

The Orthomolecular Treatment of Cardiovascular Disease in the Island Population of Fiji

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Background

The number of individuals with cardiovascular disease has been on the rise in the island of Fiji within the last decade. With the population increasing and a significant amount of individuals in poverty, non-communicable illnesses have become more rampant than infectious diseases. With the use of International intervention in combating the disease, programs that promote organic farming and community awareness have been implemented in the island. Despite these additions, cardiovascular disease is still the leading cause of death in the island of Fiji.

Cardiovascular disease is one that is preventable and reversible. However what have made it difficult for the mortality rates to decrease have been several reasons, among them are the typical western diet and sedentary lifestyle. The increased consumption of processed foods that are high in fat and sodium has been known to contribute to cardiovascular disease, along with smoking, alcohol consumption, and obesity rates among others. These are a few of the risk factors that if modified, can cause a significant difference in the mortality rate attributed to cardiovascular disease.

With other countries assisting Fiji in promoting diets that consist largely of vegetables and traditional foods, nations such as Australia and Japan have taken an active role in providing an education to make good use of the little agriculture many individuals possess. The reason for this is simply a matter of supply and demand. More and more land is being used for projects other than agriculture and the use of pesticides further decreases the quality of the soil which reduces the nutritional value of the vegetation. With political unrest and poverty still being a part of the island nation, the construction of more well-equipped medical facilities would be ideal. But, with the current state of the nation, and an economic climate that is considered poor, the population is need of something more practical and perhaps more effective. Orthomolecular Medicine (OM) has been used for several decades and through several research trials it has been proven to be effective in various illnesses. The research will show that studies in the field of cardiovascular pathology can be treated with the use of OM. OM Research that has been conducted in developed countries have shown the effectiveness of OM and despite developed countries possessing medical technology that is considered more advanced, cardiovascular disease (which is considered preventable) is still a leading cause of death. Keep in mind, that although cardiovascular disease is a somewhat of a broad topic, this thesis will focus more on the major illnesses that stem from cardiovascular disease which are the following: coronary artery disease, stroke and hypertension.

Orthomolecular medicine is a branch of clinical treatment that advocates the use of nutrition and supplements. With several studies showing that cardiovascular disease can positively be modified with the use of orthomolecular methods, these are indeed suitable for the island nation of Fiji. With Orthomolecular methods being more economical, possessing significantly less side effects, and perhaps be more efficacious, orthomolecular medicine brings something that the nation itself needs, which is practicality and effectiveness.

Incidence and Prevalence of Heart disease both in Fiji and other countries

According to the World Health Organization (WHO) “More than 60% of the global burden of coronary heart disease occurs in developing countries.”^[1] The risk factors of Coronary artery disease include smoking, hypertension and hyperlipidemia.^[2] According to a study in the journal of epidemiology, Fiji along with eight other countries in the southern pacific concluded that individuals with high serum cholesterol were consistent with coronary heart disease in the studied developing countries.^[3] In another study that involved mortality rates in the south pacific, cancer and cardiovascular deaths were both important causes of the mortality rate in seven countries in the South Pacific.^[4] In 1999 a study involving ischemic heart disease showed that Fiji was at the top of the list of mortality rates.

Age-standardized sex-specific mortality rates (ASR) /100,000 populations aged 35-64 for IHD in the Pacific

Country	Yr.	Males	Females
		ASR	ASR
Fiji	1995	398.9	103.8
New Zealand			
Zealand	1993	162.1	48.6
Australia	1994	104.6	29.4
Japan	1994	26.3	6.9

Source: Menzies Centre for Population Research, 1999

According to the WHO in 2002 39% of all deaths in Fiji were due to cardiovascular causes.^[5] The International Diabetes Institute had conducted a study involving two specific groups of Fijians both Indian and Melanesian. What it had initially found was that infectious disease had decreased while an increase in coronary heart disease was observed. Its initial survey was taken in 1980 and the cohort was followed until 1991. The cohort consisted of 1325 Melanesians and 1221 Indians, and they were taken from both urban and rural areas.^[6] The study showed the following results:

“Total mortality rates in Melanesians were 15.9 and 9.2/1000 person-years, and in Indians were 13.5 and 6.8/1000 person-years, in men and women respectively.”

The study had concluded that cardiovascular disease was responsible for a large share of the total number of deaths in the two types of Fijians studied. Another correlation that was made was that the same risk factors for coronary heart disease in the populations studied were the same risk factors in developed nations which were Diabetes, high cholesterol serum and hypertension.

When the ailments connected to coronary heart disease were examined, it was found that cardiovascular disease had a strong association with non-insulin dependent diabetic individuals and a large majority of deaths in Indian and Melanesian Fijians. It was also concluded that the same risk factor (diabetes) that led to deaths attributed to Coronary heart disease, was also the same risk factor that led to significant mortality rates involving developed populations.^[7] No matter the economic status of the nation in question, cardiovascular disease does not discriminate. In 2011 an article in the Fiji Times had reported that the Fiji Islands Health system Review Report came up with the following:

“According to the report, life expectancy in Fiji had dropped from 72.9 years in 2000 to 67.8 years in 2005 with women living, on average, five years longer than men. The report also stated that only 16 per cent of Fiji's population lives beyond 50 years of age while only 8 per cent live to see 60.”

The Non communicable Disease Survey that was conducted in 2001 showed that over 19 percent of the population was diagnosed with hypertension, while approximately one third of all deaths and half of the deaths in individuals which fall in the 40-59 age bracket had died due to diseases of the circulatory system. The report also went on to say that the mortality rate involving adults was two to three times higher than in New Zealand and Australia. This was mainly attributed to the increase in cardiovascular disease, and it was the most important factor that prevented the life expectancy of Fijians from increasing.^[8] Even military personnel suffer from conditions involving cardiovascular diseases. In an article by the Fiji Village News it was reported that the Royal Fiji Military Force Biochemistry Department Pathology Laboratory, said that 80% of all diseases within the military are due to heart disease.^[9]

The Australian AID agency which is responsible for supervising the health programs overseas created a film illustrating the effect of non-communicable diseases. According to Vive Liutaki, project officer for the Foundation for Rural Integrated Enterprises & Development (FRIEND) says in the film that non-communicable diseases are among the leading causes of death.^[10] According to the Voice of America News Agency, it was reported by the World Health Organization that the leading causes of death are non-communicable and they include heart disease. According to one of their newscasts this is especially prominent in developing nations due to these non-communicable diseases, which are forcing many individuals below the poverty line.^[11]

Conventional Medicine and Orthomolecular Medicine at a Glance

As previously mentioned progressive aspects of OM include the following: the cost, efficacy and minimal adverse reactions. Before any type of medical treatment is utilized it is important to examine the secondary effects involved. In regards to vitamin supplements the Centers for Disease Control reported the following deaths due to vitamin supplements:

The American Association of Poison Control Centers (AAPCC) attributes annual deaths to vitamins as:

2009: zero	2000: zero	1991: two
2008: zero	1999: zero	1990: one
2007: zero	1998: zero	1989: zero
2006: one	1997: zero	1988: zero
2005: zero	1996: zero	1987: one
2004: two	1995: zero	1986: zero
2003: two	1994: zero	1985: zero
2002: one	1993: one	1984: zero
2001: zero	1992: zero	1983: zero

In the last decade there have been only six deaths reported by the AAPCC. Now this could be due to the fact that not many individuals take vitamin supplements, however this is not the case. Over half of the US population takes herbal or nutritional supplements, which equals to 145 million individual doses, which equate to 53 billion doses of supplements every year. In 1998 the journal of the American Medical Association reported that 106,000 individuals die from drugs that are prescribed and used correctly.^[13] In 2003 the AAPCC reported that, conventional pharmaceutical drugs caused over 2000 deaths and 162 of those came from drugs used for cardiovascular purposes. Various studies have been conducted to study the side effects of cardiovascular drugs. One study demonstrated over 193 side effects.^[14] Another study in the Journal of the American Medical association revealed that the use of statins to treat acute coronary syndrome did not decrease the rate of death, myocardial infarctions and stroke.^[15] An additional study involving acute coronary syndrome demonstrated that initiating statin therapy after Acute Coronary Syndrome had begun showed no benefit in reducing risk of myocardial infarction and stroke for a period for up to four months, but it did show reduction in unstable angina.^[16] In regards to the use of statins, severe muscle pains were experienced by patients which did affect their quality of life.^[17] Another important aspect to point out was that according to a survey conducted measure the side effects of statin use, stated that several patients reported cognitive defects associated with the use of statins.^[18]

Homocysteine - A Modifiable Risk Factor Treated By Way Of Orthomolecular Medicine

There are several risk factors for cardiovascular disease where conventional methods have always been at the forefront, but even in the world of prescription drugs, OM must first be considered as a priority. An example of this would be homocysteine. This is an easily modifiable risk factor of heart disease. This particular risk factor was first considered in 1969. Now, homocysteine exists within five percent of the population, but in 13-47% in patients who suffer from symptomatic atherosclerotic vascular disease excessive homocysteine levels were found. In 1995, twenty-seven observational studies in which 4000 individuals participated, found that excessive levels of homocysteine in ten percent of the population were also diagnosed with coronary heart disease. The question here is how can homocysteine levels be reduced? The answer is an OM one, which is basically prescribing folic acid, b-12 and b-6:

“An increase in dietary folic acid of 0.5-5mg per day was associated with an approximately 25% decrease in homocysteine, and the introduction of supplementation with Vitamin B12 at a dose of 0.5 mg per day was

associated with a 7% reduction in homocysteine levels" (Homocysteine Lowering Trial lists Collaboration, 1998)."
^[19]

Again we go back to 1968; it was this year that homocysteine acquired attention, not from Linus Pauling but from another medical professional by the name of Dr. Kilmer McCully. McCully's work in the field of homocysteine metabolism was observed by the process of atherosclerosis in young children who were suffering from myocardial infarctions due to a genetic impairment known as homocystinuria.^[20] The pathology involved an enzyme deficiency that is used to convert methionine into cystathionine. The intermediate product in this reaction is homocysteine which then becomes cystathionine. Of course if the enzymes become deficient then homocysteine accumulates and therefore begins to destroy the collagen found in walls of the arteries. The hypothesis presented by McCully was that high doses of supplementation such as folic acid, B6, and B12 could actually be used to decrease the amount of homocysteine and prevent the harm that can be done to the arterial walls. McCully's hypothesis not only turned out to have merit but at the same time it also correlated with some of the more recent studies according to Kunin.

In 1985 a study was conducted with 75 patients who were diagnosed with vascular disease and it was found that one third contained levels of homocysteine that were considered high.^[21] Later in 1988, the same author of the previous study just mentioned, said that in the same year research was conducted in to order to test and see if 250 mg of vitamin b6 and 5 mg of folic acid could lower homocysteine levels. The study involved 32 participants and showed that in 81 percent of individuals homocysteine levels are indeed lowered. After adding 6000 mg of betaine (a chemical compound found in sugar beets), all individuals in the study had their homocysteine levels lowered.^[22] In 1991 another study was conducted to measure the effect of methionine on patients who were already diagnosed with premature vascular disease. The results were that 42 percent of individuals with cerebral disease, 28 percent of individuals with peripheral vessel disease and 30 percent of individuals who experienced a myocardial infarction, all had high levels of homocysteine.^[23] Further, in an additional study known as the physician's health study, more than 14,000 participants were followed and out of the 271 heart attacks 19 of those heart attacks were due to excess homocysteine levels.^[24] Conventional methods are not needed here but instead orthomolecular ones are.

Efficacy

As previously mentioned, Coronary Artery Disease, stroke and hypertension are the top three leading causes of death in the country of Fiji. These are the three conditions that will be looked at as to how effective is OM in treating these ailments. This will be done by reporting various studies that have included identical if not similar risk factors that are associated with cardiovascular disease.

The *New England Journal of Medicine* published two studies that demonstrated the benefits of vitamin supplementation. Between two studies, Healthcare professionals followed a cohort of 839,000 people and showed that those who supplemented with at least 100 IU of vitamin E had decreased their risk of heart disease by 59-66%. It is important to point out however that the studies were adjusted for the differences in lifestyle which were the following: smoking, physical activity, their intake of fiber, and the use of aspirin. This adjustment

was done for the purpose of the effect that vitamin E had on the heart alone. The study also went on to say that even a diet that contains significant amount of vitamin E only have heart protective effects that are very minimal, hence the need for vitamin E supplementation.^[25,26] Cambridge University showed that patients who were given the diagnosis of coronary arteriosclerosis could be able to lower their risk of a myocardial infarction if 400-800 IU of vitamin E (d-alpha tocopherol) would be taken daily.^[27]

Ascorbic Acid has also shown great benefit in the treatment of heart disease. Dr. Linus Pauling a pioneer in ascorbic acid research demonstrated several of the effects that this supplement contains. "Since vitamin C deficiency is the common cause of human heart disease, vitamin C supplementation is the universal treatment for this disease,"^[28] said Pauling. It is also understood that heart disease is a leading cause of death in the US. A study involving over 85,000 nurses, who were followed for 16 years, found that individuals who took vitamin supplements decreased their risk of heart disease. After the study was adjusted for age and other factors that were considered risks for coronary disease, vitamin C was responsible for the reduction in the risk of heart disease. A diet rich in foods that contained vitamin C did not show any type of significant benefit, which again illustrates the significance of supplementation with vitamin C.^[29]

As a side note Nobel Prize Laureate, Dr. Louis Ignarro conducted a study on hypercholesterolemic mice utilizing both vitamin C and vitamin E and found that taking these supplements decreases the risk of developing arteriosclerosis.^[29] According to studies conducted to find out the mechanism of how vitamin C works as being beneficial to individuals with heart disease, showed that Vitamin C levels reduce C-reactive protein, which is an inflammation marker. The ongoing evidence suggests that heart disease is associated with chronic inflammation.^[31]

Niacin has also been another supplement that has been used to treat certain ailments connected to heart disease. In studies conducted, Niacin showed it was able to lower cholesterol levels and therefore decrease the risk of heart disease.^[32] In another study Niacin was also able to lower cholesterol by 22 percent and decreased the level of triglycerides by 52 percent.^[33] What is also important to point out is that OM has shown that it can work successfully with conventional methods even if a genetic factor is the cause of the pathology. Familial hypercholesterolemia is an inherited genetic disease which causes levels of cholesterol to be in excess. A study was conducted with individuals diagnosed with familial hypercholesterolemia and after being given a drug by the name of colestipol along with following a specific diet the individuals did not have any significant decrease in their cholesterol levels. When niacin was administered to the group along with their current regimen of colestipol and specific diet a reduction in their cholesterol was observed.^[34]

Stroke

As the second leading cause of mortality in the country of Fiji, stroke causes fatalities mostly in people in their forties; since the retirement in Fiji is 55 this indicates that these individuals still had ten years left of their career to complete. You may ask why this is significant. The reason for this is because it is stroke that is actually causing a capital loss. "The annual national human capital loss from stroke mortality for Fiji for the year was calculated to be F\$8.85 million (US\$5.31 million)."^[35] Further, "This loss equates to one percent of national government

revenue and 9.7% of Ministry of Health budget for the same year.”^[36] In other words, capable working individuals are dying sooner, rather than later causing a shortfall in economic output.

Ascorbic acid once again has shown benefit when it comes to cardiovascular diseases. An important ailment that stems from cardiovascular disease is strokes. Arteriosclerosis that is developing in an artery is usually the mechanism that causes a clot or thrombus to form which impedes blood flow to a certain area thereby causing a stroke. A low level of ascorbic acid found in the serum plasma was associated with hypertension and individuals who suffered from obesity.^[37] In 2009 the Fiji Times online said the health ministry reported that Fiji ranked fourth on the nations that were considered most obese in the region. The article went on to say that more than half of Fiji’s population was considered overweight and many were lacking when it came to iron and micronutrients.^[38]

In Finland, another study was conducted with more than 2400 middle aged males which were all taking part in the Kuopio Heart Disease risk factor study. The main purpose of this study was to see how many participants were developing strokes. Of course the study was adjusted for various risk factors such as smoking, obesity and blood pressure among others. The study found that men that contained low serum levels of vitamin C were more than twice as likely to develop stroke compared to other males who had higher vitamin C levels in their serum plasma.^[39]

Despite individuals having the risk factors that lead to cardiovascular disease such as smoking and alcohol use, the utilization of both Vitamin E and Vitamin C proved to be effective in lowering the total mortality rates and those who died from coronary mortality. More than 11,000 people who fell into the 67-105 age category were followed for a period of nine years and the results were that those who utilized vitamin C and vitamin E at the same time lived longer.^[40]

In developed nations stroke is one of the main causes of death. However as previously mentioned homocysteine metabolism has been an important factor in many of these studies that try to analyze the risk cardiovascular events.^[41] A study in Iran was conducted to assess whether or not dietary intake of folic acid, B12 and B6 decreased the risk of stroke. This study took place in a hospital setting and patients were given a questionnaire which was used to measure their intake of the supplements in question. There were two groups in this study; one group had a history of stroke while the other group did not have any sort of history involving cerebrovascular diseases. A face to face interview was also conducted with the patient’s relative that was considered close to the patient. The information was later translated into nutrient data. The results of the study found that individuals with a higher dietary intake of the food supplements in question were associated with a lower risk of stroke.

“Intake of folic acid in men with stroke and vitamin B12 in women with stroke was significantly lower than that in the patients without stroke ($P < 0.05$), but there was no significant difference between the two groups in the level of antioxidant consumption in women and men ($P > 0.05$).”^[42]

Implementing a New Health Program Into the Island of Fiji

As previously mentioned the government of Australia along with the WHO has put programs in place to help with the prevalence of heart disease in the country of Fiji. However, some of these programs not only mention the health aspect but also mention the financial one as well. If an individual is diagnosed with a certain ailment then that individual must be put on some sort of drug regimen, which is very common in conventional medicine. Acquiring those drugs in a nation where a significant number of people are below the poverty line is difficult, and with the current health programs relying so much on foreign aid, it becomes more difficult for individuals to take their health as a priority.^[43]

When I breakdown the implantation of a new program, the first step would be education as to what are the risk factors for heart disease and the consequences if heart disease or the conditions that stem from it go unchecked. For example, in the United States there is a significant percentage of individuals who are aware that they have hypertension but are not doing anything in terms of treating it in accordance to their clinician. It is situations such as these which can then lead to significant cardiovascular events. According to Dr. Michelle Magee, an American physician at the Medstar Washington medical center, she states “There is a very high prevalence of uncontrolled hypertension and also unrecognized hypertension, so people who don’t even know they have it which increases the risk for heart disease and stroke.”^[44]

	1971-2	1974-5	1976-80	1988-91
% Aware: Told by physician that they have hypertension	51	64	73	84
% Treated (Taking medication).	36	34	56	73
% Controlled (Taking meds and BP< target on one occasion).	16	55	34	55

Therefore education becomes a priority especially in rural and urban areas where access to medical care is difficult. For example in the United States, the chart above illustrates the percentage of people that are aware that they have hypertension as the ailment but many of them do not treat it.^[45] This could be due to many factors, whether it’s financial, compliance, or the individual does not understand the ramifications of his conditions. However education has proved somewhat difficult in undeveloped countries. According to a study done in Indonesia, nutrition education is done by educators who hardly have any nutritional education training themselves, which then might do more harm than good, by telling populations to follow certain guidelines that maybe somewhat misleading.^[46]

In regards to the island of Fiji, the education and implementation of nutritional programs should be a priority. By having cooking demonstrations utilizing many of their own agriculture we can slowly decrease the need for individuals to rely on “western” style food items such as soft drinks and chips. One of the key concepts is making sure that these types of cooking demonstrations are practical and that they are able to execute these demonstrations with the limited means that the country has, in terms of cost and technology. What is particularly interesting is that Fiji faces a major problem at opposite ends of the spectrum; over-nutrition and under-nutrition. The current Fijian diet consists of foods that may be high in energy but low in vitamins, and minerals, hence these individuals are overfed and malnourished. The under-nutrition term applies to the individuals where there is an economic shortage due to a significant number of the population living below the poverty line.^[47]

It is important that programs bring a strong sense of urgency but at the same time show the individuals to make the most of what they have. A similar project has been researched before. In 1981 an article describing such programs came up with the idea of using coconut milk instead of soft drinks, and the article went on to say that implementing these types of programs must be a national effort rather than a small region trying to make these changes.^[48] It is also important to point that the article stresses the need for accountability.^[49] We can try to educate the individual but the choice is ultimately up to them. Perhaps the most important point of the article is the following:

“It has often been said that ignorance is the most cause of malnutrition.”^[50]

Educating the individual on malnutrition is also of great importance. Certain foods hold more nutritional value than others, and the traditional recipes can be altered to include more fruits, vegetables, and the common types of food items found in Fiji which among them would be taro leaves, and banana flower.^[51] Having community programs in which one individual is responsible for making and demonstrating to the rest of the village would be constructive; by making a healthy dish, it would not only bring accountability, but also bring community awareness and the confidence to the individual that he or she can take charge of his or her health and perhaps avoid the wrath of some of the common health conditions ravaging the nation. The importance of community awareness cannot be understated.

In 2008, the preventative medicine research institute conducted a study to see whether or not groups of individuals with common risk factors of heart disease would benefit from a support group rather than trying to improve their condition on their own. The results showed that individuals attempt to make certain lifestyle changes and lower their risk for heart disease improved when a social support group was in place.^[53] Research shows that a multi-factor intervention program can be successful and lowering the individual’s risk factor for heart disease.^[53] However, what success has this had in major hospitals? In the United States, the multi factor intervention programs proved to be beneficial.^[54]

“These results demonstrate that a multi-component lifestyle change program focusing on diet, exercise, stress management, and social support can be successfully implemented at hospitals in diverse regions of the United States.”^[55]

Aside from the support group, the diet is essential; Of course the perfect diet would be excellent but would it suffice? Is it possible to have an individual implement the diet utilizing more vegetables and healthier alternatives and at the same improve and perhaps maintain their optimum health? Unfortunately, it may still come up short. According to Dr. Michael Jansen M.D., author of the book *The Vitamin Revolution*, being supplied with the correct nutrients that our bodies require is a matter of genetics, and what might be good for one individual may not be good for another; indicating that certain individuals may need more of a certain type of nutrient to survive while another individual may need more of a different nutrient to endure. Jansen also goes on to talk about the work of Dr. Roger Williams, a researcher in this field, who experimented on laboratory rats and nutrition based genetics.

“Dr. Roger Williams has shown in experiments with rats that after five generations of inbreeding, litter mates, which are very close genetically, can vary in nutrient needs up to 40 times for particular nutrients. In other words, one may need 2.5 mg. of pantothenic acid (vitamin B5) and another may need 100 mg. for the same level of vitality, physical endurance and life span. There is an even greater variation in human beings, as we have a greater genetic diversity than other species.”^[56]

The work of Dr. Williams also goes on to say that the cells of the human body are given nutrients by the blood plasma and that the body needs a plentiful supply of nutrients that are derived from a healthy diet along with taking supplements. What is also important to point out is supplements are not a substitute for a healthy diet, and many individuals may confuse the fact that by the human consumption of supplements it will be able to make up for the poor diet that they may be on; it's important that individuals are not given a sense of security that may be misleading.

In a laboratory setting, Jansen goes on to say that when using a culture medium, the medium is composed of an abundant supply of nutrients and if the cells received nutrients in doses that were considered minimal, then you are risking some cells not being able to survive and therefore it may mean the loss of the cell line itself.^[57] But the environment is also something to consider. The water we drink the air we breathe along with food being tainted with pesticides and herbicides are harmful. Also, the soil as well, in certain regions of the United States some soil patterns have higher contents of selenium than others which in actuality selenium is used to fight off heart disease.^[58]

In 2000, Atish Prasad, an associate of the Land Use Planning Section, Department of Land Resources Planning & Development, Ministry of Agriculture, Sugar & Land Resettlement, Fiji, published a report outlining the various environmental factors and the impact they play on population in Fiji.^[59] The paper stressed the magnitude that soil erosion caused the degradation of soil which led to the depletion of nutrients. Of course one can make the argument that finding another piece of land in which to farm in might be more feasible, however this is not the case. Arable lands have decreased, and the use of agricultural lands has increased by two hundred percent. This may seem a step in the right direction, but with more and more land being used for projects other than agriculture a major shortage of crops ensues and with it, less viable nutrition for the population:

“Humans and animals are mobile and can select their diet/food from different sources and locations but plants are stationary in the soil. They are dependent on what the environment can supply them as nutrients....In order

to achieve sustainable food security, land and water resources management has been identified as one of the priority areas. Better use and management of natural resources by raising land productivity, controlling and minimizing land degradation, increasing bio-diversity and improving the quality of environment has become an issue for developing countries like Fiji.”^[60]

Rural lands must now be used for agricultural means. More and more farmers understand the impact that soil has on its crops, it is now understood that by spraying any type of pesticide can lead to putting the nutritional value, and the fertility of the soil in jeopardy, and with the population increasing and not enough agricultural investments to sustain it, this indicates that individuals may rely on less healthier alternatives and more on the typical ‘western’ diet for a matter of convenience. As previously mentioned it is important to keep in mind that several non-communicable diseases such as diabetes and heart disease are due to a poor diet, smoking and excessive alcohol use. As the number of heart conditions increases the food shortage increases as well as the population.

The figures for the census of population over the last century are tabulated below:^[60]

Year	Total	Year	Total
1881	127 486	1946	259 638
1981	121 180	1956	345 737
1901	120 124	1966	476 727
1911	139 541	1976	599 068
1921	157 255	1986	715 375
1936	198 379	1996	775 077

Over the last four decades the population has more than doubled.

With the population ever expanding in Fiji and the use of viable land for agricultural purposes continuing to decrease it is now more important than ever that whatever land is available is suitable for vegetation. With having suitable land, organic farming becomes just as important. If there are more nutrients in the soil then there are more nutrients in the food.

In 2012 farmers began to use objects such as kitchen waste, shredded paper, seaweed and dead wood as fertilizer. They have also gone as far as to using a type of oil from a tree known as the Indian neem tree. The oil from this tree is known to repel insects which eliminate the need for insecticides.^[62] The Fiji times also reports that more and more farmers use organic methods for fertilizing the soil. Now in terms of international involvement farmers in Fiji are being trained in Japan to learn about the methods of organic farming.^[63] All of this in hopes of improving the nutritional value of the food.

Despite all the effort, it is still imperative that population of Fiji be given an opportunity to improve their health and supplementation can greatly increase the benefits of this opportunity. By giving them nutritional supplementation such as magnesium, zinc, vitamin C and B-complex among others, we can ensure that population has the best available nutrition where vegetation lacks. With the current international programs in

place such as the Australian AID, and the additional help from other foreign countries we can enact these programs to begin passing out supplementation in accordance to the nation's leading causes of death or we can make a supplementation a part of the programs that are already in place. Of course, would clinicians be needed for this program to work? Not necessarily, with an education and compliance we can make sure that individuals understand why they are getting the supplements and what type of benefits they can experience. However what would be the danger of these types of programs that consisted of passing out supplementation? Virtually non-existent, as previously mentioned hardly anyone has passed away from supplementation, it's cheaper and the side effects are minimal if not, non-existent. The side effects of prescription drugs are numerous. In 1999 the CDC reported that 700,000 individuals had to undergo hospitalization due to side effects from drugs that were properly used. Through the several studies mentioned in this thesis we have shown the benefits of utilizing OM and the studies demonstrating OM's benefits are numerous.

Ideally, it would be wonderful if more medical facilities were put in place and if the population had greater access to medical care. Unfortunately that would be somewhat impractical in a country where so many individuals live below the poverty line, and the country relies heavily on foreign aid.^[64] The average individual in Fiji makes between 60-80 dollars per week and feeds a family of four. There is only one private hospital which caters to the individuals who have the financial capacity and the majority of individuals rely on public medical facilities.^[65] With the shortage of physicians in the country, individuals must be in charge of their own health.^[66] Clinicians all over the world can agree that the best type of medicine is one that focuses on prevention.

Although there are many other types of diseases that certainly deserve the medical community's attention in the nation of Fiji, there are two concepts that must be understood, as previously mentioned; the number one cause of death in Fiji is due to cardiovascular disease hence non-communicable diseases. The second concept is coronary artery disease is not only preventable but also reversible. Dr. Caldwell Esselstyn, Olympic gold medalist, trained as a surgeon at the Cleveland clinic and at St. George Hospital in London, and author of over 150 scientific publications says and proves that the battle with heart disease can be won. In 1995 Esselstyn published his nutritional research study on the reversal of heart disease in patients who were considered severely ill.^[67] According to Esselstyn

"Heart disease is a toothless paper tiger that needn't exist and if it does exist, it needn't progress."

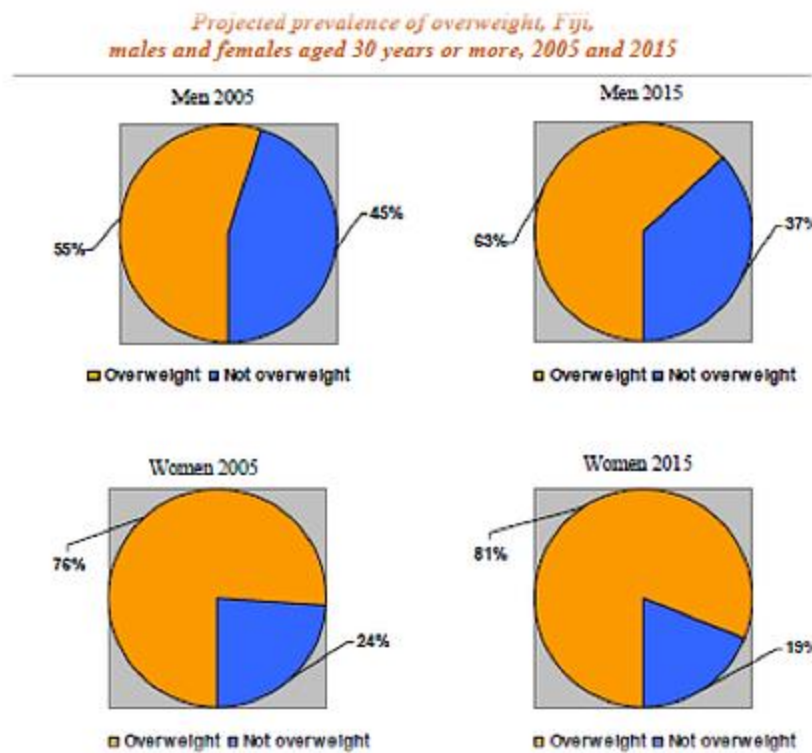
In his study he was able to show that if an individual followed a certain diet that favored no dairy and no meat of any kind, but large amounts of vegetables, they would not only be able to stop heart disease from progressing but also they would be able to reverse it as well. Another researcher in the field of nutrition research is Dr. Dean Ornish. Creator of the Ornish Diet, he was also able to prove that changes in lifestyle and diet along with supplementation can also reverse heart disease.

Compliance

The WHO reports that at least 80% of heart disease that is considered premature could have been prevented if dietary measures would have been taken.^[68] With a major cardiovascular event, you would think an individual would be more inclined to follow a strict regimen of diet, supplementation and exercise. However studies have

shown that this is not necessarily the case. In 2006 in the journal of Surgery a study involving patients who had undergone coronary artery bypass grafting revealed that compliance with a regimen involving a mixture of prescription drugs and a certain diet was extremely low in the control group. Later, additional interventions were taken and the compliance increased. The study had revealed that when multidisciplinary measures are taken and more individuals do comply, the long term outcome greatly improves. [69]

With prevention comes decreasing rates of obesity. This graph from the WHO illustrates the rate at which Fiji is becoming a country where obesity is rampant and it is the viewpoint of the WHO and the author of this thesis that the large majority of this could have been prevented. With diet and supplementation abiding by the concepts of OM, individuals are able to have more energy and a greater capability for physical activity.



What's even more interesting is we are not in need of some special apparatus or certain type of medical procedure when it comes to prevention. The philosophy behind the work of Drs. Ornish and Esselstyn is quite simple and practical. When it comes to heart disease, Esselstyn says,

"It's a foodborne illness, and we're never going to end the epidemic with stents, with bypasses, with the drugs, because none of it is treating causation of the illness."

This type of nutrition is imperative to the OM treatment, but again we must emphasize that supplementation is crucial to a population that is fighting an uphill struggle. Where the vegetation is lacking due to the current state of their agricultural means or lacking in general due to supply and demand, supplementation can fill the void

and take the nutrition levels further. According to Linus Pauling “the primary cause of heart disease is ascorbic deficiency which leads to the weakness of the arterial wall because of the failure to manufacture enough collagen.”^[70] Pauling went on to say that an amino acid known as lysine is also beneficial when it comes to heart disease. Pauling says “Lysine is a prophylactic measure for preventing atherosclerosis.”^[71]

We Can Only Do So Much

When it comes to treating a person’s condition or ailment it is important to remember that it is ultimately up to the patient whether or not they choose to execute the treatment plan. A clinician can educate the individual as to why this type of treatment must be followed whether it’s taking the prescribed drug regimen or perhaps undergoing a certain surgical procedure; the clinician can only do so much and its compliance, which will pose a significant threat to the population of Fiji. As previously mentioned cardiovascular disease is one of the leading causes of death in Fiji. Despite help from foreign countries such as Australia New Zealand, Canada and the United States the mortality rates of cardiovascular disease show hardly any signs of improvement. Fiji has also taken notice of better farming practices by establishing the Fiji Organic Association (FOA) which brings awareness to organic farming practices in terms of vegetation and livestock.^[72] However, despite all this it still does not seem to be enough. It may seem as if it’s something unattainable but the grim reality is it really isn’t.

According to Dr. Walter Koroshetz, deputy director of the National Institute of Neurological Disorders and Stroke, said in an interview that out of the studies that were conducted factors such as: elevated blood pressure, cholesterol, blood glucose, obesity, current smoking, physical inactivity, and poor diet which are related to cardiovascular health, could lead to a significant improvement if one of these factors were modified.^[73]

OM can modify these factors. With supplementation, and the right diet, along with cessation of certain lifestyle elements, this would not only improve the well-being of the population but at the same time cut down on medical costs. Blood pressure could be controlled by administration of magnesium, alpha lipoic acid and acetyl L-carnitine.^[74] Alpha lipoic acid can also lower blood glucose as well.^[75] Cholesterol can be lowered with Niacin.^[76] In 2007 The Fiji Times online reported that it costs approximately 45,000 dollars to send a patient to Australia to perform a bypass operation. The Fiji Times went on to say that this type of operation is just not an option for a country with such a significant number of people at the poverty level.

However with all of the education implemented along with the certain diets and OM methods what would be the probability that a nation such as Fiji would actually follow this sort of regimen? Only time will tell.

Orthomolecular Medicine: Why Should We?

This section of the thesis can be considered somewhat political and obviously controversial. Clinicians have known about the usage of OM for several decades, but yet it seems anything having to do with supplementation has been ridiculed and dismissed by the medical community. OM does not only extend into cardiology but as mentioned previously it also extends into various aspects of medicine including psychiatry. But with all the reasons OM can be used for, why is it not embraced?

With the breakthrough of Linus Pauling in the journal of science, another individual by the name of Adelle Davis wrote books having to do with nutrition back in the 1950's and 1960's. Instead of the benefits of nutrition being embraced they were criticized by medical professionals. Davis was able to illustrate the connection between nutrition and human biochemistry. With the coining of the phrase 'orthomolecular' by Linus Pauling, a breakthrough was made, and physicians became inspired and more eager to use nutrition as a form of treatment.^[77] So where did it go wrong? Richard A Kunin M.D., an OM practitioner, (who discovered that manganese can be used to treat drug induced tardive dyskinesia and co-founder of the orthomolecular Medical Society along with Linus Pauling), says:^[78]

“Nutrition was singled out for scorn and ridicule by the establishment. Nutrition-physicians were regarded as quacks. In 1968 nutrition rated so low in American science and medicine that there was very little research in the field. Nutrition was the bottom of the medical totem pole.”

Although it's beneficial on several levels, it does not necessarily mean that conventional methods must be replaced. There are several instances where conventional methods must be used, however when the illness in fact may be preventable, in this case heart disease, then nutrition and supplementation must be considered as a staple in the recovery process. Also, OM will pose an extremely minimal risk when it comes to safety. Individuals which are a part of relief programs can hand out supplements with the assurance knowing that what they are handing out is safe. The studies are numerous, proving the benefits of OM, and although the pharmaceutical company may have a dent in its financial portfolio, it does not negate the fact that OM is effective, economical and above all, it's practical. Dr. Andrew Saul, researcher, Orthomolecular Medicine Hall of Fame inductee, and author of several books on nutrition teaches individuals how to be responsible for their own health. In an interview with Saul in the film Food Matters Saul explains 30- 40 million individuals in United States are uninsured, and rather than to give them access to a medical system that has not met the health needs of the population, they should be given education and not medication. In regards to cardiovascular disease Saul says that the highest number of deaths is due to cardiovascular disease and within that statistic half of the deaths present with death as being the first symptom.^[79] In regards to this illness Saul says “the only way to win is not to play.”^[80]

When we actually look into implementing this program within the island population I find that the education must first be there. Clinicians must be educated in the type of role nutrition can play along with knowing what to test for and if a deficiency exists, why does it exist? And obviously, what has to be given to replace the deficiency. But with limited facilities in underdeveloped areas is OM worth it?

The answer is yes, OM is completely worth it. The comparison in costs, efficacy and side effects to conventional methods warrant an opportunity, and if this opportunity would not be afforded then it would be more of a disservice. By reducing and regulating the risk factors in question, this in turn leads to reduced costs in medications, a reduction in the mortality rate, and therefore reduces the number of illnesses that stem from not being able to control the risk factors. It's the exact same philosophy that should be taken in Fiji. With diet, lifestyle changes and supplementation; survival rates would be in the island's favor. Can an individual treat themselves using OM methods? Dr. Andrew Saul, thinks so.

As previously mentioned Dr. Andrew Saul, author of the book Doctor Yourself encourages patients to take responsibility of their own health, nonetheless with education, and the tools needed to do that, it's ultimately up to individual. Will Rogers, An American social commentator, once said, "Even if you're on the right track, you'll get run over if you just sit there."(81)

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