

## **The Negative Health Impacts of Globalization: Personal Health Responsibility and the Epidemic of Non-Communicable Diseases in Pacific Island Nations**

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### **Abstract**

*Individuals in the developing world are quick to adopt patterns of behavior that mimic Western trends even when those trends have negative long term effects on health. In this study we relate survey results describing attitudes and perceptions toward individual health responsibility of people being treated for non-communicable diseases (NCDs) including diabetes, hypertension, and cardiovascular disease. We construct four sets of regression equations reflecting four measures of health promoting lifestyle actions. Our regression results suggest that better outcomes can be expected when populations are better educated. They are more aware of effective management mechanisms for dealing with their illness and more willing to apply those mechanisms to their daily lives. Therefore more aggressive measures to promote prevention are needed which must include novel health education approaches.*

**Keywords:** Non-communicable diseases; Pacific island nations; Diabetes; Health responsibility, EQ-5D Standardized Health Measurement, Health Promoting Lifestyle Profile

### **1. Introduction**

Stroll along Victoria Parade in Suva, the charming capital city of the Republic of Fiji, and among the throngs of people making their way to the central market or to the port or to any number of large stores and small shops that line the way one notices an extraordinary number of what a Western observer would consider overweight and obese people. One would have the same sensation if that walk were taken in the teeming, high population density town of Betio on South Tarawa, the capital island of the republic of Kiribati, or in Nuku'alofa the capital city of the Kingdom of Tonga, in Apia, Samoa, in Pago Pago, American Samoa, or in most other urban aggregations in the South Pacific. What one is witnessing is the physical deterioration of a noble group of peoples that have populated these small isolated islands for many thousands of years; a deterioration that has been swift in its onset and stunning in its debilitating effects on affected populations.

The situation was not always so. Before a strong Western influence and the more general forces of Globalization were felt in the Pacific region, island peoples' food consumption patterns included root crops, tropical fruits and vegetables, fish, and game; all foods rich in nutrients and low in processed sugars and fat. There was little incidence of obesity and the accompanying illnesses that are characterized by being severely overweight including diabetes, cardiovascular disease, hypertension, renal disease, and the retinopathies and neuropathies that are characteristic of diabetes. For instance, after World War II when the United States took over Micronesia as a special U.N. Trust, a survey conducted by the U.S. Navy found very little incidence of non-communicable diseases (NCDs), or what are termed lifestyle diseases, on the islands. People fell ill and died most often from infectious diseases such as yaws and Hanson's disease (Whitney, 2005).

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Many early photos of the peoples in the region during the colonial era, whether the pictures are of early 20<sup>th</sup> century Fiji, Samoa, the Cook Islands, or Tonga, the images uniformly depict a handsome, lean, and active people. The photos may be of warriors or maidens, farmers, or field workers. There was no obesity, and therefore no obesity-related illnesses such as diabetes.

Beginning just prior to the independence granting movement in the region which began in the 1960s, the wage economy became a much more familiar phenomenon. People could, for the first time, afford to purchase imported food rather than having to farm, fish, or hunt. Epidemiological research has firmly established a relationship between these consequences of higher living standards and ill health (Kromhout et al., 2002). The food that was and continues to be imported was much higher in sugar, salt, fat, and cholesterol than the traditional foods of the region. This economic sea change caused a “mortality transition” whereby people began to sicken and die from non-communicable diseases rather than infectious diseases. More recently, the integration of these nations into the global market system through World Trade Organization (WTO) membership and separate bi-lateral and multi-lateral trading pacts has sped this process.

In the Federated States of Micronesia (FSM) the incidence of obesity in the population of those between 35 and 55 years of age is 80 percent. In the United States which is experiencing an epidemic of obesity the similar statistic is 40 percent. In the U.S. the rate of diabetes in the age group 45 to 55 is about 7 percent whereas in the FSM it is 20 percent (Whitney, 2005). The incidence of diabetes is between 30 and 40 percent in the adult population of Nauru, and 25 percent in both racial groups in Fiji (South Pacific Commission, 2000). These high incidence rates have been attributed to increasing levels of urbanization, changes in diet and physical activity patterns, a genetic predisposition to obesity, and to the opening of Pacific Island nations to the free movement of people, ideas, and goods (Evans, et al., 2001) Diabetes affects upwards of 30 million people in the Western Pacific region with predictions of this number doubling over the next twenty years (World Health Organization, 2001).

Governments in all Pacific Island nations (PINs) have dealt with the problem of lifestyle illnesses in predictable ways; by offering treatment to those afflicted and educational programs to attempt to control the spread of these illnesses in the general population. As the prevalence of NCDs has become more widespread within PINS and throughout the Pacific region the cost of treatment has become a financial burden that is no longer sustainable in many island nations. Many nations’ public health budgets are spread so thin that even basic medical services such as the provision of oral medication for the control of diabetes and hypertension are many times unavailable or available only at limited times and in limited quantities.

Epidemiological research has attempted to identify unique individual behaviors that contribute to specific health outcomes and the underlying personal factors that determine particular behaviors (Hansen, 2001). Determining these personal factors can lead to the development of more effective educational programs that attempt to eliminate risky behaviors and promote those that contribute to a healthy lifestyle (Orleans, et al. 1999). Earlier work has demonstrated that positive health outcomes can result from regular exercise (Marcus and Forsyth, 1999), quitting smoking (Orleans and Cummings, 1999), maintaining an ideal weight (Foreyt and Goodrich, 1994), good nutrition (Glanz, 1999), and minimizing stress levels (Ornish, et al. 1998). The purpose of this work was to compare the health promoting lifestyle behaviors of select chronically ill populations in three Pacific Island countries, Fiji, Kiribati, and Nauru. Our work involved developing psychological profiles of individuals who have developed the chronic illnesses of interest in order to better shape and target public health programs for the general population.

## **2. Methods**

### **2.1 Research Participants**

The authors obtained permission from the Ministries of Health of Nauru, Kiribati, and Fiji to conduct surveys among people being treated for NCDs at primary hospitals and clinics in each country. The survey targeted those individuals that suffered from and were being treated for diabetes, hypertension, cardiovascular disease including coronary heart disease (CHD), kidney disease, eye disease, nerve damage, and elevated levels of cholesterol. We targeted Nauru, Kiribati, and Fiji because of the high incidence of premature mortality for both men and women as a result of lifestyle illnesses.

Approximately 20 percent of male Nauruans and I-Kiribati, and 15 percent of females, die due to NCDs before they reach the age of 40 (SPC, 2000). Nauru has the dubious distinction of having one of the highest rates of adult-onset diabetes in the world; 30 to 40 percent of the adult population is afflicted with the disease. CHD affects approximately 27 percent of the female population of Kiribati. The prevalence of CHD in male and female Indo-Fijians is 25 percent and 17 percent respectively. Further, approximately 20 to 30 percent of the adult population of Fiji is afflicted with diabetes (SPC, 2000).

The following narratives describe the survey process at each location:

**2.2 Nauru** - The Republic of Nauru Hospital's dialysis clinic treats approximately 10 patients per day in four-hour dialysis sessions three days per week. Enumerators also contacted individuals in communities that were known to be afflicted with NCDs. These two sample subpopulations provided a total of 61 responses which, although small by population sampling standards, represents 1.7 percent of the total population of interest; i.e. the thirty to forty percent of the island population of approximately 12,000 that suffers from diabetes, hypertension, and cardiovascular disease.

**2.3 Kiribati** - We visited the Kiribati Central Hospital in the Birkenibau district on Tarawa, the capital island of the Kiribati group. Enumerators spoke with outpatients awaiting treatment and consultation at the regular medical clinic. A total of 40 usable responses were obtained over a period of four days of interviews. This number represents approximately one percent of the 4000 people on Tarawa that suffer from diabetes according to the most recent estimates available (Zimmet, 1999).

**2.4 Fiji** - The Fiji survey was the most extensive undertaken during our fieldwork. Our objective was to sample outpatient populations in urban, peri-urban, and rural regions of the country. We initially visited the diabetic and hypertension clinics being conducted at the Colonial and War Memorial (CWM) Hospital in Suva, the largest and most sophisticated medical facility in Fiji. Over a period of two days eighty-two outpatients were interviewed.

The following two days were spent at the Valelevu Medical Clinic, which is located approximately fifteen kilometers from the Suva city centre along the densely crowded principal arterial thoroughfare connecting the urban sprawl of Suva and the town of Nausori. The outpatient population was made up of an evenly divided mix of native Fijians and Indo-Fijians. We interviewed 69 outpatients awaiting consultation and treatment. In addition, the survey team conducted interviews at the Raiwaqa and Vatuwaqa medical and diabetic clinics, relatively poorer districts in the metropolitan Suva area.

The final urban survey locale was the Lautoka Hospital in the city of Lautoka on Viti Levu, Fiji's principal island, approximately 230 kilometers west of Suva. We spoke to fifty outpatients at the general medical and diabetic clinics taking place on the day of our visit. The rural population of Fiji was sampled in the market town of Labasa on Vanua Levu, Fiji's second island. We visited the Labasa Hospital during the weekly outpatient diabetic and hypertension clinics. A total of 308 usable questionnaires were completed during the Fiji portion of our survey work.

### **2.5 Survey Instrument**

We wanted to be able to quantify the degree to which a variety of health promoting behaviors is practiced among groups of individuals being treated for chronic illness in the targeted countries. A number of health behavior surveys have been developed to enable quantification including the Health Promoting Lifestyle Profile (HPLP) (Walker, Sechrist, and Pender, 1987). The HPLP was designed to assess the relationship between several different lifestyle behaviors and health status. The questionnaire has a four point response format with seventy items that are divided into six subscales: health responsibility, spiritual growth, physical activity, nutrition, interpersonal support, and stress management. We chose to use four of the six subscales that were most pertinent to our research interests. These included health responsibility, physical activity, nutrition, and stress management.

### **3. Demographics**

Table 1 provides demographic information for the three sample populations. It is important to remember that the sample population does not reflect the overall mean population demographics in each nation. In particular, Body Mass Index (BMI) results for the sample populations in Nauru and Kiribati reflect the higher incidence of overweight individuals seeking treatment for NCDs.

In fact, all three sample populations were judged to be either overweight or obese according to standard BMI classifications. Obesity is a contributing factor to many of the NCDs experienced by peoples in the Pacific (SPC, 2003). Many Pacific nations have recognized the serious public health problem that obesity poses and have begun to implement educational programs to address the issue. However, it is thought that both a genetic predisposition to store fat in Pacific Island peoples and the movement away from traditional diets to modern manufactured foods heavy in fats and sugars is counteracting any positive impact that programs to modify diet and lifestyle may be having.

The Nauru and Kiribati samples are relatively well educated for nations considered to be among the poorer in the Pacific. The Fiji group had considerably less schooling reflecting in part the rural agricultural based economy of Vanua Levu from which one-third of the Fiji responses were drawn. The younger populations of Nauru and Kiribati had higher average years in school. The proportion of single individuals in the Nauru sample is surprising considering the importance of family and marriage in the region. Perhaps this reflects the relative affluence of Nauru in the past due to its phosphate deposits, and the ability of individuals to find work in that industry. This would diminish the need to be directly tied into a nuclear family to provide financial support during times of unemployment. The percentage of single individuals in the Fiji and Kiribati samples is more reflective of the region in general.

#### **4. Statistical Methodology**

The questions included in the HPLP are aggregated into four categories: health responsibility, physical activity, nutrition, and stress management. The survey instrument methodology requires that average values for all questions within a particular category are used rather than answers to individual questions. For example, the health responsibility portion has eleven questions dealing with assessing the relative aggressiveness that the respondent demonstrates toward learning more about his illness, overall health consciousness, and willingness to engage health professionals in an information eliciting dialogue. One way to learn more about the character traits and possible motivations influencing actions that enhance health responsibility and other factors in the respondents answers is to analyze the average response values for each category. Using these average response values as dependent variables and selecting potentially revealing demographic traits as explanatory variables we constructed four sets of regression equations reflecting the four measures of health promoting lifestyle actions. In what follows we provide our *ex ante* hypotheses regarding those influences on each of the four measures, the subsequent regression results, and analyses of those results.

##### **4.1 Dependent Variable - Health Responsibility**

We used uniform variables across all three countries in describing the factors that influence health responsibility. These included age (age), whether a respondent was a diabetic (diab), whether the respondent was married (mari), whether the respondent drank alcohol (booz), number of family members (numfam), number of years of schooling (yrschol), gender of the respondent (sex), and for Fiji, the race of the respondent, as the population of Fiji is about evenly split between indigenous Fijians, and people of South Indian ancestry brought to Fiji by the British during the colonial period (race).

We believe that as individuals age they become more aware of maintaining their health or if ill attempting to alter their lifestyle to enhance their quantity and quality of life prospects. So we surmised a positive relation between age and health responsibility. Similarly we thought that those individuals suffering from diabetes would be more conscious of the factors that need to be changed or implemented in their lives to improve its quality and quantity. The way in which this variable was constructed requires that the sign on the variable be negative if our hypothesis is to be confirmed. Further, marriage generally confers greater responsibility on most individuals including a concern for one's own personal health as a familial responsibility. We therefore expected married respondents to have higher health responsibility average responses measured as a negative sign on the regression coefficient because of the way the variable was constructed. We expected those that did not consume alcohol would have a greater concern for their health and that as the number of family members increased, people would have less time to concern themselves with their own health issues and problems and be more concerned about the problems of other members of the family, especially the females that we surveyed. We therefore expected an inverse relationship between number of family members and health responsibility as well as greater personal health responsibility among males than females.

Further, we expected the better educated to be more aggressive in seeking information about their illness and in querying health professionals about better ways to manage their disease.

Finally, we had no *a priori* sense of how racial categories would influence health responsibility. The only race marker used was in the Fiji survey as the populations of Nauru and Kiribati are homogeneous. The prevalence of diabetes in the population of Fiji is similar among indigenous Fijians and Indo-Fijians although differences exist among males and females within each race. In keeping with the above assumption of education having a positive influence on health responsibility, and knowing that the Indo-Fijian population attains higher levels of education, we would offer that the Indo-Fijian population would be more health conscious. Table 2 provides the first equation regression results.

#### 4.2 Discussion

Age and number of family members were the only significant variables explaining variation in HRAVG in the Nauru sample. Both variables had the hypothesized sign. Larger families decrease personal health responsibility actions while older people are more concerned about taking action to improve their health. On Kiribati non-drinkers were more health responsible. Years of schooling was highly significant on Kiribati although average number of years in school was much higher in the Nauru sample. Perhaps a more uniform and higher level of education on Nauru caused little variation in attitudes whereas the Kiribati sample had wider variation in that variable and therefore proved significant. Non-drinkers, higher levels of schooling and fewer family members all were significant in the Fiji sample along with race. The sample indicates that Indo-Fijians were more concerned about health responsibility than indigenous Fijians. The sign on sex indicates that males in all three sample populations were more active in health responsibility than were females though not to the extent that the gender difference was statistically significant.

#### 4.3 Dependent Variable - Physical Activity (PAAVG)

We used the same explanatory variables in the regression equation determining factors that influence physical activity. We expected older people to be more concerned about maintaining activity levels and attempting to remain active to help keep in abeyance the progressive aspect of their illnesses. Type 2 diabetes and other NCDs can be managed in many cases through altering diet and including a regular program of moderate physical activity.

We had no *a priori* views of gender or marital status on a respondent's willingness to include some sort of extraordinary physical activity in their day to day lives. The unimportance lent by the survey populations toward physical activity in all three countries leads us to believe that there is no great difference between sexes toward physical activity. Further, possibly married individuals would have less time to devote to physical activity because of family responsibilities. The same argument would apply to the variable describing number of family members. The greater number of people in the family the less time a respondent would have to engage in physical activities. We expected those with greater levels of formal education to realize the benefits of physical activity over and above activities required to accomplish day to day tasks. We also thought that people who regularly consumed alcohol would be less likely to consider physical activity important to their lives. We also expected people with diabetes to understand the importance of physical activity in the management of their illness and to therefore be more willing to include extra activity in addition to their every day pursuits.

Finally, regarding race as an explanatory variable in Fiji, we believe that indigenous Fijians perceive themselves as being physically active during the various stages of their lives and therefore not particularly open to suggestions of increased activity. Indo-Fijians on the other hand are better educated and more successful in business, and arguably less physically active. This may make them more open to including physical activity regimens into their lives. Table 3 provides regression results for physical activity (PAAVG).

#### 4.4 Discussion

None of the explanatory variables had significant predictive power on physical activity response for Nauru and the  $R^2$  is low. The signs on the regression coefficients comply in most cases with our *a priori* assumptions. Older individuals as well as males were more predisposed to engage in physical activity. The greater the family size the more likely people would engage in exercise. On Nauru however, those with greater levels of education had lower mean scores in this category indicating possibly that the better educated, who typically are employed in the public service, were occupied with the significant problems that the island nation faces.

Those who were diabetic professed greater levels of physical activity than non-diabetics as our initial hypotheses supposed. The low  $R^2$ , however, indicates that there remain many other factors influencing the decision to include greater levels of physical activity into the lives of Nauruans besides the factors we have cited. Or what may be more likely, that physical activity to promote health is not of special concern to Nauruans. In Kiribati, years of schooling and whether a respondent was a drinker were the only significant explanatory variables in the physical activity equation. Those with greater levels of education were more physically active as were non-drinkers which agreed with our hypotheses. This equation has greater explanatory power with an  $R^2$  of 0.286. Here diabetics were less likely to engage in physical activity, as were the married. In Kiribati a larger family size was linked to less physical activity.

In Fiji, years of schooling and whether a respondent was a drinker of alcohol or yagona (kava) both contributed significantly to determining whether someone engaged in physical activity. The better educated one was the more likely to include a physical activity regime in one's daily life. But on Fiji the non-drinkers were more likely not to involve themselves in physical activity beyond the routine daily affairs of life. The sign on the race variable indicates that Indo-Fijians are more open to physical activity as a method to improve their quality of life although there was no statistical difference between the racial groups. Further, although two variables were statistically significant the overall explanatory power of the equation was low. Many other factors contribute to a predilection toward physical activity than the descriptors we included in the regression equation.

#### **4.5 Dependent Variable - Nutrition**

This series of equations includes all the previous descriptors as well as an indicator of employment. We thought inclusion of this measure appropriate because individuals employed in the formal labor sector may have the ability to provide a greater variety and more nutritious as well as more secure access to food. Measures of attitudes toward nutrition are especially important considering the state of domestic agriculture in two of three countries. Both Nauru and Kiribati have no commercial agriculture sector. The soils in both countries are not suitable to support large scale agricultural production. The agriculture that does exist is strictly of the home garden variety with extraordinary measures required to produce food for family consumption including creating growth mediums from palm and pandanus leaves. Islanders rely on fish and tinned fruits and vegetables imported from Australia and New Zealand. Malnutrition as a result of limited access to a variety of foods is a significant problem in both of these countries.

We expected that diabetics in all three countries would be especially concerned with their food intake and therefore expected this variable to be significant in all three equations. In addition, people employed in the formal sector may have both a concern for and the means to provide a more wholesome diet for themselves and their families. We hypothesized that women would be more concerned about nutrition than men because of their traditional role in these societies as the preparer and in many cases the purchaser of food in markets. Similarly, as family size increases we expected respondents to be more concerned with nutrition for both themselves and their children. Finally, as people age they become more concerned about the nutritional value of the foods they consume and in particular of those foods that could be potentially harmful to the heart and circulatory systems. Table 4 provides regression results for the dependent variable nutrition (NUTAVG).

#### **4.6 Discussion**

The regression equation had significant explanatory power for Kiribati. All the included explanatory variables were significant except sex and the sign on that variable was as expected. As people age, their concern for nutrition increases. This was true in all three countries though only in Kiribati was the age variable significant. There is a positive relationship between years of education and concern for nutrition in all countries though the variable was not statistically significant in the Nauru equation. As expected, being diabetic concentrated one's concern for food intake. This was the strongest result across all countries and demonstrates that a cavalierness for food intake effectively ends when an illness related to food consumption strikes. The survey respondents that were diabetic were concerned about maintaining a nutritionally sound diet; one that would potentially improve their diabetic condition or at least prevent deterioration. Men were more inclined to concern themselves with nutritional matters in Nauru and Kiribati. The opposite was true in Fiji. One possibility may be that men have more time to concern themselves with their food intake while women are occupied with the greater welfare concerns of their entire family.

Being formally employed improved nutrition scores for the Kiribati and Fiji samples though only in the Kiribati sample was the variable significant. In Nauru employment played no significant role in nutritional concern.

Finally, the race variable in the Fiji sample indicated that indigenous Fijians were more aware and concerned about nutrition than were Indo-Fijians. Both populations suffer equally from diabetes while native Fijians have higher rates of obesity. Indo-Fijians consume a traditional South Indian diet which is rich in animal fat including ghee, a type of liquefied butter, used in most food preparation. The Indian population has maintained this traditional regional diet to a greater degree than have native Fijians maintained theirs. Fish and root crops have generally been replaced in the Fijian diet by prepared foods, which may be the source of the significance of this variable in the Fiji equation. Indians are less concerned about diet, possibly because of ignorance of the potential harm high fat, high carbohydrate diets can cause, but more probably as a way of maintaining traditional society. While Fijians consume traditional foods they may be more open to diet change than Indians. In any case, the  $R^2$  on the Fiji equation indicates low explanatory power for the total equation in spite of four of the eight included variables being statistically significant. Both the Kiribati and Nauru equations indicate much more explanatory power.

#### 4.7 Dependent Variable - Stress

This group of questions dealt with the ways in which individuals coped with stress in their lives. We expected that older individuals had developed better coping mechanisms than the young simply because of the greater period of time they have had to develop those mechanisms and of a greater need for methods to deal with chronic long term illness. Further, we expected that the better educated would be more successful in using alternative stress relief methods whereas the less educated would rely on more common methods that didn't require some level of sophistication such as tobacco and alcohol consumption. We had no *a priori* expectations about whether men or women handled stress more effectively, though we expected diabetics to be more successful in dealing with stress than those respondents that were not diabetic. Employment was seen affecting stress management ability in a number of ways. On the one hand, we expected those individuals employed in the formal sector to be able to deal with stress more successfully since they were subjecting themselves to the dual burden of work and illness management. On the other hand, perhaps those respondents that held no formal employment are able to avoid that extra burden of stress associated with the workplace and could focus on dealing solely with their illness. The latter group would also have more time to practice stress alleviating actions including exercise, religious practices, and meditation. How the family situation of respondents affected their ability to manage stress was also difficult to hypothesize *ex ante*. Being married and having children could help alleviate the burden of stress experienced by survey respondents. But a family situation could also lead to increased stress and the inability to deal effectively with it. Table 5 provides regression results for the dependent variable stress (STRESSAVG).

#### 4.8 Discussion

The regression equation had reasonably good explanatory power for Kiribati but lesser ability for Nauru and effectively no ability to explain variation in the dependent variable for Fiji as measured by the associated  $R^2$ . In the Kiribati sample both age and years of schooling were significant in explaining average stress management levels; both having positive impacts. Age had similar impacts in Nauru and Fiji. None of the included variables were significant in the Fiji equation in explaining stress management average. In Nauru and Fiji being a diabetic increased one's ability to deal effectively with stress though only the Nauru sample demonstrated statistical significance. The other descriptor variables were insignificant and inconclusive in explaining the variation in the dependent variable. Alcohol consumption, formal employment, marital status, and number of family members changed signs between equations and were insignificant in all equations. The race variable in the Fiji equation indicated that native Fijians were better able to manage stress though again the variable was not significant.

#### 5. Summary and Conclusions

The Pacific region has seen an increase in the incidence of NCDs as infectious disease has become less common and as the relative wealth of most of the region has improved through its integration into the global economy. The burden of these illnesses is both financial to the individuals afflicted through lost productivity, and emotional, through the pain and suffering caused. The financial impacts are also severe and mounting for the governments involved due to the significant costs of disease treatment. The cost of managing diet-related NCDs in the Pacific accounts for about half of health care expenditures and some Pacific island countries.

From a personal perspective these illnesses exact a toll on both individuals suffering from these illnesses and their families who are deprived of both the emotional and physical energies someone in good health can contribute to the family hearth as well as the potential financial contribution to the family purse. This paper has attempted to explain the factors that contribute to the emotional state of those suffering from NCDs. Though different messages emerge from each of the estimated regression equations there are some unifying themes. One of these is education. Better outcomes can be expected when populations are better educated. They are more aware of effective management mechanisms for dealing with their illness and apparently more willing to apply those mechanisms to their daily lives. Another apparent unifying theme is age. The older the individual the more likely she will be interested in aggressively dealing with her illness in the hope of recovering some level of lost capacity. Of course, the obvious intervention would occur when people at risk for NCDs are young to avoid lifestyle decisions that contribute to illness. More aggressive measures to promote prevention are needed which should include novel approaches. Health professionals and educators must develop ways to transmit the message of healthy lifestyles to populations that do not give much attention to conventional health education methods. The poster and brochure that go unread and unnoticed do little to educate populations that need more information about the choices they make and the lifestyles they lead.

Further, our results demonstrate that people that had already been diagnosed as diabetic were more likely to engage in ways to improve their conditions. This result is difficult to turn into a plan of action. Prevention rather than illness management must be the goal of every public health ministry in the region. But more than simply setting of goals is needed. Effective plans of action to institutionalize prevention in public health care workers and eventually in the general population are what is required. It is a mistake to think that fatalism is a personality characteristic that is irreversible, that nations in dire public health straights cannot reverse their fortunes within a generation and move on with development and the pursuit of better lives for every citizen. What is needed is effective action plan including education to counteract uninformed choices and convince populations that cultural strengths will ultimately overcome physical susceptibilities that have rendered large portions of island populations at risk.

## **References**

- Evans, M., Sinclair, R.C., Fusimalohi, C., Liava'a, V. (2001) Globalization, diet, and health: an example from Tonga. *Bulletin of the World Health Organization*, 79 (9).
- Foreyt, J.P., and Goodrich, G.K. (1994). Impact of behavior therapy on weight loss. *American Journal of Health Promotion* 8(6), 466-68.
- Glanz, K. (1999). Progress in dietary behavior change. *American Journal of Health Promotion* 14(2), 112-17.
- Hansen, W. (2001). The future of health behavior and prevention research. What will change in the next 25 years? *American Journal of Health Behavior* 25(3), 228-33.
- Kromhout, D., Menotti, A., Blackburn, H. Prevention of Coronary Heart Disease. Diet, Lifestyle, and Risk Factors in the Seven Countries Study. (New York, Kluwer Academic Publishers, 2002).
- Marcus, B.H., and Forsyth, L.H. (1999). How are we doing with physical activity? *American Journal of Health Promotion* 14(2), 118-24.
- Orleans, C.T., and Cummings, K. (1999). Population based tobacco control: progress and prospects. *American Journal of Health Promotion* 14(2), 83-91.
- Orleans, C.T., Gruman, J., Olmer, C., Elmont, S.L., Hollendonner, J.K. (1999). Rating our progress in population health promotion. *American Journal of Health Promotion* 14(2), 75-82.
- Ornish, D., Scherwitz, L., Billings, J., Brown, S., Gould, K., Merritt, T., Sparler, S., Armstrong, W., Ports, T., Kirkeeide, R., Hogeboom, C., Brand, R. (1998). Intensive lifestyle changes for reversal of coronary heart disease. *Journal of the American Medical Association* 280 (23), 2001-2007.
- Secretariat of the Pacific Community, (2003). "Diet, Physical Activity, and Health". Meeting of the Ministers of Health of the Pacific Island countries. Nuku'alofa, Tonga, March.
- South Pacific Commission (SPC), (2000). Lifestyle Diseases in Pacific Communities. Noumea, New Caledonia
- Walker, S.N., Sechrist, K.R., Pender, N.J. (1987). The health promoting lifestyle profile: Development and psychometric characteristics. *Nursing Research*, 36(2), 76-81.
- Whitney, Scott. (2005). "Pacific Governments are Grappling with Health Threats" *Pacific Magazine*, January .
- Zimmet, P. (1999). Prevalence rates of diabetes in Kiribati 1999. South Pacific Commission, August.



**Table 1. Select demographics of the Fiji, Nauru, Kiribati sample populations**

<i>Demographics</i>	<b>Fiji*</b>	<b>Nauru</b>	<b>Kiribati</b>
Age (mean)	54.3	42.6	45.9
Weight (kg)	74.2	86.2	80.6
Height (cm)	167.7	163.1	164.3
BMI**	26.6	32.6	30.0
Number in family	4.4	5.0	7.9
Years in school	5.8	11.4	9.7
Married (%)	91.0	60.7	82.5
Single (%)	5.0	26.2	10.0
Married years	30.8	18.3	19.9

\* Weighted average by number of respondents at each sampled site.

\*\* Body Mass Index – Below 18.5 – underweight

18.5 – 24.9 – normal

25.0 – 29.9 – overweight

30.0 and over - obese

**Table 2. Dependent Variable - Health Responsibility (HRAVG)<sup>§</sup>**

	<b>Nauru</b>	<b>Kiribati</b>	<b>Fiji</b>
Age	0.338 (2.285)**	0.228 (1.335)	0.041 (0.623)
Diab	-0.138 (-1.040)	-0.046 (-0.285)	-0.055 (-0.971)
Mari	-0.024 (-0.168)	-0.151 (-0.960)	-0.058 (-1.013)
Booz	(-0.118) (-0.858)	0.427 (2.223)**	0.136 (2.077)**
Numfam	-0.299 (-2.008)**	-0.014 (-0.083)	-0.098 (-1.701)*
Race	-----	-----	-0.153 (-2.469)**
Yrschol	0.181 (1.313)	0.616 (3.390)***	0.213 (3.138)***
Sex	-0.103 (-0.732)	-0.065 (-0.394)	-0.036 (-0.541)
F	1.558	2.593	4.123
R <sup>2</sup>	0.179	0.362	0.102

<sup>§</sup> standardized coefficients

\* \*\* \*\*\* significance at the 90%, 95%, 99% level respectively

t-statistics in parentheses

**Table 3. Dependent Variable - Physical Activity (PAAVG)<sup>§</sup>**

	Nauru	Kiribati	Fiji
Age	0.224 (1.421)	-0.008 (-0.144)	-0.072 (-1.085)
Diab	0.052 (0.371)	-0.151 (-0.881)	-0.008 (-0.148)
Mari	-0.051 (-0.334)	-0.067 (-0.404)	-0.008 (-0.132)
Booz	-0.087 (-0.596)	-0.345 (-1.698)*	0.154 (2.290)**
Numfam	0.104 (0.659)	-0.095 (-0.528)	0.011 (0.186)
Race	—	—	-0.016 (-0.256)
Yrschol	-0.065 (-0.442)	0.396 (2.060)**	0.154 (2.152)**
Sex	0.082 (0.545)	-0.108 (-0.617)	0.020 (0.302)
F	0.560	1.830	2.585
R <sup>2</sup>	0.073	0.286	0.067

<sup>§</sup> standardized coefficients

\* \*\* \*\*\* significance at the 90%, 95%, 99% level respectively

t-statistics in parentheses

**Table 4. Dependent Variable - Nutrition (NUTAVG)<sup>§</sup>**

	Nauru	Kiribati	Fiji
Age	0.184 (1.195)	0.383 (2.306)**	0.007 (0.109)
Sex	-0.410 (-3.138)***	-0.201 (-1.292)	0.037 (0.551)
Race	—	—	0.105 (1.673)*
Numfam	-0.004 (-0.028)	—	0.139 (2.384)**
Yrschol	0.053 (0.420)	0.582 (3.424)***	0.244 (3.466)***
Booz	0.060 (0.457)	0.631 (3.537)***	-0.046 (-0.682)
Diab	-0.193 (-1.690)*	-0.274 (-1.803)*	-0.092 (-1.680)*
Employ	0.095 (0.641)	-0.313 (-1.997)*	-0.087 (1.412)
F	2.950	3.462	2.665
R <sup>2</sup>	0.325	0.472	0.068

<sup>§</sup> standardized coefficients

\* \*\* \*\*\* significance at the 90%, 95%, 99% level respectively

t-statistics in parentheses

**Table 5. Dependent Variable - Stress (STRESSAVG)<sup>§</sup>**

	Nauru	Kiribati	Fiji
Age	0.268 (1.701)*	0.445 (2.439)**	0.034 (0.489)
Race	—	—	0.041 (0.630)
Sex	-0.152 (-1.057)	-0.107 (-0.625)	0.050 (0.723)
Yrschol	0.074 (0.533)	0.519 (2.780)***	0.093 (1.284)
Booz	-0.109 (-0.751)	0.244 (1.246)	0.027 (0.388)
Diab	-0.239 (-1.744)*	0.069 (0.414)	-0.058 (-0.975)
Employ	0.007 (0.045)	-0.235 (-1.368)	0.030 (0.470)
Numfam	-0.056 (-0.364)	0.034 (0.197)	0.008 (0.138)
Mari	-0.177 (-1.209)	0.085 (0.529)	-0.042 (-0.705)
F	1.351	2.214	0.524
R <sup>2</sup>	0.181	0.364	0.016

<sup>§</sup> standardized coefficients

\* \*\* \*\*\* significance at the 90%, 95%, 99% level respectively

t-statistics in parentheses