Dietary Patterns of Acculturation in Traditional Societies:

A Study in Nutrition and Health

Chris Busby

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This paper will explore the effects that acculturation has on the diet and health of traditional societies. The effects of acculturation can be both beneficial and detrimental to a population. Acculturation influences all areas of a society’s culture and lifestyle. For this paper, I will focus on the changes in diet and how they relate to a population’s health.

In this paper acculturation will be taken as a change in culture that is initiated by the conjunction of two or more autonomous cultural systems (Siegel et al., 1953). A principal condition necessary for acculturation to occur is that at least two cultural groups come into continuous first-hand contact (Teske and Nelson, 1974). Acculturation may influence diet in ways that may not be obvious to outsiders. The purpose of this project is to examine the responses and trends that traditional societies exhibit when outsiders attempt to modernize them. A review of the nutritional characteristics of both traditional societies and modern societies will be presented. Next, the changes that come due to acculturation, such as changes in subsistence patterns, will be discussed. Some beneficial responses that arise from acculturation will be examined. Finally, I will review some proposals and plans for future research. However, a review of the basic terms and theories that will be covered in this paper are necessary in order to continue on.

Wirsing (1985) comments that the two recurrent themes in medical anthropology literature are: (1) that traditional societies, with little or no contact with modern societies, are usually well adapted to their environment, and have good levels of health and nutrition; (2) that when such societies have extensive contact with modern societies, and experience change, their adaptation is disrupted, and their health put in danger. According to Wirsing (1985), a traditional society is said to be “acculturating” if it has extensive and continuous contact with a modern society. The more continuous contact becomes, the more pressure there is to change (Wirsing,
1985). These changes create situations and lifestyles that traditional societies must adapt to. An unacculturated traditional society, for the purposes of this paper, is a small, geographically isolated, indigenous society (Wirsing, 1985). The traditional societies may be hunters and gatherers, fishermen, or horticulturalists; they may be shifting habitation or seminomadic (Wirsing, 1985). Traditional societies must adapt to changes brought by acculturation. Baker (1984) refers to adaptation as any biological or cultural attribute that aids an organism’s ability to function in a given environment. It will be seen in this paper that acculturation in traditional societies alters nutrition. Nutrition is important in human adaptation because it can be an individual stressor such as, scarcity of food, thus facilitating adaptation (Haas and Harrison, 1977; Stinson, 1992). Nutrition may also play a role as a modifier in other stressors (e.g. diseases) (Haas and Harrison, 1977; Stinson, 1992). The changes brought about by altering nutrition disrupt homeostasis. The response by a society to these changes determines its livelihood. However, even if traditional societies can accommodate to these changes, their rates of morbidity and mortality will increase initially (Wirsing, 1985).

**Beneficial Characteristics of Traditional Societies**

* Cultural Attributes

The culture of a society is adapted to its ecosystem. The culture of both traditional and modern societies has adapted to allow these groups to get the maximum benefit from their environment. One important function that culture can possess is its ability to protect health. Some characteristics of traditional cultures include living in small groups, a nomadic and non-sedentary lifestyle, and the knowledge to not reduce ecological complexity (Wirsing, 1985). Modern culture is typically characterized by a sedentary lifestyle with a market economy.
In each ecosystem, environmental resources will be a factor when selecting for group size (Wirsing, 1985). A greater stability in foodstuffs results in a larger population size, while seasonal variations in food quantity limit population. Hunters and gatherers, who typically live in small groups, depend on the wild plants and game that surround them for food (Wirsing, 1985). The number in a group is limited by the seasonal availability of these resources (Wirsing, 1985). Nomadism is the adaptive response to seasonal variation of resources and resource depletion (Wirsing, 1985). These factors keep the group size small. Other factors play a role in controlling group size. There are cultural practices that keep the group size small. Wirsing (1985) points out that the available evidence shows that traditional unacculturated societies experience low population growth rates. Wirsing (1985) documents that only 22% of Yanomamo adults live beyond thirty years, and the annual growth rate is 0.5-0.7%. Various cultural practices have been given to account for this population stability, such as postpartum sex taboos, abortion, and infanticide (Dennett and Connell, 1988). Traditional societies have manifested advantages to small group size. The health benefits of this practice are that small groups cannot maintain some infections indefinitely (Wirsing, 1985). Wirsing (1985) explains that diseases are not absent, rather they are under stable control. In their study of the central highlands of Papua New Guinea, Dennett and Connell (1988) argue that the idea of disease stability is far too complex and misunderstood to be given as a group size benefit. Dennett and Connell (1988) conclude that the data in the central highland study is inadequate to demonstrate any form of disease stability over a long period of time.

*Dietary Attributes*

The major attribute of the traditional diet is its diversity. Hunter-gatherer groups, for example, have diets based on the seasonal availability of food. Seasonal variability in food
results in a greater dietary complexity. Traditional diets have been assumed better than modern
diets in their low fat, high fiber, high mineral, low sodium content (Wirsing, 1985). These
hunter-gatherers also show low blood pressure levels in most individuals, and low blood
cholesterol (Cavalli-Sorza, 1981). Epidemiological data shows that a high fat diet, by various
altering mechanisms in the body, promotes carcinogenic effects on the large bowel, breast,
endometrium, and prostate in humans (Zaridze, 1986). The low fat diet of the hunter-gatherer
may be a factor in their low documented cancer rates (Wirsing, 1985). The traditional diet seems
to be advantageous, but there are shortcomings. While the traditional diet may be more diverse,
the seasonal availability of food may lead to periodic famine.

Whereas a diet of high dietary fat is not considered healthy, a diet high in fiber seems to
select for better disease adaptation. An examination of the properties of fiber gives support for
this observation. Fiber is a residue of plants and is resistant to the alimentary enzyme (Wirsing,
1985). Fiber’s ability to hold water in the intestine, to increase stool weight, and to decrease
stool transit times has afforded many benefits (Wirsing, 1985). Notably, fiber can protect against
diverticulosis and colon cancer, and it is possibly relevant to the low rate of metabolic and
cardiovascular disease (Wirsing, 1985). The Bushmen, for example, have avoided the ailments of
modern diets, such as obesity, high blood pressure, heart disease, and hemorrhoids (Truswell and
Hansen, 1976). Subsequently, the Bushmen are known to consume large amounts of fiber
(Truswell and Hansen, 1976). The high fiber diet has apparently given the Bushmen an
advantage to modern diseases, but the diet does have disadvantages. Dennett and Connell (1988)
point out that while a high fiber diet has spared the New Guinea highlanders from many modern
diseases, it has done little to relieve the stresses of protein-energy malnutrition.
There are situations where diet is known not only to prevent certain diseases, but also to serve as a regulator of already present diseases. One situation of interest is the role of cassava-based diets in providing a buffer against the effects of sickle-cell anemia (Haas and Harrison, 1977). In clinical analysis, it was found that cyanate was good at disrupting the hydrophobic bonds in the hemoglobin-S molecule, which decreased sickling, increased red blood cell life span, and decreased crises in homozygotes (Haas and Harrison, 1977). This is important because many populations in the malarial, sickle-cell region have diets that are rich in thiocyanate, and cassava is the richest source of preformed thiocyanate (Haas and Harrison, 1977). It appears that adaptation to a cassava-based diet is a dietary pattern that has reduced the impact of sickle-cell anemia. However, we must not assume that this factor is the lone determinant in the symptoms of this illness. In order to be sure of cassava’s medical value, factors such as amount of intake, seasonal availability, age of individual, and many others must be taken into account. Thus, it cannot be said that cassava alone provides a buffer against sickle cell anemia.

Another dietary adaptation is the chewing of coca (Erythroxylon coca) leaves in marginally nourished highland Peruvian groups (Haas and Harrison, 1977). Coca chewing results in rapid elevation in blood glucose levels, and chewing adds significant amounts of calcium, thiamine, riboflavin and ascorbic acid to the diet (Haas and Harrison, 1977). There are other hypothesized adaptive effects, including the slowing of intestinal motility, tolerance and energy conservation in the cold, and increased endurance (Haas and Harrison, 1977; Hanna, 1974).

The idea that traditional societies have superior diets to modern societies is a sound one when we look at health statistics. However, we must understand that traditional societies are adapted to their immediate environment, and modern societies are adapted to their environment.
The high frequency of chronic diseases in modern societies has likely been a consequence of its difficulty in adapting to the changes.

**Changes due to Acculturation**

Contact between cultures has become a way of life for both traditional and modern societies in the last century. Increased contact with modern cultures has created the need for the traditional society to change and vice-versa. There are many changes that come with acculturation, and these changes can have drastic consequences on diet and nutrition. I will review the impact that the adoption of sedentary life-style and its characteristics has had on the traditional society’s diet and health. I will then examine some effects that accompany a change in diet.

*Sedentary life*

The introduction of modern culture brings with it a change to subsistence patterns. This change is a move from the nomadic hunter-gatherer life-style to a sedentary, domestic life-style. Jackson (1991) emphasizes two effects of reliance on agriculture as primary subsistence model. First, the variety of plant foodstuffs declines and the uniformity of nutrients ingested increases (Jackson, 1991). Second, people mostly eat specific concentrations of a specific plant chemical with the ability to alter metabolism and change fitness of themselves, their animals, and parasites in the environment (Jackson, 1991). These assertions indicate that the change to sedentism results in a decrease in the nutrients gained from plants. However, Jackson gives no evidence to support these hypotheses. It is clear that acculturation works through many pathways that alter a society’s life-style.

Health initially declines with the introduction of fixed settlements (Wirsing, 1985). Many of the groups in the New Guinea central highlands have adopted a sedentary lifestyle (Dennett
and Connell, 1988). They lacked the nutritional and health benefits that mobility provides for, including better hygiene, dietary diversity, and ability to avoid seasonal hardships (Dennett and Connell, 1988). Contamination of the ground and drinking water by waste sites is another health hazard that arises from sedentary life (Wirsing, 1985). The reason for this contamination is that the nomadic life-style favored frequent moves from camp to camp. Frequent movement serves to provide fresh resources to a population. Another aspect of fixed settlements is the observed increase in population size and density (Wirsing, 1985). This boom in population size can facilitate the transmission of respiratory infection (Wirsing, 1985). A suggested hypothesis for solving the sanitation problem is that hygienic conditions tend to be better with paved streets, thus the use of piped water and latrines, and wearing shoes may increase sanitation (Wirsing, 1985). This hypothesis seems feasible, but with it arise many more problems. The building of roads and pipe systems on tribal land can have numerous damaging effects. Not only will construction destroy tribal land and end isolation, but it will also bring in foreign workers who carry the potential to pass on new pathogens (Wirsing, 1985). This construction would destroy numerous ecological niches and replace them with artificial ones (Wirsing, 1985). In these new niches, only a few parasitic species could survive (Wirsing, 1985). This would leave humans in such environments with fewer species and a heavier burden of parasites (Wirsing, 1985). For example, the villagers of the Demera River estuary in Guyana tried to improve their welfare by converting from maize subsistence to the more economically valuable, rice (Desowitz, 1976). The villagers cleared the cattle fields for rice cultivation, but the new wet rice fields were ideal for mosquito breeding (Desowitz, 1976). Consequently, the removal of cattle and boom in mosquito population resulted in high human malarial rates (Desowitz, 1976).
Part of adapting to modern culture means entering into the economic market. Paid work and a cash-crop economy accompany this. If the unaccultured native population wishes to participate in the market and acquire desired goods, then they must provide something of value to exchange (Wirsing, 1985). Paid labor is a commodity that is desired. In response to paid labor, people will shift from a well balanced diet of locally available nutrients to a monotonous diet of the carbohydrate rich staple food with low protein, mineral, and vitamins (Wirsing, 1985). The problem is that jobs tend to last just long enough that a worker would have to quit his previous subsistence activities (Wirsing, 1985). The Warao provide an example. Wirsing (1985) comments that the Warao had come to depend on local sawmill income in 1980. However, the government closed the sawmills, leaving the Warao without income (Wirsing, 1985). The Warao could not revert to prior subsistence patterns because the fields had not been cleared and planted (Wirsing, 1985). In contrast, Dennett and Connell (1988) provide evidence that nutrition levels are improving over time with increasing access to money, but nutritional status varies with degree of acculturation.

The conversion to a cash-crop economy facilitates a variety of nutritional and ecological changes. One important point is that the income created varies based on the larger economy (Wirsing, 1985). This instability can create hard financial times that may be novel to a society. In addition, the local wild foods which are diverse and nutrient rich are replaced by high-yielding nutrient poor crops (Wirsing, 1985). The high labor required to grow rubber in Nigeria has had many effects on traditional farming and nutrition (Dewey, 1979). The high labor has forced farmers to give up cultivating yams, maize, rice, beans, groundnuts, melons, vegetables, and pineapples and switch to a more cassava-based diet (Dewey, 1979). Cassava growing requires less time, but is less nutritious. Consequently, the health of the traditional Nigerian farmer is
said to have declined (Dewey, 1979). Furthermore, domestication is also known to have caused the extinction of many plant species, which modified the toxicity of domesticated plants (Jackson, 1991).

**Nutritional Factors**

The change to a sedentary life has a great effect on nutrition. When a population settles they quickly use up the game supply in their ecosystem, which leads to a decrease in the protein intake (Wirsing, 1985). Also, the reduction in the diversity of plant products threatens to disrupt the amino acid balance in vegetables (Wirsing, 1985). In addition, culture practices that encourage reproduction are likely to increase the population size (Wirsing, 1985). The problem is that with the increase in population comes more mouths to feed. It is usual to see a decline in the nutrition of children (Wirsing, 1985). The body will react in different ways to changes in diet, but many times if the amount of essential nutrients is decreased then we expect a decline in health.

A major factor that affects nutrition in children is the length of breast-feeding. Breast-feeding in traditional societies tends to be long in duration (Gussler, 1987). However, in modern societies a substantially shorter duration of breast-feeding is observed (Gussler, 1987). As acculturation progresses and traditional societies adapt, this situation becomes a problem. The modern discouragement of spacing children creates a situation with more frequent live births that require earlier weaning and supplementary feeding with contaminated and nutrient poor carbohydrate-staple foods (Wirsing, 1985). The switch from breast-feeding to bottle-feeding, which comes with acculturation, to accommodate more children has other disadvantages. Bottle-feeding does not give the infant the protective factors in the mother’s milk (Wirsing, 1985). The initial result is an overpopulated and malnourished society, however as time passes traditional
societies may adapt. The modern society is a model of successful long-term adaptation to nutritional change, resulting in a greater availability of food and a longer life span.

The changes in rates of cancer among populations suggest that the modernization of dietary habits is contributing to the increase in cases of breast and colon cancer (Frisancho, 1993; Gray et al, 1979; Wynder and Gori, 1977). Although it is impossible to pick exactly the factors responsible for the differences in cancer rates, evidence indicates that a diet high in fat and protein is associated with an increase in cases of breast and colon cancer (Frisancho, 1993). In addition, modern peoples live twenty to thirty years longer than traditional peoples and thus experience longer exposure to environmental carcinogens. We must keep in mind that many other environmental carcinogens could influence the outcome of these results.

**Beneficial Responses to Acculturation**

Acculturation is a tough cultural process for a society to have to go through. Many of the attributes of traditional society life are altered permanently. However, these societies have come up with both cultural and biological responses to adapt. It seems universal that acculturation brings with it a change in subsistence patterns from a diverse diet based on locally available nutrients to a diet that focuses on a low nutrient staple-crop (Dewey, 1979; Wirsing, 1985). I will examine some of the adaptations that have evolved in order to utilize the nutrients available. I will then research how the human body adapts morphologically to nutrient deficiency.

**Staple-Crop Adaptations**

In diets that have rice as the staple, the major nutritional limitation is the amount of protein and vitamin (Haas and Harrison, 1977; Katsura and Oiso, 1976). Milled rice has less nutritional value than unmilled rice. However, with acculturation milled rice became the preferred form in most areas of rice-based diets (Frisancho, 1993; Robson, 1972). The milling
and washing of rice removes thiamine and other water-soluble vitamins, and it decreases protein content (Haas and Harrison, 1977). One bodily response to this nutrient deficiency is beriberi (Haas and Harrison, 1977). There are two types of beriberi, dry beriberi and wet beriberi, the latter being the most serious with the possibility of cardiac failure (Frisancho, 1993). Practices such as adding dried or fresh fish, fish sauces, soy products, or fresh vegetables to rice can serve to increase the amount of protein available (Haas and Harrison, 1977). Another practice, in India, is parboiling, in which unhusked rice is steamed and dried before milling (Haas and Harrison, 1993). This practice provides us with evidence that beriberi is caused by a thiamine deficiency because adult beriberi is much less common in areas where rice parboiling occurs than in rice-eating non-parboilers (Katsura and Oiso, 1976). However, we must remember that beriberi can occur anywhere if there is a deficiency in thiamine.

Corn, as a cash crop, presents similar problems to areas that adopt it. The main protein component, Zein, is low in the amino acids lysine and tryptophan and high in leucine (Haas and Harrison, 1977). Corn is also low in the amount of niacin it has (Haas and Harrison, 1977). Societies that have corn-based diets have a low quality of protein product and are in high risk of pellagra (Haas and Harrison, 1977). Pellagra can cause skin and g.i. lesions, and may cause nervous system and mental disorders (Bindon, 2004). It is known that pellagra is almost absent in the New World. There are two practices that have apparently given New World population’s immunity form this disease (Haas and Harrison, 1977). One is the combination of corn with beans, whose amino acid make-up complements each other (Haas and Harrison, 1977). The other is the practice of treating corn with alkali before grinding, which has a beneficial effect on the availability of niacin and essential amino acids (Haas and Harrison, 1977).
Traditional societies confronted with acculturation often shift subsistence patterns from a diverse diet of locally available nutrients to a staple-crop farming technique. This shift in agriculture is characterized by a reliance on a specific crop for the majority of dietary nutrients. The simplification of the traditional diet results in specific nutrient deficiencies. Nutrient deficiencies may lead to diseases, such as beriberi and pellagra.

Morphological Adaptations

A common question is whether small body size is an adaptation to malnutrition (Stinson, 1992). There are hypotheses that small body size is an advantage under nutritional stress because human beings need less nutrients for growth and upkeep (Stini, 1975; Stinson, 1992). Small body size does decrease the calories expended performing certain tasks (Stinson, 1992). However, it should be noted that small body size does not increase the work efficiency (Stinson, 1992).

Similarities can be found if we compare the small body size hypothesis to the characterization that industrialized countries show a tendency of people to increase in height and mature earlier in age than nonindustrialized countries (Frisancho et al, 1977). In addition, it is assumed that this trend is due to the increase in dietary fat and protein (Frisancho et al, 1977). From these assumptions we take the increase in availability of food to be a major determinant in body size. Thus, in time, adaptation to acculturation will lead to an increase in body size. In the New Guinea central highlands, where stunted growth is common, the growth of children in the Asai Valley is slower than reported in any other world situation (Dennett and Connell, 1988). In addition, it has been suggested that stunting markedly increases the risk of death (Dennett and Connell, 1988). Therefore, Dennett and Connell (1988) conclude that stunting, rather than being an adaptation to malnutrition, is a response to nutritional stress.
Discussion

Limitations

The major limitation of this study is that no specific cultural attribute can be assigned to every traditional society. A theory may hold up in one society and be completely false in another. I will admit my bias toward the idea that acculturation is a health risk. However, I feel that I presented information that showed both positive and negative effects of acculturation. I presented only a few of the theories about certain concepts. It must be understood that there are many different opinions on the effects of acculturation on nutrition, and it is beyond the range of this paper topic to go into intricate statistics. Finally, the most limiting factor to this review is that I have no first hand field experience researching these assumptions. In no way could I gain the full scope of the events to reasonably justify my statements.

Conclusions

Understanding the effects of acculturation on the diet of traditional societies is becoming increasingly important to many researchers and health officials. It is almost impossible to assume that there are any living undiscovered societies in the world. This means that all native societies are coming into contact with change. This paper has given many characteristics of this change, so it is by looking at the studies that we must realize the importance in further understanding of this process.

The effect that acculturation can have on the diet of a society is astounding. The change in diet is most often associated with a change in the amount of minerals and nutrients. These changes associated with adoption of a sedentary lifestyle, cash cropping, and paid work, usually result in an initial decrease in health to a society. Although, in time a society can adapt to change and thrive. Modern societies have adapted to a different lifestyle than traditional
societies. The result is an increased life span in modern societies. If a society can adapt to a change in nutrition then that society has a good chance of continuing. However, the effects on a society that fails to adapt can be detrimental. With human adaptation and nutrition the changes are quantitative and qualitative differences in amount of food consumed and variation of food (Frisancho, 1993). Traditional societies tend to have a highly diverse diet that is not necessarily abundant. Acculturation brings a more monotonous diet, but there is no real trend in abundance. It would seem that one of the most important aspects of the change due to acculturation would be nutritional status.

It is unlikely that any society can adapt to a nutritional change in the magnitude of that brought about by acculturation. This has been the trend in my research. There is no expectation of an adaptation to nutritional deficiencies to arise quickly. One of the main problems associated with the introduction of new nutrients is that a society has nutritionally adapted in its absence. Adaptation strives to create balance, and dietary changes disrupt that balance. We know that throughout history humans have constantly encountered change. It is our ability to adapt to changes that gives us our livelihood. Therefore, we can assume that even when confronted with a change such as acculturation, traditional societies will adapt in time.

Future Research

The potential for future research in this is quite extensive and necessary. Much of the literature needs to be updated, and critiques of the present data need to continue. It is essential to the future of both traditional and modern societies to understand the aspects concerning acculturation. Further research on nutritional needs and requirements of individual societies will provide researchers with information that may be able to reduce the spread of disease and malnutrition. In addition, an understanding of the mechanisms by which nutrient amounts affect
the occurrence of disease will be beneficial. Continued research in cause and effect factors of change in dietary intake may provide data that could give insight into modern health problems. McElroy (1990) gives the model of biocultural studies as a means for research in this area. These studies give methods and models for studying the interaction between biological and cultural factors affecting human health (McElroy, 1990).

The evidence presented gives us a grasp on the concepts of nutritional adaptation. However, expansion in the studies mentioned and in related studies, will provide more pieces to this complex puzzle. A sense of urgency is needed in that acculturation causes many changes. For, if we do not understand the mechanisms of acculturation then through change we will loose the model for study.
References Cited


Bindon JR. 2004. Tuscaloosa, AL. (March 17, 2004);
    http://www.as.ua.edu/ant/bindon/ant475/Nutrition/nutrition.htm#top


