

DEMOGRAPHIC STUDY ON CAFFEINE CONSUMPTION

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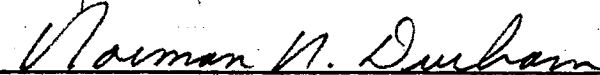
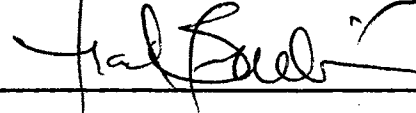
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## CHAPTER I

### INTRODUCTION

Caffeine has been a regular part of the daily diets of millions of people for hundreds of years. At least in part due to its long history of use in the human diet, caffeine has been included in the Food and Drug Administration's list of substances that are "generally recognized as safe" (Lecos, 1983). Caffeine, at present levels of consumption, possibly poses only minimal health hazards (Lecos, 1983); however, the FDA expects ongoing safety studies to help resolve emerging concerns and controversies about caffeine consumption.

Most studies concur that caffeine affects many systems of the body, yet simple agreement ends there. Some studies extol the short term benefits to the body, but many possible detrimental effects also are associated with caffeine consumption.

One of caffeine's most commonly known effects is the stimulation of the nervous system. Caffeine, a Central Nervous System (CNS) stimulant, passes the blood-brain barrier and can act directly on medullary,



vasomotor, and vagal centers of the brain (Syed, 1976). Its effects are most dramatic in people who are tired. In these cases, it can rouse the sleepy (Switzer, 1935), speed reaction time (Thorton, 1939), increase alertness (Switzer, 1935), and improve concentration (Grady, 1986). This stimulation can alter the perception of fatigue.

Caffeine also affects the cardiovascular and muscular systems, and this may account for changes in normal heart action (Colton, 1970). Caffeine has been associated with many cardiovascular problems. Specifically, myocardial infarctions (heart attacks) and arrhythmias (irregular beating of the heart) (Dews, 1984). These toxic effects generally are associated with chronic consumption.

In those people who are not regular caffeine consumers, caffeine affects many physiological systems. A dose equivalent to the amount in two cups of coffee (200 mg.) produces a small rise in blood pressure (Van Handel, 1980) about an hour after consumption, as well as causes decreases and subsequent increases in heart rate (Grady, 1986).

Caffeine ingestion also increases breathing rate, urine output, and levels of fatty acids and glucose in the bloodstream (Grady, 1986; Graham, 1978; Van Handel, 1983). High caffeine doses induce an increase in serum triglyceride levels or elevated cholesterol

(Graham, 1978). The most common effect of caffeine is a temporary increase in metabolism (Van Handel, 1980).

Other than these general responses to caffeine, specific effects and audiences are also noted. People with ulcers are often told to avoid caffeine because it irritates the stomach lining by stimulating the secretion of gastric acid and enzymes (Jacobson, 1981; Grady, 1986). The FDA has recently urged expectant mothers to avoid or minimize caffeine consumption until studies on its link with birth defects are completed (Hunter, 1984; Lecos, 1983). In general populations, anyone who consumes extreme levels of caffeine clearly can experience toxic effects; ingestion of caffeine has caused convulsions and vomiting with complete recovery in six hours. The acute human fatal dose appears to be greater than 10 gm. or 120 mg. per kilogram of body weight (Graham, 1978).

Within normal levels of caffeine consumption, once ingested and absorbed, caffeine is rapidly distributed in tissues according to water content. This may account for the action caffeine has on muscle tissue, as muscle tissue is approximately 75% water. Caffeine can increase contraction capacity, and even alter the length and twitch characteristics of muscle fibers (Coleman, 1980). No specific binding to any one particular body tissue has been observed; however, caffeine has the ability to enter virtually all tissues

easily (Hunter, 1984). The ease of absorption permits caffeine to permeate tissues throughout the body within one hour of consumption (Hunter, 1984).

The stimulant effect of caffeine was explained in 1981 by a group at Johns Hopkins School of Medicine led by Solomon Snyder (Grady, 1986). Scientists had known for about ten years that caffeine blocked the action of adenosine, a chemical in the body with many properties, including the ability to act as a sedative. By locking onto special receptor molecules in brain cells, adenosine reduces the cells' activity. Snyder's group showed that caffeine, which has a molecular structure similar to adenosine, acts as a stimulant by attaching itself onto the receptors, thereby preventing adenosine from attaching and allowing the cells to maintain firing action (Grady, 1986). The researchers also found that the body has more than one kind of adenosine receptors, that receptors are distributed differently in various tissues, and that caffeine can hook up with all types, hence explaining its ability to affect many bodily systems (Grady, 1986).

## CHAPTER II

### LITERATURE REVIEW

#### Caffeine Contents of Common Products

Just about everyone consumes caffeine in their regular diets, and since so many possible effects are attributed to caffeine intake, it is important to note the level of caffeine content in common products. Caffeine is present in many beverages, foods, and medications that are consumed daily.

Coffee, the beverage most commonly associated with caffeine, has been cultivated since 575 A. D. in Ethiopia (Dews, 1984). It first reached Europe in the 17th century, its popularity spreading rapidly. Now it has become one of the most consumed beverages in the world and the most commonly consumed source with an elevated caffeine content. The content of coffee will vary with the preparation method (see Table 1). Also, coffee is not particularly consistent in caffeine amounts since there is a wide range of caffeine in coffee grades; however, brewed coffee consistently is rated highest in caffeine content (see Table I).

TABLE I  
COFFEE CAFFEINE LEVELS

Coffee (5 oz. cup)	mgs. caffeine	
	avg.	range
Brewed (drip)	115	60-180
Brewed (percolated)	80	40-170
Instant	65	30-120
Decaffeinated, brewed	3	2-5
Decaffeinated, instant	2	1-5

Coffee consumption levels for the United States were reported by the International Coffee Organization (International, 1988). Coffee consumption has steadily decreased since 1962, the peak year for coffee consumption in the U. S. at 3.12 cups per day per person. This figure increased to 4.17 cups per day for regular users in that same year. By 1988, those figures had fallen to 1.67 cups per person per day and 3.34 cups per day for regular users.

In 1988, men drank more coffee than women, 1.86 cups per day to 1.50 cups per day respectively.

In examining consumption by age groups, persons in the 50-59 year range drink the most coffee, 2.85 cups per day. This figure is followed by those in the 40-49 year range, who consume 2.57 cups per day. Persons in the 60-69 year range drink 2.49 cups per day. The other categories consume less than 2 cups per day.

Among caffeine-related products, tea leaves have the earliest historical origins, dating back to 2737 B. C. in China (Dews, 1984). But despite tea's popularity in the Orient, it didn't reach Western Europe until the 1600's. Now tea has reached worldwide popularity. Consumed either hot or cold, tea has a notable caffeine level, with imported tea brands having a slightly higher caffeine content than domestic brands (see Table II).

TABLE II  
TEA CAFFEINE LEVELS

Tea (5 oz. cup)	mgs. caffeine avg. range	
Brewed, major U. S. brands	40	20-90
Brewed, imported brands	60	25-110
Instant	30	25-50
Iced Tea (12 oz. glass)	70	67-76

Caffeine is also one of the major ingredients in soft drinks that have become so popular today. Made from kola nuts, these drinks began to appear in the 1880's: Dr. Pepper appeared in 1885, Coca-cola in 1886, and Pepsi-Cola followed in 1896 (Dews, 1984). In 1985, for the first time, soft drinks displaced coffee as America's favorite drink (Grady, 1986).

Caffeine levels of soft drinks vary with the brand name, but most of the popular soft drinks have significant levels of caffeine (see Table III). The soft drink brand with the highest caffeine content is Mountain Dew, containing 54 mg. in a 12- ounce serving.

TABLE III  
SOFT DRINK CAFFEINE LEVELS

Brand	Milligrams Caffeine 12 ounce serving
Mountain Dew	54
Tab	46.8
Coca-cola/Diet Coke	45.6
Shasta Cola	44.4
Mr. Pibb	40.8
Dr. Pepper/Diet Dr. Pepper	39.6
Pepsi	38.4
Diet Pepsi	36
RC Cola	36
Diet Rite	36

Not only is caffeine found in many commonly consumed beverages, but it is present in more than 1000 non prescription drug products, as well as numerous prescription drugs. Caffeine is most often used in weight-control remedies, alertness or "stay-awake" tablets, headache and pain-relief remedies, cold products, and diuretics. When caffeine is an added ingredient, it must be listed on the product label.

Some examples of caffeine-containing drugs are the following:

TABLE IV  
CAFFEINE LEVELS OF DRUGS

Non-prescription drug	Milligrams caffeine per dose
Weight-control aids	
Dexatrim	200
Dex-a-diet	200
Dietac	200
Prolamine	140
Maximum Strength Appedrine	100
Alertness Tablets	
Nodoz	100
Vivarin	200
Anagesic/Pain relief	
Excedrine	65
Vanquish	33
Midol	32.4
Anacin	32
Diuretics	
Permathene H2	200
Maximum Srength Aqua-ban	200
Aqua-ban	100
Cold/Allergy Remedies	
Duradyne-Forte	30
Coryban-D capsules	30
Triaminicin tablets	30
Dristan Decongestant	16.4

(FDA, Food Additive Chemistry Evaluation Branch, 1983)

Caffeine is also present in other products consumed daily, such as chocolate. However, the products that have been previously discussed contain the highest levels of caffeine. The consumption levels of



these products by specific populations will be the focus of this study.

#### Problem

On-going caffeine research is attempting to isolate more specific problems posed by elevated caffeine consumption levels. Thus, the need exists to specify, by the groups that have been identified, the highest levels of consumption in hopes that research can more effectively define possible negative health implications from caffeine consumption and monitor the health effects in the specified population.

#### Purpose

The purpose of this study is to identify and compare caffeine consumption levels by gender, age, occupation, income range, education, and self-described fitness level, and to further compare our findings to national trends.

## CHAPTER III

### PROCEDURES

#### Subjects

Subjects were randomly selected from the total population within the state of Oklahoma. Subjects were then asked to anonymously and voluntarily complete a questionnaire.

#### Instrument

The instrument for this study is a two-page questionnaire, containing 24 items (see Appendix 1). The questionnaire is divided into three sections: the first section outlines basic personal information, such as age, sex, height, and weight. The second section contains questions on the amount of caffeine-containing products the subjects consumed. The final section asks questions about the individual, such as race, occupation, income range, formal education level, and self-described fitness level.

## Design

Two wellness classes (50 students each) were assigned to have 5 questionnaires each completed. Each student attempted to identify one subject within each 10 year increment from 20-70 years. Questionnaires were distributed to 500 voluntary participants. Four-hundred and eight questionnaires were completed and returned, and these responses comprise the basis for this study.

The Internal Review Board of Oklahoma State University approved the survey form and method for collection used for this study (see Appendix 2).

## Procedure

The randomly selected population who completed the questionnaire was arranged by age groups in 10-year intervals. Descriptive statistics were used to isolate levels of caffeine consumption and the type of products which contained the caffeine being consumed.

## Assumptions

It was assumed that our sampling is representative of the adult population by age group of the state of Oklahoma, and that the questionnaire will be completed accurately and honestly.

## CHAPTER IV

### RESULTS

Out of 500 questionnaires the data in 408 completed questionnaires was returned, six areas contained sufficient data to represent a qualified study. This analysis will compare gender, age, occupation, income range, and self-described fitness level to cups of coffee per day, glasses or cans of cola drinks per day, and glasses or cups of tea per day.

Of the total population (408) in this study, there were 181 men and 226 women. The number in each age range was 122 from ages 20-29, 80 from ages 30-39, 68 from ages 40-49, 70 from ages 50-59, 41 from ages 60-69, and 13 over the age of 70 years.

In the occupation categories 52 responded as administrative/managerial, 36 in sales, 33 as homemakers, 32 as clerical, 30 as laborers, and 65 as students.

Educational level responses showed 84 high school graduates, 141 persons who have attended or are attending college, 99 college graduates, and 56 persons who have done post-graduate work.

Responses in the income ranges showed 131 who earned less than \$15,000 annually, 94 made \$15,000-\$24,999, 64 that made \$25,000-\$34,999, 32 that earned \$35,000-\$44,999, 27 that earned \$45,000-\$55,999, and 27 that made more than \$55,000 annually.

Self-described fitness level responses reflected 50 persons who believed they were in excellent fitness levels, 137 responded in good condition, 163 reported average, and 46 stated they were below average.

#### Coffee

In this study 66% of our surveyed population reported consuming coffee regularly. The most often stated amount of coffee consumed daily was 2 cups; 27% of those who consumed coffee reported this amount. Three cups per day and one cup per day followed with 20% and 18% respectively. Fourteen percent of regular drinkers consumed 4 cups per day. Ten percent of those who consumed coffee regularly drank 7 or more cups per day. Five cups per day was reported consumed by 7% of those who drank coffee regularly. And only 5% of the regular consumers reported drinking 6 cups per day (see Table V).

TABLE V  
CUPS PER DAY REGULAR COFFEE USER

Cups/day	% of coffee drinkers
1	18
2	27
3	20
4	14
5	7
6	5
7 or more	10

This survey showed persons in the 60-69 age category to consume the most coffee per person per day, 3.20 cups, followed by those one decade their junior in the 50-59 age range with 3.03 cups per day. The other age categories all showed less than 3.0 cups per person per day; 40-49, 2.86 cups, > 70, 2.50 cups, 30-39, 2.35 cups and finally 20-29, 1.13 cups per day (see Table VI).

TABLE VI  
COFFEE CONSUMPTION BY AGE

Age	Cups/day person	(N)	Cups/regular coffee user/day
20-29	1.13	51	2.62
30-39	2.35	60	3.06
40-49	2.86	55	3.38
50-59	3.03	58	3.55
60-69	3.20	36	3.55
> 70	2.50	10	3.00

(N)-number of regular users identified in each category

In coffee comparisons with occupation categories, those persons in administrative and managerial positions reported the highest coffee consumption--3.21 cups per person per day. This rate was followed closely by those who responded as laborers with 3.13 cups per day. Two categories reported consuming over 2 cups per day--professional or technical with 2.61, and homemakers with 2.42 cups per day. Persons responding in the clerical and sales categories consumed less than 2 cups per day with 1.56 and 1.66 respectively. The lowest consumption level is reflected by students at 0.61 cups per day (see Table VII).

TABLE VII  
COFFEE CONSUMPTION BY OCCUPATION

Occupation	Cups/person/ day all in profession	(N)	Cups/regular consumers in profession
Professional/Technical	2.61	59	3.40
Managerial/Administrative	3.21	47	3.55
Laborer	3.13	23	4.00
Clerical	1.56	22	2.27
Sales	1.66	22	2.72
Homemaker	2.42	22	3.63
Student	0.61	18	2.22

Coffee consumption levels compared with income range categories showed persons who earn more than \$45,000 annually consume the most coffee at 3.00 cups per person per day. Persons that earn \$25,000-\$34,999 a year consume 2.51 cups per day, followed by those in the \$15,000-\$24,999 income range consuming 2.35 cups per day, and \$35,000-\$44,999 at 2.25 cups per day. Persons who reported earning less than \$15,000 only consumed 1.58 cups per person per day (see Table VIII).

TABLE VIII  
COFFEE CONSUMPTION BY INCOME RANGE

Income Range in \$	Cups/day/all in income range	(N)	Cups/day/regular user in range
< 15,000	1.58	69	3.01
15,000-25,000	2.35	69	3.20
25,000-35,000	2.51	50	3.22
35,000-45,000	2.25	26	2.96
> 45,000	3.00	46	3.5



When examining coffee consumption in relation to formal education level, persons who have done postgraduate work appear to consume the highest amount of coffee at 2.76 cups per person per day. This amount is followed by college graduates with 2.50 cups per day. High school graduates consume 2.25 cups per day. Those who attended college, but did not graduate drank the least with 1.61 cups per day (see Table IX).

TABLE IX  
COFFEE CONSUMPTION BY EDUCATION

Education level	Cups/day/all in group	(N)	Cups/day/regular users in group
High school grad	2.25	56	2.60
Attended college	1.61	78	2.92
College graduate	2.50	76	3.26
Post-graduate	2.76	43	3.60

Subjects who consumed coffee regularly were asked to rate their own perception of their fitness level. Those who responded that they were in excellent condition consumed the smallest amount of coffee, 1.00 cups per person per day. Persons responding in the good fitness category consumed just less than 2.0 cups per day with 1.92 cups per day. Those who responded in the average and below average fitness categories consumed 2.60 and 2.15 cups per person per day respectively (see Table X).

TABLE X

## COFFEE CONSUMPTION BY FITNESS LEVEL

Fitness Level Self-described	Cups/day/all persons/group	(N)	Cups/day/regular drinkers/group
Excellent	1.00	27	1.80
Good	1.92	84	3.14
Average	2.60	121	3.51
Below average	2.15	33	3.00

When asked to rate the reasons why they drank coffee, regular consumers rated enjoying the taste highest, followed by coffee's ability to wake them up in the morning. Low ratings were shown for chatting with fellow workers and concentrating on work (see Table XI).

TABLE XI

	Most Important		Least Important		
	1	2	3	4	5
	By Percentage				
Enjoy Taste	44.0	16.9	15.5	14.8	9.7
Concentrate on work	15.7	13.8	18.9	19.5	32.5
Chat with fellow workers	18.1	23.9	16.4	11.9	29.9
Wake-up in morning	39.8	21.4	12.6	10.7	15.0
Stay alert during day	21.7	18.3	25.0	23.9	10.0

In responding to caffeine's affect, over 50% of coffee drinkers responded that it keeps them awake. Just over 25% stated that caffeine relaxes them. And around 10% responded that it makes them jittery.

## Caffeinated Soft Drinks

In this study, average caffeinated soft drink (CSD) consumption was found to be 1.80 12-ounce per person per day for all participants. Men consumed a slightly higher amount at 1.92 cans per day, in comparison to women who only consumed 1.71 cans per day. This difference is much less--practically non-existent--for regular CSD consumers, with men drinking 2.25 cans per day followed closely by women consuming 2.23 cans per day.

In examining age ranges, the age group with the highest rate of CSD consumption in this study was the 30-40 year, with 2.41 cans per person per day, followed closely by the 20-29 age range, with 2.25 cans per day. Past the age of 40 years cola consumption declines with each decade: 1.63 cans per day in the 40-49 age range, 1.44 cans per day in the 50-59 age range, and 1.34 cans per day in the 60-70 range (see Table XII).

TABLE XII  
CSD CONSUMPTION BY AGE

Age Range	Cans/person/day	(N)	Cans/regular drinkers/day
20-29	2.25	112	2.45
30-39	2.41	74	2.60
40-49	1.63	50	2.22
50-59	1.44	53	1.90
60-70	1.34	27	2.03

The percentage of cans that regular CSD consumers drinks per day is greatly proportioned to two or less. Over 60% of those who drink CSD regularly, drink two or fewer per day (see Table XIII).

TABLE XIII  
CANS/DAY REGULAR CSD USER

Cans/day	% of regular consumers
< 1	4.6
1	35.1
2	23.8
3	19.5
4	7.9
5	3.4
6 or more	5.8

In this study, comparison of occupation categories and CSD consumption indicated that persons in sales consume the highest amount of CSD products at 2.61 per day, followed closely by laborers with 2.53 cans per day. Persons in managerial and administrative positions consumed 2.0 cans per day. Right behind them were students at 1.98 cans per day. Professional and technical persons consumed 1.57 cans per day and clerical positions reportedly consumed 1.56 cans per day. The lowest consumption rate was shown by homemakers with 1.21 cans per day (see Table XIV).

TABLE XIV  
CSD CONSUMPTION BY OCCUPATION

Occupation	Cans/day all in profession	(N)	Cans/day regular consumers in profession
Professional/ Technical	1.57	63	1.92
Managerial/ Administrative	2.00	43	2.42
Clerical	1.56	24	2.08
Sales	2.61	34	2.76
Laborer	2.53	26	2.92
Homemaker	1.21	19	2.10
Student	1.98	56	2.30

In comparison of income and CSD consumption, persons in the \$15,000-\$24,999 annual income category were the only ones who averaged over 2 cans per day at 2.04. Persons in the \$45,000-\$54,999 drank 1.88 cans per day followed closely by those who made less than \$15,000 annually with 1.75 cans per day. Persons in the \$25,000-\$34,999 and \$35,000-\$44,999 income range consumed 1.53 and 1.50 cans per day respectively. The lowest rate of consumption was those in the over \$55,000 range with 0.92 cans per day (see Table XV).

TABLE XV  
CSD CONSUMPTION BY INCOME RANGE

Income range in \$	Cans/persons in income range	(N)	Cans/day/ user
< 15,000	1.75	109	2.11
15,000-24,999	2.04	83	2.31
25,000-34,999	1.53	47	2.08
35,000-44,999	1.50	26	1.80
45,000-54,999	1.88	21	2.42
> 55,000	.92	19	1.30

In comparing CSD consumption to formal education levels, those who attended college category consumed the most cola products--2.72 cans per day. High school graduates drank 1.86 cans per day. College graduates consumed 1.72 cans per day. The least amount was consumed by persons who have done post graduate work at 1.60 cans per day (see Table XVI).

TABLE XVI  
CSD CONSUMPTION BY EDUCATION

Formal Education	Cans/day all in group	(N)	Cans/regular consumers
High School grad	1.86	67	2.34
Attended college	2.72	119	3.22
College graduate	1.72	81	2.11
Post graduate	1.60	41	2.24

Comparing CSD consumption to self-described fitness levels, those who believed they were in excellent or good physical condition consumed more CSD products than those who believed they were in average or below average condition (see Table XVII).

TABLE XVII  
CSD CONSUMPTION BY FITNESS LEVEL

Fitness Level	Cans/day	(N)	Cans/day regular consumer
Excellent	2.12	43	2.46
Good	2.32	112	2.83
Average	1.76	129	2.22
Below Average	1.93	36	2.47

Responding to caffeine's effect, over 50% of CSD consumers reported that it keeps them awake. Just over 20% stated that it relaxes them and less than 10% stated that it makes them jittery.



## Tea Products

Of the participants in this study, 65% drink tea on a regular basis. Of that 65%, nearly 40% drink only 1 cup or glass per day (see Table XVIII).

TABLE XVIII  
CUPS OR GLASSES PER DAY TEA USER

No. of cups/day	% of regular consumers
1	39.8
2	30.3
3	9.1
4	8.4
5 or more	8.7

In this study, women consumed a slightly larger amount of tea than men. Women of this population drank 1.40 cups or glasses, per day, compared to men who drank only 1.19 cups or glasses per day.

Age range comparisons to tea consumption showed that persons between 30-39 years consume the most tea, 1.60 servings per day. Persons in the 60-69 age range drank 1.41 servings per day, followed by 50-59 year olds with 1.32 servings per day. Those over the age of 70 drank 1.30 servings per day. Those in the 40-49 range consumed 1.24 servings per day. the lowest rate was reported by the 20-29 year olds with 1.19 servings per day (see Table XIX).

TABLE XIX  
TEA CONSUMPTION BY AGE

Age Range	Cups/person/ Day	(N)	Cups/regular user/day
20-29	1.19	76	1.92
30-39	1.60	55	2.32
40-49	1.24	41	2.09
50-59	1.32	48	1.93
60-69	1.41	30	1.93
> 70	1.30	9	1.88

Tea was consumed most by persons who responded in the clerical occupation category with 1.56 servings per day. This figure was followed by persons in the professional and technical category, 1.45 servings per day, laborers, 1.43 servings per day; and administrators or managers, 1.42. Homemakers drank 1.30 servings per day. The lowest consumption rate was reported by students with 0.87 servings per day (see Table XX).

TABLE XX  
TEA CONSUMPTION BY OCCUPATION

Occupation	Cups/person/ day	(N)	Cups/regular user/day
Professional/Technical	1.45	52	2.15
Managerial/Administrative	1.42	38	1.94
Clerical	1.56	25	2.00
Sales	1.19	24	1.79
Laborer	1.43	43	2.86
Homemaker	1.30	24	1.79
Student	0.87	34	1.67

In comparison of income and tea consumption, those who make \$25,000-\$34,999 annually consume 1.56 servings per day, followed by those who earn \$35,000-\$44,999 who drink 1.46 servings per day. Persons in the \$15,000-\$24,999 consume 1.38 servings per day. Those whose income is less than \$15,000 drink 1.23 servings per day. Persons who earn \$45,000-\$54,999 consume the least amount of tea at 1.11 servings per day (see Table XXI).

TABLE XXI  
TEA CONSUMPTION BY INCOME

Income range in \$	Cups/person/ day	(N)	Cups/regular user/day
< 15,000	1.23	77	2.10
15,000-24,999	1.38	60	2.16
25,000-34,999	1.56	49	2.04
35,000-44,999	1.46	21	2.23
45,000-54,999	1.11	18	1.66
> 55,000	1.14	19	1.63

The comparison of tea consumption and formal education level indicates that persons who attended college but never graduated consume the most tea at 1.58 servings per day. This figure is followed closely by college graduates who drank 1.54 servings per day. High school graduates drank 1.40 servings per day. Those who have done post graduate work drank the least amount of tea at 1.01 servings per day (see Table XXII).

TABLE XXII  
TEA CONSUMPTION BY EDUCATION

Education Level	Cups/person/ day	(N)	Cups/regular user/day
High school grad	1.40	54	2.18
Attended college	1.58	91	2.46
College graduate	1.54	76	2.01
Post-graduate	1.01	29	1.96

The comparison of tea consumption to self-described fitness level showed that those who reported average physical condition consumed the most tea at 1.72 servings per day. This was followed by those who believed they were below average with 1.41 servings per day. Those who reported good fitness levels consumed 1.32 servings per day, while those who believed they were in excellent condition consumed only 0.86 servings per day (see Table XXIII).

TABLE XIX  
TEA CONSUMPTION BY FITNESS LEVEL

Fitness Level	Cups/person/ day	(N)	Cups/regular user/day
Excellent	0.86	30	1.43
Good	1.32	94	1.93
Average	1.72	107	2.21
Below average	1.41	28	2.32

There were other categories in the questionnaire, including chocolate consumption and medication usage, but these topics did not draw sufficient responses to be included in this study.

## CHAPTER V

### DISCUSSION, SUMMARY, AND CONCLUSIONS

#### Coffee

The U.S. is the top coffee market in the world, which is reported by the International Coffee Organization (ICO). The following United States data is taken from the 1988 ICO winter study. However, coffee consumption has decreased markedly since 1962, the year coffee consumption in the U.S. reached its peak. In that year the average amount of coffee consumed per person per day was 3.12 cups. By 1988, that figure had fallen to 1.67 cups per day. Thus, coffee consumption has decreased 46% over that period. During this time, not only have percentages for the total population fallen, but the average number of cups per coffee drinker has fallen from 4.17 cups per day in 1962, to 3.34 cups in 1988.

The number of people who drink coffee on a regular basis has gone from 75% of the population in 1962. to only 50% in 1988. In this study, 66% of the persons questioned reported drinking coffee regularly; thus, coffee consumption appears elevated in the population.

We may account for some of this discrepancy since this study only included persons over the age of 20. In 1988, 4.7% of the coffee consumers were under the age of 20.

Nationally, men drink more coffee than women. In 1988, men drank 1.86 cups per day as opposed to women who drank only 1.5 cups per day. In this survey showed a slightly higher rate of consumption, with women drinking 2.23 cups per person per day and men at 2.20 cups per day.

In this study, the most often stated amount of coffee consumed daily was 2 cups: 27% of those who consumed drinking coffee reported this amount. Three cups per day and one cup per day followed with 20% and 18% respectively. In 1988, the average number of cups consumed per selfdescribed coffee drinker per day was 3.34. This survey showed the average number of cups per day to be 3.20 for this population. Nationally, persons over the age of 30 years drink, on the average, over two cups of coffee daily, compared to those individuals in the 20-29 age group, whose per capita consumption is near one cup. We also found this representative of the surveyed population in this study.

In coffee consumption comparisons with occupation categories, those persons responding as laborers drank a high amount of coffee, while those in management and

administrative positions also consumed high amounts of coffee. The lowest consumption level is reflected by students, which would be represented by their ages since the least amount of coffee is consumed by persons under the age of 30.

In this study, coffee consumption levels showed slight increases with increases in income, with only one exception, incomes between \$35,000 and \$44,999. Persons with annual incomes greater than \$45,000 consumed the highest amount of coffee. The lowest rate of consumption was reflected by persons in the less than \$15,000 salary.

When examining coffee consumption in relation to formal education level, persons who have done post-graduate work appear to consume the highest amount of coffee, while those who have attended college, but did not or have not graduated drink the least. A partial explanation for this may be the fact that those in college are generally near the age of 20 years which is the lowest coffee-consuming age range.

Subjects who consume coffee regularly were asked to rate their own perception of their fitness level. Those who responded that they were in excellent fitness condition consumed the smallest amount of coffee. Those who drank the most coffee reported their fitness condition to be average.



When asked to rate the reasons why they drank coffee, regular consumers rated enjoying the taste highest, followed by coffee's ability to wake them up in the morning. Low ratings were shown for chatting with fellow workers and concentrating on work. Staying alert all day fell in the middle of the responses.

In responding to caffeine's effect, over 50% of coffee drinkers responded that it keeps them awake. Just over 25% stated that caffeine relaxes them. And around 10% responded that caffeine makes them jittery.

#### Caffeinated Soft Drinks

In recent years soft drinks have replaced coffee to become the most popular beverage in America. Nearly 60% of all beverages consumed today are soft drinks (Grady, 1986). Virtually all CSD contain a noticeable amount of caffeine.

Coca-cola is the most commonly consumed of these CSD beverages, followed closely by Pepsi Cola. Since the NutraSweet addition to the beverage market, diet colas have made considerable gains in popularity. Diet Coke has escalated to the third highest selling soft drink. Dr. Pepper is the fourth fastest selling carbonated drink, followed by Diet Pepsi. These five beverages account for over 55% of the soft drink market share ("New Paint," 1986).

In this study, average CSD consumption was found to be 1.80 12-ounce cans per person per day for all participants. Men consume a slightly higher amount at 1.92 cans per day, in comparison to women who only consume 1.71 cans per person per day. This difference is much less for regular CSD consumers, with men drinking 2.25 cans per followed closely by women consuming 2.23 cans per day.

In examining age ranges, the age group with the highest rate of CSD consumption in this study was 30-39 years, followed closely by 20-29 year range, with 2.41 cans and 2.25 cans respectively. After the age of 40 years, consumption decreased 0.20 cans per day for each decade.

The percentage of cans that regular CSD consumers drink per day is greatly proportioned to two or fewer. Over 55% of those who drink colas regularly drink two or fewer. Thirty percent drank between 3-5 cans per day. Only 6% drank 6 or more cans per day.

In this study, comparison of occupation and CSD consumption indicated that persons in sales drank the most cola at 2.61 cans per day. Laborers also consumed a high amount of CSD products with 2.53 cans per day. The lowest consumer was the homemaker, who drank only 1.21 cans per day.

In comparison of income and CSD consumption, persons in the \$15,000 to \$24,999 annual income

category were the only ones who averaged over 2 cans per day. At the bottom of the range were persons with annual incomes greater than \$55,000, who drank less than 1 can per day.

Comparing CSD consumption to education levels, those who attended college without receiving a degree consumed nearly 1 more can per day than those in the other categories. A portion of this figure may be accounted for by the high number of college students who participated in this study, since college age people consume a high amount of soft drinks.

Correlating CSD consumption to self-described fitness levels, those who believed they were in excellent or good physical condition consumed more CSD products than those who believed they were in average or below average condition.

Responding to caffeine's effect, over 50% of CSD consumers reported that it keeps them awake. Just over 20 stated it relaxes them and less than 10% stated it makes them jittery.

### Tea Products

Tea is another beverage that is consumed world-wide and also contains caffeine. Of those in this study, 65% consume tea on a regular basis. Of that 65%, nearly 40% drink only 1 cup or glasses per day. Women consume a slightly larger amount of tea

than men. Women of this population drank 1.40 servings per day, as compared to men who drank on 1.19 servings per day. Of those regular tea consumers, the difference is near the same for women and men, 2.12 servings and 1.90 servings respectively.

Age range comparisons to tea consumption showed that persons between 30-39 years consume the most tea--over one and a half servings per day. The group that consumed the least amount, 1.19 servings per day, was between 20-29 years.

Tea was consumed most by persons who responded in the clerical occupation category with 1.56 servings per day. The lowest amount reported was from students who drank less than one cup per day with 0.87 servings.

In comparison of income and tea consumption, those who make \$25,000-\$34,999 consume just over one and one half servings per day, as opposed to those who make \$45,000-\$54,999 and annually consume the least , just over 1serving per day.

The comparison of tea consumption to educational levels indicates that all tea consumption levels were near one and one half servings per day, with the exception of persons in the post-graduate category, which was just over one serving per day.

The comparison of tea consumption to self-described fitness level showed that as tea consumption increased fitness category decreased, with

the exception of those in the below average category, which was slightly above the rate persons responding in the average category.

Responding to Caffeine's effect, nearly 50% of regular tea consumers stated that it keeps them awake. Another 23% reported relaxation, and just over 10% responded getting jittery.

To examine the levels of caffeine consumption for each of the categories in this study, we must assume caffeine levels for each of the products. We will assume coffee contains 100 milligrams per cup, tea contains 70 milligrams per cups or glass, and cola drinks contain 40 milligrams per can (12-ounce).

With these assumptions, our study indicates woemen consume more caffeine than men for the surveyed population. In this study, women consumed 389.4 mgs. of caffeine per day, men only 346.1 mgs./day.

In an age comparison, persons in the 60-69 age category consumed the most caffeine in our survey with 472.3 mgs. of caffeine per day. The lowest consumption rate in our study was those in the 20-29 age range with only 286.3 mgs. caffeine per day. The other surveyed age ranges consumed over 400 mgs. of caffeine per day (see Table XXIV).

TABLE XXIV  
 CAFFEINE CONSUMED PER DAY BY AGE

Age range	mgs./caffeine consumed/day
20-29	286.3
30-39	443.4
40-49	438
50-59	453
60-69	472.3

The examination of occupation categories shows persons responding as laborers consumed the most caffeine, 514.3 mgs. per day. This was followed closely by persons.

In administrative and managerial positions who consume 500.4 mgs. per day. The lowest consumption level of caffeine was shown by students, with only 201.1 mgs. per day (see Table XXV).

TABLE XXV  
 CAFFEINE PER DAY BY OCCUPATION

Occupation	mgs. caffeine consumed/day
Laborer	514.3
Administrative/Managerial	500.4
Professional/Technical	425.3
Homemaker	381.4
Sales	353.7
Clerical	327.6
Student	201.1

In comparisons of income ranges, persons who annually make more than \$45,000 consume more caffeine, 452.9 mgs. per day, than those in lower income categories. The lowest consumption level, 314.1 mgs. per day, belongs to those who make less than \$15,000 annually (see Table XXVI).

TABLE XXVI

## CAFFEINE PER DAY BY INCOME RANGE

Income Range in \$	Mgs. caffeine consumed/day
< 15,000	314.1
15,000-24,999	413.2
24,000-34,999	421.4
35,000-44,999	387.2
> 45,000	452.9

Comparing educational levels shows that college graduates consume the most caffeine at 426.6 mgs. per day, and persons who attended college but did not or have not received degrees consume the least caffeine, 380.4 mgs. per day (see Table XXVII).

TABLE XXVII

## CAFFEINE PER DAY BY EDUCATION

Educational Level	Mgs. caffeine consumed/day
High school grad	397.4
Attended college	380.4
College graduate	426.6
Post-graduate	410

Persons in the average fitness category consumed the largest amount of caffeine, 450.8 mgs. per day. The lowest rate of consumption was reported by those in the excellent category, only 245 mgs per day (see Table XXVIII).

TABLE XXVIII  
CAFFEINE PER DAY BY FITNESS LEVEL

Fitness Level	Mgs. caffeine cafflene/day
Excellent	245
Good	377.2
Average	450.8
Below average	390.9

#### Summary and Conclusions

Although at the present time caffeine has not been cited as causing serious health hazards, on-going research shows that caffeine can influence and affect many physiological systems. This study attempted to isolate specific categories of a population segment that could be at risk if health hazards pertaining to caffeine consumption are proven in the future.

The product studied most extensively was coffee, which was consumed most by persons over the age of 50. Even though coffee consumption is on the decline, over 60% of those who participated in this study drank coffee regularly.



CSD consumption was also surveyed. Cola products were consumed more by persons under the age of 40. CSD consumption has, in recent years, increased to higher levels than coffee consumption in the United States. This study indicates the trend of the younger generations to be drinking less coffee and more CSD products

Tea consumption, another area studied, was shown to be fairly constant through age categories, near one and one-quarter servings per person per day, with the exception of those in the 30-39 age range who consumed slightly more than one and one-half servings per person per day.

Each of these product's consumption levels were compared by gender, occupation categories, income range, educational levels, and self-described fitness levels.

At this time caffeine consumption has not shown to have serious health implications, if and when it does, some people will begin reduce consumption. But there will still be some people who will not acknowledge these possible affects, and continue to consume elevated amounts, much in the way smoking is viewed in today's society.

Future research could involve the isolated groups found in this study to more closely identify their habits and routines and to consider why and how these

populations consume high levels of caffeine-containing products. If future research does indeed isolate major health problems in conjunction with caffeine consumption, the populations identified in this study may need more observation and education as to the effects of caffeine intake. If caffeine is viewed as a source of alertness, identifying persons who use caffeine in this manner can be studied. Populations that maintain extended periods of alertness, such as people in the transportation industry or persons involved in shift work.

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APPENDIX 1

OKLAHOMA STATE UNIVERSITY  
CAFFEINE CONSUMPTION QUESTIONNAIRE

OKLAHOMA STATE UNIVERSITY  
CAFFEINE CONSUMPTION QUESTIONNAIRE

Survey participation is voluntary. All information will be confidential. Participation does not waive your legal rights or release the institution from liability for negligence.

Age \_\_\_\_\_ Sex \_\_\_\_\_ Weight \_\_\_\_\_ Height \_\_\_\_\_

COFFEE

Number of cups (6 oz.) per week day \_\_\_\_\_

Type: (circle one) 1 drip 2 percolated 3 decaffeinated 4 instant

How long have you been drinking that amount \_\_\_\_\_

SOFT DRINKS

Number of cans or glasses (12oz.) per week day \_\_\_\_\_

Brand: (circle one) 1 Coco-Cola or Diet Coke 2 Pepsi or Diet Pepsi

3 Dr. Pepper 4 Mountain Dew

5 Other \_\_\_\_\_

TEA (iced or hot)

\_\_\_\_\_ Glasses/Cups (circle one) per week day

CHOCOLATE (any form)

\_\_\_\_\_ Type usually consumed \_\_\_\_\_ per week day

MEDICATION

(pain relievers or cold medicine-aspirin, dristan, etc.)

\_\_\_\_\_ Type or Brand \_\_\_\_\_ per week day

Do you take "stay awake" medication or diet pills? \_\_\_\_\_ per day

How does caffeine affect you?

\_\_\_\_\_ keeps me awake

\_\_\_\_\_ makes me jittery

\_\_\_\_\_ relaxes me

\_\_\_\_\_ other (explain) \_\_\_\_\_

Why do you drink coffee? (rate 1-5; 5 best reason)

\_\_\_\_\_ enjoy the taste

\_\_\_\_\_ to concentrate on my work

\_\_\_\_\_ to chat with fellow workers

\_\_\_\_\_ to wake up in the morning

\_\_\_\_\_ To help me stay alert during the day

\_\_\_\_\_ other (explain) \_\_\_\_\_

RACE

American Indian  
 Asian or pacific islander  
 Black  
 Hispanic  
 white  
 Other \_\_\_\_\_

EDUCATION COMPLETED

8th grade or less  
 9th-11 grade  
 12th grade  
 13-15 years  
 16 years (college grad)  
 17 or more (grad school)

USUAL OCCUPATION

Professional/Technical  
 Farmer  
 Managerial or administrators  
 Clerical  
 Sales  
 Service worker  
 Labcrer  
 Armed-Forces  
 Homemaker  
 Student  
 other \_\_\_\_\_

INCOME CATEGORY

\$15,000 or less  
 \$15,000-\$25,000  
 \$25,000-\$35,000  
 \$35,000-\$45,000  
 \$45,000-\$55,000  
 \$55,000-\$75,000  
 \$75,000 or more

Which would best describe your fitness level?

Excellent  
 Good  
 Average  
 Below average  
 Poor

THANK YOU!



APPENDIX 2

OKLAHOMA STATE UNIVERSITY

INTERNAL REVIEW BOARD

APPROVAL

INSTITUTIONAL REVIEW BOARD  
FOR HUMAN SUBJECTS  
OKLAHOMA STATE UNIVERSITY

Proposal Title: Demographic Survey on Caffeine Consumption

Principal Investigator: Bert H. Jacobson/Bret Bouher

Date: March 15, 1989 IRB # AS-89-022

-----  
This application has been reviewed by the IRB and

Processed as: Exempt  Expedite  Full Board Review   
Renewal or Continuation

Approval Status Recommended by Reviewer(s)

Approved  Deferred for Revision   
Approved w/Provision  Disapproved

Approval status subject to review by full Institutional Review Board at  
next meeting, 2nd and 4th Thursday of each month.  
-----

Comments, Modifications/Conditions for Approval or Reason for Deferral or  
Disapproval:

Signature:  Date: March 16, 1989  
Chair of University Board

✓  
VITA

Bret J. Bouher

Candidate for the Degree of  
Master of Science

Thesis: DEMOGRAPHIC STUDY ON CAFFEINE CONSUMPTION

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