average hospital cost of the five most expensive, and the least expensive, NCDs in Tonga in 2002, escalated to 2012 prices.

Original source (Doran C, 2003)

Disease	Average hospital cost in TOP in 2002	Average hospital cost in TOP, escalated by inflation rate of 6 per cent compound, in 2012	\$US equivalent cost in 2012
Diabetes mellitus	2306	4129	2300
Malignant neoplasms of male genital organs	2004	3588	1999
Malignant neoplasms of digestive organs	1900	3402	1895
Malignant neoplasms of breast	1820	3259	1815
Malignant neoplasms of respiratory and intrathoracic organs	1799	3221	1794
Lowest average NCD cost is COPD bronchitis	236	422	235
Average of 27 NCDs	1447	2591	1443

Table 4.4

Average hospital cost of the five most expensive, and the least expensive, NCDs in Vanuatu in 2002, escalated to 2012 prices

Original source: (Doran C, 2003)

Disease	Average hospital cost in Vatu in 2002	Average hospital cost in Vatu, escalated by inflation rate of 4 per cent compound, in 2012	\$US equivalent cost in 2012
Malignant neoplasms of bone and articular cartilage	217,430	321,849	3,460
Malignant neoplasms of ill defined, secondary and unspecified sites	195,193	288,933	3,106
Malignant neoplasms of urinary tract	177,898	263,332	2,831
Diseases of the arteries	158,131	234,072	2,516
Diabetes mellitus	131,677	194,914	2,114
Lowest average NCD cost is COPD (bronchitis) ²⁵	39,973	59,169	641
Average for 29 NCDs	73,798	109,239	1,186

²⁵ Table 4 of the original report states that ischaemic heart disease / coronary heart disease is the lowest average cost with an ALOS of 3.5 days and an average cost of Vatu 34,936. It would seem questionable that ischaemic heart disease is the lowest average cost of 29 separately specified NCDs in Vanuatu, so the next lowest average cost – COPD (bronchitis) is used.

Previous studies on the costs of treating Type 2 diabetes in Vanuatu

4.11 **A more recent study estimated the specific costs of treating Type 2 diabetes in Vanuatu.** The study involved surveying 172 diabetes patients at the Port Vila referral hospital in late 2006. (Falconer D et al, 2010). Table 4.5 below summarises the annual unit, and total, costs for these 172 patients, using latest exchange rates. The key point to note is that it cost an estimated \$ 20,715 to treat 172 diabetes patients in 2006, or \$ 120 per patient using current exchange rates. The bulk of the cost (72%) came from inpatient overnight care. Assuming an average inflation rate of 4 per cent compound over the six years since that estimate was first done implies current costs in 2012 would be around \$ 151 per patient. What is also noticeable from the Table 4.5 is that, despite mainly 'free' health care in Vanuatu, direct out of pocket payments by patients totalled an estimated Vatu 1.8 million (\$ 8699) for all patients: money that could have been spent on other goods and services.

Table 4.5

Estimated costs of treating Type 2 Diabetes patients in Vanuatu

Source: (Falconer D et al, 2010)

Item	Estimated unit cost in Vanuatu Vatu	Estimated unit cost in current \$US	Estimated usage per annum	Total cost in Vatu	Total cost in current \$US ²⁶
<i>Direct cost to the health system</i>					
Outpatient visitation	200	2.15	2212 visitations	442,400	4,759
Overnight hospital admission	9,883	105	140	1,383,620	14,885
Medication	3,220	34	Varied (not all patients were issued drugs)	99,600	1,071
Total direct cost to the health system	13,303	143		1,925,620	20,715
<i>Direct out of pocket expenses to</i>					

²⁶ The original article used the then current exchange rate of 110 vatu = US\$ 1. This paper uses the latest exchange rate of 92.95 Vatu = US\$ 1.

<i>individuals per year</i>					
Over the counter medications	6,600	71	31	204,600	2201
Transport	1980	21	110	217,800	2343
Special diets for diabetics	36,480	392	38	1,386,240	4155
Total direct costs to an individual with all components	45,060	484	Varied (not all patients incurred all expenses)	1,808,640	8699

4.12 The study authors make the observation that their cost estimates may be conservative. That is because patients surveyed were from Vanuatu's main referral hospital and therefore possibly receiving better quality care than at provincial clinics. Consequently those patients at Vanuatu's main referral hospital could have fewer or less severe diabetic complications than the national average.

New estimates of the cost of drug treatment for diabetes and hypertension in Vanuatu

4.13 **Estimates have been made during the course of this NCD stocktake study of the direct cost to Government of treating adult Type 2 diabetes patients in Vanuatu.** It should be noted that these are conservative estimates using minimal essential treatment. The estimates do not include additional drugs for complex cases, or costs of any required surgery. Nor do they include any direct (transport costs etc) or indirect (foregone income) to individual patients. The information and analysis was developed in close consultation with senior officials in Vanuatu responsible for national pharmaceutical and related purchases at the Central Medical Store. Best available, including generic, drug prices at September 2012 were used. The following summarises the findings to date.

4.14 **It is clear that the cost to Government is high even when treating newly diagnosed, Type 2 diabetes patients: a minimum of around \$347 per patient per year.** The estimated direct cost to Government of primary level care for a newly diagnosed Type 2 diabetes is Vt 31,334 or \$ 347 per patient per year. This includes nurse attended outpatient clinic visits once a month, glucose testing strips, minimal level laboratory tests, and metformin tablets to help control blood sugar levels. To put this in perspective, the \$ 347 annual estimated cost per patient in 2012 is 2.2 times more than the total (i.e. public and private) per capita expenditure on health in Vanuatu in 2010 (latest year available from WHO). It is 2.42 times the per capita total *government* expenditure on health, including external financing, in 2010 (latest year available from WHO).²⁷ The cost of minimal but essential drugs²⁸ alone at the oral therapy phase of treatment is Vt 2934 (\$ 32.57) per patient per year. This is more than eight times the Vt 360 (\$4) notional budget allocation for all drugs per person

²⁷ As can be seen in Annex 2, WHO states that per capita total expenditure on health (public and private) and per capita government expenditure on health, was \$ 157 and \$143 respectively in Vanuatu in 2010. 09. (WHO, Global Health Observatory, 2012)

²⁸ Including metformin to help control blood sugar levels.

per year in Vanuatu. In other words, the drug costs alone for a newly diagnosed Type 2 diabetes patient absorbs the budget allocation of 8 other citizens in Vanuatu.

4.15 Costs to Government then more than doubles to around \$ 831 per patient per year as the disease progresses: more than seven times the average total per capita government expenditure on health. If the disease progresses and the patient requires insulin, costs to Government rise significantly to an estimated Vt 74,867 (\$ 831) per patient per year. This includes the cost of regular insulin, increased frequency of blood glucose level testing, increased laboratory tests, and syringes and dressings but does not include costs of treating any complications or surgery. The cost of the insulin vials alone is Vt23,655 (\$262) per patient per year to Government. This is more than 1.8 times total Government expenditure, including donor funding, of \$ 143 per patient per year in 2010 (latest year available from WHO). The cost to Government of just insulin alone of one patient in a year absorbs 65 citizens notional drug budget allocation in 2012²⁹.

4.16 The financing challenge is even more difficult if Government sought to fund these costs through its own domestically generated resources, without recourse to external financing. Government's own expenditure on health, excluding external financing, is an average of Vt 6248, or \$69 per person³⁰ in 2012. One newly diagnosed Type 2 diabetes patient on oral medication, assuming average annual costs of \$347 per year, therefore absorbs five times the average per capita domestically resourced government expenditure on health. A patient that progresses to an insulin regime, assuming direct costs of \$831 per patient per year, absorbs twelve times the average per capita budget for health appropriated from government's own resources.

New estimates of the cost of kidney dialysis in Samoa

4.17 Field visits during the stocktake mission enabled **a preliminary estimate to be made of the cost to Government of operating a kidney dialysis machine in Samoa.** That study is in Annex Six. The key findings are as follows. Government spent Samoan Tala (SAT) 6 million on six patients prior to the establishment of the National Kidney Foundation (NKF) because they were transferred to New Zealand for treatment (simple average of around SAT 1 million per patient including airfares). The NKF is now treating 50 patients for SAT 4.9 million (simple average of SAT 98,000 per patient) suggesting a saving per patient of SAT 902,000 per patient (\$ 38,000 per patient) and assuming no difference in quality of treatment and outcome. This suggests a substantial cost saving to Government.

4.18 Another way of looking at the expenditure is to examine the affordability of expenditure to Government and the opportunity cost (that is, what other activities in the health sector or beyond could be purchased by Government instead). Analysis suggests the estimated average total cost of dialysis was SAT 92,110 (\$ 38, 686) per patient per year in Samoa in 2010/11. This is more than twelve times (12.41) the average GNI per capita in Samoa of \$ 3117. The average total cost of

²⁹ Cost of insulin alone is Vt 23,655 (\$262) per patient per year. The notional budget allocation for all medicines is Vt 360 (\$4 per person) per year in 2012.

³⁰ The total 2012 Government appropriation to the Ministry of Health was Vt 1,534,639,563. The total population of Vanuatu is estimated at 245,619.

dialysis *per treatment* was SAT 590 (\$ 247). Those on dialysis need three treatments per week for the rest of their lives. Health outcomes therefore need to be scrutinised objectively given the cost of SAT 92,110 per patient per year. Unfortunately, 31% of patients have died less than a year after commencing dialysis. Almost two thirds have died two years after commencing it. Much of the reason for these very expensive, but poor, health outcomes is that patients are diagnosed and commence treatment too late for dialysis to extend life significantly. This in turn suggests that reallocating resources to secondary prevention and kidney disease retardation would have important health benefits for a larger number of Samoans and, over time, help to improve the low cost-effectiveness of treatment and reduce costs to Government. At present, however, prevention and retardation of kidney disease absorbs less than 5% of the total appropriation of the NKF.

Overseas Treatment Costs

4.19 Pacific Island governments, and their development partners, incur high absolute and relative costs when patients are referred overseas for treatment. Patients – most of whom are NCD patients - are referred to Australia, New Zealand or elsewhere when specialised surgeons and associated facilities are not available in the small islands of the Pacific. There is only limited published material on the costs – and consequences in terms of health outcomes – of such referrals. One earlier study estimated that between 1992 and 2000, there were 22 rheumatic heart disease operations per year on Samoan patients referred to New Zealand at an average cost of NZ\$ 28,000 - NZ\$ 44,000 per operation (US\$ 23,176 – US\$ 36,420 using exchange rate in September 2012). (Viali S, 2006).

4.20 A more recent study conducted by the Ministry of Health in Samoa analysed the Overseas Visit Treatment Scheme (OVT). It found the OVT absorbed 15 per cent of total public health expenditure in 2009/10, to the benefit of less than 0.1 per cent of the nation's population. (Ministry of Health 2010) Expenditure on OVT almost matched the entire public expenditure on outpatient curative care (SAT 6.98 million) in 2006/7. Public expenditure on OVT (\$T9.35 million in 2010/11) is now larger than the total budget of ten other Government departments or authorities. Expenditure has been growing: OVT absorbed 11 per cent of total public health funding in 2008/9, but this had grown to 15 per cent by 2009/10. It has not been possible to assess the equity or overall health impact of this expenditure. Records are not available on the socio-economic profile of those being referred overseas. Nor are records available on the average duration of patient life after treatment overseas, although anecdotal evidence suggests cancer patients survive only a few years.

Chapter Five: Broad implications for Ministers of Health, and Ministers of Finance and Planning

5.1 Despite gaps in the data, some broad implications can be identified for Ministers of Health, Ministers of Finance, and other Ministries. Paragraphs 1.13 – 1.17 of this report show there are still some important gaps in the extent and quality of data on NCDs. Data on the costs of preventing and treating NCDs at various levels within the health system are particularly scarce. Nevertheless this rapid stocktake has confirmed the broad landscape of NCDs in the Pacific. Despite gaps in data, it is clear there are some implications for Ministers of Health, Ministers of Finance and Planning, and other Ministries. The following section highlights those broad implications.

Implications for Ministers of Health

5.2 The social determinants of NCDs, and the underlying risk factors, are multi-sectoral yet the responses and costs will often be borne largely by Ministries of Health. High consumption of tobacco, alcohol, salt, and energy rich imported foods; limited physical activity; and “obesogenic” environments are all risk factors for NCDs. Even though they are each beyond the direct control of the health sector, the health sector arguably absorbs the costs of NCDs more than other sectors.

5.3 The rise of NCDs has consequences for the overall organisation and functioning of the health system. Many health systems in developing countries have been designed around population based communicable diseases priorities that are now not necessarily particularly well suited to addressing NCDs (Robinson H and Hort K, 2011) (Samb B et al, 2010). The health system typically dealt with immunisation against communicable diseases for the population as a whole, especially infants and children, and treatment of episodic one-off illnesses including diarrhoea amongst young children and respiratory infections. NCDs however involve different challenges, skills and approaches: often very long term – even lifelong – care and treatment for maintenance of blood pressure or glucose levels of individual – often adult – patients in single rather than population based services. Procurement and distribution systems for drugs become even more important in NCDs given their range and complexity.

5.4 The shift to NCDs involves a double burden: completing the unfinished agenda of communicable and reproductive health whilst expanding the response to NCDs. Several countries in the Pacific face an unfinished agenda of primary health care to complete immunisation coverage and address stunting, vector borne diseases (malaria) or reproductive health services (access to family planning and responding to the growing incidence of sexually transmitted infections). For some countries this double burden will also involve the challenge of increasing public expenditure on health, whilst at the same time looking for ways to achieve cost containment in the health budget, so as not to put undue pressure on national budgets.

5.5 It would be a mistake for Governments – and their development partners - to “verticalise” the response to individual NCDs. Although priorities need to be set, it would be a mistake to simply target one high prevalence NCD such as diabetes or cardiovascular disease (CVD). Many NCDs co-exist: people with diabetes are two to six times more likely to develop CVD and around 2.5 times

more likely to develop tuberculosis, a communicable disease. (International Diabetes Federation, 2011). The risk factors for heart disease are also similar to those for diabetes and cancer. Uncontrolled diabetes during pregnancy threatens the health of mother and child, potentially affecting broader maternal and newborn health outcomes. NCDs should therefore be part of the whole health system, not another 'vertical' intervention.

5.6 Screening and effective treatment becomes even more important for NCDs. Most NCDs remain undetected for long periods because they have few symptoms. Diseases like diabetes have been significantly under-diagnosed in parts of the Pacific. (Colagiuri S et al, Prevalence of Diabetes in the Kingdom of Tonga, 2002). This means that opportunities for early preventive measures are missed, and the disease progresses to the point where the patient needs life-long medication and treatment and / or expensive to treat complications occur. Even where correct diagnosis occurs, gaps in service delivery and poor compliance by patients, means patients are less likely to avoid progression of the diseases, and likelihood of complications. The 2002 NCD STEPS survey in Fiji found that almost one in five (19.1%) adults screened had hypertension. Two thirds of those screened were not aware they had hypertension, and of those who did know two thirds still had high blood pressure. Questions about the overall effectiveness of the health system arise when significant proportion of patients were being reached, but were not receiving – or taking – medication. Having said that, screening itself imposes direct financial costs (money is required for diagnostic equipment and testing strips) as well as opportunity costs (time and resources spent by health workers doing testing that might have been spent more productively on other activities). Even where screening is affordable and cost-effective in terms of identifying early higher risk cases, there needs to be good sequencing of investments: generating demand for health services as a result of screening may simply overwhelm already stretched public health services.

5.7 Governments (and their development partners) need to think hard about the level of resources – and the likely outcomes – going to population wide health promotion and prevention. There is some evidence to suggest that funding for health promotion, especially NCDs is too low. In Tonga, only 1.6% of health funds were used for the prevention of NCDs, compared to 15.7% of funds being used for in-patient curative care, in 2005/6 (Government of Tonga, Second National Millennium Development Goals Report, 2010). In Vanuatu, while 16.7% of total recurrent health expenditure went to the category “prevention and public health services” (page 17 of latest NHA) only 30 million Vatu (\$330,000) was actually spent on prevention of NCDs per se (page 20). This represents just 2.0% of total recurrent health expenditure. Similarly in Samoa: only Tala 305, 204, or Tala 1.69 per capita, representing 0.4% of Total Health Expenditure was spent on prevention of NCDs in 2006/7 (latest year available for NHAs). The newly established “Tonga Health” had an operating budget of just TOP 3.5 (\$2) per person per year for all its health promotion activities in 2010. Within that budget, an average of TOP 0.26 and TOP 0.12 (\$0.15 and \$0.06)³¹ was then available for healthy eating programs and tobacco control respectively (Tonga Health, 2010). Of course, it is possible coding and cost allocation practices underestimate the amount of funding actually going to prevention. There may be useful health promotion and preventive interventions subsumed under other cost headings including outpatient visits. And in Tonga’s case, Tonga Health is just starting up.

³¹ Operating expenses for healthy eating was TOP 27,760 and for tobacco control was TOP 12,471. The population of Tonga is 104,058.

Nevertheless, the available statistics do suggest low expenditure on health promotion in absolute and relative terms.

5.8 On the other hand, simply spending more money on broad “health awareness” and generalised health promotion is unlikely to be effective by itself in changing deeply ingrained lifestyle habits. Effective health promotion messages that encourage lifestyle changes can be a particularly powerful way of averting NCDs: for pre-diabetic individuals, lifestyle modification through diet and exercise is associated with a 40-70% relative risk reduction in subsequently acquiring type 2 diabetes (Tabak A et al, 2012). But changing lifestyles is not easy, and money can be wasted. Recent research from the University of Queensland in Australia finds that Government had spent over US\$ 130 million equivalent per year on healthy lifestyle messages but that this had only a “trivial” effect on reducing heart disease.³² This is an important and plausible finding: Government exhortations to increase general health awareness and improve lifestyles and eating behaviours are unlikely to have high impact especially in the face of widespread food manufacturers' practices (inclusion of salt, sugar, fats) and advertising.³³ Some investment in disseminating basic information and general “health awareness” is necessary. But this needs to be complemented by proactive and targeted health promotion, and changes to the prices of goods such as tobacco, alcohol, and foods rich in salt, sugar and saturated fats, if general “health awareness” is to get traction in reducing NCDs.

5.9 There is some anecdotal evidence that unregulated and untrained informal healers are providing herbal and other ‘cures’ for diabetes, cancers and other NCDs in the Pacific. This is of obvious concern from a public health point of view and undermines the health system. Patients are likely to have the disease progress under these ‘cures’ and encounter complications which are then more difficult and expensive to treat in the formal health sector. There is also a risk that poor and vulnerable people will be financially exploited for out of pocket payments for such herbal ‘cures’.

Implications for Ministers of Finance, and Planning, and their Ministries.

5.10 This initial stocktake also finds several issues of direct interest to Ministers of Finance and Planning, and their Ministries.

5.11 First, expenditure on health per capita is higher than that in lower middle income countries across the world. This is true for both government expenditure on health per capita as well as total (public and private) expenditure on health. Table 5.1 shows that total (public and private) expenditure per capita in Samoa is nearly two and half times (2.48) the amount in other lower middle income countries globally. (As seen from Annex 3, total expenditure on health in Samoa was \$ 154 per capita in 2009, compared to the average of \$ 62 in lower middle income

³² Cobiac L 2012.

³³ This contrasts with other Government interventions that do demonstrably reduce NCDs and injuries which involve health messages *as well as* other interventions. Raising tobacco prices to certain levels through taxes, accompanied by health warnings, demonstrably reduces uptake of NCD causing tobacco use amongst the young and the poor. Compulsory seat belt wearing in cars, helmet use for motor cyclists, and random breath testing for alcohol, accompanied by health warnings, also demonstrably reduces traffic injuries.

countries, ie 2.48 times greater in Samoa). When it comes to Government expenditure, the differences are even larger: government expenditure on health per capita was 5.28 times larger in Samoa than in lower middle income countries during 2009. Annex 3 provides the details. As noted elsewhere, such high per capita expenditure generally reflects the small populations of the Pacific.

Table 5.1

Ratio of per capita expenditure in Samoa, Tonga and Vanuatu compared to other lower middle income countries.

Source: (WHO, Global Health Observatory, 2012)

	Samoa	Tonga	Vanuatu
<i>Total expenditure on health</i>			
Per capita total expenditure on health (public and private) compared to other lower middle income countries, current US\$ 2009	2.48	2.29	1.98
Per capita total expenditure on health (public and private) compared to other lower middle income countries, PPP, I\$ 2009 ³⁴	1.62	1.43	1.45
<i>Government expenditure on health</i>			
Per capita Government expenditure on health compared to other lower middle income countries, current US\$ 2009	5.28	4.52	4.4
Per capita Government expenditure on health compared to other lower middle income countries, PPP I\$ 2009	3.57	2.92	3.35

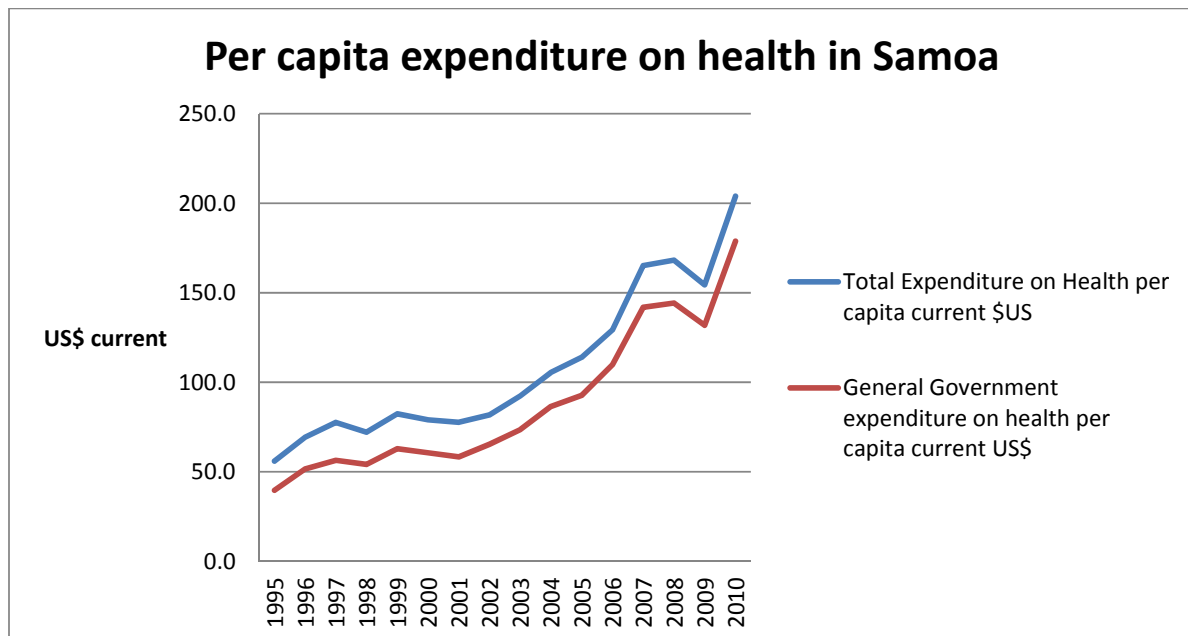
5.12 The second thing to note is that expenditure on health per capita has been rising in Samoa, Tonga and Vanuatu, driven by increases in government expenditure. This is illustrated in Charts 5.1 – 5.3. It is very obvious that such increases in per capita expenditure, despite population growth, are driven by total government expenditure on health, including external financial support from

³⁴ Footnote 7 explains PPP and I\$

donors and other partners.³⁵ The relatively small formal private sector in each of the three countries means private out of pocket and / or private insurance is generally less than 10% of Total Health Expenditure in the three countries. Pronounced falls in Samoa reflect, amongst other things, the tsunami and earthquakes of 2009, a reminder of the vulnerability of small island economies to natural disasters. Pronounced falls in Tonga reflect a targeted program to reduce salaries in the health sector. Chart 5.4 shows a generally rising trend in per capita health expenditure in constant PPP terms. Again, the 2009 tsunami effects on public expenditure generally are visible.

Chart 5.1 Samoa

Source: (WHO, NHA Database, 2012)



³⁵ "Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds. Total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation." Reference: www.data.worldbank.org/indicator/SH.XPD.PUBL

Chart 5.2 Tonga

Source: (WHO, NHA Database, 2012)

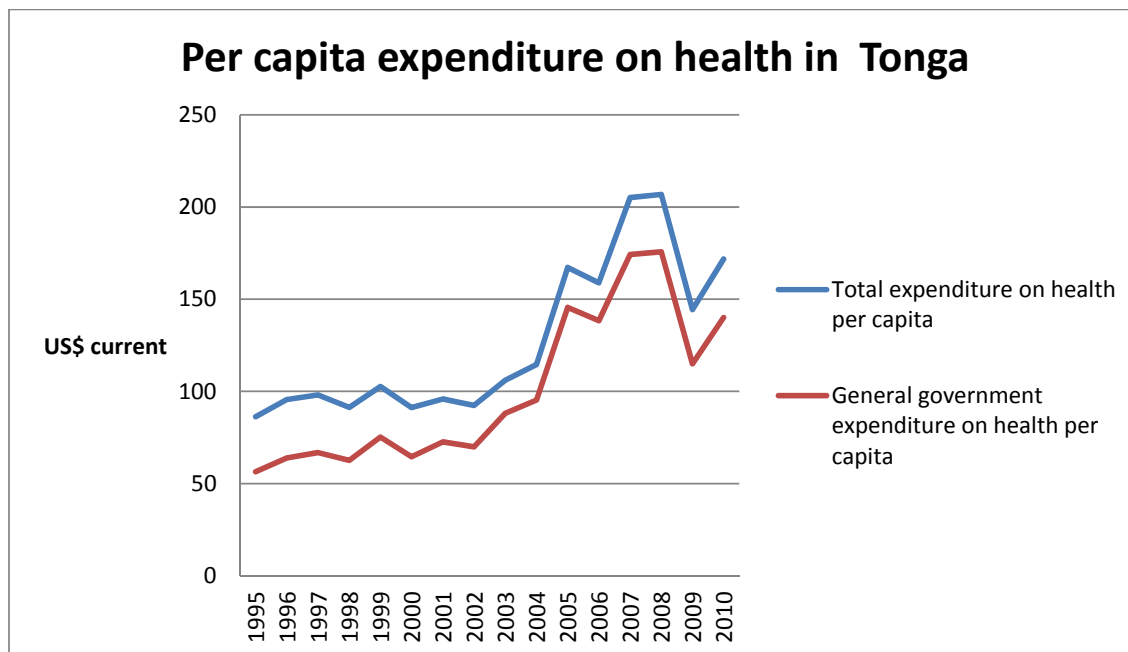


Chart 5.3 Vanuatu

Source: (WHO, NHA Database, 2012)

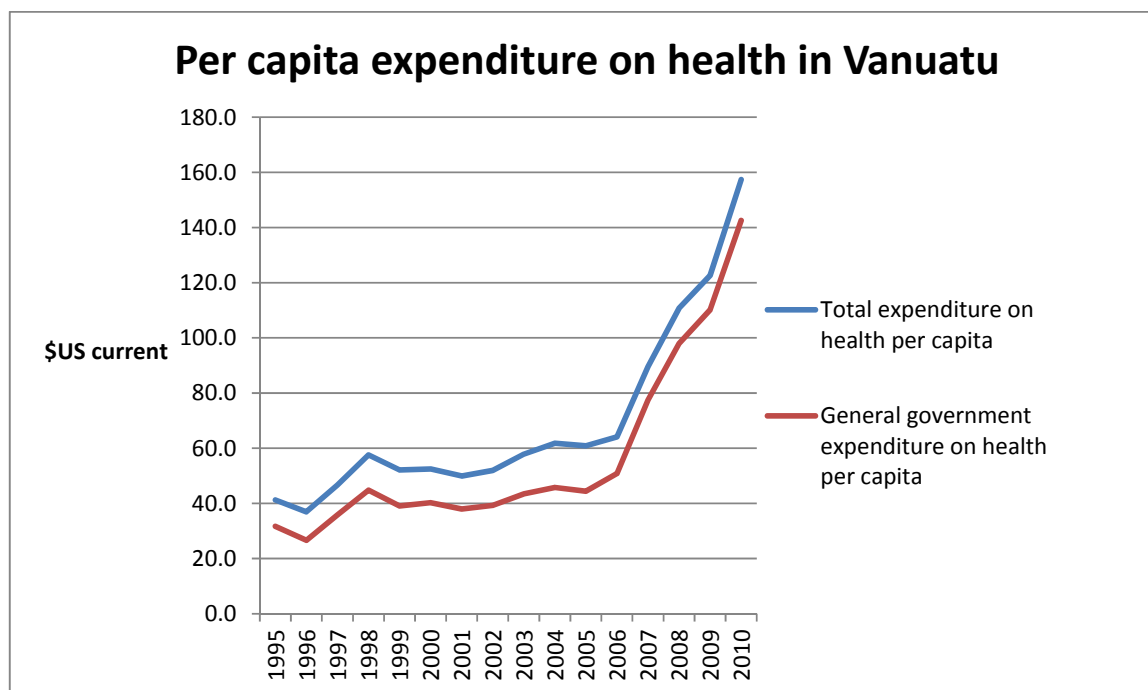
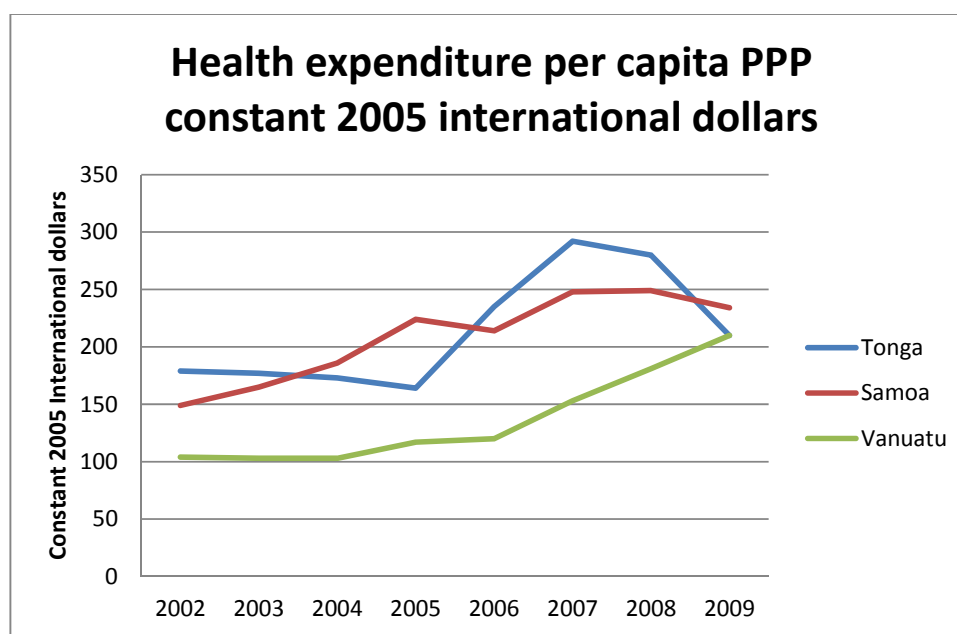


Chart 5.4

Health expenditure per capita PPP, constant International dollars³⁶.

Source: (World Bank, World Development Indicators, 2012)

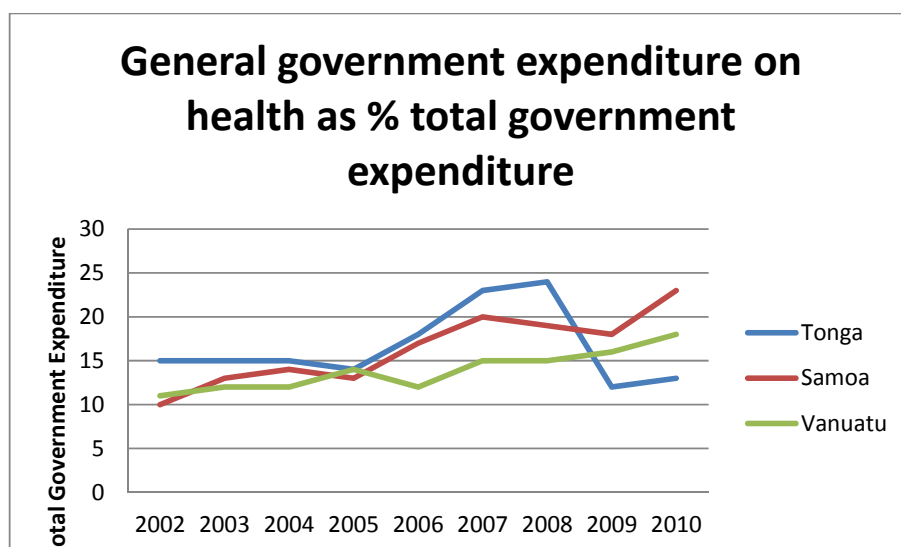


5.13 The third point to note is that general government expenditure on health is a significant and generally rising share of total government expenditure. As can be seen from Chart 5.5, all three countries have already allocated 15% of total general government expenditure (including external donor assistance) to health for at least some time over recent years. (Fifteen per cent of government expenditure going to health was the target level set by most African countries under the Abuja Declaration of 2001, and yet to be met in most cases). Latest estimates from WHO are that general government expenditure on health was 23.4%, 18.2% and 12.9% of total government expenditure in Samoa, Vanuatu, and Tonga respectively in 2010. (WHO, Global Health Observatory, 2012). These relatively high rates reflect the historical pattern of Government financing of health; the relatively small formal private sector to share health costs; the priority generally given to health by consecutive Governments in the three countries; and donor support.

³⁶ See footnote 7 for explanation of PPP and International dollars.

Chart 5.5

Source: (World Bank, World Development Indicators, 2012)



5.14 More recent figures show that the Government of Samoa is providing SAT 69 million (\$7 million) to health in 2011/12. This represents 16% of total government expenditure – higher than the target level set by African countries in Abuja Declaration of 2001 - and is the second largest call on Government expenditure after Education. Similarly, the Government of Tonga expects to spend TOP 22.1 million on health in 2011/12, or 12.9% of the Government’s total cash budget. (Government of Tonga, Budget Statement 2011/2012). Expenditure by the Government of Tonga on medical drugs at TOP 2 million is the fourth largest item of Government expenditure on goods and services and is much more than expenditure on other essential expenditures such as maintenance of buildings (TOP \$1.57 million) or fuel (TOP \$1.5 million). The Government of Vanuatu appropriated Vt 1.53 billion (\$ 16.8 million) from its own domestically generated resources (excluding external assistance) in 2012, representing 9.4% of total government expenditure. As a result of overspends, Government of Vanuatu has had to rely on significant supplementary budget support, and emergency funding from development partners, to maintain essential health services. In short, there is some evidence to suggest that the health sector has received a level of prioritisation within the three Governments, and that, at least in the case of Vanuatu, financial strains are appearing.

5.15 **The fourth point to note is that there may be relatively little scope (“fiscal space”) ³⁷ to increase government expenditure on health.** A recent analysis of health care financing in the Pacific and East Asia concluded that “the key health financing issues for low and middle income countries is how to mobilise sufficient resources to finance health services without resorting to excessive public sector borrowing and how to raise revenues equitably and efficiently” (Langenbrunner J and Somanathan A, 2011). Sustained national economic growth – an obvious source of additional

³⁷ One report notes that “fiscal space – as defined in the literature – is said to exist when a government has budgetary room to increase spending, and can do so without impairing fiscal solvency i.e. the government’s present and future ability to cover its recurrent expenditures and service its debts”. (Heller P, 2006)

revenue – is somewhat problematic in the Pacific where small, remote, economies are subject to economic shocks and natural disasters. The Governor of the National Reserve Bank of Tonga recently noted that real economic growth in Tonga has been slow for the past decade, averaging a little over 1 per cent per annum. Economic growth reached 4.7 per cent growth in 2010/11, but this was mainly the result of lumpy, one-off aid expenditure. Overseas remittances have traditionally supported the Tongan economy, accounting for around 30 percent of GDP in 2008. However since 2008, remittances have fallen by \$100 million, equivalent to almost 15 percent of GDP in 2011, as a result of the global financial crisis (Mafi S, 2012). Similarly, the former Finance Secretary in Samoa recently noted that the tsunami, and then global economic crisis, reduced national economic growth in Samoa and led to an expansion of the fiscal deficit above the target rate of 3% in 2008 to 4% in 2009, 7% in 2010, and around 9% now (Vaai K, 2012).

5.16 A recent analysis of Tonga's options to expand fiscal space for health has lessons for many countries in the Pacific. The analysis basically explores five options for generating more revenue for health: relying on broad economic growth; reprioritising and elevating health within government expenditure; using health sector specific resources such as insurance or earmarked taxation; increasing foreign aid to health; or generating efficiencies (Tandon A and Cashin C 2010). The analysis found that prospects for expanding fiscal space through improved macroeconomic conditions and economic growth were, in principle, good, although noted that Tonga (like other island economies) was vulnerable to natural disasters and economic shocks.³⁸ Prospects for expanding fiscal resources for health through improved efficiency was also good: for example expenditure on preventive services in Tonga was low in spite of high and often preventable NCD burdens. Reallocating existing health resources to prevention could yield large gains.

5.17 However the analysis also concluded prospects for expanding fiscal space through other options were limited. Significantly increasing the share of government expenditure going to health seems unrealistic given its relatively high share already. Generating resources within the health sector also appear limited at least in the medium term: there are strong public finance arguments against earmarking taxes³⁹, and health insurance schemes require time to build even under ideal circumstances. Imposing user – fees raise important issues of access and equity. There were moderate prospects of increasing resources to health through additional health-sector specific grants and foreign aid. Traditional bilateral⁴⁰, multilateral, UN and regional agencies have been supportive of health and other sectors in Tonga and other countries of the Pacific. However there

³⁸ Tonga has seen real GDP growth of 0.3% in 2009/10; 1.5% in 2010/11 and 1.2% in 2011/12. Long run average economic growth is 2 % per annum. (Government of Tonga, Budget Statement 2011/2012). Nor does Tonga have the financial head room to increase health expenditure by a significant amount: the Government expects a fiscal deficit of TOP 25.4 million for 2010/11, and Government acknowledges that Tonga is currently exceeding most of the IMF recommended thresholds for debt sustainability. (Government of Tonga, Budget Statement 2011/2012). Samoa expects GDP growth of 2% in 2010/11 and 1% in 2011/12. (Government of Samoa, Budget Address for 2012/13, 2012). Vanuatu has seen higher GDP growth in recent years, but is facing serious funding constraints.

³⁹ In essence, the tax revenue generated should be pooled with other government revenues and then allocated to that investment that yields the highest return for society, be that in the education sector, roads and infrastructure, environmental protection etc.

⁴⁰ Especially Australia, New Zealand and to an extent Japan.

are limits to this expansion when external resources for health now represent 17.4% of total expenditure on health in Tonga in 2010.

5.18 The fifth point to note is that at a time when Governments are focused on the relatively high costs to them of health care, risk factors are feeding a large ‘pipeline’ of NCDs in each of the three countries, which will put significant additional pressure on existing health systems, around 90% of which is funded by Government. Chapter Three of this report provides the latest evidence on risk factors for NCDs in the three countries. Chapter Four shows that NCDs are an important determinant of cost increases. Importantly, even relatively small costs per patient to Government has fiscal implications, as NCDs are usually chronic and medication is often then required for the remaining years of a person’s life. The least expensive blood glucose strips cost just Vatu 11 (\$0.12) per strip. A Type 2 diabetes patient using one each day is therefore a cost to the Government health system of \$44.57 per patient per year, around one third of total per capita government expenditure on health in 2010. This is \$445, before inflation, every ten years for every patient, just for blood glucose testing strips. The chronic and long term nature of most NCDs, and their treatments, suggests that Ministers of Finance would therefore be well advised to ensure their financing strategy for NCDs is explicitly linked to the Government’s Medium Term Expenditure Framework.

5.19 The sixth point to note is that development partners need to work with Governments to strengthen health systems more broadly, avoiding making NCDs yet another ‘vertical’ disease approach. Development partners play an important role in all three countries. As just one example, Vanuatu received Vt 224.6 million (\$ 2.4 million) in donor funding in 2010, and a further Vt 29 million (\$ 318,000) from the Global Fund to Fight AIDS TB and Malaria. Since 2010 Japan has been providing an extra Vatu 105 million (\$1.15 million) per annum for a broad range of pharmaceuticals in Vanuatu, an amount equivalent to 175 % of government’s own contribution. However Government reports show that NCDs per se receive the *smallest* allocation within donor funding, the majority of funding going instead to vector borne diseases (malaria), family health, and health promotion.⁴¹ Having up to date National Health Accounts (NHAs) will help Governments, and their development partners, to have a more comprehensive and coherent view of sources and uses of financing to tackle not just NCDs but other health priorities as well. An up to date NHA can serve as a focal point, and “glue” for bringing together resources in the health sector in a complementary manner, and avoiding fragmentation. Samoa uses a Sector Wide Approach (SWAp) to health financing involving some, but not all, of the major development partners. This is important as well managed SWAps should, by definition, facilitate a whole of health sector approach to financing and service delivery, avoiding ‘vertical’ programs. Tertiary hospitals can be better integrated into the health system more broadly by providing training, supervision and research of NCD prevention and treatment to lower levels of the health system. This would be a more affordable and cost-effective approaches to preventing and treating NCDs than patients admitting themselves to the main tertiary hospital.

5.20 Ministers of Finance, and Planning, should also be aware of broader economic implications of NCDs particularly when they affect working age cohorts. As noted in paragraph 3.5 – 3.6 almost half (48%) of all deaths from cardiovascular disease in Tonga occur below age 64: people who *potentially* at least are still of working age. This has implications for productivity and income losses

⁴¹ Family health and health promotion would – or should – involve contributions to reducing the burden of NCDs but it is not possible to estimate what percentage is involved.

at the national, household, and company / firm level although the exact impacts will depend upon the levels of employment, under-employment, unemployment and overall productivity of workers. There will also be losses to national revenue if workers who would otherwise pay income tax withdraw from the workforce prematurely and reduce their rate of savings. (There is currently no income tax levied in Vanuatu).

5.21 Losing members of a potential workforce through (otherwise preventable and avoidable) NCDs can impose large costs on an economy. WHO estimates that cardiovascular disease (CVD) among people aged 35-64 cost China an estimated \$ 30 billion. Only one quarter of this cost came from direct health costs: the rest was from lost productivity. (WHO, Integrating poverty and gender into health programs: module on noncommunicable diseases. , 2007).

5.22 Losing members of the potential workforce through avoidable NCDs could, in theory, dilute one of the strategic benefits open to Samoa, Tonga and Vanuatu: its potential “demographic dividend”. More specifically these three countries can expect to see growing absolute, and relative, numbers of working age people (potentially) earning incomes and paying taxes which can then be used to support the very young and the elderly. As can be seen in Table 5.2 below, each country has reduced “dependents” (those less than 15 years of age, and those above 65 years of age) as a percentage of the working population from around 100% to 63%-73% in 2010. Projections suggest the dependency ratio could narrow even further – to around 50% or below – by 2050 as large cohorts of currently young people move into the workforce and fertility declines (reducing the number and proportion of dependent children under 15 years of age). This is a major strategic advantage to the three countries provided that large cohort of young people do get productive jobs, earn incomes and pay taxes. However to the extent that NCDs appear amongst working age populations and reduce their capacity to work, this ‘demographic dividend’ is diluted.

Table 5.2

Age Dependency Ratio (%) past and projected for Samoa, Tonga and Vanuatu

Source: (World Bank, World Development Indicators, 2012)

Country	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Samoa	101	97	78	81	82	73	53	60	62	43
Tonga	101	96	89	78	78	63	57	47	53	50
Vanuatu	96	94	93	90	83	70	60	54	52	49

Implications for both Ministers of Health, and Ministers of Finance: a convergence of public health and public expenditure and possible “win wins”.

Primary prevention, secondary prevention, and primary health care: what do the terms mean?

Primary prevention aims to prevent the occurrence of a disease in the first place.

Secondary prevention involves early treatment or management of a disease once it has arisen so to reduce or postpone subsequent deterioration and complications.

Primary health care is the first level of care or entry level to the formal health system. The primary health care setting, including rural aid posts and health clinics, provides a good mechanism for primary and secondary prevention of NCDs through screening for high blood pressure and risk factors for diabetes; advice on diet, exercise, and tobacco cessation; and dispensing basic drugs such as aspirin and statins. This would complement and extend the traditional role of primary health care in preventing and treating communicable diseases, and providing ante-natal and maternal care.

5.23 There are also two strategic issues where the interests of the Ministers of Health, and the Ministers of Finance, directly coincide. The first is the importance of improving efficiency and effectiveness, particularly through primary and secondary prevention. From the Minister of Health’s perspective, primary and secondary prevention is a strategic win. Good screening and management at primary and secondary levels of the health system avert, or at least postpone, death and illness. On the other hand poor primary or secondary prevention leads to complications, more complex surgery and treatment, often at tertiary or overseas centres, diverting resources that could have been used for other major health priorities. For example, diabetic amputations accounted for 22.3% of all surgeries in Tonga during 2010. Minor diabetic amputations were the second leading surgery event (89 surgeries) after appendectomy (95 surgeries). Government reports note that hospitalised diabetes patients are resource intensive patients as they require many dressings and usually long stays in hospitals. Diabetic patients admitted for major amputation surgery are also classified as emergencies or semi-emergencies rather than elective surgery. (Government of Tonga, Report of the Minister for Health., 2010).

5.24 Effective primary and secondary prevention is also in the interests of Ministers of Finance. Every patient in Samoa who successfully manages diabetes through primary and secondary prevention, and so avoids advanced kidney disease, saves the Government around US\$37,000 per year in dialysis costs.⁴² Every

⁴² This is the *net* saving from the total estimated cost of US\$ 38,686 per patient per year for dialysis. It assumes there are still around US\$ 1600 worth of treatment costs per patient per year to help prevent the patient progressing to dialysis treatment. On the other hand, the IDF argues that targeting of high risk individuals “is at best likely to have a moderate impact on the prevalence of type 2 diabetes”. This, they argue, is because it is proving hard to apply research studies on prevention into scalable, ‘real world’ interventions. It is also because “a substantial proportion of diabetes will arise in people who are not identified as high risk, and who would not, therefore, be recruited for such preventive interventions.” The IDF urge focusing on the underlying determinants of diabetes, making environments less obesogenic. These conclusions, drawn from global

person in Vanuatu who changes their lifestyle through primary prevention and successfully avoids becoming a newly diagnosed Type 2 diabetes patient saves the government a minimum of \$ 347 per year (paragraph 4.14). This is more than twice the annual per capita Government expenditure on health. Effective secondary prevention also has high pay-off to Government. Every diagnosed Type 2 diabetes patient in Vanuatu who is stabilised through secondary prevention, and so avoids progressing to an insulin regime, then saves the government an *additional* \$484 per year (paragraph 4.15).

5.25 A second area where the interests of Ministers of Health, and Ministers of Finance, converge is tobacco taxation. Tobacco consumption significantly contributes to, or accelerates, the adverse health outcomes of each of the four main NCDs: heart disease; cancers; lung disease and diabetes. Tobacco kills around half of all its users, often prematurely. Numerous and large studies have long shown that raising excise duties on tobacco, and maintaining them in real terms against inflation and disposable income, has a double benefit: it reduces uptake of tobacco amongst the poor and the young, whilst simultaneously generating extra revenues for Government. (World Bank, *Curbing the Epidemic*, 2009). (Abedian I et al, 1998).

5.26 Ministries of Finance should also note the potential revenue currently being lost, and avoidable expenses otherwise incurred, by not having optimum taxation rates for tobacco. More specifically, WHO recommends that excise duties alone should be at least 70 per cent of the retail prices of cigarettes as an important component in curbing tobacco consumption and uptake, especially amongst the young. (WHO, *Technical Manual on Tobacco Tax Administration.*, 2010). Analysis undertaken by Ministry of Finance officials during the June 2012 World Health Organization Workshop on Tobacco Taxation in Auckland, New Zealand, highlighted the benefits of increasing tobacco excise rates in the Pacific. Raising the excise rate on cigarettes by 50% would increase cigarette excise revenue by around 14% and 20% per annum in Samoa and Tonga respectively. This translates into extra excise revenue of 3.6 million Tala (\$ 1.6 million) for Samoa and 2.5 million Pa'anga (\$1.45 million) for Tonga each year. Final consumer prices of cigarettes in Samoa would increase by around 30% with the share of excise in the final price rising from 47% to 54%. Final consumer prices of cigarettes in Tonga would increase by around 35% with the share of excise in the final price rising from 54% to 60%.

5.27 Other studies note the (otherwise preventable) costs to the health system from tobacco consumption, and compare it to revenue collected from tobacco to highlight the overall *net* losses. For example, the average tobacco tax revenue in the Philippines was estimated to be \$ 442 million, whereas the estimated health costs from tobacco use were estimated to range from \$ 2.8 billion to just over \$ 6 billion in 2003: health costs outstripping tobacco revenue at least 6:1. (Southeast Asia Tobacco Control Alliance, 2010). Arguments by tobacco companies that tobacco control measures harm the economy are usually exaggerated. Consumers do not simply stop spending when tobacco control measures take effect: instead they reallocate their purchases to other products, including potentially better and more nutritious food, housing improvements and other items that can promote health and stimulate the local economy. Similarly, tobacco farmers and manufacturers do

experience, appear valid in general. But it is not at all clear that they apply to the very specific and high prevalence situations in the Pacific, including the three countries in this study.

not simply stop producing when consumption of tobacco goes down. Instead, they reallocate land and capital to producing other products, none of which are likely to be as lethal as tobacco. Claims by the tobacco industry that raising taxes on tobacco are regressive and disproportionately hurt the poor are wrong: latest research shows that the poor bear the smallest share of any tax increase yet disproportionately large health gains (Jha P et al, 2012).

5.28 Studies suggest that raising the price of tobacco (and then adjusting it to keep pace with inflation) is one of the most strategic interventions and “best buys” to reduce NCDs (Beaglehole R et al, 2011). Pacific Island countries would, however, need to respond for public health reasons to a possible switch to home grown, informally marketed, loose tobacco leaf if prices of manufactured cigarettes were raised through taxes. Ministers of Health and Ministers of Finance will also need to consider the costs and consequences of increasing taxes on other risk factors for NCDs including alcohol, and foods with high concentrations of sugar, salt, fats and trans-fats.

5.29 While Ministers of Health, and Ministers of Finance, have the most direct interest in preventing and treating NCDs, other Ministries also have a direct interest. Ministers of Agriculture have an interest in ensuring arable land is used for nutritious fruit and vegetables (and not allocated to tobacco production). Ministers for Commerce and Industry, and the Public Service Commissioner, have an interest in ensuring workplaces and cafeterias are conducive to healthy and active lifestyles, and that workers are not becoming absent due to otherwise preventable NCDs. Ministers of Education have direct interests in ensuring school curriculum (and cafeterias) promote active lifestyle and better nutrition.

Chapter 6: Initial Recommendations and Possible Next Steps

Initial recommendations for discussion with Governments and development partners.

6.1 It is too early to make firm, specific recommendations. For the reasons outlined in Chapter one, key data on which to base firm, specific, recommendations is missing. Furthermore, governments and their development partners have not had an opportunity to review the findings of this rapid stocktake, and advise where they see the main priorities and opportunities. While it is therefore too early to make firm, specific recommendations, the landscape is sufficiently clear from this rapid stocktake to suggest some potential areas for subsequent discussion and attention.

6.2 Improving the data and evidence base on which better decisions can be made would appear to be a strategic priority. As noted in paragraphs 1.13 - 1.17, some key data on the epidemiology, and costs, of NCDs are missing or are unreliable. This undermines good decision making. Yet Governments cannot afford to waste any resources on ineffective interventions, especially when Government expenditure on health in 2010 was just \$140, \$143 and \$179 per capita in Tonga, Vanuatu, and Samoa respectively. (WHO, Global Health Observatory, 2012). Better data would help make better choices about how to allocate scarce resources to best effect. Paragraph 6.3 below outlines some priority data gaps that governments and development partners might wish to address in the short term. Over the medium to longer term, governments could also keep up to date their National Health Accounts, and have a separate chapter on NCDs as Tonga has done, so as to provide a coherent and comparable mapping of sources and uses of funds in the total health sector

6.3 Several priority questions about the economics of NCDs suggest themselves based on the findings of this stocktake report. What is the full cost to Government, and to households, of treating the main NCDs? How do those costs vary between different levels of the health system (community health clinic, rural secondary hospital, urban tertiary hospital)? How do costs to Government (and households) increase as a particular NCD progresses? What are the costs, and consequences, of alternative NCD interventions, including the cost of doing nothing or continuing a “business as usual” approach? What are the main cost drivers behind specific NCD treatments: technology, drugs, staffing? What are the investment, and recurrent, costs of scaling up priority NCD interventions to the national level, including training of health workers? Do unit costs of drugs and equipment increase as more remote islands are reached, or do unit costs decrease through economies of scale and buying in bulk? How much would it cost to scale up the WHO “best buys” PEN package nationwide, and what are the recurrent cost implications? What impact does the direct (out of pocket) and indirect (foregone income) costs to households of NCDs have on the poorest two quintiles? Do health promotion measures actually change lifestyle decisions and how much do they cost? Based on modelling and projections of NCDs prevalence, what is the range of forecasts for health care costs to government over a five and ten year period?

6.4 Prioritising high risk, premature deaths, would appear to be a priority. Chapter Three demonstrates the widespread prevalence of NCDs, the widespread prevalence of multiple risk

factors, and the relatively high level of premature NCD deaths. Priorities will therefore need to be set. This is particularly so when total health expenditure range from just \$ 157 per person per year in Vanuatu to \$204 per person per year in Samoa. (WHO, Global Health Observatory, 2012). The WHO approach to identifying high risk cardiovascular disease (CVD) candidates appears to be one good way of prioritising interventions in the Pacific. That is because, as Chapter 3 shows, CVD is the leading cause of death in the Pacific and is the result of multiple risk factors (weight, hypertension, cholesterol, tobacco and age). The WHO approach uses these multiple risk factors to then generate colour coded prediction charts of absolute risk. Importantly, reviewers note this approach has been validated in primary health care settings in low and middle income countries without access to sophisticated diagnostic technology. Reviewers also note that “a shift from management of single risk factors to total cardiovascular risk prediction and management will enable restricted health care resources to be targeted to individuals who are most in need and most likely to benefit”. (Lindholm L and Mendis S, 2007).

6.5 Prioritising primary but especially secondary prevention would seem to be a priority.

Chapter Three notes the widespread levels of obesity and overweight, including amongst the young. Chapter Four then notes how the cost to government escalates as a disease like Type 2 diabetes progresses. As noted in those discussions, every person in Vanuatu who changes their lifestyle through primary prevention and successfully avoids becoming a newly diagnosed Type 2 diabetes patient saves the government a minimum of \$ 347 per year (paragraph 4.14). This is more than twice the annual per capita total government expenditure on health. Effective secondary prevention also has high pay-off to government. Every diagnosed Type 2 diabetes patient in Vanuatu who is stabilised through secondary prevention, and so avoids progressing to an insulin regime, then saves the government an *additional* \$484 per year (paragraph 4.15). Chapter Four also suggests there is insufficient investment in primary – and especially secondary – prevention and care. Reallocating scarce resources from expensive dialysis treatment for a few, to primary and secondary prevention for the many, should be considered. This is particularly so given the relatively poor survival outcomes of dialysis.

6.6 Prioritising preventative interventions amongst young women and would appear to be a strategic priority.

Improved health for young women is a worthwhile investment in its own right. But adverse maternal health, including under-nutrition, obesity, and diabetes, can also program chronic disease in the developing foetus *in-utero*, transferring increased NCD risks (and costs) to the next generation. (Barker D, 1998.) (Elisaia A et al, 2009). Chronic diseases amongst pregnant women can also raise the risk of complications and costs. The Center for Disease Control in the USA estimates that every one dollar invested in preconception care for women with diabetes can reduce health costs by up to \$ 5.19 by preventing costly complications (CDC, 2008). Pregnant women with diabetes, hypertension or obesity have also recently been found to be 1.61 times more likely to have a child with autism spectrum disorder and 2.35 times more likely to have neurodevelopment delays. (Krakowiak P et al, 2012)

6.7 Increasing taxation on tobacco, and possibly some food items, is a priority.

Chapter Five notes that increasing taxation on tobacco is a “win-win” for Ministers of Health and Ministers of Finance, raising revenue while simultaneously reducing tobacco uptake amongst the young. A **recent** study has identified five priority interventions to combat NCDs in developing countries globally, with

tobacco control being the most urgent and immediate priority. The study (Beaglehole et al. 2011) was published in *The Lancet* against the backdrop of the UN's High Level Meeting on Prevention and Control of Non-communicable Diseases. The five priority interventions identified were tobacco control, salt reduction, improved diets and physical activity, reduction in hazardous alcohol intake, and provision of essential drugs and technologies. The report explains that "the priority interventions were chosen for their health effects, cost-effectiveness, low costs of implementation, and political and financial feasibility. The most urgent and immediate priority is tobacco control" (Beaglehole R et al, 2011). Given high rates of obesity and overweight in the Pacific, governments may also need to give priority to taxation of certain foods and drinks, including those with high sugar, salt, or saturated fats. The contrasting experience of countries increasing taxation on sugary drinks in four countries of the Pacific has been examined in recently published research (Thow A M et al, 2010).

Possible next steps

6.8 Looking to the future, updated estimates on the Burden of Disease (BOD) and associated risk factors are likely to be released later in 2012. The updated BOD report will include estimates of death, and disability, for 266 disease outcomes (including NCDs) as well as 66 underlying risk factors for disease, and all major NCD risks such as nutritional status. The report will cover estimates for three time periods (1990, 2005, and 2010) for 20 different age groups, and both sexes. The regional and global estimates are based on separate country estimates of BOD for 187 countries, including those in the Pacific with populations greater than 50,000. Strategies for publication and dissemination of the country estimates are yet to be finalised by the BOD study core team. It is envisaged that an Asia Pacific regional forum could be held sometime in the first six months - possibly the first quarter - of 2013 where regional and national level estimates are proposed to be disseminated. Policy makers in the Pacific will then be able to see national level estimates of incidence, prevalence, and duration of NCD diseases as well as communicable diseases, and injuries. They will also see estimates of deaths and disability attributable to NCDs, and their risk factors by age groups and gender. Governments in the Pacific, and their development partners, can use those updated BOD estimates to explore the public health, and public financing, implications of NCDs as a strategic priority.

6.9 The World Bank will now use this rapid stocktake report as a basis for discussion and feedback with Governments, and their development partners, about possible next steps. Whatever the outcome of those consultations, it is clear that the main response needs to come from the countries and their governments in the region. Development partners, including the World Bank, can assist in various ways. But achieving effective and sustainable results in response to the rise of NCDs will be determined largely by the actions taken – or not taken - by governments and individuals in the Pacific.

6.10 The World Bank, and the international consultant undertaking this rapid stocktake, takes this opportunity to thank Government officials in Samoa, Tonga and Vanuatu, and their development partners, for the excellent discussions held to date.

Annex One: Pacific Islands Indicators of Non-Communicable Diseases and Risk Factors in 2008

Source: (WHO 2011)

Indicator	Cook Islands	Fiji	Kiribati	Marshall Islands	Micronesia (Federated States)	Nauru	Niue	Samoa	Solomon Islands	Tonga	Tuvalu	Vanuatu
Total population	20,288	860,623	99,546	54,038	111,064	10,255	1,468	183,081	538,148	104,058	9,827	239,651
NCDs as a percentage of all deaths (%)	74	77	69	73	67	70	72	70	60	74	73	70
Current daily smoking total (%)	34	8	67	17	17	47	...	36	28	22	32	12
Physical inactivity (%)	72	...	49	51	65	49	...	49	42	41	...	...
Raised blood pressure (%)	41	39	33	32	38	39	...	40	30	40	...	41
Raised blood glucose (%)	20	13	22	26	15	12	...	21	15	17	...	8
Overweight (%)	90	65	80	79	75	92	...	84	65	87	...	62
Obese (%)	63	30	46	45	40	71	...	54	30	57	...	27
Raised cholesterol(%)	58	52	34	44	46	44	...	33	32	48	...	...

Annex Two: Health expenditure statistics for Samoa, Tonga and Vanuatu, 2010

Source: (WHO, Global Health Observatory, 2012)

Country	Total expenditure on health as % Gross Domestic Product 2010	General government expenditure on health as % total expenditure on health 2010	Private expenditure on health as % total government expenditure 2010	General government expenditure on health as % total government expenditure 2010	External resources for health as % total expenditure on health 2010	Out of Pocket expenditure as % of private expenditure on health 2010	Per capita total expenditure on health at average exchange rate (US\$) 2010	Per capita total expenditure on health PPP ⁴³ (I\$) 2010	Per capita government expenditure on health at average exchange rate (US\$) 2010	Per capita government expenditure on health (PPP I\$) 2010
Samoa	6.5	87.7	12.3	23.4	13.4	63	204	283	179	248
Tonga	5.1	81.5	18.5	12.9	17.4	67.8	172	229	140	187
Vanuatu	5.2	90.6	9.4	18.2	23.4	56.7	157	240	143	217

⁴³ See Footnote 7 for an explanation of PPP and International Dollars

Annex Three: Health Expenditure Samoa, Tonga and Vanuatu compared to Income Groups

Source: (WHO, World Health Statistics , 2012)

	Total expenditure on health as % Gross Domestic Product 2009	General government expenditure on health as % total expenditure on health 2009	Private expenditure on health as % total government expenditure 2009	General government expenditure on health as % total government expenditure 2009	External resources for health as % total expenditure on health 2009	Out of Pocket expenditure as % of private expenditure on health	Per capita total expenditure on health at average exchange rate (US\$)	Per capita total expenditure on health PPP44 (I\$) 2009	Per capita government expenditure on health at average exchange rate (US\$) 2009	Per capita government expenditure on health (PPP I\$) 2009
Samoa	5.4	85.3	14.7	18.3	11.3	63	154	234	132	200
Tonga	4.6	79.3	20.7	11.4	11.6	67.8	142	207	113	164
Vanuatu	4.9	89.8	10.2	16.4	23.3	56.7	123	210	110	188
Low Income Group	4.9	38.9	61	8.5	25.7	78	25	59	10	23
Lower Middle Income Group	4.4	39	61	5.5	2.4	87	62	144	25	56
Upper Middle Income Group	6.1	54.8	45.1	10.5	0.2	75	326	565	177	309

⁴⁴ See Footnote 7 for an explanation of PPP and International Dollars

Annex Four: Crude death rates from Non-Communicable Diseases in the Pacific Island region

Source: (SPC, 2011)

per 100,000 population aged 25+

PICT	Latest Year	Malignant Neoplasms			Circulatory Diseases			Diabetes Mellitus			Respiratory Diseases		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
American Samoa	2005	..	..	137	..	..	313	..	..	126	..	..	80
CNMI	2005	..	..	..	..	..	..	..	..	..	..	..	..
Cook Islands	2009	250	223	236	349	396	373	125	74	99	75	50	62
Fiji	2008	110	182	146	599	400	501	293	314	304	103	65	84
French Polynesia	2007	237	191	214	242	164	204	33	17	25	79	62	71
FSM	2009	104	76	90	163	170	167	186	214	200	95	45	70
Guam	2000	174	125	150	350	237	295	19	32	25	..	..	..
Kiribati	2009	59	53	56	223	110	163	35	40	37	..	..	..
Marshall Is	2009	198	203	200	521	224	374	354	299	327	..	..	..
Nauru	2008	100	100	100	149	201	175	50	151	100	149	100	125
New Caledonia	2006	272	196	234	237	182	209	14	20	17	75	44	59
Niue	2001	..	..	..	..	..	..	..	..	..	..	..	..
Palau	2008	284	193	243	454	264	369	142	193	165	184	141	165
PNG	2008	6	9	7	15	13	14	2	2	2	..	..	..
Samoa	2005/6*	45	61	53	136	111	124	66	53	59	23	18	21
Solomon Islands	2005	..	..	..	..	..	..	..	..	..	..	..	..
Tokelau	2009	..	..	..	..	..	..	..	..	..	..	..	..
Tonga	2008	174	148	161	442	224	331	28	22	25	122	148	135
Tuvalu	2007	0	0	0	..	..	295	..	..	92	..	..	..
Vanuatu	2009#	14	23	18	27	43	35	0	6	3	..	..	..
Wallis & Futuna	2005	..	..	..	..	..	..	..	..	..	..	..	..

Note: figure not available

Source: WHO Country Health Information Profiles

hospital data only

* excludes breast cancer

Annex Five: Recent estimates of the economic costs of NCDs from the international literature

1. **Abegunde and colleagues examined 23 low and middle income countries accounting for around 80 per cent of chronic disease mortality.** They concluded that if nothing is done to reduce the risk of chronic disease, an estimated \$ 84 billion of economic production would be lost from heart disease, stroke, and diabetes between 2006 and 2015. India would lose the most at \$ 16.6 billion cumulative GDP loss by 2015. Details are in the table below. Achieving an additional 2 per cent yearly reduction in chronic disease death rates over 10 years would avert 24 million deaths in those countries and save an estimated \$ 8 billion (Abegunde D et al, 2007).

Table One

Estimated foregone GDP losses to NCDs, selected countries.

Source: (Abegunde D et al, 2007)

Country	Foregone Gross Domestic Product in 2006 (\$ billion)	Foregone Gross Domestic Product in 2015 (\$ billion)	Cumulative Loss by 2015 (\$ billion)
India	1.35	1.96	16.68
People's Republic of China	1.01	1.84	13.81
Indonesia	0.33	0.53	4.18
Pakistan	0.15	0.21	1.72
Thailand	0.12	0.18	1.49
Bangladesh	0.08	0.14	1.14

2. **Clements and colleagues** (Clements B et al, 2012) **note the rise in health expenditure for developed and developing countries more broadly.** They note that:

Since 1970, total real per capita health spending has increased fourfold, while spending as a share of GDP has increased from 6 per cent to 12 per cent in advanced economies. In emerging economies, total health spending has increased from below 3 per cent of GDP to 5 per cent. These increases have put great fiscal pressure on governments and financial pressure on households and businesses.

3. **They further note that the primary drivers of growth in health spending include rising income, population aging, and technological advancements.** (They cite references to suggest that one third to one half of the increased health expenditure in the United States between 1960 and 2007 was due to technological advances including the introduction of new diagnostic and treatment equipment). Additional factors explaining increased expenditure include productivity issues, health insurance coverage, and health policies (Clements B et al, 2012).

4. **One recent WHO study examined the impact of NCDs on national health expenditures, rather than the economy more broadly.** A detailed examination of 13 mainly OECD countries found that NCDs accounted for over one third of a country's total health expenditure, and almost half of hospital spending in most countries. (Garg C and Evans D, 2011). In five of the six cases where time series data existed, the share of NCD expenditure overall rose. This was particularly noticeable in Germany: expenditure on NCDs rose from 27% to 51% of total health expenditure between 2002 and 2006. Importantly, however, that study included mental disorders in its definition of NCDs, along with the standard diseases of cardiovascular, endocrine (mainly diabetes) respiratory and neoplasms (cancers). The importance of including mental disorders in that study is clear: increases in expenditure on mental health accounted for the greatest component of increased expenditure on NCDs.

5. **NCDs can cause broader economic effects on developing country economies, particularly when they involve loss of production through disability or death of working age people.** The World Bank study of China estimates that the economic benefit of reducing cardiovascular disease mortality by 1 per cent per year over a 30-year period (2010–2040) could generate an economic value equivalent to 68 per cent of China's real gross domestic product in 2010, more than US\$ 10.7 trillion (valued in purchasing power parity terms-PPP). The study found that more than 50 per cent of the NCD burden is falling on the economically active population group. Importantly, however, many of those NCDs affecting working age adults can be prevented, or at least postponed to much later life, by reducing tobacco consumption and other NCD risk factors. (World Bank, Toward a healthy and harmonious life in China: stemming the rising tide of non-communicable diseases, 2011)

6 **NCDs can also cause significant – even ‘catastrophic’⁴⁵ – financial hardship in situations to individual households, especially where out of pocket payments are high and risk pooling is limited.** World Bank studies found that a single stay in a public hospital for cancer or heart disease in India involved out of pocket expenses equivalent to between 40-50 % of national income in 2004, rising to 80-90 % at a private facility. The odds of incurring catastrophic hospitalisation expenses for cancer were 160 % higher than for communicable diseases. Out of pocket expenses for an NCD related single hospital stay in India were found to be almost double for that of costs for other health conditions, with most out of pocket expenditure used to purchase medicines, diagnostic tests, and medical appliances. Outpatient costs were found to be 15 – 20 % higher for NCD related diseases than other diseases. Modelling suggests that if NCDs were to be completely eliminated, the estimated GDP in India would have been 5 to 10 % higher than otherwise, particularly as a result of the beneficial impacts of increased life expectancy. (Mahal A et al, 2010)

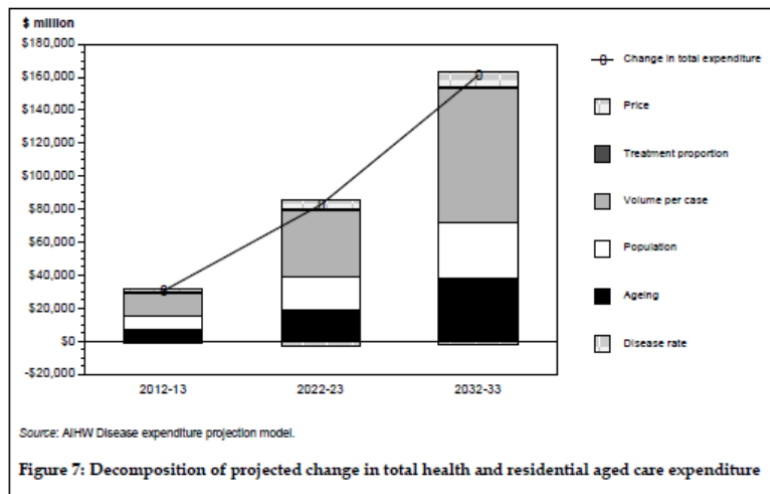
⁴⁵ Catastrophic is generally defined as health expenditure shocks that absorb between 10% to 40% of household expenditure.

7 **What drives current and future costs of treatment of NCDs is context specific, but some important insights are emerging.** Interesting new analysis from Australia suggests that the *volume* of treatment services is more likely to drive health costs over the coming years than ageing, price inflation, or other factors. (AIHW, Projections of Australian Health Care Expenditure By Disease 2003 to 2033, 2011). As can be seen from Chart Six below, the largest contributor to the overall projected increase in health expenditure in Australia up to 2032 comes from changes in the *volume* of health services provided per case of disease (AUD 81.3 billion). Changes in volume of health services mainly reflects introduction of new technologies and changes in treatment practices. Population ageing (AUD 37.8 billion contribution), overall population growth (AUD 34.4 billion) and excess health price inflation (AUD 8.8 billion) are also important contributors to increased expenditure.

Chart One

Projected changes in total health care expenditure in Australia 2012/13 to 2032/33

Source: (AIHW, Projections of Australian Health Care Expenditure By Disease 2003 to 2033, 2011)



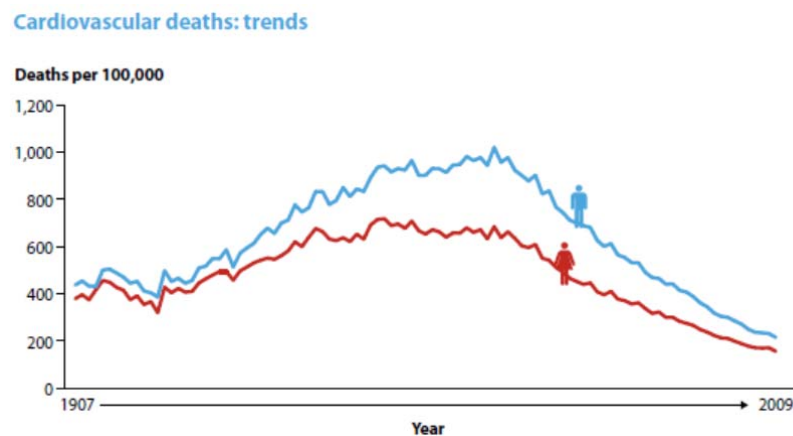
8 **That study also emphasises that changing patterns of disease determine cost drivers over time.** The Australian report notes that “diabetes has the greatest projected increase (436%) between 2003 and 2033, followed by dementia (364%). The projected increase in expenditure for injuries (116%), neonatal and maternal services (88% and 84%) is low in comparison, these last two because changes in the age structure of the population mean those giving birth will be a smaller proportion of the population. The projected growth in diabetes expenditure of 436% is due to multiple reasons, particularly the projected impact on diabetes prevalence rates of expected increases in obesity”. (Goss J, 2008).

9 The Australian study also shows **the benefits of effective prevention and interventions on health outcomes and costs**. Australia has seen a dramatic national level ⁴⁶ reduction in deaths from cardiovascular disease for decades: age standardised death rates from CVD declined from 830/100,000 in the late 1960s to just over 200/ 100,000 in 2006. (AIHW, Cardiovascular disease mortality: trends at different ages, 2010). As can be seen from the Chart seven below, the death rates from cardiovascular disease have been reduced by 78% since its peak in 1968 and are now at rates lower than they were in 1907 for both men and women. Had deaths from CVD stayed at the peak levels of 1968, 156,000 more people would have died just in 2009. The incidence rate of CVD is also projected to fall by 40.4 per cent of the period 2003 -2013.

Chart Two

Rates of death from cardiovascular disease in Australia for men and women: 1907-2009

Source: (AIHW, Australia's Health In Brief, 2012)



10 An important point to note is that costs still rise in this case, but at a rate and a level much lower than they would have had prevention strategies not been so successful. More specifically, the projected cost attributable to CVD still rises, from AUD 9.3 billion to AUD 22.6 billion over the period 2003 to 2032. However this is still AUD 3.2 billion lower than would have been the case had the disease rate been constant.

⁴⁶ This national level progress has not been evenly distributed. Indigenous Australians (Aborigines and Torres Strait Islanders) have high rates of CVD and other diseases.

Annex Six: Financial Cost to Government of Samoa of the National Kidney Foundation

Key Messages

Kidney disease is one important aspect of the large and increasing problem of Non-Communicable Diseases (NCDs) in Samoa. The Government of Samoa funds virtually all of the NKF operations. The NKF itself focuses on treatment (mainly haemodialysis). Prevention and retardation of kidney disease absorbs less than 5% of the total appropriation. The estimated average total cost of dialysis was SAT 92,110 per (USD 38,686) per patient per year in Samoa in 2010/11. The average total cost of dialysis *per treatment* was SAT 590 (USD247). Those on dialysis need three treatments per week for the rest of their lives. Outcomes need to be scrutinised objectively given the cost of SAT 92,110 per patient per year. Unfortunately, 31% of patients have died less than a year after commencing dialysis. Almost two thirds have died two years after commencing it. Much of the reason for these very expensive, but poor health, outcomes is that patients are diagnosed and commence treatment too late for dialysis to extend life significantly. This in turn suggests that reallocating resources to secondary prevention and kidney disease retardation would have important health benefits for a larger number of Samoans and, over time, help to improve the low cost-effectiveness of treatment and reduce costs to Government. Focusing screening and prevention for diabetes and potential kidney disease on pre-pregnant young women would help to interrupt the transmission of NCDs to the next generation of Samoans.

Background, and purpose of the paper

1. Kidney disease is one important aspect of the large and increasing problem of Non-Communicable Diseases (NCDs) in Samoa. Almost three quarters (73%) of all patients at the National Kidney Foundation (NKF) have diabetes and/or hypertension as a primary diagnosis for serious kidney disease.⁴⁷ Given risk factors in Samoa it is inevitable that demand for treatment of kidney treatment will continue to grow. Latest estimates find that 86% of Samoan adults are overweight, of which 46% are obese: key risk factors for diabetes and hypertension.⁴⁸ Treatment of kidney disease is expensive: reports from neighbouring American Samoa suggest treating kidney disease was around USD43,000 per patient.⁴⁹ Samoa needs to ensure what it spends on preventing and treating NCDs, including through the NKF is affordable, effective, efficient, equitable, and financially sustainable. This paper provides some preliminary analysis of costs at the NKF to contribute to that effort.

2. The specific purpose of this paper is to estimate the costs of treating haemodialysis (“dialysis”) patients at the NKF and make some initial observations about affordability and identification of “good buys” for the Government. The perspective taken is therefore that of the

⁴⁷ Report to the General Manager NKF April 2012.

⁴⁸ Village Health Fair Progress Report 2012.

⁴⁹ (Pacific Islands News Association, 2011)

Government, rather than society as a whole. (While patients bear some direct, and indirect, costs, these are small: see discussion below).

Expenditure at the NKF

3. Table One below shows the total Government budget appropriation to the NKF since its establishment in 2005, and the share of NKF expenditure as a percentage of total Government expenditure through the Ministry of Health.

Table One

Government Appropriations to NKF in Samoan Tala (current prices) and share of NKF as percentage total appropriations to Ministry of Health

Source: (Government of Samoa Approved Estimates)

Item	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12
Total appropriation to NKF	4,611,502	5,343,479	4,376,000	4,521,389	4,966,862	
Total appropriation to MOH	60,344,075	70,074,380	58,985,691	65,131,805	69,064,202	
NKF as per cent of total appropriation to Ministry of Health	7.6	7.6	7.4	6.9	7.2	

4. Table two below provides the breakdown of costs for the NKF by main output.

Table Two

NKF: Breakdown of Costs by Main Output, in Samoa Tala (current prices)

Source: (Government of Samoa Approved Estimates 2011-12)

Output	2010/11	Domestic funding in 2011/12	Per cent of the appropriation going to defined outputs 1-4	Per cent of total Government appropriation in 2011/12 ⁵⁰
1. Policy Advice to the Minister	585,158	458,331	15	9.2
2. Medical Services of which:	1,905,598	2,002,983	65.8	40.3
Personnel	763,312	761,918		
Operating expenses	258,030	316,480		
Capital Costs	128,709	296,854		
Overheads	755,547	627,731		
3. Prevention, Early Detection and Education of which:	161,655	233,034	7.6	4.7
Personnel	61,506	120,917		
Operating expenses	37,030	63,830		
Capital costs	5,000	-		
Overheads	58,119	48,287		
4. Maintenance Services of which:	224,076	347,113	11.4	6.9
Personnel	87,256	110,616		
Operating expenses	60,330	81,080		
Capital costs	18,371	58,843		
Overheads	58,119	96,574		
			100%	
(Sub total of outputs 1-4 delivered by NKF)	(2,876,487)	(3,041,460)		
Transactions on behalf of the State of which:	1,946,982	2,168,742		43.6
Overseas medical supplies	1,390,695	1,540,695		
Water rates	20,000	20,000		
Electricity	150,000	200,000		
Ambulatory supplies	150,000	150,000		
VAGST	236,287	258,047		
Government Grant	4,521,389	4,966,862		
Cost recovery		84,3400		

⁵⁰ Sum to 104% because these are as a percentage of Government appropriations only and do not include cost recovery or charitable donations.

5. Three things are noticeable from Table Two.

6. First, **Government directly bears virtually all of the cost of the NKF**. Multilateral and bilateral development partners do not provide funding to the NKF, although are active and substantial supporters to other parts of the Government's health program. Samoan nationals pay only a notional fee of SAT 10 per treatment, and overseas visitors pay SAT 500 per treatment. Total cost recovery was SAT 84,340 or just 1.6% of the Government appropriation for the year: not sufficient to even cover the electricity charges at the NKF. There are no third party contributions via insurance.

7. Second, **NKF believe Government is nevertheless saving money compared to the previous alternative**. More specifically, NKF officials state Government spent T 6 million on six patients prior to the establishment of the NKF because they were transferred to New Zealand for treatment (simple average of around SAT 1 million per patient including airfares). Now the NKF is treating 50 patients for SAT 4.9 million (simple average of SAT 98,000 per patient) suggesting a saving per patient of SAT 902,000 per patient (USD 380,000 per patient) and assuming no difference in quality of treatment and outcome.

8. Third, it is clear from Table 2 that the **greatest share of expenditure goes to treatment of kidney disease rather than prevention**. Virtually two thirds (65.8%) of the budget for the four designated outputs goes to "medical treatment" (output two). In contrast, prevention and early detection (output three) attracts the lowest share 7.6% of the SAT 3,041,460 going to direct outputs. These priorities do not change when the total budget to the NKF is examined. Including the additional payments made by NKF to other government authorities, including SAT 1.5 million for overseas medical supplies, virtually all of which goes to treatment rather than prevention, reduces prevention to 4.7% of the total budget. (Of course, other parts of the Samoan health system also do spend money on overall prevention of NCDs, including the Ministry of Health, and the National Health Service. The point being made here is that treatment, rather than prevention, of kidney disease per se is the focus of the NKF).

Estimate of cost of treatment per patient

9. Table Three estimates the financial cost to Government of treating an individual patient on dialysis. Several simplifying assumptions and adjustments are applied to make this estimate. More specifically, the Value Added GST (VAGST) was excluded as this is an internal transfer payment from NKF to Government, and not the cost of using a resource. One-off, short term (often one week) dialysis treatment for overseas patients was excluded. The expenditure on items for Samoans not obviously either "treatment" or "prevention", were recalculated to reflect the notional share of 4.7% total appropriation going to prevention. For example, total expenditure of SAT 458,331 for policy advice to the Minister and Board (output one) was reduced by 4.7 % (SAT 21,495) on the simplifying assumption that 4.7% of that output would be on prevention, mirroring the share "prevention" receives overall. The same process of apportioning the notional 4.7% expenditure to prevention was applied to maintenance (output 4) and payments to other Government Departments (e.g. overseas

medical supplies, electricity, water, ambulatory peritoneal dialysis supplies). This process reduced the total Government appropriation assigned directly to “treatment” to SAT 4,605,535 (USD 1,934,324). Table Three then estimates the average cost per patient, assuming each patient receives three dialysis treatments per week for every week of the year.

Table Three

Estimated cost to Government of treating a patient in 2011/12

Component	Tala	Cumulative total in Tala	USD equivalent
Total appropriation to NKF	4,966,862		2,086,082
Less VAGST (a transfer payment)	236,287	4,730,575	
Less pro-rata of 4.69% going to prevention applied to:			
• Minister and Board (output one)	21,495		
• Maintenance (output four)	16,279		
• Medicine	72,258		
• Water	938		
• Electricity	7,035		
• Peritoneal supplies	7,035		
Total estimated cost for dialysis treatment		4,605,535	1,934,324
Cost per patient			
Total average cost per patient per year (Total of SAT 4,605,535 for dialysis divided by 50 patients per year)	92,110		38,686
Total average cost per patient per week	1,771		743
Total average cost per treatment per patient (3 treatments per week)	590		247

10. The end result is that **the average total cost of dialysis was SAT 92,110 per (USD38,686) per patient per year in Samoa in 2010/11.** The average total cost of dialysis per treatment was SAT 590 (USD247). Those on dialysis need three treatments per week for the rest of their lives.

11. It should be noted that this is a particularly **conservative estimate with important limitations.** It is conservative because no allowance has been made for the capital cost of the land on which the NKF sits, or the buildings. The important limitations to this exercise include the fact that simple average costs have been estimated, whereas marginal costs (how costs change by small increments of increased services) is of more relevance. Nor is there any estimation made of scale economies (lower average costs as coverage expands) or productivity improvements over time. This is also a snapshot in time: wage increases of staff, or exchange rate driven cost of imported medicines and equipment would quickly alter the estimates. Given that the unit of analysis is cost to Government, direct (e.g. transportation costs) and indirect (e.g. opportunities foregone to earn an income by accompanying carers) were excluded, even though they are real. Similarly, no attempt has been made to quantify ‘pain and suffering’ of patients.

12. An estimated average cost of dialysis of SAT 92,110 (USD 38,686) per patient per year raises several important implications.

13. First, **is this expenditure effective and the best use of money?** To those being treated, and their families, the answer would be yes. How much they would be “willing to pay” for the treatment is an important concept in economics as it sheds light on the perceived benefits of a service. However this is difficult to measure and raises ethical concerns. Presumably, however, patients value the treatment much more than the SAT 10 Tala they pay per treatment (SAT 30 per week).

14. However from the **Government’s perspective, the effectiveness of the expenditure is questionable. About 31%** of patients on dialysis have died in less than a year after commencing dialysis. A further 17% of patients have died at the one year point after commencing dialysis. A further 16% have died at the end of two years. Thus, nearly two thirds (64%) of patients have died within two years. Expenditure of an average SAT 92,110 (USD 38,686) is around twelve times the GNI per capita of Samoa of around USD 3200 per capita, and therefore not “cost-effective” under usual benchmarks. Officials at NKF believe a key explanation for the relatively poor outcomes in terms of extending life are that patients are diagnosed, referred, and commence treatment for kidney disease, too late.

15. This, in turn, suggests that **focusing more resources on secondary prevention to prevent or at least postpone onset of severe kidney disease and dialysis would be a good investment in both public health and public finance.** If Government focussed more on screening, early referral, and early adherence to “retardation” schemes, then health outcomes for a larger number of Samoans would be improved, and savings would occur. The net savings to Government would also be very large: even if secondary prevention through provision of medicines and testing cost US\$ 1000 per patient per year, Government would still save an estimated US\$ 37,686 per patient per year in averted costs of dialysis.

16. A similarly **high impact “good buy”** would be to focus screening, prevention and, where necessary, diabetes and kidney disease retardation medicine on younger women before they are pregnant. Investing in the health of young women is not just desirable and justified in its own right (maternal health and gender are prominent parts of the Millennium Development Goals). Rather, investing in young women’s health is can help to interrupt the transmission of metabolic disorders *in utero* to her offspring that can predispose her son or daughter to obesity and NCDs. (Elisaia A et al, 2009).

17. The high cost of dialysis also raises the question of the **financial affordability and sustainability of the current focus on treatment.** As Table one shows, appropriations to the NKF are relatively stable in absolute and relative terms, absorbing around 7% of the total appropriation to the Ministry of Health and its sector over recent years. By itself, this is not a major problem at least in terms of financial sustainability (although it could be argued the money would be better spent on other high priority programs). However, Samoa faces a large and growing pipeline of diabetes and heart related illnesses as the population ages and becomes more urbanised. The Village Health Fair

found that 86% of adult Samoans are overweight or obese: almost half (46%) of those surveyed were clinically obese (BMI 30-39) and 14% were morbidly obese (BMI 40+). This implies a large increase in the need for treatment over time. Paradoxically, the better Samoa is at screening for diabetes, hypertension, and kidney disease, the more demand will be put on the health system more generally and the NKF more specifically. This can only increase financial pressures on an already tight fiscal situation and outlook. Cost recovery of SAT 10 per treatment, totalling just SAT 84,340 or 1.6% of the budget, shows that current arrangements are not financially sustainable.

18. Economic analysis is also about **equity**. NKF statistics show that dialysis patients are reasonably distributed across different age groups and not significantly skewed to the very old. The largest age group on dialysis is the 61-70 year olds (25%) followed by the 41-50 year olds (22%) and then the 51-60 year olds (14%). Over 71 year olds and under 40 year olds make up the balance. (Details on gender were not available at the time of this analysis). NKF does not keep statistics on the socio-economic background of patients on dialysis, or whether they are urban or rural dwellers. It is therefore not possible to assess if the high expenditure is pro-poor or pro-rich.

Some selected studies from overseas on dialysis and other options.

19. One major study in the United States found that **dialysis for hospitalised adults had very limited health benefits in terms of prolonging life, and was not cost effective**. More specifically the study found that the median survival time for hospitalised patients undergoing dialysis in various hospitals in the United States was just 32 days. Only 27% were alive after 6 months. But costs were high: the estimated average cost was \$US 128,200 per quality adjusted life year saved. For patients with an initially poor prognosis, the cost was \$US 274,000 per quality adjusted life year saved. Even for patients with a good prognosis, the estimated cost was \$US 61,900 per quality adjusted life year saved, all of which “far exceeded the \$US 50,000 per quality adjusted life year, a commonly cited threshold for cost effective care”. (Hamel M B et al, 1997).

20. On the other hand **there are affordable, cost-effective, and even cost –saving interventions at the level of primary and secondary prevention for diabetes**. For example, preconception care for women with diabetes leads to healthier mothers and babies. The Centers for Disease Control in the USA estimate that every \$US 1 invested in such care can reduce health costs by up to \$US 5.19 by preventing costly complications. (CDC, 2008).

21. Furthermore, one major recent study (Li R et al, 2010) found strong evidence to classify the following interventions as either cost saving or very cost – effective compared to other interventions to treat diabetes across the USA.

Cost saving— 1) ACE inhibitor (ACEI) therapy for intensive hypertension control compared with standard hypertension control; 2) ACEI or angiotensin receptor blocker (ARB) therapy to prevent end-stage renal disease (ESRD) compared with no ACEI or ARB treatment; 3) early irbesartan therapy (at the microalbuminuria stage) to prevent ESRD compared with later treatment (at the macroalbuminuria stage); 4) comprehensive foot care to prevent ulcers

compared with usual care; 5) multi-component interventions for diabetic risk factor control and early detection of complications compared with conventional insulin therapy for persons with type 1 diabetes; and 6) multi-component interventions for diabetic risk factor control and early detection of complications compared with standard glycemic control for persons with type 2 diabetes.

Very cost-effective— 1) intensive lifestyle interventions to prevent type 2 diabetes among persons with impaired glucose tolerance compared with standard lifestyle recommendations; 2) universal opportunistic screening for undiagnosed type 2 diabetes in African Americans between 45 and 54 years old; 3) intensive glycemic control as implemented in the UK Prospective Diabetes Study in persons with newly diagnosed type 2 diabetes compared with conventional glycemic control; 4) statin therapy for secondary prevention of cardiovascular disease compared with no statin therapy; 5) counseling and treatment for smoking cessation compared with no counseling and treatment; 6) annual screening for diabetic retinopathy and ensuing treatment in persons with type 1 diabetes compared with no screening; 7) annual screening for diabetic retinopathy and ensuing treatment in persons with type 2 diabetes compared with no screening; and 8) immediate vitrectomy to treat diabetic retinopathy compared with deferred vitrectomy.

Conclusion

22. In **conclusion**, NKF are staffed by skilled and dedicated professionals. Dialysis services are valued by those relatively few people (around 50 per year) on dialysis. But this is a particularly expensive form of treatment at around SAT 92,110 per (USD38,686) per patient per year. The health outcomes, measured in terms of extended life, are poor with two thirds dying within two years of commencement of dialysis. Giving greater emphasis to secondary prevention (screening, retardation medicine etc) would improve the cost-effectiveness of the program. Screening and retardation interventions that prevented or postponed the requirement for dialysis treatment would be a major and strategic public health benefit, and save the Government millions of tala.

Annex Seven: First draft of a possible policy briefing note for a hypothetical Pacific Minister of Health, and Minister of Finance

The problem statement

NCDs are an important health challenge in the Pacific. They are already the leading cause of death in twelve Pacific Island Countries, frequently accounting for 70% of all deaths and often occurring at rates twice that of all communicable, maternal, perinatal and nutritional conditions combined. Life expectancy in Tonga has fallen as a result of NCDs. Cardiovascular disease is the leading cause of death in the Pacific. At least one quarter of NCD deaths are premature in Tonga, Samoa and Vanuatu, proportions that can be much higher than other lower middle income countries. NCDs such as diabetes and stroke can also cause chronic ill health and disability as well as death. The Pacific now has some of the highest rates of diabetes in the world.

Existing risk factors suggest that NCDs will be a major health challenge for the Pacific in coming years. Each of the 10 countries in the Pacific for which data is available have 60% or more of the adult population overweight, and in six countries more than 75% are overweight. Obesity often occurs at young ages: nearly one in four boys and one in five girls in Tonga are obese. Other risk factors are also significant including tobacco, diet, and physical inactivity. Only around 5 % of adult females, and around 10 % of adult males, were free of any NCD risk factor. Most Pacific countries have young populations: the median in Samoa, Tonga and Vanuatu is 21 years of age. As those populations age, NCDs can be expected to increase. This is especially so given the existing level of risk factors laid down in younger life in parts of the Pacific, sometimes summarised as Smoking, Nutrition, Alcohol and Physical inactivity (“SNAP”).

NCDs also impose important financial and economic costs especially to Governments in the Pacific which fund most health care. The estimated average total cost of dialysis for patients with diabetes related kidney failure to the Government of Samoa was \$ 38,686 per patient per year in 2010/11: more than twelve times the Gross National Income of Samoa. A newly diagnosed Type 2 patient in Vanuatu costs the government a minimum of \$347 per year, more than twice the total per capita government expenditure on health. Cost to government more than doubles to \$831 per year if the patient has to move to an insulin regime.

Implications for Ministers of Health, and Ministers of Finance

There are implications for Ministers of Health. The underlying risk factors for NCDs often lay in personal lifestyle choices beyond the health sector, yet the responses and costs will often be borne largely by Ministries of Health. The rise of NCDs has consequences for the overall functioning of the health system, including responding to the double burden of communicable diseases, and NCDs. It would be a mistake for Governments – and their development partners - to “verticalise” the response to individual NCDs.

There are also implications for Ministers of Finance, because government funds most health care in the Pacific. The paradox is that government expenditure on health is generally low in absolute terms - less than \$0.50 per person per day in Samoa, Tonga and Vanuatu – but high in relative terms compared to other countries of similar income levels globally. Governments in the Pacific face the challenge of financing the response to a double burden: an unfinished agenda of communicable and reproductive needs while also addressing rising costs for NCDs as populations age. But there are limited prospects for significantly increasing Government expenditure to health in absolute terms due to generally subdued economic growth in several countries of the Pacific. Nor is there large scope (“fiscal space”) to increase the *share* of general government expenditure going to health which is generally higher than in other comparable countries globally. Ministers of Finance and Planning should also note that NCDs often involve chronic or life-long treatment costs: widespread prevalence of NCDs therefore has implications for Medium Term Expenditure Frameworks.

There are broader economic costs too. Premature NCD deaths, which are relatively high in the Pacific, could dilute one of the strategic benefits open to Samoa, Tonga and Vanuatu: its potential “demographic dividend” from a potentially large working age population. Almost half of all deaths (48%) in Tonga occur below age of 64, particularly amongst men, as a result of cardiovascular disease. Chronic NCD illness also have broader economic effects: lost productivity through time off work; money spent on medical treatment that could have been spent on other goods and services in the economy; withdrawing people from productive pursuits (work or school) to become carers.

Opportunities for strategic responses and “win-wins”

There are several strategic opportunities where the interests of the Ministers of Health, and the Ministers of Finance, would appear to directly coincide in a “win-win” situation. Increasing, and then maintaining, the real price of tobacco taxes has a double benefit: it reduces uptake of tobacco amongst the poor and the young, thereby eliminating a major risk factor for NCDs, whilst simultaneously generating extra revenues for Government. Consideration could be also given to increasing taxes on alcohol, or food and soft drinks known to be high in sugars, saturated and trans fats, and / or high salt content. Investing in young female health and antenatal care is also a ‘win-win’ by breaking the inter-generational link between metabolic disorders of the mother and subsequent heightened risks of NCDs in her offspring.

Effective primary and secondary prevention also have significant health and financial returns. Every person in Samoa who avoids dialysis for kidney damage saves the government \$38,686 per year. Every person in Vanuatu who changes their lifestyle through primary prevention and successfully avoids becoming a newly diagnosed Type 2 diabetes patient saves the government a minimum of \$ 347 per year: more than twice the annual per capita government expenditure on health. Effective *secondary* prevention also has high pay-off to government. Every diagnosed Type 2 diabetes patient in Vanuatu who is stabilised through secondary prevention, and so avoids progressing to an insulin regime, then saves the government an *additional* \$484 per year over the cost of an oral medication regime.

References

- Abedian I et al. (1998). *The Economics of Tobacco Control: Towards an Optimal Policy Mix*.
- Abegunde D et al. (2007). The burden and costs of chronic diseases in low income and middle income countries. *The Lancet Vol 370*.
- ADB. (2012). *The state of Pacific towns and cities: urbanisation in ADB's Pacific developing countries*.
- AIHW. (2010). *Cardiovascular disease mortality: trends at different ages*. Canberra : Australian Institute of Health and Welfare.
- AIHW. (2011). *Projections of Australian Health Care Expenditure By Disease 2003 to 2033*. Australian Institute of Health and Welfare.
- AIHW. (2012). *Australia's Health In Brief*. Canberra : Australian Institute of Health and Welfare.
- Asian Development Bank. (2006). *Key Indicators: Policy Effectiveness in Health and Education*.
- Barker D. (1998.). In-Utero Programming of Chronic Disease. *Clinical Science Vol 95*.
- Beaglehole R et al. (2011). Priority Actions for the Non Communicable Disease Crisis. *The Lancet Vol 377 Issue 9775*.
- Bloom D et al. (2011). *The Global Economic Burden of NonCommunicable Diseases*. Harvard School of Public Health and World Economic Forum.
- Carter K et al. (Forthcoming publication). *Causes of death in Tonga: quality of certification and implications of statistics*.
- CDC. (2008). *Preventing Diabetes And Its Complications*. US Department of Health and Human Services.
- Chisolm D et al. (2010). Economic Impact of Disease and Injury: Counting What Matters. *British Medical Journal Volume 340*.
- Clements B et al. (2012). *The Economics of Public Health Reform In Advanced and Emerging Economies*. IMF.
- Colagiuri S et al. (2002). Prevalence of Diabetes in the Kingdom of Tonga. *Diabetes Care Volume 25 (8)* .
- Colagiuri S et al. (2008). *The Epidemiology of Diabetes in Pacific Island Populations in The Epidemiology of Diabetes Mellitus* .
- Coyne T. (2000). *Lifestyle Diseases In Pacific Communities*. Secretariat of the Pacific Community.
- DiBello J et al. (2009). Dietary Patterns Are Associated with Metabolic Syndrome in Adult Samoans. *The Journal of Nutrition*.

- Doran C. (2003). *Economic impact of NCDs on hospital resources in Tonga, Vanuatu and Kiribati*.
- Drummond M et al. (2005). *Methods for the economic evaluation of health care programs. Third edition*. OUP.
- Elisaia A et al. (2009). The role of maternal diet in programming obesity, hypertension, and metabolic disease and its relevance to the Western Pacific region. *Samoa Medical Journal Vol 1 No 1*.
- Falconer D et al. (2010). Counting the cost of type 2 diabetes in Vanuatu. *Diabetes Research and Clinical Practice Vol 87*.
- Ferrannini E and Cushman W. (2012). Diabetes and hypertension: the bad companions. *The Lancet Vol 380, Issue 9841*.
- Garg C and Evans D. (2011). *What is the impact of non-communicable diseases on national health expenditures: a synthesis of available data*. WHO.
- Global School Based Student Health Survey. (2012). *GSHS Western Pacific*. Retrieved from <http://www.cdc.gov/gshs/countries/westpacific/index.htm>
- Goss J. (2008). *Projection of Australian health care expenditure by disease 2003 - 2033*. Canberra : Australian Institute of Health and Welfare.
- Government of Samoa. (2011). *Village Health Fair Report*.
- Government of Samoa. (2012). *Budget Address for 2012/13*.
- Government of Samoa Ministry of Finance. (2008). *Strategy for the Development of Samoa 2008 - 2012*.
- Government of Tonga. (2008). *Tonga National Health Accounts Financial Year 2005/6*.
- Government of Tonga. (2010). *Report of the Minister for Health*.
- Government of Tonga. (2010). *Second National Millennium Development Goals Report*.
- Government of Tonga. (2010). *Tobacco Survey for Retail Stores in Tonga*.
- Government of Tonga. (2011). *TongaHealth Annual Report*.
- Government of Tonga. (n.d.). *Budget Statement 2011/2012*.
- Government of Vanuatu. (2011). *Health Information System Annual Report*.
- Government of Vanuatu. (2012). *Health Information System Annual Report*.
- Government of Vanuatu. (2012). *Public Expenditure Review: Health Sector*.
- Hamel M B et al. (1997). Outcomes and cost effectiveness of initiating dialysis and continuing aggressive care in seriously ill hospitalised adult patients. *Annals of Internal Medicine Vol 127*.

- Han JC et al. (2010). Childhood Obesity. *The Lancet Vol 375*.
- Heller P. (2006). The Prospects of Creating "Fiscal Space" In The Health Sector. *Health Policy and Planning*.
- Hufanga S et al. (Forthcoming). *Mortality Trends In Tonga: What Can We Conclude From Available Data*.
- Ibrahim M and Damasceno A. (2012). Hypertension In Developing Countries. *The Lancet Vol 380*.
- International Diabetes Federation. (2011). *IDF Diabetes Atlas Fifth Edition*.
- Jha P et al. (2012). *Tobacco taxes: a win-win measure for fiscal space and health*. Asian Development Bank.
- Joffe B and Zimmet P. (1998). The Thrifty Genotype in Type 2 Diabetes: An Unfinished Symphony Coming To Its Finale. *Endocrine Vol 9 No 2*.
- Krakowiak P et al. (2012). Maternal Metabolism Conditions And Risks for Autism And Other Neurodevelopmental Disorders. *Pediatrics*.
- Langenbrunner J and Somanathan A. (2011). *Financing health care in East Asia and the Pacific: Best Practices and Remaining Challenges*. World Bank.
- Lee I M et al. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of disease and life expectancy. *The Lancet Vol 380*.
- Li R et al. (2010). Cost-effectiveness of interventions to prevent and control diabetes mellitus: a systematic review. *Diabetes Care Vol 33*.
- Lindholm L and Mendis S. (2007). Prevention Of Cardiovascular Disease in Developing Countries. *The Lancet Vol 370*.
- Mafi S. (2012). *Tonga: averting a bleak economic future*. Retrieved from Development Policy Centre: http://devpolicy.org/tonga-averting-a-bleak-economic-future/?utm_source=Devpolicy&utm_campaign=3bb838b19d-RSS_DAILY_EMAIL&utm_medium=email
- Mahal A et al. (2010). *The Economic Impact of NonCommunicable Diseases for India*. World Bank.
- Matsuzaki T et al. (2011). Association of Alzheimers Disease Pathology With Abnormal Lipid Metabolism: The Hisayama Study. *Neurology Vol 77*.
- Ministry of Health 2010. (n.d.). *Samoa Overseas Treatment Scheme: Financial and Disease Analysis for Financial Year 2008/9 and 2009/10*.
- Pacific Islands News Association. (2011). *American Samoa diabetes could reach USD 122 million*. Retrieved from PINA: <http://www.pina.com.fj/?p=pacnews&m=read&o=20678959634eb99ef626077687f83e>

- Robinson H and Hort K. (2011). *Non-communicable Diseases and Health Systems Reform in Low and Middle Income Countries*. Health Policy and Health Finance Knowledge Hub Working Paper Series Number 13. The Nossal Institute For Global Health. .
- Samb B et al. (2010). Prevention and management of chronic disease: a litmus test for health-systems strengthening in low income and middle income countries. *The Lancet* .
- Schiffirin E. (2012). Hypertension: treatments, diabetes, and developing countries. *The Lancet Vol 380*.
- Seiden A et al. (2012). Long Term Trends in Food Availability, Food Prices, and Obesity in Samoa. *American Journal of Human Biology*.
- Southeast Asia Tobacco Control Alliance. (2010). *ASEAN tobacco tax report card: regional comparisons and trends*.
- SPC. (2011). *NCD Statistics for the Pacific Islands Countries and Territories*. Public Health Division, Secretariat of the Pacific Community.
- Tabak A et al. (2012). Prediabetes: A High Risk State For Diabetes Development. *The Lancet Vol 379*.
- Tandon A and Cashin C 2010. (n.d.). *Assessing Public Expenditure on Health From A Fiscal Space Perspective*. HNP Discussion Paper, World Bank.
- Tangcharoensathien V. (2011). Health-financing reforms in South East Asia: Challenges in Achieving Universal Coverage. *The Lancet Vol 377 Issue 9768*.
- Tarnow L et al. (1994). Prevalence of arterial hypertension in diabetic patients before and after the JNC-V. *Diabetes Care Vol 17*.
- Thow A M et al. (2010). Taxing Soft Drinks In the Pacific: Implementation Lessons For Improving Health. *Health Promotion International Vol 26 No 1*.
- Tonga Health. (2010). *Annual Report 2009/10*.
- UK Diabetes. (2012). *State of the Nation*.
- UNICEF. (2012). *Global Study on Child Poverty and Disparities: National Report Vanuatu*.
- Vaai K. (2012). *Slow economic recovery, disappearing tourists: a Samoa update*. Retrieved from Development Policy Centre: <http://devpolicy.org/slow-economic-recovery-disappearing-tourists-a-samoa-update-2/>
- Viali S. (2006). Rheumatic Fever and Rheumatic Heart Disease in Samoa. *Pacific Public Health Vol 13 No 2*.
- Whiting D et al. (2011). IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Research and Clinical Practice*.
- WHO. (2004). *Tonga STEPS Survey Fact Sheet 2004*.

- WHO. (2007). *Integrating poverty and gender into health programs: module on noncommunicable diseases*. .
- WHO. (2009). *WHO Guide To Identifying The Economic Consequences Of Disease And Injury*.
- WHO. (2010). *Global Status Report on NCDs*.
- WHO. (2010). *Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings*.
- WHO. (2010). *Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings*.
- WHO. (2010). *Technical Manual on Tobacco Tax Administration*.
- WHO 2011. (n.d.). *Global Status Report on Noncommunicable Diseases 2010*.
- WHO. (2011). *Noncommunicable Diseases Country Profiles* .
- WHO. (2011). *Noncommunicable diseases fact sheet*.
- WHO. (2011). *Noncommunicable Diseases Fact Sheet*.
- WHO. (2011). *Scaling up action against NCDs: How much will it cost?*
- WHO. (2012). *Global Health Observatory*. Retrieved from <http://www.who.int/gho/countries/en/index.html>
- WHO. (2012, September). *NHA Database*. Retrieved from http://apps.who.int/nha/database/StandardReport.aspx?ID=REP_WEB_MINI_TEMPLATE_WEB_VERSION&COUNTRYKEY=84701
- WHO. (2012). *Obesity and overweight fact sheet number 311*.
- WHO. (2012). *WHO Global Health Expenditure Atlas* .
- WHO. (2012). *WHO Global Report: Mortality Attributable to Tobacco*.
- WHO. (2012). *World Health Statistics* .
- Winkelmayer W et al. (2002). Health economic evaluation: the special case of end stage renal disease and treatment. *Medical Decision Making Vol 22 No 5*.
- World Bank. (2009). *Curbing the Epidemic*.
- World Bank. (2011). *The growing burden of non-communicable diseases in the eastern Caribbean*.
- World Bank. (2011). *The Growing Danger of Non Communicable Diseases: Acting Now to Reverse Course*.
- World Bank. (2011). *Toward a healthy and harmonious life in China: stemming the rising tide of non-communicable diseases*.

World Bank. (2012). *How We Classify Countries*. Retrieved from
<http://data.worldbank.org/about/country-classifications>

World Bank. (2012). *World Development Indicators*.