

Social Status, Food Preference, and Coronary Heart Disease in Ribeirão Preto, Brazil

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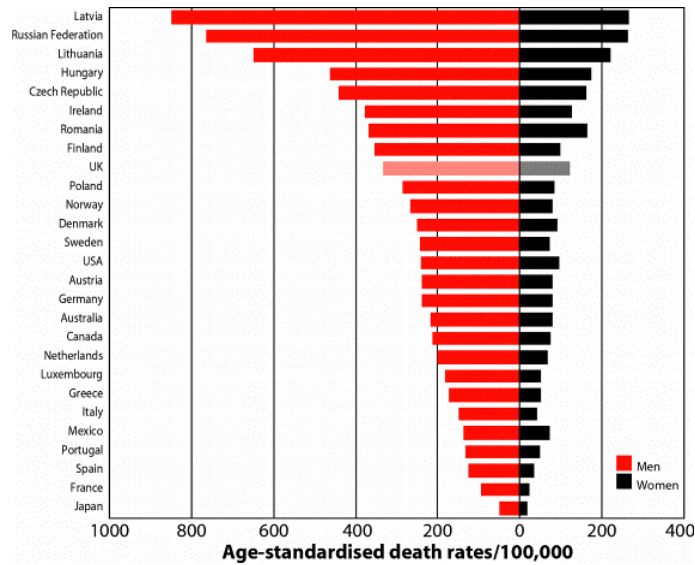
Bibliography: 2 pp

Prepared for Dr. Bindon
Principles of Physical Anthropology

Introduction

Coronary heart disease (CHD) is the primary cause of premature mortality in most modern societies (Mann, 2002). In transitional or modernizing societies, such as the countries of Eastern Europe and Asia, the rate of CHD mortality is increasing (dos Santos et al., 1994; Mann, 2002; Zhao et al., 2001). Figure 1 below illustrates the geographic distribution of CHD mortality rates throughout the world.

Figure 1: Death rates from CHD, men and women aged 35-74, 1994, selected countries.



Source: WHO 1999.

A great deal of CHD research has been dedicated to understanding the relationship between **diet** and CHD occurrence in individuals and populations. As the economic and cultural environments of developing countries become more modern (or “western”), so do the diets of their citizens (Zhao, 2001; dos Santos et al., 1994; Mann, 2002; Dressler, 2000).

Scientists interested in the link between diet and CHD have explored the biological, clinical, social and cultural aspects of diet in society (Zhao, 2001; Mann, 2002; Oths, to be published). To this end, understanding the prestige value of certain foods, and the multiple roles that prestige value of food plays in society, may enhance our understanding of the link between modernization, consumer culture, and health risk. This paper will combine biomedical, nutritional, and cultural research to conjecture about the relationship between the cultural value of food and health status in Ribeirão Preto, Brazil.

The etiology of cardiovascular disease

Cardiovascular disease in biomedical terms

Cardiovascular disease encompasses three related but distinct illnesses: 1) coronary heart disease (CHD), also referred to as coronary artery disease (CAD) or ischaemic heart disease (IHD); 2) cerebrovascular disease; and, 3) peripheral arterial disease. These illnesses are caused by a similar pathological process that affects the heart, brain, and peripheral arteries respectively (Mann and Truswell, 2002). This paper focuses specifically on the process and occurrence of coronary heart disease.

Pathology of coronary heart disease

CHD results from the coincidence of tissue degeneration and subsequent accumulation of cells and lipids inside one or more of the coronary arteries. Mann and Truswell (2002) explain that the process begins with the formation of an atheromatous plaque, a lesion that forms on the inner coat of the artery due to the degeneration the fatty tissue. The plaque itself can block blood flow into the heart muscle, or myocardium. Thereafter, a thrombus (or clot) can form on the surface of the atheromatous plaque and further restrict the flow of blood through the artery. The photographs below (Figure 2) illustrate the difference in appearance of a normal and diseased coronary artery:

Figure 2: Cross-sections of human coronary arteries, normal and diseased.



Above: Normal coronary artery.

Below: Severe coronary atherosclerosis.



Source: Medlibrary, University of Utah. 2002.

The atherosclerotic plaque can cause two common clinical conditions: angina pectoris and myocardial infarction (mild and severe heart attacks). Angina pectoris is a painful sensation resulting from a short-term block of blood flow to the myocardium. The pain is felt in the chest and down the left arm, and typically passes within 15 minutes. Myocardial infarction (heart muscle death) is associated with severe and protracted pain, following a long-term restriction of blood flow to the myocardium (Mann and Truswell, 2002).

Some of the risk factors, or characteristics associated with an increased chance of developing coronary illness, include age, sex, arterial hypertension, high levels of serum cholesterol (TC) and an unfavorable serum lipid profile (LDL and HDL) (Mann and Truswell, 2002; Bindon, personal communication). A review of the biochemistry of coronary heart disease will facilitate an understanding of the relationship between diet and CHD.

Lipoproteins, triglycerides, cholesterol, endothelial cells and platelets are among the variety of lipids and cells that interact in the pathogenesis of the atherosclerotic plaque and arterial thrombus (Mann and Truswell, 2002). This paper focuses on the interactions of the blood serum contents low-density-lipoprotein (LDL), high-density-lipoprotein (HDL), and total cholesterol (TC), with key dietary compounds including saturated fatty acids and polyunsaturated fatty acids.

In a simplified model of the formation of the atherosclerotic plaque, low-density-lipoprotein is a key molecule (Mann and Truswell, 2002). LDL transports the bulk of cholesterol in the blood stream. When the oxidized LDL concentration is high, LDL is more likely to become deposited in the atheromatous plaque. There are two ways in which the oxidized LDL concentration can become too high: 1) ingestion of excess amounts of dietary factors that effectively increase blood LDL levels; and 2) ingestion of excess amounts of dietary factors that increase the rate of oxidation of LDL molecules in the blood stream (Mann and Truswell, 2002). An LDL-C concentration of 130 mg/dL or higher is considered indicative of high risk for CHD (Bindon, personal communication). HDL-C is considered a protective factor because it can inhibit the oxidation of LDL (Mertens and Holvoet, 2001). An HDL-C concentration of greater than 40 mg/dL is desirable (Bindon, personal communication). The key to understanding the relationship between blood serum levels and potential for plaque formation is understanding that the contents of blood serum are constantly interacting, and overall health is best when these chemical reactions are at equilibrium.

Coronary heart disease and nutrition

The blood serum equilibria are affected by molecules introduced to the blood stream through dietary intake (Mann and Truswell, 2002). The table below (Table 1) summarizes the effects of several dietary compounds on serum lipids:

Table 1: Effects of nutrients and selected foods on coronary heart disease risk or protective factors.

Nutrients	Risk Factors
Saturated fatty acids	↑ LDL, ↑ thrombogenesis
Cholesterol	↑ LDL
Linoleic acid (moderate quantities)	↓ LDL
Linoleic acid (excessive quantities)	Might ↑ LDL oxidation
ω-3fatty acids (from fish)	↓ Platelet aggregation, ↓ thrombogenesis
Oleic acids	Might ↑ HDL, ↓ LDL
Transunsaturated fatty acids	↑ LDL, ↓ HDL
Total fat	↑ Haemostatic factors, especially factor VII
Fruits and vegetables	↓ Blood pressure
Low fat dairy products	↓ Blood pressure

Source: Table adapted from Mann, 2002, and Rodriguez Artalejo et al., 2002.

Note the roles of saturated fatty acids, cholesterol, and transunsaturated fatty acids in the mediation of LDL and HDL levels in the blood stream, as these nutrients will be of highest relevance to this paper.

Analyzing different foods for their chemical content, specifically in regard to the compounds listed in the table above, has allowed nutritionists to classify foods according to their contribution toward CHD risk (Mann and Truswell, 2002; Mann, 2002; Rodriguez Artalejo et al., 2002). The following table (Table 2) describes the foods and nutrients that have been found to protect against and to promote CHD rates:

Table 2: Potentially protective or promotive foods and nutrients in coronary heart disease

Protective Foods	Nutrients
Fruit and vegetables	Antioxidant nutrients
Wholegrain cereals	Several unsaturated fatty acids
Fish and fish oils	Non-starch polysaccharides (dietary fiber)

Nuts (unsalted)	Calcium
Soy products	Folate
Low fat dairy products	Plant sterols/stanols
Alcohol (moderate intake)	
Promotive foods	Nutrients
High fat dairy products	Saturated fatty acids, especially myristic and palmitic acids
Fatty meats	
Eggs	Transunsaturated fatty acids
Coffee (unfiltered boiled)	Cholesterol

Source: Table adapted from Mann, 2002, and Mann and Truswell, 2002.

Note that high fat dairy products, fatty meats, saturated fatty acids, transunsaturated fatty acids, and cholesterol are categorized as foods and nutrients that promote coronary heart disease risk.

Coronary heart disease in Brazil

Having briefly described the mechanics of coronary heart disease, my focus will now shift toward exploring the relationship between CHD occurrence and the cultural value of food in Ribeirão Preto, Brazil. Brazil is at the same time both a developed and a developing country that has experienced a dramatic shift in CHD occurrence over the past seventy years. dos Santos et al. (1994) describe this trend: In the 1930's, infectious and parasitic illnesses accounted for 40% of all mortalities, while cardiovascular illnesses only accounted for 12%. In the decade of the 80's, only 12% of all deaths were due to infectious and parasitic illnesses, while up to 30% were due to cardiovascular disease. Today CHD "constitutes the most important cause of death in all regions of the country" (Castanho et al., 2001:1). This change in the disease profile of Brazil has been attributed to social and cultural transitions linked to development and modernization (Fornes et al., 2000). The following two figures (Figures 3 and 4) illustrate the relationship of CVD mortality rates to other causes of death in Brazil, and illustrate the percentage of CVD

mortality accounted for by each of the specific cardiovascular diseases. Together, these tables demonstrate that 8.4% of total mortality in Brazil is due to CHD:

Figure 3: The proportion of total mortality attributed to cardiovascular disease in Brazil

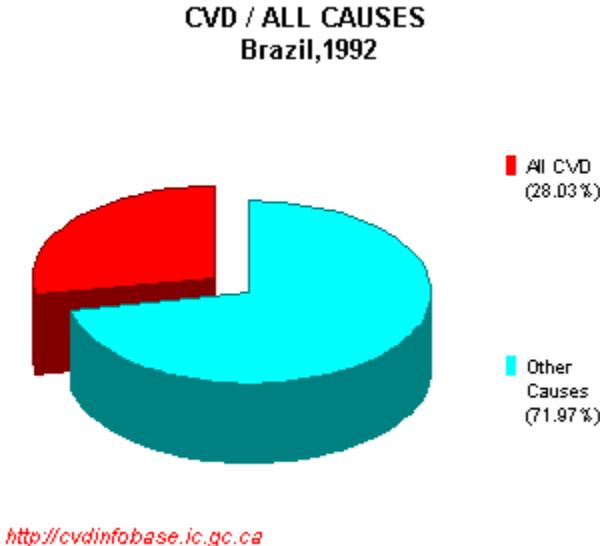
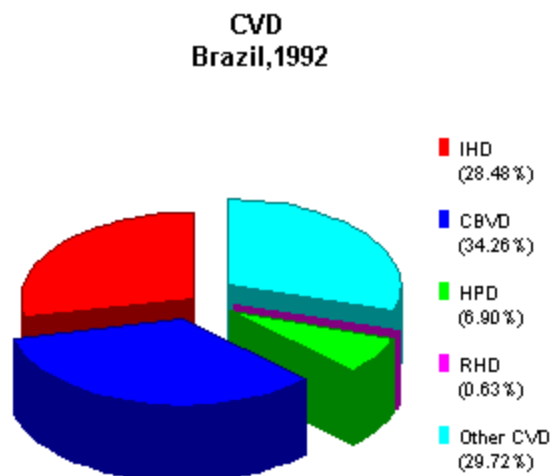


Figure 4: The proportion of CVD mortality attributed to CHD (IHD here) in Brazil.



<http://cvdinfobase.ic.gc.ca>

Source: WHO CVD infobase. 2002.

Food culture and CHD in *Ribeirão Preto* Brazil: a case study

Socioeconomic groups and lifestyles

Ribeirão Preto is a city of approximately 500,000, located in the center of the state of São Paulo, Brazil (Dressler, 1998). Four neighborhoods of different socioeconomic status have served as the target populations in the work of Oths (to be published), Dressler et al. (1998), Dressler et al. (2000), dos Santos et al. (1994), and Dressler et al. (1991). The results of these studies, all part of a greater research project spanning almost ten years, have provided a variety of data about the Brazilian city as a whole and about the different experiences of members of each socioeconomic class. The poorest of the four neighborhoods chosen is a *favela* (squatter settlement) located on the edge of the city. The lower middle class neighborhood is a *conjunto habitacional*, or public housing project. The research also surveys one middle class and one upper class neighborhood.

The cardiovascular disease risk factor profile of Ribeirão Preto has been outlined in a 1994 study by dos Santos et al. The researchers took a representative sample from each of four

socioeconomic groups in the city. Figure 5 shows the average serum lipid and cholesterol concentrations across all four neighborhoods: The average HDL-C concentration of the sample was 45.9 mg/dL (*s.d.* = 10.8). The average total serum cholesterol concentration was 181.9 mg/dL (*s.d.* = 39.8) and the ratio of TC to HDL-C was 4.1 (*s.d.* = 1.2). Although the HDL-C profile is within a healthy range, the TC/HDL-C ratio indicates a very high level of risk in this population.

Figure 5. Serum lipid concentrations in Ribeirão Preto.

HDL-C concentration	45.9 mg/dL (<i>s.d.</i> =10.8)
TC concentration	181.9 mg/dL (<i>s.d.</i> =39.8)
TC/HDL-C ratio	4.1* (<i>s.d.</i> =1.2)

* A TC/HDL-C ratio of less than 4 is indicative of reduced risk.

Source: dos Santos et al., 1994.

This study concluded that dietary behaviors of the population, specifically an elevated ingestion of cholesterol and of polyunsaturated fat, were related to positive and negative serum lipid concentrations, respectively. The researchers found a significant positive correlation between dietary cholesterol and TC in men and women (*correlation value*=0.28 and 0.27 for men and women respectively, *p*= 0.05). There was a significant negative correlation between total calories from polyunsaturated fat intake and HDL-C (*correlation value*= -0.23 for men, -0.37 for women, *p*= 0.1 and 0.05, respectively). When the socioeconomic class groups were analyzed independently, it was observed that the intake of saturated fats and cholesterol increased with an increased social status. The authors thereby conclude that increasingly modern

lifestyles, including modern food lifestyles, may have deleterious effects on cardiovascular health. Fornes et. al. (2000) and Zhao et al. (2001) came to similar conclusions, using similar research methodology in Brazil and China.

National/local culture and perceived value of food items

The research by dos Santos et al. (1994) demonstrated that there is a correlation between social class and the intake of nutrients that have been correlated with undesirable lipid profiles. One might wonder why a highly modern diet would contain more cholesterol, fat, and sugar—which has also been correlated with CHD risk (Mann, 2002), and why people are inclined to consume these foods. Oths (to be published), in her research exploring the relationship between food items and social prestige in Ribeirão Preto, provides valuable insight into this problem.

The theoretical perspective used in Oths' research can contribute to our understanding of the link between modernization and chronic heart disease. The theory posits that people of every social class strive to meet the ideals of those in the class directly above them, so long as there is a class above them. Furthermore, individuals symbolically represent themselves as higher class through consumption of prestigious goods and participation in elite activities. The use of foods within each of the socioeconomic classes follows this pattern.

In Oths' study, twenty-one food items were pile-sorted by study participants according to prestige value, and cultural consensus analysis was used to determine the average rank of food items by each group. The food items included traditional Brazilian dishes, such as *churrasco* (barbeque) and *feijoada* (beans and meat), and more trendy food items heavily advertised in the Brazilian media.

The results are discussed using the rankings of the upper middle class as a standard because the rankings of the upper income group represent the high status ideals. Figure 6

displays the ranking of the top ten food items by social group. The top ten food items of the upper income group are highlighted. The potentially harmful food items (determined by high fat, cholesterol, or sugar content) are in all capitals. Note that the wealthy group has a high number of meats and heavily advertised foods at the top of the list. The prestige rankings of the lower-middle class more closely resemble those of the upper class than of the middle class. The middle class ranked some fruit and vegetable items above the higher fat and sugar content items.

Figure 6. Rankings of food items according to prestige for four socioeconomic groups.

	Upper Class	Middle Class	Lower Middle Class	Lower Class
1	Shrimp	Shrimp	CHURRASCO	Fruit juice
2	FEIJOADA	CHURRASCO	FEIJOADA	FRESH CHEESE
3	CHURRASCO	FEIJOADA	COCA-COLA	Yogurt
4	Fresh fish	PIZZA	PIZZA	Fresh fish
5	Palm heart	Small papaya	CHOPP	CHURRASCO
6	PIZZA	Fresh fish	SALTY SNACKS	HAM
7	HAM	WHITE SAUCE	CHOCOLATE	Orange
8	CHOCOLATE	Broccoli	HAM	Grapes
9	CHOPP	Yogurt	Grapes	French bread
10	FRESH CHEESE	Fruit juice	Fresh fish	BUTTER

Source: Oths K. To be published.

Oths compares these rankings to actual consumption of highly prestigious food items. These results are displayed in Figure 7. She observes a “pattern of decreasing utilization of high status goods and increasing consumption of low status goods as one moves down the socioeconomic scale” (Oths, to be published: 17). The poor are discluded from eating the high status foods, even the high status traditional Brazilian foods, because of limiting cost and access.

Figure 7. Trends in actual consumption of prestigious food items in Ribeirão Preto.

Upper Class	Lower Class
Greatest consumption of high status foods	Lowest consumption of high status foods

Adapted from text of: Oths K. To be published.

It is important to mention here that these highest status foods, such as *feijoada*, *churrasco*, pizza, ham, chocolate, and fresh cheese, Coca-Cola, butter, white sauce, and salty snacks, are all foods high in animal (saturated) fats, cholesterol, and sugar, or somehow otherwise correlated with CHD (Mann and Truswell, 2002). Based on evidence of the link between nutrition and CHD, it seems that if an increase in socioeconomic status correlates with an increase in the consumption of high status foods, it may also correlate with a higher CHD risk profile in terms of blood lipid and total cholesterol counts. This aligns well with the results of the study of dos Santos et al. (1994).

Tentative conclusions

The research reviewed here suggests that the relationship between food and identity is linked to wider trends in modern consumer culture. Food items are not only tangible objects with greater or less palatability, but they are also meaningful status symbols. To answer the question posed in the introduction, increasing affluence throughout the world may be initiating a change in diet through the introduction of consumerism and the concept of social mobility to modernizing societies. Population health is involved because in contemporary culture, the highly advertised and most expensive elite food items—the most desirable and high class food items—are also higher in fat and sugar content.

Discussion

This review of studies regarding CHD throughout the world and in Brazil demonstrates that food behavior mediates the relationship between culture and health. There are limitations to the impact of this finding. First, it is important to remember that serum lipid profiles and dietary intake are two of the several factors contributing to the risk of CHD and CVD. Other studies have emphasized the role of genetics (Mann and Trusswell, 2000), cultural consonance (Dressler et al., 1998 and 2000), confounding illnesses such as diabetes and hypertension (Mann 2002), and behaviors such as a sedentary lifestyle, smoking and alcohol consumption (Mann and Trusswell, 2000) in the etiology of CHD. Also, CHD rates may appear to be higher due to increasing life expectancy in modernizing and modern cultures (Privett, personal communication). Furthermore, there remains inconsistency in the CVD literature in regard to which nutrients and compounds have the **greatest** impact on blood serum levels and resultant CHD risk (Dressler et al., 2000).

Finally, it is very difficult to link culture to biology, as this paper has attempted to do, with a great deal of accuracy or verifiability. The pathology of a disease is often no more simple than are the complexities of everyday life. Because culture is always changing, so are individuals' and groups' ambitions, behaviors, and health. The combined efforts of several researchers over a decade in Ribeirão Preto has led to the collection of a variety of biological and cultural data which suggest trends in CHD; however, it will take extensive hypothesis testing to formulate a model of the impact of cultural and socioeconomic change on cardiovascular health outcome.

Conclusion

The aim of this paper was to elaborate our understanding of the link between modern consumer culture and CHD risk. Through an examination of the cultural and social roles of high status foods, it has been demonstrated that advertisement and cost can make foods more desirable, and the consumption of desirable foods has a bearing on an individual's apparent social status as well as on his health. It is my hope that this paper contributes a unique perspective toward the exploration of the link between affluence and CHD in the post-industrialized cultures of the world.

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