THE MOST INTERESTING MEN IN THE WORLD:

ALCOHOL ABUSE AND ALCOHOLISM IN SOUTH AMERICA

By

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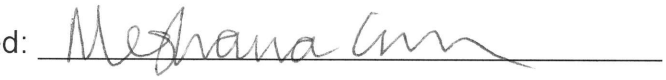
Signed: 

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Abstract

Alcohol is most widely consumed drug in the world, and its history dates back to the era of Antiquity. Throughout the ages alcohol has served many functions in society, from ritual offerings, medicine, and as a manner of temporarily escaping the mundane life. Consumption patterns differ for every continent and country due to a variety of factors, including the development of cultural practices, interactions between various cultures, and socioeconomic conditions. The continent of South America is an extremely intriguing place of study due to the various civilizations that have colonized the land over the ages. Alcohol abuse and alcoholism are common problems in many South American countries, especially among the men. Along with the systemic physiological consequences, chronic alcohol use has also led to a variety of other societal problems such as increased violence and teenage pregnancy. The main obstacle towards treatment is the current cultural attitudes towards alcohol, a drink that still holds an important place in many religious ceremonies. However with an integrated approach that includes medical intervention, education, and comprehensive policies, the rates of alcoholism and the damage it causes can be reduced throughout South America.

Preface

The inspiration for this thesis came directly from my experiences working in a rural medical clinic in Huancayo, Peru. The population with whom I worked was mostly poor farmers and laborers with little to no formal education. To exacerbate the situation, many only spoke the language of their indigenous ancestors, Quechua, and were unable to integrate themselves with the Spanish-speaking majority. Decades of political unrest, poor economic conditions, and social marginalization had created a number of problems within these urban villages, including high crime rates, teenage pregnancy, and malnutrition. One factor which exacerbated all of the aforementioned problems was widespread abuse of alcohol. After returning to the US I decided to investigate this matter in order to further discern patterns of alcohol consumption in South America and the current measures being done to address this problem.

Introduction – History

Alcohol has been a central component of human civilization since Neolithic times. Historically, drinking alcohol did not carry the same stigma as it does today because of its ceremonial and often religious function in society. According to author Desmond Morris, the symbolic act of drinking was extremely important to early people because it represented the continuation of life, because "a man deprived of sustenance will die of thirst long before he succumbs to starvation" (Social Issue Research Center). To celebrate this occasion, Morris postulates that a need arose for a drink more special than water, and alcohol fit this description quite adequately.

According to anthropological data the oldest types of alcohol were wines and beers, and were more common throughout the Eastern Mediterranean and Mesopotamia, where there were better conditions for significant harnessing of the fermentation process. Beer was used mainly for the purpose of social drinking, while wine had more of a ritualistic function, especially in Ancient Greece and Rome. The process of alcohol distillation to make spirits occurred later than fermentation, around 1500 BC in the Indian subcontinent. However, unlike their Mediterranean counterparts, alcohol in this area was used mostly medicinally. Throughout antiquity, poor public hygiene meant that many available water supplies were contaminated with cholera and other dangerous pathogens, and alcohol itself was the safest beverage to drink because the liquid was often subjected to boiling or other sterilization processes during fermentation. Those who drank beer often lived longer and reproduced more frequently, giving them a survival advantage over water-drinking populations. Additionally, alcohol is a mild antiseptic and was used as both an analgesic and anesthetic. Beer was a common prescription in Mesopotamian, Egyptian, and Greek medicine for many maladies, and may also have been the "unintentional vehicle for the delivery of powerful antibiotics in those early times" (Hajar 344). Medical archeologists discovered on a section of bone dated back to the Roman Egyptian era a layer of the antibiotic tetracycline. They postulated that during the fermenting process, tetracycline formed in response to contamination with airborne streptomycete, and then was ingested as beer. The frequent consumption of tetracycline-laced beer since antiquity could be a reason for why bacteria are so resistant to the antibiotic today.

The use of alcohol as an intoxicant is also widely disputed amongst cultural anthropologists and historians. Historically, there is consistent evidence that humans are

constantly seeking ways to achieve an altered state of consciousness. However, when one takes into consideration why grains that could have been harvested into nutritive bread were instead fermented into alcohol, it raises questions about the cultural habits of these early societies. Intoxication was a method of escaping the mundane nature of the daily, arduous life. Initially, more natural drugs such as opium and hemp were used because alcohol was more integrated in ritual practices. Additionally, the importance of alcohol in the social realm meant that solitary drinking was frowned upon because it indicated a selfish activity. The possibility of social disorder was greater when people consumed 'risky' beverages in excess; thus more emphasis was placed on using alcohol to develop positive patterns of social interaction.

The function of alcohol in modern society has retained some of the same features that existed in the past. For example, it is still used in celebrations and as a means of social bonding. However, there has also been an increase in the incidence of solitary drinking as a coping method to deal with the various stresses of modern life. The consequences of this trend range from the rising incidence of alcohol-related diseases to increases in social violence. Furthermore, the globalization of cultures has helped negative drinking habits spread across borders, compounding the problems caused by excessive drinking. In order to gain a comprehensive view on the status of alcohol drinking around the world, the World Health Organization has published *The Global Status Report on Alcohol and Health*, *2011*. This document not only provides perspective on the current situation but also steps towards the resolution of the problem.

Definitions and Terminology

The first few steps that need to be taken towards resolving alcoholism is to first understand the problem and its various levels. The following is a table that lists the various different categories of alcohol usage:

Social Drinker	A person who consumes alcohol in moderation, or no more than two standard drinks per day, in accepted social situations. (McGraw-Hill Concise Dictionary of Modern Medicine) Reference the figure below for guidelines about standard drinks
Moderate Drinking	Often confused with social drinking, but with the exception that moderate drinking doesn't have to be only done in a social context. Moderate drinking is lower-risk pattern of drinking that does not interfere or harm the drinker or society. For women moderate drinking is no more than one standard drink per day, and for men it is more than two standard drinks per day (CDC – Alcohol and Public Health)
Heavy Drinking	Heavy drinking is the consumption of more than two standard drinks per day for men and more than one for women.
Binge Drinking	According to the National Institute on Alcohol Abuse and Alcoholism is a "pattern of alcohol consumption that brings blood alcohol concentration level to 0.08% of higher" (CDC-Alcohol and Public Health). This translates into five or more standard drinks, in a single occasion, for men and four or more for women.
Alcohol Abuse	Alcohol abuse is a pattern of disease that is harmful and interferes with a person's health, interpersonal relationships, and/or professional life. Some manifestations of alcohol abuse include failing to fulfill professional and personal responsibilities, ongoing drinking despite the obvious presence of problems, and continuous problems with the law due to alcohol abuse (CDC – Alcohol and Public Health)
Alcoholism	Alcoholism is a chronic disease in which the body is dependent on alcohol. Alcoholics lose control over when, how much, and for how long they drink, and often experience strong cravings for alcohol when they are not drinking it (Mayo Clinic). Alcoholics build very high tolerances to alcohol, and also experience withdrawal symptoms when alcohol use is discontinued

STANDARD DRINK EQUIVALENTS	APPROXIMATE NUMBER OF STANDARD DRINKS IN:
BEER or COOLER	
12 oz.  **~5% alcohol**	• 12 oz. = 1 • 16 oz. = 1.3 • 22 oz. = 2 • 40 oz. = 3.3
MALT LIQUOR	
8-9 oz.  **~7% alcohol**	• 12 oz. = 1.5 • 16 oz. = 2 • 22 oz. = 2.5 • 40 oz. = 4.5
TABLE WINE	
5 oz.  **~12% alcohol**	• a 750 mL (25 oz.) bottle = 5
80-proof SPIRITS (hard liquor)	
1.5 oz.  **~40% alcohol**	• a mixed drink = 1 or more* • a pint (16 oz.) = 11 • a fifth (25 oz.) = 17 • 1.75 L (59 oz.) = 39 *Note: Depending on factors such as the type of spirits and the recipe, one mixed drink can contain from one to three or more standard drinks.

Statistics and Epidemiology

Epidemiological studies reveal that developed countries have the highest rate of alcohol consumption, but this does not necessarily translate into highest rate of mortality from alcohol-

related causes (Global Status Report, Forward). On average in 2005, any person over 15 consumed about 6.13 pure liters of alcohol. As mentioned previously, highly developed countries in the Northern Hemisphere as well as Argentina, Australia, and New Zealand have the highest rates of consumption, equal to or greater than 12.5 liters of alcohol per person annually. Medium consumption levels, consisting of values between 2.5 and 12.49 liters capita are largely found in southern Africa, and the North and South America. The lowest consumption rates are most prevalent in Northern Africa, the Middle East, and Southern Asia due to widespread influence of Islam. These consumptions values have been relatively stable since 1990 in all WHO regions, however when one takes a closer look the age in which people start drinking, there is a 70% increase in the frequency of consumption of alcoholic beverages for the young adolescent group, which consists of individuals between the ages of 13 and 15. Worldwide there is an even larger increase in the consumption frequency for the 18-25 year old population. As per the report by the WHO "overall, hazardous, and harmful drinking patterns, such as drinking to intoxication and binge drinking, seem to be on the rise in adolescents and young adults" (Global Status Report 10). As a consequence of problematic drinking habits established at an earlier age, there has been an increase in alcohol-related negative consequences.

Measuring the per capita consumption of alcohol worldwide gives a limited picture of the entire scope of the problem. To compensate for its limitations the Comparative Risk Assessment and in the Global Burden of Disease Study developed a statistical value known as the Patterns of Drinking Score (PDS), which reflects how people drink as opposed to how much they drink. The PDS scale ranges from 1, which signifies the least risky patterns, to 5 which is

the most risky pattern of drinking. The classification of drinking attributes is as follows: the usual quantity of alcohol consumed per occasion, festive drinking, proportion of drinking events, when drinkers get drunk, proportion of drinkers who drink daily or nearly daily, drinking with meals, and drinking in public places. The results of this study were more indicative of the correlation between alcohol consumption and related problems. Southern and Western European countries have the lowest risk although they have some of the highest per capital consumption of alcohol. Regions at where the most risky patterns of drinking exist are Central Asia, Mexico, Russia, South Africa and Ukraine. The majority of central Africa and South America also have high score for risky patterns.

Although South America is not an area of the most concern when compared to other countries with a higher PDS, the patterns of alcohol consumption in this continent are unique because of the mixing of multiple cultures in the area over the last few centuries. Heavy episodic drinking is most prevalent in Brazil, Paraguay, Argentina, Uruguay, and Peru. In these countries, anywhere from 5 to 30% of the men participate in heavy episodic drinking. The statistics are radically different for women due to the influence of the patriarchal, *machismo* culture. In these same countries where 30% of more of the male population drinks heavily, the corresponding number for women is still less than 20% (Global Status Report 11). This disparity stems from numerous perceptions and stereotypes about alcohol and women. In many developing countries of South America, especially Peru, the patriarchal machismo culture is still prevalent in both the urban and rural regions. The concept of *machismo* is that of an exaggerated masculinity, and is partly derived from the common Spanish legend of Don Juan, a philandering wealthy noble who lived during the middle ages (Otis and Davis 339). During that

time women were controlled in one of three ways: *patria protesta* (paternal authority), *manus* (submission to husband's will), and *tutela* (guardianship). She was not considered her own person, thus all her decisions were made for her. When the Spaniards arrived in Latin and South America, they introduced their form of *machismo,* also called *donjuanisimo*, to the one already prevalent among the indigenous communities. These two forms differed in the importance sense that the latter was not focused on male dominance over women, but rather "as tokens of his social and military dominance or conquering virility" (Otis and Davis 340). However, the advent of the Spanish military conquest over the natives also predicated a cultural conquest as well, and soon the indigenous version of *machismo* was replaced by the Spanish ideal, which extols the male attributes of "vengeance, drinking, womanizing, banditry, and glorification of male sexual prowess" (340). The female counterpart of *machismo* is *marianismo,* which delineates the qualities demonstrated by the exemplary, ideal women: obedience, piety, meekness, and self-sacrificing. She is completely dedicated to her duties as a wife and mother, and quietly endures "all the suffering inflicted by macho men" (341). An ideal woman additionally does not partake in any male activities, especially drinking, because she would be overstepping her proper place and entering the man's world.

Like many other countries in South America, Peru is the "product of several centuries of interactions between the original Indian population and the Spanish culture" (Yamamoto 1059). The recent phenomenon of urbanization has lead to dramatic erosion of the traditional culture and lifestyle. There is great stress in having to adapt and assimilate to modern culture, and as a coping mechanism many of the poorer men have turned to alcohol. Approximately one third of Peruvian men will suffer from a lifetime of dependence of alcohol, and this is especially true for

men who start drinking at the age of 18 or younger. For women, the number is drastically lower, as less than 3% of women will suffer from a lifetime dependence on alcohol, and there are virtually no significant records of women over 65 who suffer from alcoholism.

The Physiology of Alcohol

Neurological Effects

The effects of alcohol differ depending on the level and frequency consumption, gender, race, current health status of the person, genetic background, age at which they started drinking, and family history. There are certain effects of alcohol that resolve quickly, once the alcohol has cleared from the blood stream, but there are also many more long-term, lasting damage caused by chronic drinking. Among the immediate, outward and reversible signs of excessive consumption of alcohol are slurred speech, loss of control over fine motor skills, and temporary feelings of euphoria (National Institute on Alcohol Abuse and Alcoholism). However, once blood alcohol levels reach 0.09% and above, the person descends into various stages of lethargy and confusion, experiencing more serious symptoms such as impaired memory, loss of reflexes, delayed reactions, moderate to severe ataxia, confusion, dizziness, vomiting, lapses in consciousness, decreased heart rate, coma, and at the very worst, death. The consequences of alcohol consumption are systemic, negatively affecting all systems of the body.

Beginning with the physiology of the brain, long term chronic drinking can alter the very structure of this organ. The National Institute of Alcohol Abuse and alcoholism reports that of the 20 million alcoholics in the United States alone, approximately half suffer from mild to severe cognitive impairments due to alternations in brain structure and function (Oscar-Berman and Marinkovic). On a macro-structural basis, alcohol can lead to central atrophy of the entire

brain, leaving the brain of an alcoholic smaller than that of a non-alcoholic. This reduction in size predisposes the person to early onset of dementia and Alzheimer's disease and also corresponds to the aging effects of alcohol, thus demonstrating why the brain of an alcoholic consumer resembles the brain of a chronologically old non-alcoholic. Certain areas of the brain are especially vulnerable to alcohol more than others, such as the cerebral cortex and sub-cortical areas such as the limbic system, thalamus, hypothalamus and basal forebrain. These regions control a wide range of functions, from expression of emotion, memory, neuroendocrine control, learning, and memory, and alcohol related brain shrinkage can lead to temporary or permanent cognitive deficits.

The reduced size of the brain entails fewer inter-hemispherical connections in the brain and decreased blood flow to the organ. Brain MRI scans show a prominent reduction in the prefrontal cortex, an area known as the 'executor' because it is the center of goal-related behaviors. The impulsive behavior demonstrated by many individuals after excessive consumption is partially due to the "disruptions of the normal inhibitory functions of prefrontal networks" (Oscar-Berman and Marinkovic), and although the behavior may be reversible after consumption ceases, the damage is often permanent. The left hemisphere also houses most of the speech and language centers of the brain, and damage to these areas results in the characteristic slurred speech of a person under the influence. On the other hand, the right hemisphere is largely responsible for spatial cognition and emotional intelligence. The depressant nature of alcohol causes a person to sometimes appear emotionally 'flat', or less responsive to emotionally charged situations. They have more difficulty recognizing and

perceiving facial expressions and these impairments in emotional processing can be reflected by further damage in other areas of the brain, particularly the limbic system.

One of the most persistent causes for concern in alcohol use is the age at which a person begins drinking. Adolescents are at a stage where their brains are rapidly developing, and chronic, excessive alcohol consumption at this age can also have severe long-term consequences that manifest earlier than if the drinking habits were started as an adult. There are few times in a person's life when the brain has as much plasticity as it does during adolescence. As they learn the knowledge and skills required to be successful as adults, the neurons are constantly communicating with each other and forging new networks in the brain. The hippocampus of the adolescent brain is particularly susceptible to damage. In a study performed by Dr. White and associates, sensors were placed directly inside living brain slices of adolescent rats, and they discovered the activity of specific chemical receptors in this area were significantly suppressed by alcohol, leading to future problems with memory and learning (Butler, NY Times). In normally developing rats, the neurotransmitter glutamate bind to these receptors, allowing calcium to enter the neuron and set off a reaction cascade which helps strengthen the synapses between neurons, which are essential to retention of memories and creation of new ones. Researchers at Duke University led by neuropsychologist Dr. Scott Swartzwelder discovered that the suppressive effect of alcohol on the adolescent brain cells is significantly stronger than on adult brain cells. After the equivalent of one or two drinks, chemoreceptor activity in the hippocampus of the adolescent rats was partially suppressed but at higher levels of alcohol receptor activity shut down completely. This reduction and complete halt on receptor activity in the hippocampus also causes excessive drinkers to experience

'blackouts', or periods of time of which they have no memory, but were still conscious. Frequent blackouts, previously thought to be a symptom of adult alcoholism, are also extremely prevalent among young users, and although the person's memory can return, they can cause long-term problems in learning and memory. Additionally, they put the victim at risk for great injuries.

Another serious consequence of adolescent drinking is the increased likelihood of adult dependence on alcohol. Alcoholism is a biological disease, not simply a behavioral problem. During adolescence the frontal lobe of the brain, which is the center of adult decision-making skills, is still heavily developing and remodeling, and alcohol "creates disruption in parts of the brain essential for self-control, motivation, and goal setting" (Butler, NY Times). A regular non-alcoholic can rationally deduce the consequences of excessive drinking, but an alcoholic does not have these same capabilities because of damage to the frontal lobe. The death of neurons in the frontal lobe of adolescent rats was nearly twice as severe when compared to adult rats exposed to the same amount of alcohol, further impairing higher cognitive functions in the adolescents. However, despite the inability of neurons to regenerate, an adolescent brain is much more capable of recovering than an adult brain. In a study done by clinical psychologists Sandra Brown and Susan Taper, MRI scans of the brains of adolescents who drank frequently showed that other regions of the brain were active to compensate for the damaged areas. According to Dr. Tapert, when the drinkers were younger, "their brains had been able to recruit wider areas for the task" (Butler, NY Times), thus giving hope that the damage can be reversed if drinking is ceased in the adolescent. The sensitivity of the teenage brain to the effects of

alcohol undermines its resilience. If proper attention is given early, the adolescent can become an adult with little to no cognitive deficiencies.

Apart from the nervous system, alcoholism also has wide systemic effects on every other part of the body. The effects of alcohol begin as soon as it is ingested because the alcohol is absorbed and transported rapidly to other tissues since it is a water soluble compound. The effects of alcohol depend on the rates of absorption and elimination, which depend on a variety of other factors as well. First, the when alcohol is ingested alongside food, especially those with a higher fat content, it take longer to be absorbed. The second factor is gender and weight. Females are more easily affected by alcohol because of their generally smaller stature, body mass, and higher proportion of body fat than in males, giving females fewer means by which the body can distribute the alcohol to diffuse the effects. Additionally, women also have lower activities of the alcohol metabolizing enzyme alcohol dehydrogenase, therefore more ingested alcohol reaches the blood without being digested first. As a result, alcoholic women are predisposed to suffering from alcoholic liver disease, heart muscle damage, and brain damage than their male counterparts.

Hepatic Effects

Once alcohol is consumed and distributed throughout the body, it affects each and every system differently. The organ most associated with alcohol abuse and alcoholism is the liver, which is especially vulnerable because it receives its blood directly from the intestine where 80% of alcohol absorption occurs. The liver is the primary site of alcohol metabolism. Unfortunately, many of the by-products of alcohol metabolism are extremely toxic to the liver, such as acetaldehyde and other free radicals, and accumulation of these products leads to liver

damage, either in the form of hepatitis or cirrhosis. Curiously enough, a history of alcoholism in an individual does not necessarily guarantee the development of liver disease. In fact, “no more than one-half of heavy drinkers develop alcoholic hepatitis or cirrhosis” (Maher 5), which indicates that other factors, such as genetics and environment, influence significantly the development of alcohol induced liver damage. There are three main categories of damage, and each fall within varying degrees of severity. The mildest is the presence of a fatty liver, which occurs in almost all heavy consumers of alcohol. Second is alcoholic hepatitis, “characterized by widespread inflammation and destruction of liver tissue” (Maher 6), occurring in up to 50% of alcoholics. Without treatment this condition can be fatal but with abstinence it can be reversible as well. Lastly and most severe is alcoholic cirrhosis, diagnosed in about 15-30% of heavy drinkers. Such advanced structural impairments results in correspondingly functional impairments, which could lead to secondary systemic failures of other organs. These three types of damage do not necessarily have to occur in sequential order, and the onset of liver disease may either be rapid or gradual. The exact mechanisms of how alcohol by-products damage the liver is not known, but much speculation has been done about possible hypotheses regarding this process.

Free radicals cause most of the direct cellular damage in the liver. Normally free radicals are absorbed rapidly by antioxidants. However, people who have a history of prolonged heavy drinking, antioxidant defenses are impaired. Free radicals then may sequentially degrade the cell membrane and have more access to damage intracellular proteins, lipids, and DNA, thus seriously compromising cell function. A second mechanism of damage is alcohol-induced hypoxia. To digest the ethanol in alcohol, the liver requires additional oxygen, thereby reducing

its availability for other cellular functions. The secretion of endothelin, a vasoconstrictor, by the cell lining of liver sinusoids exacerbates oxygen deficiency of hepatic cells.

Adduct formation is another way the liver can be damaged from excess alcohol consumption. It occurs when highly reactive compounds, such as acetaldehyde and some free radicals, attach chemically to proteins in the blood and liver. The immune system perceives these new formations as cellular toxins and launches and immune response to them, which in turn can attack healthy hepatocytes. The next main mechanism of alcohol-induced structural damage is fibrosis, most prevalent in patients with advanced liver disease. Long term alcohol consumptions triggers the stellate, or fat storing cells in the liver, to produce collagen, the protein that forms scar tissue. Among all the damage that the liver sustains due to alcoholism, fibrosis is by far the most severe because it often leads to irreversible cirrhosis.

Chronic alcohol consumption, as seen in alcoholics, also leads to widespread inflammation of the liver and an imbalance in many biological molecules and process. Among the most studied are eicosanoids, cytokines, endotoxins, adduct formation and fibrosis. Eicosanoids are a broad category of molecules that perform various functions. The activity of certain classes of eicosanoids, such as thromboxanes and leukotrienes, are altered by high alcohol consumption in a way that removes their protective effects on the liver. Cytokines are another family of chemicals produced by the immune system. Similar to eicosanoids, cytokines normally have protective effects upon the liver but they can also be harmful after being modified by long-term heavy alcohol consumption. One cytokine in particular, TNF-a, may be directly toxic to liver cells because it stimulates the liver to produce other cytokines, which

"attract white blood cells to the liver and stimulate them to release free radicals and toxic enzymes" (9).

Along with the biochemical pathways of damage, alcohol also creates severe structural damage in the liver through adduct formation and fibrosis. Adduct formation occurs when highly reactive compounds, such as acetaldehyde and some free radicals, attach chemically to proteins in the blood and liver. The immune system perceives these new formations as cellular toxins and launches and immune response to them, which in turn can also attack healthy hepatocytes. The next main mechanism of alcohol-induced structural damage is fibrosis, most prevalent in patients with advanced liver disease. Long term alcohol consumptions triggers the stellate, or fat storing cells in the liver, to produce collagen, the protein that forms scar tissue. Among all the damage that the liver sustains due to alcoholism, fibrosis is by far the most severe because it often leads to irreversible cirrhosis.

Gastrointestinal Effects

Not only does alcoholism affect the substances produced by the body's cells; it also impacts substances produced by bacteria lining the gastrointestinal tract. Endotoxins are among the major molecular constituents of the outer membrane of some bacteria. In a healthy individual, scarce amounts of endotoxins cause limited or no damage but an alcoholic generally has an increased permeability to endotoxins, giving them greater access to the blood circulation and the liver. Once they reach the liver it is believed that endotoxins primarily act upon Kupffer cells, stimulating them to release chemicals and propagate the cycle of inflammation and hypoxia.

Although 80% of alcohol absorption occurs in the intestines, the remaining 20% that occurs in the stomach leads to numerous gastrointestinal defects. Alcohol ingestion and digestion both begin in the mouth, and over time chronic alcoholics begin to develop numerous gastric maladies, varying from tooth decay to esophageal cancer. Most of the damage associated with alcohol in the GI tract is the result of damage to the mucus membranes that lines the upper GI tract. Various metabolic and functional GI changes are noted in alcoholics. Beginning with the mouth, chronic alcohol abuse can cause damage to salivary glands, especially the parotid gland just below and front of the external ear. Additionally, alcoholism is also linked to inflammation of the tongue and mouth, increased incidence of tooth decay and gum disease, and impaired movement of the esophagus. Descending down the GI tract, the esophagus is one of the first areas that can sustain severe alcohol induced damage. Every single drinking episode can significantly weaken the LES, permitting backflow of the acidic contents of the stomach into the esophagus. Other more serious pathologies of the oral cavity and esophagus are oral cancer, Barrett's esophagus, GERD, esophageal stricture, GI bleeding, gastritis, esophageal cancer, "nutcracker esophagus, Mallory-Weiss syndrome, and esophageal varices", (Alcohol and the Digestive System)each to be explained in further detail below.

Oral cancer develops when cancerous cells invade and destroy health cells in the lips, mouth, and upper throat. This is not to be confused with esophageal cancer, which is caused by tumors growing in the lining of the esophagus. Other esophageal maladies are Barrett's esophagus, a precancerous condition in which "the lining of the esophagus is replaced by abnormal cells which leads to abnormal acid production" (Alcohol and the Digestive System), and esophageal strictures, where damaged cells in the lining cause the esophagus to constrict

abnormally. The “nutcracker esophagus” is a movement disorder characterized by increased pressure during peristalsis (up to 180 mm Hg, the same generated by a nutcracker from which this disease derives its name). It is interesting to note that unlike other gastrointestinal diseases associated with alcoholism, nutcracker esophagus does not progress in its severity; thus treatments are targeted towards symptomatic control. Mallory-Weiss syndrome and esophageal varices are two types of gastrointestinal bleeding that occur mostly in the junction between the esophagus and stomach. The former is due to tears in the mucosa and the latter is a disease resulting from dilated veins.

Alcoholism also has general effects on gastric acid secretion, mucosa, muscle, and motility. Low to moderate alcohol consumption has stimulatory effects on gastric acid secretion, but in higher doses, as often seen in alcoholics, it is inhibitory. Consequently, lower acid production means that the ability of the stomach to kill harmful bacteria ingested with food is impaired, which may lead to “colonization of the upper small intestine with potentially harmful organisms” (Alcohol and the Digestive Tract) increasing the risk of infection. Chronic alcohol use can also damage and destroy parts of the musical lining, leading to inflammation and hemorrhagic lesions. Alcoholism also causes a decrease in smooth muscle contraction but an increase in propulsive contractions. Together these lead to increased incidence of nutrient malabsorption, delayed emptying of the stomach, bacterial degradation of food and production of gasses, all of which may result in fullness, abdominal discomfort, and diarrhea.

Descending down the GI tract, the consequences of alcoholism in the small intestine mainly involve digestion and absorption. Heavy alcohol consumption interferes with the enzymes required for digestion and transportation, and can cause erosions and bleeding in the

mucosal lining. Chronic alcoholism also increases intestinal permeability, which allows molecules that would normally be inhibited to pass through the intestinal wall into the bloodstream. It also decreases the peristaltic movements that occur to further digest food in the small intestine. As a consequence, alcoholics tend to suffer from a shortened transit time for food and more frequent diarrhea than non-alcohol abusers. Alcoholism also causes differences in absorption among the three sections of the small intestine. Chronic alcoholics generally demonstrate decreased absorption of water and sodium in the jejunum and the ileum, reduced absorption of carbohydrates, proteins, and fats in the duodenum but not the jejunum, and malabsorption of many micronutrients such as thiamine, folic acid, and vitamin B1. Alcohol also interferes with the work of many intestinal enzymes, including lactase, those enzymes necessary for the transport of nutrients from the intestines to the blood stream as well as those involved in the metabolism and breakdown of drugs and other foreign substances in the GI tract. The small intestines of alcoholics are further compromised due to an overgrowth of intestinal bacterial flora with could be a major sources of endotoxin to the body. The proposed mechanism of this toxicity is linked to the increased intestinal permeability that alcohol causes, which makes it more likely that endotoxins will be released from the intestine into the blood stream, making the liver especially more susceptible to injury (Bode and Bode 76-82).

Reproductive Consequences - Men

Alcoholism not only has its well known consequences in the nervous, digestive and cardiovascular system, but it also can greatly impair and reduce reproductive function in both men and women. Specifically for males, alcohol effects all three parts of the hypothalamic-pituitary-gonadal (HPG) axis, which is the system associated with the male reproduction. This

specific neuroendocrine dysfunction also has great affects with respect to testosterone levels in the body. Research in this area is still relatively new, but scientists believe that the damage incurred by the reproductive system is a result of alcohol metabolism, alcohol-related cell damage, and the various other problems associated with alcohol. Alcohol damages "all three levels of the male reproductive unit: the hypothalamus, pituitary and testes" (Emanuele and Emanuele). Normally, if there exist transient periods of low testosterone, the pituitary stimulates production of LH and FSH to stimulate testosterone production. However, studies in young male rats have shown that both acute and chronic alcohol exposure result in testosterone suppression and lower LH and FSH levels. Thus, the feedback needed to compensate for low testosterone levels is affected by alcohol abuse.

The specific effects of alcohol on the testes are not yet well determined. What is known is that there are multiple effects somewhere on the path of testosterone synthesis, either in the manufacture of molecular enzymes necessary for testosterone production or in the steroid precursors to the hormone. Scientists have linked increased levels of beta-endorphin, nitric oxide, and oxidation as possible mechanisms through which alcohol interferes with testosterone production and inhibits reproductive and sexual ability in men. Further areas of investigation in this area include studying the effects of "alcohol-induced oxidative damage and apoptosis in the testes, consequences of paternal alcohol exposure in offspring, and effects of alcohol on leptin" (Emanuele and Emanuele) One has to keep in mind that the age of alcohol use also plays a large role in determining consequences, and men with earlier ages of alcohol exposure are much more predisposed to suffer from reproductive and sexual dysfunction.

Reproductive Consequences - Women

As mentioned previously in the introduction, consumption of alcohol in females carries a much greater stigma. Historically, since drinking alcohol was more of a men's activity, women who participated were thought to be loose and promiscuous, flagrantly violating gender norms at the time. However, in the last century as women gained equal rights there was also a progressive rise in the incidence of alcohol abuse in females. This phenomenon has had some direct impacts upon the female reproductive system, including disruptions in menstrual cycle, normal hormone levels, and bone health. Similar to the male reproductive system, the female one is comprised of three main organs: the hypothalamus, pituitary, and ovaries. Throughout the course of a woman's life she experiences rapidly different hormone levels, from the onset of puberty, to menopause and afterwards.

Young adolescent females are especially vulnerable to suffering from the detrimental effects of alcohol because of the rapid hormonal changes that occur during puberty. Considering that the incidence of alcohol abuse in this population is rising, this poses a great cause for concern about not just these women, but also their ability to give birth to healthy offspring. Research done in girls between the ages of 12 and 18 show depressed estrogen levels for as long as two weeks after moderate drinking, which suggests that alcohol may "alter the reproductive awakening and maturation that marks puberty" (Emanuele, Emanuele, and Wezeman). Since estrogen is also linked to bone health, low levels can also cause long-term effects on bone health in these young girls.

Even when alcohol consumption is not at a level where it damages other organs, it significantly disrupts the normal menstrual cycles, causing problems anywhere from irregularity,

cessation of menses, anovulation, and infertility. Two possible mechanisms that could explain alcohol's effects on the female reproductive system are short-term elevations in estradiol and testosterone, both of which inhibit the hypothalamic-pituitary unit. Heavy alcohol use is also linked towards increased incidence of osteoporosis in post-menopausal women. Alcoholics have lower bone mass due to loss of bone tissue, especially evident in the spine and iliac crest. There are some contradictory studies which show that female rats exposed to high doses of alcohol have higher levels of estrogen, which should theoretically protect them from bone loss. However, this increase in estrogen cannot compensate for the reduction in osteoblast and bone cell function.

Cardiovascular Effects

The cardiovascular system best exemplifies the systemic consequences of alcoholism. Unlike in the reproductive system, cardiovascular effects of alcoholism are mainly seen after years of chronic, heavy drinking rather than after a single episode. The peculiar aspect of the cardiovascular system is that it is one of the few that can actually benefit from light, moderate drinking through increases in high density lipoproteins, cellular signaling, platelet function in blood clot formation, and stimulation of blood clot dissolution. However, episodes of heavy drinking override any benefit of alcohol upon the cardiovascular system, and can cause heart muscle disorders, arrhythmias, high blood pressure, and strokes. The mechanisms of both the benefits and consequences of alcohol usage will be elaborated upon shortly.

The research done on alcohol's effects on the cardiovascular system mainly focus on factors that either promote or prevent the development of coronary artery disease (CAD). Moderate consumption of alcohol has been linked to an increase in HDL cholesterol, which

plays a key role in reducing the amount of LDL cholesterol circulating in the blood. The biochemical mechanisms by which moderate alcohol intake, defined in this study as one to two drinks per day, are largely unknown. The two most well known hypotheses are that moderate alcohol consumption stimulates production of the two principal protein constituents of HDL, apoliproteins A-I and A-II, and increased activity of the enzyme lipoprotein lipase (LPL), which is responsible for the transfer of lipids and apoliproteins from VLDL to chylomicrons.

Alcohol's increase in plasma HDL cannot fully explain the reduction in CAD risk among moderate drinkers because "no more than one-half of CAD risk reduction is associated with changes in HDL and LDL levels" (Zakhari 23). The cellular signaling that occurs in the endothelium of blood vessels is one of the largest predicators of a person's risk for atherosclerosis. Normally, when there is an accumulation of fat in the arteries the endothelial cells send out chemical signals that trigger an inflammatory response, trapping LDL and phagocytes within the artery walls. The phagocytes then release factors that oxidize the LDL, activating a set of transcription factors that are important in the development of atherosclerosis. The end result of this cellular cascade is platelet activation and the subsequent formation of a blood clot, or thrombus, at the inflammatory site. There are several theories existent about how alcohol thwarts this inflammatory process. It may reduce the expression of transcription factors responsible for the production of adhesion molecules, or the antioxidants and other compounds in alcohol, particularly red wine, could prevent the oxidation of LDL molecules in the first place. Normal to high levels of HDL also can help prevent LDL oxidation through the activity of two enzymes, platelet-activating factor acetylhydrolase and paraoxonase.

However, while alcohol does have a positive effect on HDL levels no association has been found between moderate alcohol intake and these two enzymes.

The third positive effect that alcohol can confer upon moderate drinkers is changes in platelet function during blood clot formation. When rupture occurs because of plaque buildup in the artery, platelets coming into contact with collagen and other subendothelial compounds become activated and form a blood clot to seal off the damaged area. The risk involved is if a portion or all the blood clot dislodges and travels elsewhere in the body via the bloodstream. Thus, any factor that decreases platelet aggregation and blood clot formation will "attenuate the thrombotic complications of atherosclerosis" (24). At moderate consumption levels, alcohol's antithrombotic effects are related to platelet granule secretion and inhibition of thromboxane A2 production. Alcohol also interferes with the structural integrity of activated platelets by interfering with granule fusion, thereby changing the shape of the platelets. In moderate chronic consumption platelet function is greatly reduced and clotting time is increased, and these positive effects can last for several weeks even if alcohol intake ceases.

The last positive effect of moderate alcohol intake that will be discussed is its effects on blood clot dissolution. Normally, there is a balance between the compounds responsible for blood clot formation and dissolution. The fibrinolytic process, in short, consists of plasmin, after being activated from its precursor plasminogen, degrading the fibrin in blood clots. Epidemiologic studies have shown increased fibrinolytic activity in both men and women after alcohol consumption, due to a substantial increase in the compound t-PA which converts plasminogen to its active form, plasmin. Ironically, while alcohol can protect against adverse coronary events its effect on the clotting process also increases the risk of alcohol-induced

hemorrhage. Alcohol also influences fibrinolysis through serum levels of triglycerides. Moderate consumption is correlated with a lower serum level, which in turn reduces activity of plasminogen activator inhibitor (PAI-1) and increases fibrin degradation. Conversely, heavy alcohol consumption is associated with higher fasting serum triglyceride levels, which increases activity of PAI-1 and decreases the incidence of blood clot dissolution.

There are definite health benefits to moderate alcohol intake. Unfortunately, many people cannot adhere to a discipline of only one to two drinks per day. Statistically, about 34% of the population is responsible for approximately 62% of all alcohol consumption. Inevitably, this subset of the population will experience the adverse effects of alcohol upon the cardiovascular system rather than the protective benefits. Four specific cardiovascular maladies will be discussed in relation to alcohol abuse: cardiomyopathies, arrhythmias, hypertension, and risk of stroke.

Cardiomyopathy is an umbrella term that encompasses a variety of different problems of the heart muscle. The most prevalent found in alcohols is dilated cardiomyopathy, characterized by enlargement of the heart, low cardiac output, and eventually congestive heart failure. Alcoholic cardiomyopathy specifically accounts for 20-50% of all cardiomyopathy cases in Western countries through a variety of different pathways. Among the first that alcohol affects is membrane permeability to calcium, the main ion responsible for cardiac muscle contraction. Alcohol reduces the efficiency by which the muscle responds to an influx of calcium ions as well as interferes with the integrity and function of other contractile proteins like actin and myosin. Another way that alcohol damages cardiac muscle is by reducing the oxygen supply to the heart, making the heart work harder to achieve normal levels of contraction.

Along with structural effects, alcoholism also has negative effects on the electrical circuitry of the heart, causing arrhythmias. Alcohol abuse can cause chaotic patterns of heartbeat in the atria, also known as atrial fibrillation. The mechanism by which alcohol affects the circuitry is through the thickening and scarring of connective tissue that occurs in cardiomyopathies. This disturbs the ventricular rhythm by impeding electrical circulation. Other proposed mechanisms include “electrolyte disturbances, a lack of oxygen to the heart muscle, and an increase in basal plasma levels of the substances involved in transmitting impulses from nerves to muscles, such as catecholamines” (26). Given this information, there is a definite association between alcohol and cardiac arrhythmias; however, alcohol is generally not their main cause.

Conversely, there is a definite causal relationship between alcohol and hypertension independent of other risk factors. In an 1984 study performed by Potters and Beevers, the blood pressure of 16 hypertensive men who drank at least 4 pints of beer on average dropped drastically when they were prohibited to drink for a mere four days. These results were replicated in a second study by Dr. Malhotra, et al a year later. Chronic alcohol consumption increases blood pressure through a variety of ways. The first is increased sympathetic activity, which if sustained, can permanently raise resting blood pressure. Secondly, alcohol raises levels of compounds that transmit impulses from nerves to muscles, such as catecholamines, which causes blood pressure if they are present in excess. Thirdly, chronic alcohol consumption decreases the sensitivity of baroreceptors in arterial walls. Baroreceptors respond to the stretching of artery walls associated with changes in blood pressure and the impulses sent to the central nervous system from them help regulate blood pressure. The last mechanism by

which alcohol can increase blood pressure is by disturbances in the concentration of magnesium ions. There exists a fine balance between the effects of magnesium and calcium in the body. The former causes blood vessels to relax while the latter tends to have the opposite effect. Thus, if calcium ions predominate then there will be overall more system vasoconstriction, thereby raising arterial blood pressure. Alcohol not only increases a patient's blood pressure, but also interferes with the activity of blood pressure reducing medications. For example, it increases clearance of propanolol from the body and opposes the effect of clonidine. With regards to diuretics, since alcohol decreases the concentration of magnesium ions in the blood, the use of any agents that reduce blood pressure through increasing kidney excretion is contraindicated because it could exacerbate the loss of magnesium ions.

Treatment

Alcoholism is more than mere behavior pattern or lifestyle; it is a disease with definite psychological and physiological causes. As a result, there are a variety of treatments designed to treat the various aspects of alcoholism. Unfortunately the efficacy of these treatments is hindered by a number of factors, including people's unwillingness to admit to their problem, lack of access to treatment facilities, or lack of financial means to afford treatment. The first step to any treatment plan is alcohol detoxification, which takes approximately four to seven days. Most patients under alcohol detoxification experiences symptoms of alcohol withdrawal anywhere from six to 48 hours after alcohol consumptions decreases. There is a wide range of alcohol withdrawal symptoms, including headache, tremor, sweating, agitation, anxiety, irritability, nausea and vomiting, heightened sensitivity to light and sound, disorientation, and difficulty concentrating. The more severe symptoms of alcohol withdrawal include transient

hallucinations, delirium tremors, and large increases in heart rate, breathing rate, pulse, and blood pressure. Only about 5% of patients experiencing withdrawal symptoms will experience delirium tremors; thus the majority of patients being treated for alcoholism will only experience mild to medium alcohol withdrawal symptoms (Myrick and Anton 36). Detoxification normally occurs in a treatment facility of a hospital so that the patient can be treated for alcohol withdrawal and other co-morbidities that could exacerbate withdrawal. Alcoholics often experience nutritional deficiencies, dehydration, arrhythmias, liver and pancreatic disease, as well as gastric and neural impairment. Thus it is in their best interests if they are monitored in a hospital setting until their condition is more stable.

Pharmacological treatment for alcohol withdrawal is a contested matter in medicine. On one hand, there are those who argue that people who only experience mild alcohol withdrawal need not be treat pharmacologically, and instead receive supportive in-patient care such as providing a "quiet environment, reduced lighting, limited interpersonal interaction, nutrition and fluids, reassurance, and positive encouragement" (40). About two-thirds of all patients undergoing outpatient alcohol detoxification complete it successfully without pharmacological assistance. However, supportive care sometimes is not adequate enough to treat symptoms such as hallucinations, insomnia, anxiety, and seizures. Benzodiazepines are a class of sedatives used to treat the aforementioned symptoms, with the exception of hallucinations. Anti-seizure medications are also viable alternatives for a variety of reasons. Not only do they function to counteract one of the more severe symptoms of alcohol withdrawal, but there is also a dramatically reduced risk of abuse potential. Anti-seizure medications also can be used to treat

mood and anxiety disorders, and they are also less sedative than benzodiazepines and “allow the patient to engage more quickly in alcohol treatment programs” (41).

There are other medications, apart from those used to treat alcohol withdrawal, which help treat alcoholism as well. Disulfiram, also known by its retail name Antabus, discourages consumption by interacting with ingested alcohol to cause adverse effects upon the body. These include flushing of the face, headache, nausea, vomiting, chest pain, weakness, blurred vision, mental confusion, sweating, choking, breathing difficulty, and anxiety. Disulfiram is a very fast acting drug, and the effects can be felt approximately 10 minutes after alcohol enters the body, and the effects can last for up to an hour (PudMed Health). The mechanism by which Disulfiram works is through inhibition of the enzyme alcohol dehydrogenase. Instead of being metabolized like normal, in the presence of disulfiram acetaldehyde begins to build up in the blood stream and cause all of the previously stated consequences upon the body. When taking this medication patients must abstain from drinking alcohol for one entire week, as a reaction may occur within this time and could be extremely dangerous. Additionally, anyone taking Disulfiram should also be careful to avoid certain foods, liquid medicines, tonics, toiletries, perfumes, and aerosol sprays because these could contain a sufficient amount of alcohol to trigger a negative reaction. Furthermore, consumption of any wines or beers that proclaim to be ‘alcohol-free’, as these beverages can also cause a reaction if consumed in sufficient quantities. Recorded side effects of this medication include drowsiness, fatigue, nausea and vomiting, bad breath, decreased sex drive, mood changes, and allergic skin rash, and liver problems (NetDoctor).

Another common medication prescribed to deter drinking is Naltrexone, sold under the name ReVia. It works by "decreasing the craving for alcohol and blocking the effects of opioid medications and opioid street drugs" (PubMed Health). The proposed hypothesis by which naltrexone reduces craving is that it affects the neural pathways in the brain where dopamine is normally found, thereby reducing feelings of pleasure when alcohol is consumed. Naltrexone is generally prescribed during the first 12 weeks of alcohol rehabilitation to reduce the craving during the early days of abstinence, and it is available in injection and implant form. Side effects of Naltrexone include upset stomach, nervousness, anxiety, and muscle/joint pain. In more severe cases, patients may suffer from confusion, drowsiness, hallucinations, vomiting, stomach plain, skin rash, diarrhea, or blurred vision. In very large doses Naltrexone can cause liver failure (Naltrexone – Treatment for Alcoholism and Addiction).

All of these previously mentioned medications will only be successful in the treatment of alcoholism if they are in addition to holistic plans to cure alcoholism, which includes extensive behavioral therapy, psychosocial consultations, and participation in support groups. A good therapy program must address the fundamental reasons to why the patient developed his or her dependency to alcohol. Only when the patient comes to understand these can they proceed to making substantial life changes to overcome the addiction. With respect to treatment programs, there are two main types: short-term and long-term. Short-term programs generally last less than six months, and most are only 28 days long. Alcoholics are most successful in recovering if they adhere to a program for longer than 3 months, whether it may be a residential treatment facility or on an out-patient basis. Support groups such as Alcoholics

Anonymous have been absolutely crucial to treatment success in the US. Unfortunately their presence is not as strong in developing nations such as those of South America.

In addition to mainstream treatments, there are numerous alternative remedies which have proven successful to treatment symptoms of alcoholism. Especially in rural regions in South America where alcoholism is most prevalent, these approaches may have the most success because they appeal the most to the local indigenous population. The use of herbs is a time-honored approach by many cultures to treatment numerous afflictions, and three herbs in particular, milk thistle, kudzu, and dandelion, have been shown affective in treatment of liver problems and to reduce alcohol cravings. Milk thistle (*Silybum Marianum)* is proven most effective in patients with mild liver disease. Unfortunately it does not demonstrate the same level of success in patients with severe liver disease such as cirrhosis, in which the damage is irreversible. Milk thistle is often used with dandelion (*Taraxacum officinale)* to help reduce alcohol withdrawal symptoms. Kudzu (*Pueraria lobaba)*, used in traditional Chinese medicine, might help reduce alcohol cravings. However, the studies in humans do not produce as consistent findings as the ones with animals do. Furthermore, kudzu also can interact negatively with many other medications such as blood-thinners, methotrexate, diabetes medications, and estrogens. Another widely contested effective treatment to alcoholism is homeopathy. Although there are few studies that demonstrate the effective of homeopathic remedies to alcoholism, most professional homeopaths based on their clinical experience may prescribe a variety of remedies based on the patient's constitutional makeup, which is the combination of his physical, emotional, and intellectual makeup. Some common homeopathic remedies are:

"Arsenicum album -- for anxiety and compulsiveness, with nausea, vomiting, and diarrhea

Nux vomica -- for irritability and compulsiveness with nausea, vomiting, and constipation

Lachesis -- for alcohol cravings, headaches, and difficulty swallowing

Staphysagria -- for angry individuals who tend to suppress their emotions and may have been abused physically, sexually, or psychologically in the past" (University of Maryland Medical Center – Alcoholism)

Socio-cultural Concerns

A successful treatment program can only occur after the patient has admitted to their problem. This is the most challenging step, especially in South America where alcohol consumption is such an integral part of the culture. Further obstacles that I personally observed during my stay in South America were the widespread poverty, lack of education, lack of access to medical facilities, gender inequality, and poor economic capacity. There must be education about the impact of alcohol on the body and mind in South America countries, especially those where alcoholism is most prevalent, in order to break the vicious familial cycle of alcoholism. From my perspective, the most challenging aspect of effectively treating this disease is the overwhelming hurdle of separating alcohol consumption from the culture. Alcohol is considered to not just an important aspect of socialization, but it is also a central component in many of the ceremonial and religious celebrations in South America. For example, during the Festival of Santiago in Peru, it is customary for Peruvians to become so intoxicated that nine months from the date of this festival, there is a baby boom in the country. The reason for this extreme alcohol abuse is more than simple lack of control; it has everything to do with the attitudes and

behaviors surrounding the festival itself. Peruvians find it highly offensive and rude if someone turns down an offer to drink in this festival; thus, one's cup is literally always full.

Since it is the most widely consumed drug in the entire world, it should come as no surprise that there are widespread socio-cultural effects of alcoholism. To give a brief overview, according to a public health study done by the WHO, approximately 5.4% of all deaths in the Americas are attributable to alcohol, a percentage that is 68% greater than the global average of 3.7%. Alcohol is also associated with over 60 different medical conditions and is the biggest risk factor for the development of disease in the area, especially in men between the ages of 15 and 44, dramatically lowering their productivity in the workforce. On an individual basis, lower productivity levels may only translate to a few hundred or thousand dollars; however on an aggregate level this result in much reduced economic output, social unrest, and more pervasive poverty.

The psychological and behavior changes that occur after alcohol consumption increase the risk that an individual may become "either a perpetrator or victim of violence" (PAHO 13), which includes everything from intimate partner violence, child abuse, youth violence, sexual violence, abuse of the elderly, and other violent crimes. Alcohol misuse is a catalyst for violence, demonstrated by the following statistics:

- Alcohol abuse is responsible for approximately 26% of male homicides and 16% of female homicides
- 80% of patients in the ERs of Brazil and Argentina were being treated for alcohol-associated injuries.
- Alcohol was an aggravating factor in 76% of reported sexual violence cases.

- In a study of all fatally injured victims tested for alcohol in the Institute of Forensic Medicine of Sao Paulo, 64% of drowning victims, 52% of homicide victims, 53% of fatally injured pedestrians, and 50% of drivers/passengers were intoxicated at the time of their death.

Sadly enough, the victims who suffer the most from alcohol abuse in South America are women and children since they are easy targets for the men's aggressive behaviors. In a 1998 National Addiction Survey of the Americas performed in Mexico, it is estimated that almost 66% of all domestic violence cases are associated with alcohol. The historically patriarchal societies of South America are already oppressive to women, and to combine these cultural patterns with alcohol abuse results in widespread human rights violations of women and children in these areas. Another manner by which alcohol abuse affects women and children is by lowering their economic capacity. Addicts, even if they are impoverished, will often fail to provide enough money for their families to buy food. Instead, any disposable income goes towards the purchase of alcoholic drinks, thereby increasing hunger and malnutrition.

The Next Steps Forward

Since alcohol abuse and alcoholism are as much a public health concern as they are an individual concern, the Pan American Health Organization (PAHO) has put together a "Basis for Action Plan" that aims to reduce alcoholism and alcohol related harm in South America. First and foremost, there needs to be consistent, comprehensive approach towards dealing with alcoholism and its effects in South America. PAHO identified that the most effective way to reduce alcoholism would be due to policy changes since this would result in a reduction in the amount of alcohol available for the population to misuse. The "10 Building Blocks" addressed in

PAHO's comprehensive plan target four main areas of concern: the availability of alcoholic beverages, the demand for alcoholic beverages, appropriate responses to address the harms caused, and the need to develop mechanisms to facilitate and sustain efforts to reduce alcohol-related harm (35). The following table explains in more detail what is included in each of the 10 Building Blocks:

Block 1:	Establish mechanisms by which to regulate the "production, importation, retail, availability and consumption of alcoholic beverages". This includes everything from placing restrictions of when alcohol can be sold, enforce a licensing system for all alcohol distributors and retailers, and placing sanctions upon the aforementioned two groups in the event of negative consequences associated with alcohol.
Block 2	Establish an alcohol taxing system. One proposed idea is to increase the tax in relation to the alcohol content of the beverage, thus hopefully deterring people from purchasing and consuming beverages with high alcohol content.
Block 3	Either regulate or ban entirely alcohol advertising and promotion on any means and media. This will hopefully produce, over a time, a cultural shift in the attitudes of alcohol and reduce its consumption in the long run
Block 4	Address concerns and consequences of driving while intoxicated to avoid needless deaths, injuries, and costs to the public
Block 5	Develop and integrate programs in primary health for screening of early signs and symptoms of alcohol abuse. Educate health professionals about the importance of recognizing these signs and treating them as early as possible
Block 6	Develop, integrate, and make accessible and affordable a treatment system for the whole range of alcohol related problems
Block 7	Develop information systems that track alcohol consumption patterns so any further policy changes will be based upon relevant data
Block 8	Raise public awareness and support alcohol control policies and improve public education on the consequences of excessive alcohol consumption
Block 9	Support and raise resources so that individual communities also have the means to address alcohol related problems amongst themselves
Block 10	In order to protect the ability to control alcohol market and public health concern, one should consider alcohol to be a special commodity in a trade agreement.

Conclusion

The problem of alcohol abuse and alcoholism in South America is extremely complex and multi-faceted. Historically, alcohol has been central to many of the cultural and religious activities, but supplantation of traditional culture with Western ideas lead has created an undue burden upon the indigenous population, contributing to the rise of alcohol abuse and addiction. The physiological effects upon the body are nearly standard, independent of the region studied. Thus, in order to develop strategies to combat this problem one must examine the socio-political structure of the country, cultural attitudes towards alcohol, and the societal effects alcohol problems have created within the country. In much of South America, centuries of the *machismo* culture mean that alcohol abuse is, outwardly, a male issue. However, closet alcohol use by women is also a growing issue that few people recognize, but can have even further deteriorating consequences on family stability and child welfare. Treating alcoholism in this region requires understanding the scope of the problem and approaching it from many angles. This includes stricter regulations, new policies, education, community outreach, and health measures. A diverse problem requires a diverse solution with a short-term and long-term component. The former is addressing and remedying the medical problems in alcoholics and reduce the quantity that they consume, while the latter would be targeted towards the root cause of alcoholism, which are the cultural attitudes towards alcohol and use proper place in society.

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