The Potential Impact of Salt Reduction in Fiji

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Report prepared by
Health Technology Analysts Pty Ltd

The George Institute for Global Health

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Acknowledgement of country

The George Institute acknowledges the Gadigal people of the Eora Nation as the First Custodians of the land on which our Australian office is situated. We pay our respect to Elders past, present and emerging.

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Executive summary

The purpose of this report is to demonstrate the economic value of implementing population-wide salt reduction programs across Fiji using a Social Return on Investment (SROI)* approach. The report examines the maximum level of spending at which a salt reduction strategy still represents a valuable investment. This investment (the threshold value) would result in equivalent costs and savings for implementing a salt reduction program in Fiji.

High blood pressure is one of the most serious risk factors for cardiovascular disease (e.g. stroke, heart failure and coronary heart disease (CHD)), the leading cause of death worldwide. High blood pressure is responsible for more than half of strokes and heart attacks. In Fiji non-communicable diseases (NCDs), including cardiovascular disease, result in thousands of deaths every year and affect the lives of many more. Around 80% of deaths in Fiji are caused by an NCD and those numbers are growing.**

The relationship between eating too much salt and high blood pressure is well established. Reducing salt intake is widely recognised globally as one of the most cost-effective measures for preventing NCDs.

This report assessed the potential benefits of implementing a national salt reduction program in Fiji to prevent stroke and CHD events such as heart attack, and reduce healthcare needs, informal care and productivity costs. These benefits were used to calculate the threshold cost of implementing a profitable salt reduction program from a social perspective.

The base case salt reduction target was 1 gram (g) reduction per day over a year. Results showed reducing salt intake by 1g per day for a year would potentially prevent 234 heart attacks and 72 strokes resulting in 131 lives saved and more than FJD 1.8 million in reduced costs to society each year. Considering these savings, a threshold value of FJD 2.04 per person per year would result in equivalent costs and savings per year from a 1g per day salt reduction program in Fiji.

The findings demonstrate a minimal investment in a national salt reduction program in Fiji is likely to yield a positive social return on investment for the prevention of cardiovascular events.

*Increasing constraints on public resources have led to increased accountability requirements to demonstrate the value-for-money of healthcare and community funding decisions. Social Return on Investment frameworks go beyond traditional economic valuation methods, to assess the broader socio-economic impact of a program. The goal of these analyses is to encapsulate the costs and impacts of a program and translate them into a digestible and meaningful language for a non-academic audience.

***www.health.gov.fj/ncds/ncds-in-fiji*

Broad strategies

Key broad strategies for salt reduction include:

- government policies - including appropriate fiscal policies and regulation to ensure food manufacturers and retailers produce healthier foods or make healthy products available and affordable.
- working with the private sector to improve the availability and accessibility of low-salt products.
- consumer awareness and empowerment of populations through social marketing and mobilisation to raise awareness of the need to reduce salt intake consumption.
- creating an enabling environment for salt reduction through local program interventions and the promotion of "healthy food" settings such as schools, workplaces, communities, and cities.
- monitoring of population salt intake, sources of salt in the diet and consumer knowledge, attitudes and behaviours relating to salt to inform program decisions. Implementing salt reduction programs that promote the use of low sodium (potassium enriched) salts and condiments (seasonings, bouillon cubes, soy and fish sauce).

Other local practical actions to reduce salt intake include:

- integrating salt reduction into the training curriculum of food handlers.
- removing saltshakers and soy sauce from tables in restaurants and introducing product or shelf labels making it clear that certain products are high in sodium.
- providing targeted dietary advice to people visiting health facilities.
- advocating for people to limit their intake of products high in salt and that they reduce the amount of salt used for cooking.
- educating children and providing a supportive environment for children so that they start early with adopting low salt diets.

Actions by the food industry should include:

- incrementally reducing salt in products over time so that consumers adapt to the taste and don't switch to alternative products.
- promoting the benefits of eating reduced salt foods through consumer awareness activities in food outlets.
- reducing salt in foods and meals served at restaurants and catering outlets and labelling sodium content of foods and meals.

World Health Organization – Salt reduction (2020)
www.who.int/news-room/fact-sheets/detail/salt-reduction

Introduction

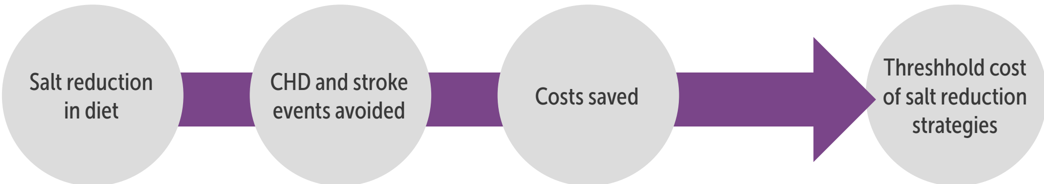
Cardiovascular diseases (CVDs) are the major cause of death among people aged over 60 and second among those aged 15-59.[1] According to the World Health Organization (WHO), 62% of all strokes and 49% of coronary heart disease events are attributable to high blood pressure.[2] The direct causal relationship between dietary salt intake and blood pressure is well established[3,12,13,14,15] with salt reduction widely recognised as one of the most cost-effective means for preventing NCDS around the world.[4,5,6,7,8,9,10,11]

Reduction of dietary salt intake is considered an effective measure to reduce blood pressure. The WHO recommends the consumption of less than 5g of salt per day as a population nutrient-intake goal[16] and urges its member states to take action at a population level to reduce dietary salt intake.[17] This report and accompanying analysis aim to demonstrate the economic value of implementing population-wide salt reduction programs across Fiji.

Objectives and scope

The objective is to identify a threshold value that would make the costs and savings of a salt reduction policy in Fiji equivalent using a social return on investment approach. The approach adopted in this analysis is outlined in the linkage logic map below (Figure 1).

Figure 1: Linkage logic map



Abbreviations: CHD, Coronary Heart Disease

An Excel model was developed to assess the potential benefit of a salt reduction strategy at a population level. These benefits are realised through reductions in stroke and CHD events and corresponding reductions in healthcare use and productivity costs, as well as the need for informal care.

It is acknowledged this analysis does not include confounding factors that may affect blood pressure levels and the associated risk of stroke or CHD events.

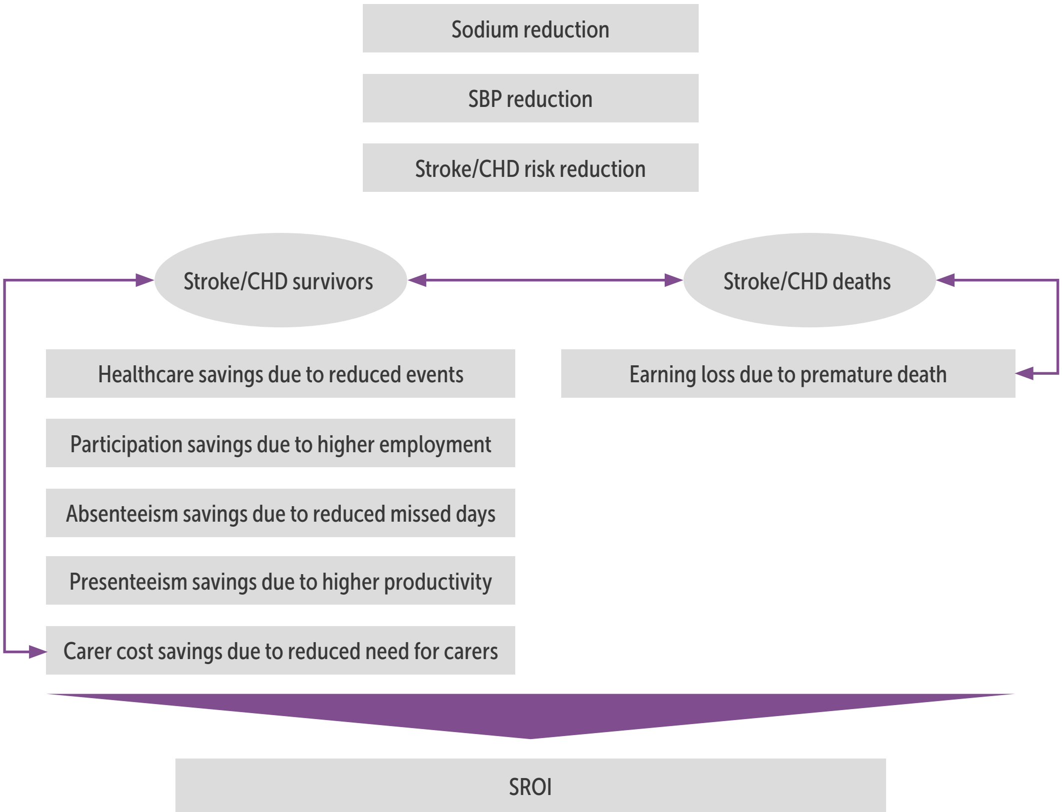
Methodology

The Fiji Sodium Impact Assessment Project (FSIA) estimated average daily salt intake in Fiji as 11.70g per day. This value is much higher than the WHO recommended levels of 5g/day.[16] The model explores the effect of varying levels of reduction of population salt intake: 0.2g/day, 0.5g/day, 0.8g/day, 1g/day, 2g/day, 3g/day and 6.7g/day. (The FSIA was funded by the National Health and Medical Research Council (NHMRC) as part of the Global Alliance for Chronic Diseases hypertension research program, which evaluated the impact of multifaceted interventions to reduce population salt intake in Fiji and Samoa.[18])

The impact of dietary salt reduction on blood pressure changes was estimated through a linear regression model published by Law et al.[19] The new estimated blood pressure levels were then associated with lower incidence of stroke and CHD, based on results from a network meta-analysis by Law et al.[20] The reduction in stroke and CHD events and deaths were associated with healthcare costs, productivity changes (including participation, absenteeism and presenteeism for the person affected by the event) and informal care requirements.

A schematic of the methodology developed for this analysis is shown in Figure 2.

Figure 2: Flowchart of the methodology of this analysis



Abbreviations: CHD, coronary heart disease; SBP, systolic blood pressure; SROI, social return on investment.

The model only takes into consideration the incident population of stroke and CHD for the year of analysis, therefore ignoring the long-term consequences of people who experienced an event in the previous years. Moreover, costs and savings shown by this analysis are accrued for one year only. The assumptions and limitations of the model and analysis are covered in more detail in Section 6 and the Appendix.

The model uses the cost and saving results to calculate the SROI threshold value of the intervention. The SROI is a method to measure values not traditionally reflected in financial analysis, to assess the creation of value for the community. Within this framework, inputs are applied to service activities to produce outputs, from which outcomes are derived, which result in the overall impact.

The purpose of SROI is to examine the relationship between inputs and impact to assess the social value an activity creates in a robust and rigorous way. SROI puts social impact into the language of 'return on investment', a common language bridging sector-specific barriers.

The analysis uses an SROI-informed methodology, but it does not claim to be a complete SROI evaluation; the term SROI is thereby used for simplicity of understanding.

Model input

Incidence and distribution of stroke and CHD

The rates of stroke (2015) (Table 1) and cardiovascular events (excluding stroke – the national data do not separate out CHD) (2015) (Table 2), and the age and gender distribution of such events were sourced from the Global Burden of Disease Data Tool, as reported in the Fiji Ministry of Health and Medical Services Annual Report 2015.[21]

Table 1: Stroke incidence and mortality by age and gender

Stroke incidence by age and gender (2015)			
Age	**Male**	**Female**	**Total**
1 to 4	3	3	6
5 to 9	3	3	6
10 to 14	3	3	6
15 to 19	3	3	6
20 to 24	4	4	8
25 to 29	6	6	12
30 to 34	10	9	19
35 to 39	16	13	29
40 to 44	25	21	46
45 to 49	40	34	74
50 to 54	62	54	116
55 to 59	77	71	148
60 to 64	76	75	151
65 to 69	69	71	140
70 to 74	57	67	124
75 to 79	39	55	94
80 plus	37	57	94
Total	530	549	1,079

Age	Incidence
15-19	0.00001
20-29	0.00002
30-39	0.00006
40-49	0.00014
50-59	0.00030
60-69	0.00034
70+	0.00036

Incidence	1,079
Deaths	534
Mortality (%)	49.49%

Stroke mortality by age and gender (2015)			
Age	**Male**	**Female**	**Total**
1 to 4	1	1	2
5 to 9	0	0	0
10 to 14	1	1	2
15 to 19	1	1	2
20 to 24	2	1	3
25 to 29	3	2	5
30 to 34	3	3	6
35 to 39	5	5	10
40 to 44	7	7	14
45 to 49	10	10	20
50 to 54	19	18	37
55 to 59	26	23	49
60 to 64	32	33	65
65 to 69	33	37	70
70 to 74	37	41	78
75 to 79	31	41	72
80 plus	36	63	99
Total	247	287	534

Age	Incidence
15-19	0.33333
20-29	0.40000
30-39	0.33333
40-49	0.28333
50-59	0.32576
60-69	0.46392
70+	0.79808

Source: Global Burden of Disease Data Tool, as reported in the Fiji Ministry of Health and Medical Services Annual Report 2015[21]

Table 2: Cardiovascular disease (excluding stroke) incidence and mortality by age and gender

Cardiovascular disease (excluding stroke) incidence by age and gender (2015)			
Age	**Male**	**Female**	**Total**
1 to 4	39	40	79
5 to 9	48	55	103
10 to 14	36	40	76
15 to 19	34	34	68
20 to 24	39	38	77
25 to 29	47	47	94
30 to 34	66	67	133
35 to 39	88	89	177
40 to 44	194	178	372
45 to 49	251	229	480
50 to 54	355	337	692
55 to 59	434	431	865
60 to 64	435	471	906
65 to 69	412	468	880
70 to 74	331	414	745
75 to 79	211	301	512
80 plus	172	286	458
Total	3,192	3,525	6,717

Age	Incidence
15-19	0.00008
20-29	0.00020
30-39	0.00036
40-49	0.00098
50-59	0.00179
60-69	0.00206
70+	0.00197

Incidence	6,717
Deaths	2,543
Mortality (%)	37.86%

Cardiovascular disease (excluding stroke) mortality by age and gender (2015)			
Age	**Male**	**Female**	**Total**
1 to 4	4	3	7
5 to 9	2	2	4
10 to 14	3	3	6
15 to 19	5	5	10
20 to 24	10	6	16
25 to 29	12	8	20
30 to 34	21	13	34
35 to 39	40	17	57
40 to 44	60	26	86
45 to 49	106	40	146
50 to 54	172	65	237
55 to 59	204	89	293
60 to 64	214	122	336
65 to 69	186	123	309
70 to 74	180	142	322
75 to 79	140	130	270
80 plus	165	225	390
Total	1,524	1,019	2,543

Age	Incidence
15-19	0.14706
20-29	0.21053
30-39	0.29355
40-49	0.27230
50-59	0.34040
60-69	0.36114
70+	0.57259

Source: Global Burden of Disease Data Tool, as reported in the Fiji Ministry of Health and Medical Services Annual Report 2015[21]

These assumptions were then applied to the incidence populations to estimate the number of stroke and CHD events, stratified by age group. Similarly, stroke (2015) and CHD mortality rates (2015) were applied to the number of stroke and CHD events to derive the number of stroke and CHD deaths in each age group.[21]

Salt intake and blood pressure

A linear regression model developed by Law[19] was used to estimate blood pressure changes attributable to salt intake levels. The model assumes that no other factors affect blood pressure[19]. Using the estimated mean salt intake of 11.70g/day, a baseline measurement of systolic and diastolic blood pressure, stratified by age group was estimated. Table 3 shows the predicted blood pressure by age group at 0.2g/day, 0.5g/

day, 0.8g/day, 1.0g/day, 2.0g/day, 3.0g/day and 6.7g/day reductions in daily salt intake. The reduction in blood pressure associated with each gram of sodium intake reduction is not linear across age groups, therefore the impact of the intervention has differing effects across the age groups.

Table 3: Blood pressure levels (mmHg) to salt intake (g/day) by age

Age	11.70 g/day (baseline)		0.2g/day reduction		0.5g/day reduction		0.8g/day reduction		1.0g/day reduction		2.0g/day reduction		3.0g/day reduction		6.7g/day reduction	
	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP
15-19	123.27	70.85	123.10	70.79	122.85	70.70	122.60	70.61	122.43	70.55	121.59	70.25	120.74	69.94	117.62	68.82
20-29	126.68	74.53	126.51	74.45	126.26	74.31	126.01	74.18	125.85	74.10	125.02	73.66	124.20	73.22	121.14	71.59
30-39	129.86	79.72	129.68	79.62	129.40	79.47	129.12	79.32	128.93	79.22	128.00	78.71	127.08	78.21	123.64	76.33
40-49	134.33	83.21	134.11	83.09	133.78	82.91	133.44	82.72	133.22	82.60	132.11	81.99	130.99	81.39	126.87	79.14
50-59	143.47	86.28	143.16	86.12	142.69	85.88	142.23	85.65	141.91	85.49	140.36	84.69	138.81	83.90	133.06	80.97
60-69	154.24	87.39	153.89	87.25	153.37	87.03	152.85	86.81	152.50	86.67	150.76	85.94	149.02	85.21	142.59	82.53
70+	154.24	87.39	153.89	87.25	153.37	87.03	152.85	86.81	152.50	86.67	150.76	85.94	149.02	85.21	142.59	82.53

Abbreviations: DBP, diastolic blood pressure; mmHg, millimetre of mercury; SBP, systolic blood pressure

Source: Law[19]

A network meta-analysis conducted by Law[20] estimated a 6.3% reduction in the incidence of stroke and 3.4% reduction in the incidence of CHD for every 1% change in systolic blood pressure. As described above, since the relationship between salt intake and blood pressure differs by age, the absolute risk reduction in stroke and CHD incidence also differs across the age groups.

The expected reduction in stroke and CHD event incidence, as a result of a reduction in systolic blood pressure, is applied to the baseline number of stroke and CHD events to derive the new incidences of stroke and CHD events with the salt reduction intervention.

Healthcare costs

The healthcare costs associated with each stroke and CHD event are FJD 1,703 (FJD 2014 – due to the high volatility of Fiji inflation rate, prices obtained through direct Fiji sources were not adjusted).[22] Healthcare costs are applied to those who survived a stroke or a CHD event.

Productivity costs

Productivity costs were split into three categories: participation, presenteeism and absenteeism.

Participation

A study by Hannerz et al.[23] reported that 62.1% of working age people recovering from stroke are gainfully employed after the event, compared to 79.1% of the working age population in Australia that did not experience a stroke.[23, 24] Therefore, 78.5% (0.621/0.791) of people who experienced a stroke will gainfully be employed relative to non-stroke sufferers. Similarly, 52.8% of CHD victims are reported to be gainfully employed after an event, resulting in 66.8% of CHD victims being gainfully employed (0.528/0.791) relative to their non-CHD counterparts.[25] As no specific Fijian study is available, this was used as a proxy to calculate the participation increase due to reduced stroke and CHD events in Fiji.

Absenteeism

Even if a significant proportion of people can return to work after a stroke or CHD event, their condition increases the number of sick days taken throughout the year.
It is estimated that people recovering from stroke will request 26 additional days from work per year compared to those without stroke.[26] Similarly, those who suffered a CHD event are estimated to take an additional 23 days off work per year compared to the average population.[27]

Despite not being employed in a paid job, the same number of days are estimated to be lost for those who are unemployed from lost household productivity. Average household productivity is valued at 30% of the average Fiji wage rate.[24]

This productivity estimate is applied to those stroke and CHD survivors who are not employed in a paid job. As no specific Fijian study is available, this study was used as a proxy to calculate the absenteeism decrease due to reduce stroke and CHD events in Fiji.

Presenteeism

Stroke and CHD events can significantly affect a person's ability to function effectively while at work. A meta-analysis of presenteeism studies in the United States found that workers with heart disease averaged 13.5% lower productivity than those who did not suffer heart disease.[28] This rate is applied to both stroke and CHD survivors. As no specific Fijian study is available, this study was used as a proxy to calculate the presenteeism decrease due to reduced stroke and CHD events in Fiji.

Informal carer costs

Informal care costs are those costs associated with the value of the care provided by family or friends. While informal care is provided free of charge, there is an economic cost, as time spent caring is time that cannot be directed to other activities such as paid work, unpaid work (such as housework or yard work) or leisure. For simplicity, informal carer costs are limited to productivity losses for the purposes of this model.

The cost of lost productivity related to informal care was calculated using Australian studies, as no specific Fijian study is available.[24, 25] As the Fijian wages differ from the Australian ones, the value obtained from the study was reproportioned based on 2018 Fijian weekly earnings (FJD 350)[29] relative to 2018 Australian ones (AU$1,229).[30]

The cost of lost productivity for stroke is measured in the model by the estimated potential wages of carers had they been in the workforce. This is determined by the average wage for someone of the same age and gender who is still in the workforce. As half the carers are over 55, and two thirds of them are female, the average hourly rate was estimated to be AU$13. This could be an overestimation of the value due to earlier retirement age in Fiji compared to Australia, but no local source of data was identified. However, as most of this group may not re-join the workforce in the absence of caring for a stroke survivor, the weighted average of employment in matching age and gender groups was calculated to be 31%. The Survey of Disability, Ageing and Carers reported that 68% of carers spent 40 hours or more per week caring for people with stroke. Assuming this cohort spent an average of 50 hours a week, the weighted average for all carers would be 41 hours per week. Thus, the average cost of lost productivity was estimated to be AU$8,425 (2012 AU$) per carer of a stroke patient.[24] When reproportioned to 2018 Fiji weekly earnings (the latest available data point – due to the high volatility of Fiji inflation rate, prices obtained through direct Fiji sources were not adjusted), the average cost of lost productivity per carer of a stroke patient was estimated to be FJD 1,756.

The same approach was followed to estimate the cost of informal care for CHD patients. In a British study of carers for patients experiencing coronary heart disease, it was observed that carers spent an average of 280 hours per year caring for their loved ones.[25] Thus, the average cost of lost productivity was estimated to be AU$1,128 (2012 AU$) per carer of a CHD patient. When reproportioned to 2018 Fijian weekly earnings, the average cost of lost productivity per carer of a stroke patient was estimated to be FJD 235.

An estimated 6.27% of stroke survivors require full time care, calculated by taking the prevalent population of stroke (2012) divided by the number of stroke carers as reported in a published report.[24] The figure of 6.27% is also assumed to be applicable for CHD survivors in the absence of CHD-specific data.

Premature death cost

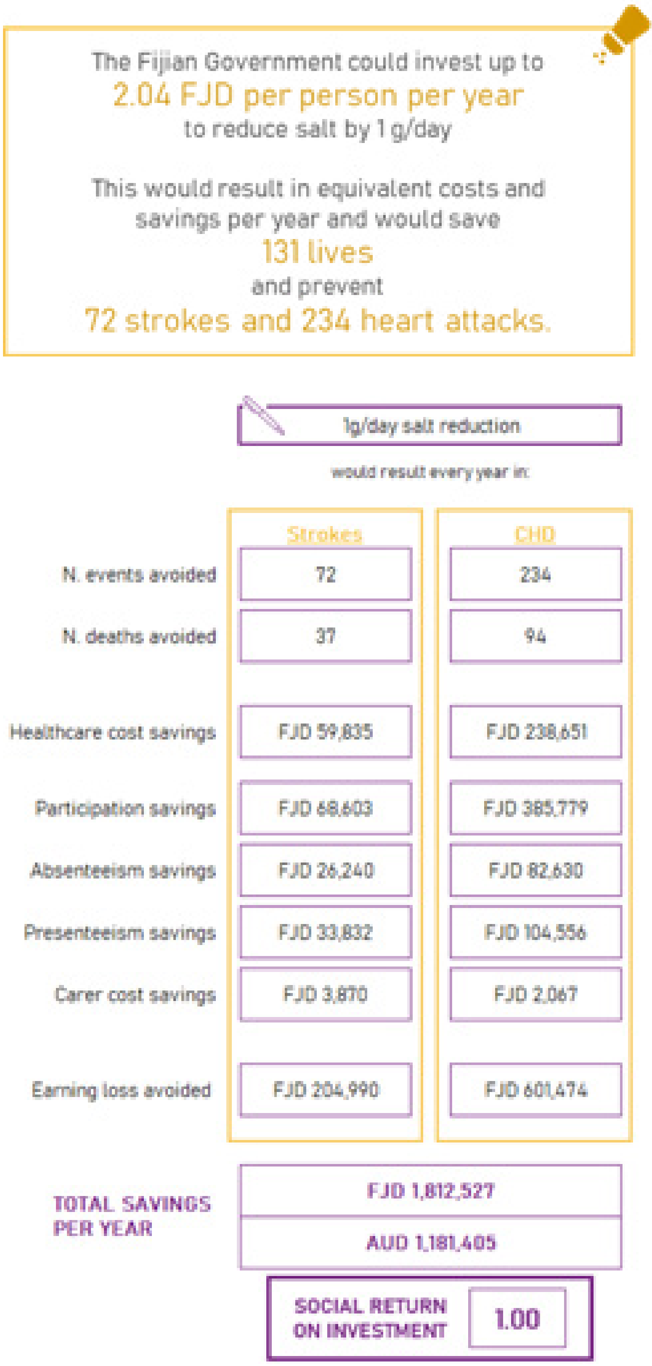
The cost associated with premature death is estimated by calculating the lost earnings of those who were employed before, based on employment rate by age group in Australia,[25] reproportioned for 2020 Fiji unemployment rate,[31] their stroke or CHD event for one year. Each person who dies is assumed to accrue lost earnings for the whole year.

Impact

Base case

The impact of reducing the intake of salt by 1g/day in Fiji and the threshold cost of implementing a profitable salt reduction program from a social perspective is reported in Figure 3.

Figure 3: Impact of 1g/day reduction in salt intake

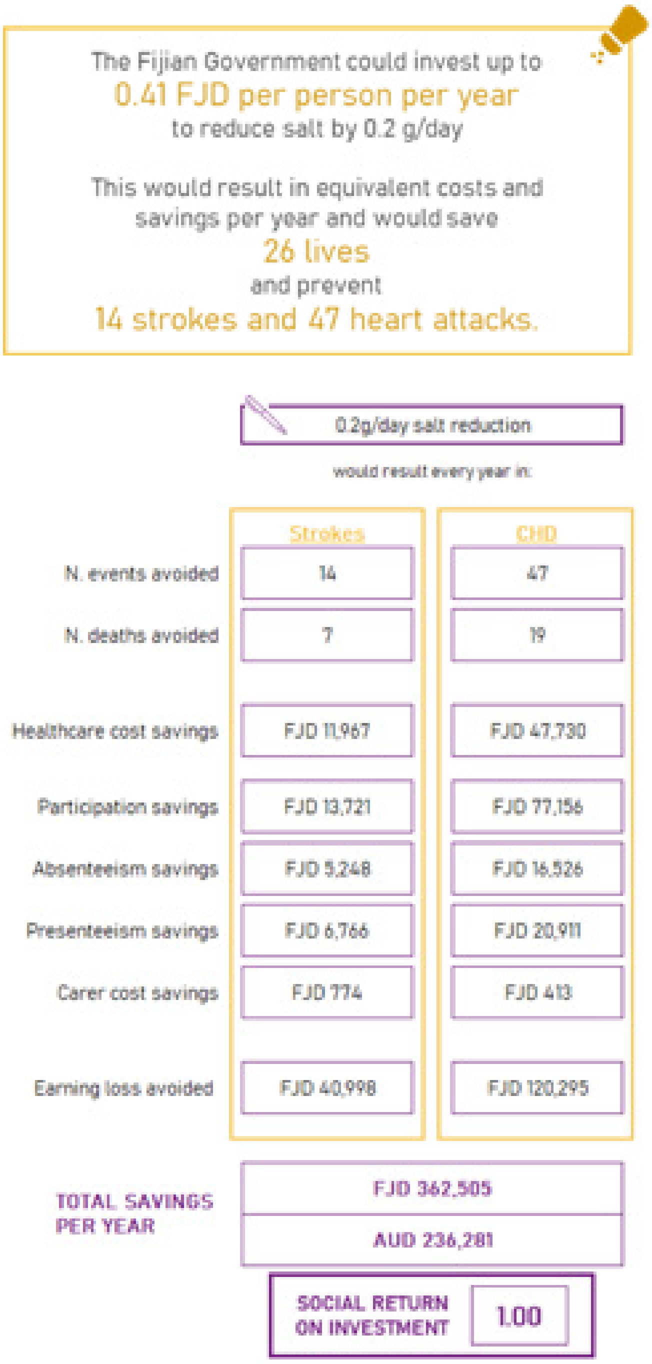


The average scenario, or base case, salt reduction target was 1g reduction per day over a year. Results showed reducing salt intake in Fiji by 1g per day for a year would potentially prevent 234 heart attacks and 72 strokes resulting in 131 lives saved and more than FJD 1.8 million in reduced costs to society. Considering these savings, a threshold value of FJD 2.04 per person per year would result in equivalent costs and savings per year from a 1/g day salt reduction program in Fiji.

Sensitivity analysis

The sensitivity of the model to the level of salt reduction was tested. Results of the analyses are shown in Figure 4. These results give an indication of a range of salt reduction levels and associated investment and return.

Figure 4: Impact of different levels of salt reduction



The Fijian Government could invest up to
4.07 FJD per person per year
to reduce salt by 2 g/day

This would result in equivalent costs and savings per year and would save
262 lives
and prevent
144 strokes and 468 heart attacks.

2g/day salt reduction

would result every year in:

	Strokes	CHD
N. events avoided	144	468
N. deaths avoided	74	188
Healthcare cost savings	FJD 119,670	FJD 477,302
Participation savings	FJD 137,207	FJD 771,557
Absenteeism savings	FJD 52,481	FJD 165,259
Presenteeism savings	FJD 67,663	FJD 209,113
Carer cost savings	FJD 7,740	FJD 4,135
Earning loss avoided	FJD 409,981	FJD 1,202,948

TOTAL SAVINGS PER YEAR

FJD 3,625,054

AUD 2,362,810

SOCIAL RETURN ON INVESTMENT 1.00

The Fijian Government could invest up to
13.65 FJD per person per year
to reduce salt by 6.7 g/day

This would result in equivalent costs and savings per year and would save
876 lives
and prevent
483 strokes and 1,568 heart attacks.

6.7g/day salt reduction

would result every year in:

	Strokes	CHD
N. events avoided	483	1,568
N. deaths avoided	247	629
Healthcare cost savings	FJD 400,893	FJD 1,598,960
Participation savings	FJD 459,642	FJD 2,584,717
Absenteeism savings	FJD 175,810	FJD 553,619
Presenteeism savings	FJD 226,671	FJD 700,527
Carer cost savings	FJD 25,929	FJD 13,851
Earning loss avoided	FJD 1,373,436	FJD 4,029,876
TOTAL SAVINGS PER YEAR	**FJD 12,143,932**	
	AUD 7,915,415	

SOCIAL RETURN ON INVESTMENT 1.00

Assumptions and limitations

For the purposes of this model, salt reduction is assumed to be the only variable altering blood pressure and therefore stroke and CHD risk. While it is true that excess salt consumption is linked to other health issues, such as chronic kidney disease and diabetes,[32, 33] this analysis only captures the benefit of salt reduction measured through the reduction in stroke and CHD events. Additionally, this analysis only looks at the effect of salt on blood pressure in isolation, therefore not considering any confounding factors.

Another limitation of the current analysis is related to the population considered for the cost calculations. The model calculates the effect of the intervention on an incident population experiencing a stroke or CHD event in the analysed year. Therefore, costs associated with prevalent patients that experienced an event in previous years and still suffer the economic impacts through direct healthcare and indirect costs of that event are not considered in the model.

As this analysis only shows the savings expected for one year only, direct healthcare and indirect productivity cost savings accrued over future years are not captured.

The people whose death due to stroke or CHD will be prevented will continue to contribute to the economy over their lifetime, but due to the nature of the analysis the long-term impact is not captured. Therefore, the cost savings and benefit of a mandatory reduction program as presented in this analysis are likely to be conservative.

As a limited number of Fijian studies were available, international studies were used where necessary.

From a methodological perspective, the analysis represents a simplified application of the SROI methodology. Only a limited number of stakeholders/outcomes were included, and no SROI valuation filters such as deadweight, attribution or displacement metrics were used.

Conclusions

This project assessed the impact of salt reduction programs in Fiji using a SROI framework. The results can be used to inform decision makers and demonstrate the value of investment in these programs. The SROI method is a recognised methodology for providing a holistic framework in its inclusion of broader social impact, with strong foundations in traditional economic evaluation. Whilst our approach has been modified it represents a scientifically sound and verifiable instrument to improve decision-making when allocating public health budgets.

This assessment found that by reducing salt intake by 1 g/day across Fiji, the number of potentially saved lives each year is estimated to be 131, with an estimated 234 heart attacks and 72 strokes events avoided. Considering these savings, a threshold value of FJD 2.04 per person per year would result in equivalent costs and savings per year from a 1/g day salt reduction program in Fiji.

These findings demonstrate a minimal investment in a salt reduction program is likely to yield a positive social return on investment for the prevention of cardiovascular events in Fiji.

Appendix – Assumptions

Blood pressure modelling assumptions

Blood pressure effects are assessed in isolation of other factors, such as level of exercise, lifestyle factors, and smoking status. Therefore, reduction in salt intake is assumed to be the sole factor in reducing blood pressure.

The effect of salt in reducing blood pressure is assumed to take full effect immediately, without a progressive ramp up.

As the linear regression model reported in Law[19] does not extend beyond individuals aged 70+, the relationship for the 60-69 age group is assumed to apply for the 70+ age bracket.

Incidence of stroke and CHD

The incidence of strokes (2015) and cardiovascular events (excluding stroke) (2015), and the age distribution of such events were sourced from the Global Burden of Disease Data Tool, as reported in the Fiji Ministry of Health and Medical Services Annual Report 2015.[21]

A 1:1 ratio between events and individuals is assumed, therefore no individual can experience more than one stroke or CHD event in the year (in the model).

All stroke and CHD events are assumed to occur at the beginning of the year; therefore costs/savings are assumed to be accrued for a whole year (no half-cycle correction).

The model only takes into consideration the incident population of stroke and CHD for the year of analysis, therefore ignoring the long-term consequences of people who experienced an event in the previous years.

Cost assumptions

The model incorporates a household productivity loss for those individuals that are not employed. This is assumed to be valued at 30% of the average Australian wage rate. The value was obtained from the economic impact of stroke in Australia report[24] which specifically focuses on stroke. Nevertheless, there is no reason to believe this to be a stroke-specific value, as it assesses the productivity of the general population. Therefore, in the lack on CHD specific data, the stroke value was used.

The model incorporates productivity loss as a result of presenteeism due to CHD i.e. the person's affected ability to function effectively while at work. This is valued at 13.5% of the average Australian wage. The value is obtained by a meta-analysis conducted by Goetzel[28] of presenteeism studies in the United States that found workers with heart disease averaged 13.5% lower productivity than their non-heart disease counterparts. Due to the lack of stroke specific data, this value was also used (as a proxy) for stroke sufferers.

As no data is available on the proportion of stroke patients requiring part-time vs. full-time care, the average full-time equivalent (FTE) care required by each person suffering a stroke was calculated as the number of carers who cared for people with stroke as their main condition, divided by the stroke prevalence, as reported in Deloitte Access Economics.[24] As no CHD specific data was available, the average FTE care required by each person suffering a CHD event is assumed to be equal to that of a person suffering a stroke.

As no specific Fijian studies were available to estimate these values, these international studies were used as a proxy.

Only people who survive a stroke or CHD event are assumed to incur a healthcare cost.

Of those who die from stroke or CHD event only those employed are assumed to incur a mortality cost i.e. lost wages/earnings that would have been earned by the person in the year.

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