UNLV | UNIVERSITY LIBRARIES

UNLV Theses, Dissertations, Professional Papers, and Capstones

5-2011

Calcium supplemental usage and potential health issues sssociated with the rate of usage in Las Vegas, NV

Tanesha Nicole Moss
University of Nevada, Las Vegas

Follow this and additional works at: https://digitalscholarship.unlv.edu/thesesdissertations

Part of the Public Health Commons, and the Vital and Health Statistics Commons

Repository Citation

Moss, Tanesha Nicole, "Calcium supplemental usage and potential health issues sssociated with the rate of usage in Las Vegas, NV" (2011). *UNLV Theses, Dissertations, Professional Papers, and Capstones*. 1017.
http://dx.doi.org/10.34917/2356137

This Thesis is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Thesis in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Thesis has been accepted for inclusion in UNLV Theses, Dissertations, Professional Papers, and Capstones by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

CALCIUM SUPPLEMENT USAGE AND POTENTIAL HEALTH ISSUES ASSOCIATED WITH THE RATE OF USAGE IN LAS VEGAS, NV

by

Tanesha Nicole Moss

Bachelor of Science
University of California, Los Angeles
2007

A thesis submitted in partial fulfillment
of the requirements for the

Master of Public Health
Department of Epidemiology and Biostatistics
School of Community Health Sciences
Division of Health Sciences

Graduate College
University of Nevada, Las Vegas
May 2011

Copyright by Tanesha Nicole Moss 2011
All Rights Reserved

THE GRADUATE COLLEGE

We recommend the thesis prepared under our supervision by

Tanesha Nicole Moss

entitled

Calcium Supplemental Usage and Potential Health Issues Associated with the Rate of Usage in Las Vegas, NV

be accepted in partial fulfillment of the requirements for the degree of

Master of Public Health
School of Community Health Sciences

Michelle Chino, Committee Chair

Chad Cross, Committee Member

Shawn Gerstenberger, Committee Member

Timothy Bungum, Committee Member

Sally Miller, Graduate Faculty Representative

Ronald Smith, Ph. D., Vice President for Research and Graduate Studies
and Dean of the Graduate College

May 2011

ABSTRACT

Calcium Supplement Usage and the Potential Health Issues Associated with the Rate of Usage in Las Vegas, NV

by

Tanesha Nicole Moss

Dr. Michelle Chino, Examination Committee Chair
Professor of Public Health
University of Nevada, Las Vegas

Calcium is a very important nutrient and as such, it is very important that all humans consume sufficient amounts. However, some calcium supplements have been known to contain small quantities of lead. This research project used a retrospective approach to explore the trade-off between the benefits of calcium vs. the potential lead exposure amongst people who are taking these supplements. A survey consisting of 10 questions was used to try to assess the rate of consumption of specific types of calcium supplements. This research project obtained lead levels in calcium supplements from previous research and applied that data into this research project using the assumption that the levels were consistent to currents levels of lead in calcium supplements. The Mann-Whitney and Chi-Square tests were used to analyze the data, since it was determined that the continuous variables in the data were non-normal and the other variables were categorical. Significance was determined for $\alpha<.05$. It was found that women consume more milligrams of calcium per day when compared to men and they also as have a higher exposure to lead as a result. The research also found that there is a positive association between age and the length of time a person has been consuming calcium supplements.

ACKNOWLEDGEMENTS

I would like to acknowledge the following people because without their assistance I would not have been able to complete this research project: Dr. Michelle Chino, Dr. Chad Cross, Dr. Shawn Gerstenberger, Dr. Timothy Bungum, Dr. Laura Kruskall, Dr. Sally Miller, and Ronnie Bullocks. I would also like to thank the various mall and grocery store locations within the Las Vegas valley that allowed me to conduct my surveys on their property. I would also like to thank those individuals that took the time to participate in this research project by filling out one of my surveys, without them giving up their time, this would not have been possible. I would also like to thank my family and friends who helped to encourage me throughout my journey. And last, but not least, I would like to thank the School of Community Health Sciences which challenged me to be the best student I could be and for giving me the knowledge to achieve my dream.

TABLE OF CONTENTS

ABSTRACT iii

ACKNOWLEDGEMENTS iv

LIST OF TABLES vi

CHAPTER 1 INTRODUCTION 1
- Purpose of the Study 1
- Specific Aims 3
- Significance of Study 3

CHAPTER 2 LITERATURE REVIEW 5
- Calcium and its Significance to the Human Body 5
- Lead and its Relationship to Calcium 7

CHAPTER 3 METHODOLOGY 11
- Research Design 11
- Study Participants 12
- Measurements 13
- Data Collection 13
- Data Analysis Technique 14
- Human Subject's Protections and Ethical Considerations 14

CHAPTER 4 DATA ANALYSIS 15
- Study Population 15
- Analysis of Individuals Taking Calcium Supplements 17
- Analysis of Individuals Not Taking Calcium Supplements 23

CHAPTER 5 RESULTS 26
- Discussion of Results and Conclusions 26
- Limitations and Recommendations for Further Study 29

APPENDIX 31
- Supplemental Data 31
- Survey 43

REFERENCES 44

VITA 46

LIST OF TABLES

Table 1 Descriptive statistics for all of the participants in the study..... 16
Table 2 Overall Statistics for the entire study population along with the variable used to group the data 16
Table 3 Type of supplements participants are taking by type as well as the average amount of calcium, average potential lead threat, average length of time individuals have been taking supplements, and average number of supplements individuals are taking separated by sex and race..... 18
Table 4 Statistics for individuals who said that they take calcium supplements or multivitamins with calcium along with the variable used to group data..... 21
Table 5 Average amount of Calcium taken by people (age categories)..... 22
Table 6 Reasons participants gave for not taking any calcium supplements 24
Table 7 Statistics for individuals who said that they do not take any calcium supplements along with the variable the data was grouped by 25

CHAPTER 1

INTRODUCTION

Purpose of the Study

Calcium is a vital and necessary nutrient that assists in carrying out various processes in the body. These processes include the regulation of the heart and other muscles in the body, regulation of neural pathways by acting as a second messenger, and control of bone and tooth strength (Power, M. et.al, 1999). In addition to the effect calcium has in these well understood pathways, there has been research conducted in the last 10-20 years to suggest that the level of calcium intake may also be involved in reducing cholesterol levels by increasing the amount of HDL in the body, reducing the risk of colon cancer and the recurrence of colon polyps, reducing tooth loss, reducing blood pressure in people suffering from hypertension, preventing kidney stones made of calcium oxalate, stimulating lipolysis in obese individuals to help them to lose weight, and reducing symptoms of PMS (Moyad, M., 2003). Due to the myriad of health benefits that may result from an increase in calcium intake in both males and females, it is important that all individuals are consuming an adequate amount of calcium daily. In order to ensure sufficient calcium in their diets, many people in this country take calcium supplements.

As a result of taking calcium supplements people may also be exposed to increased amounts of lead due to the existence of lead in calcium supplements. There is conflicting evidence that shows that calcium can be used as a protective agent against lead absorption in rats (Fullmer, C. and Rosen, J., 1990) and in pregnant women (Ettinger, A. et.al, 2009) but there is other research that suggests that calcium supplement intake may cause individuals who are taking the supplements, to minimally increase their exposure to

lead due to the amount found in the supplements (Gulson, B., et.al., 2001, Gulson, B., et.al., 2003, and Ross, E., et.al (2000). Since there is conflicting research on the topic and a limited understanding of the calcium/ lead pathway in the body, it is important to gain as much of an understanding of the rate of exposure to lead and usage of calcium by adults consuming calcium supplements. Currently the United States Environmental Protection Agency has not set an acceptable level of lead that individuals can be exposed to (ATSDR, 2007) which means that even a minimal exposure to lead is too great when one considers the number of adverse health effects associated with lead exposure, which include: encephalopathy, high blood pressure, decreased glomerular filtration rate, neurobehavioral and neuropsychological problems, reduced fertility, cancer, and death (ATSDR, 2007). Therefore it is important to understand the average potential intake of lead that an individual may be consuming as a result of taking calcium supplements in order to understand the possible amount of lead exposure for calcium supplement taking adults in the Las Vegas valley in order to determine whether or not that is an acceptable level of lead exposure considering the numerous health benefits of taking calcium supplements.

Overall, this research project will seek to understand whether or not there is a specific demographic of people that are consuming more calcium supplements than others and if they have an increased amount of lead exposure as a result. The population of interest for this research project is adult males and females ages 18 and above because these individuals are members of the adult population that could benefit from increasing their calcium intake through the use of calcium supplements and multivitamins. This research project will collect data on those who take calcium supplements and those who do not

take calcium supplements, and compare their reasons for taking supplements and their knowledge of the potential for increased lead exposure. It is expected that Caucasian females will have an increased use of calcium supplements due to the knowledge that this group is more likely to suffer from osteoporosis in old age than other groups.

The Specific Aims of this project are:

1. To find out the average amount of calcium being consumed by individuals in the study.
2. To find out the average duration of time that these individuals have been consuming calcium supplements.
3. To find out if one group of individuals is more likely than others to consume calcium supplements.
4. To find the average amount of lead individuals in the Las Vegas valley may be exposed to. (This calculation is an estimate based on values obtained by researchers in previous research and as a result, this research project will not differentiate average lead consumption by type of supplement.)
5. To find out reasons why certain individuals may choose not to take calcium supplements.

Significance of Study

The main purpose of this study is to explore the trade-off between the benefits of calcium vs. the potential lead exposure among people who take these supplements. This research project will seek to understand what demographic of people are more likely to take calcium supplements and if they can consume enough calcium supplements to cause

a potential health problem due to the presence of lead in the supplements. The aforementioned specific aims of this project will be considered in hopes of understanding these relationships. This study will look at whether or not one group is more likely than another to consume calcium supplements in order to have a foundation for other research to determine the reasons why the other groups are not consuming as much calcium so that all demographics within the US understand the overall benefits of taking calcium supplements. This research project also takes into account the reasons people gave for not taking calcium supplements in an attempt to assist in the process of understanding these reasons. It is also important to see how long and how much calcium individuals are consuming from calcium supplements in order to gain an understanding of whether the usage is long term or short term and whether individuals are consuming a high enough amount of calcium to have an effect on their overall health. The U.S. Surgeon estimates that people aged 9-18 should be consuming 1300 mg calcium/day, 19-50 1000 mg/day, and 51 and above 1200mg/day (U.S. Surgeon General, 2004). In addition to collecting this information, it is also important to find out the average exposure to lead by individuals consuming all types of calcium supplements since calcium supplements are one of the most popular agents used by individuals to prevent or treat calcium deficiency and because of the health risks associated with lead consumption.

CHAPTER 2

LITERATURE REVIEW

Calcium and its Significance to the Human Body

Calcium is a bivalent cation that is used in a lot of different biochemical reactions that aid the body in carrying out numerous processes. Its wide usage and necessity to the body has caused the scientific community to refer to calcium as a nutrient or substance that is vital to the everyday functioning of the body. Calcium can be found in various forms in nature, yet once stored in the human body, it is primarily found in the teeth and bones (Power, M., et.al 1999 and Sunyecz, J. 2008). The abundance of calcium in the teeth and bones highlights its importance to the human body, especially to these structures. Calcium is widely used in the body as a second messenger, a substance used to signal various processes in the body, such as muscle contraction and maintenance of normal heart contractions and to maintain strong and healthy bones and teeth (Power, M. et. al 1999). Without adequate amounts of calcium from the diet, also known as hypocalcemia, adverse health reactions can affect the overall quality of life of the individual suffering from hypocalcemia. These adverse reactions can include tetany, which is prevented by calcium and can lead to death due to a lack of oxygen that is traveling to the brain, tooth loss and osteoporosis or osteopenia, both of which result from bone loss (Power, M., et.al 1999 and Moyad, M., 2003). Bone is broken down in response to inadequate amounts of calcium in the blood. In order to break down bone, the body produces increased amounts of parathyroid hormone and osteoclasts which leads to higher levels of calcium in the blood (Power, M., et. al 1999 and Sunyecz, J., 2008). One of the causes of this reaction is an inadequate consumption of calcium from the diet. In order to prevent these adverse

health reactions the US Surgeon General has set recommended daily consumption rates of calcium, by age, 1300mg/day aged 9-18, 1000 mg/day aged 19-50, and 1200mg/day age 51 and above (US Surgeon General, 2004).

In addition to the well understood effects that calcium has on the bone, teeth, and muscles, there has been research conducted in the last 20 years to suggest that calcium may also be involved in regulating other processes in the body such as hypertension, colon cancer, obesity, hypercholesterolemia, and Pre- menstrual syndrome (Moyad, M., 2003). Hypertension is known as high blood pressure and it affects 24% of Americans every year (Mayad, M., 2003). If it is not regulated, it can lead to cardiovascular disease and can ultimately cause death. Research has shown that increased consumption of calcium in individuals suffering from hypertension may decrease blood pressure in those individuals. With respect to colon cancer, it is the second leading cause of cancer death that affects both males and females (National Center for Health Statistics, 2011). Research has shown that calcium consumption may reduce the risk of recurring polyps and reduce the risk for developing colon cancer in general (Moyad, M., 2003). Obesity is a growing problem in this country, and can lead to diabetes type II as well as hypertension. Calcium may stimulate lipolysis in people suffering from obesity and reduce their weight (Moyad, M., 2003). Hypercholesterolemia, also known as high cholesterol, is a significant health problem in this country that results from high amounts of LDL (low density lipoprotein) and low levels of HDL (high density lipoprotein) (Moyad, M., 2003). Without reducing cholesterol levels, plaques can develop in the arteries and veins which may lead to cardiovascular disease and death. Research has shown that calcium intake can lead to increased amounts of HDL which would result in

decreased levels of cholesterol in the blood (Moyad, M., 2003). Pre- menstrual syndrome, commonly known as PMS, disrupts the lives of many women in this country each year. Calcium consumption may reduce PMS symptoms, such as pain, water retention, and food cravings (Moyad, M., 2003). Due to the long list of benefits associated with calcium intake, it is important that all Americans, especially those aged 18 and above are consuming adequate amounts of calcium on a daily basis. Yet the question persists of whether or not these benefits outweigh the problems associated with consuming lead that may be found in calcium supplements.

Lead and its Relationship to Calcium

Lead is a very toxic substance that can cause a number of adverse health effects which includes both cancer and death if absorbed in very high quantities (ATSDR, 2007). The US EPA has classified lead compounds in the B2 class for possible carcinogens (California EPA, 2002). According to the EPA, acute exposure to lead can cause dullness, irritability, poor attention span, epigastric pain, constipation, vomiting, convulsions, coma, and death in adults (ATSDR, 2007), whereas chronic exposure to lead can cause cardiovascular effects, musculoskeletal effects, renal effects, cataracts, neurobehavioral effects, as well as others in adults. Due to the number of adverse health effects of lead, the California EPA has determined that the amount of lead that can be consumed on a daily basis is 8.5×10^{-3} mg of lead/ kg of substance and the US EPA refuses to set an RfD, also know as reference dose, for inorganic lead because adverse health effects can occur at very low levels, in which case an allowable level of lead exposure can not been determined (California EPA, 2002 and ATSDR, 2007). According

to the US EPA an RfD "…is an estimate…of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD is generally expressed in units of milligrams per kilogram of bodyweight per day (mg/kg/day)" (EPA, 1993).

The danger posed by lead is inherent in its ability to be absorbed into the body, by various tissues and organs, including the liver, kidneys, brain, bone, and in the blood (ATSDR, 2007). One of the problems with lead absorption is that once it is absorbed, it can stay in the body and cause chronic health effects over an unknown period of time. According to the ATSDR 94% of the body's total burden of lead can be found in the bones. This poses a potential problem because the half-life of lead in the body can be anywhere from 30 days to 27 years due to the added absorption of lead by the bones (ATSDR, 2007). This is a problem because if lead is not quickly being removed from the body, it can accumulate in the bone and release at any time over the course of an individual's life. Once released from the bones, lead enters into the blood and can flow to other tissues and organs. Some studies have suggested that the release of lead from the bones to the blood may happen via diffusion once the bones' affinity for calcium is stronger than its desire for lead (ATSDR, 2007). Studies have shown that by increasing the uptake of calcium, lead absorption is decreased (ATSDR, 2007), which may suggest that increased calcium uptake may increase the amount of lead in the blood. Once released into the blood, lead can flow into various parts of the body using iron, calcium channels, and transport proteins to transport itself into various parts of the body and disrupt normal functioning (ATSDR, 2007). The long half-life of lead makes it difficult to get rid of once it has been absorbed into the body. The only true way to prevent the

accumulation of lead in the body and the health effects associated with chronic and acute exposure to lead is to eliminate an individual's overall exposure to lead.

The federal government has put into affect various cautions to prevent exposure to lead and researchers have performed various studies to make sure that substances like calcium supplements are not violating the guidelines that have been set. In 2000, a study was published, which looked at calcium supplements and whether or not they met the 1999 criteria for acceptable lead levels in California (Scelfo, G. and Flegal, R., 2000). The acceptable level of lead per day was set at 1.5 µg per daily dose of calcium. Approximately, two-thirds, or 91, of the supplements tested, failed to meet the new criteria. The California standard is one of the few that has been published on this topic, and is actually fairly lineate, considering that the desired level for lead consumption, set by the Agency for Toxic Substances and Disease Registry, is 0µg per day (ATSDR, 2007). The inability for certain products to adhere to this, somewhat lineate, standard could prove to be potentially problematic for all US citizens if a conclusive link is found between the use of calcium supplements and lead exposure. Currently, there is conflicting evidence as to whether or not lead poses a potential health risk in the presence of calcium due to the fact that there may be a decrease in the absorption of lead in the presence of calcium (Gulson, B., et.al., 2001; Gulson, B., et.al., 2003; Gulson, B., et.al. 2006). The problem with the absorption of lead by humans is two-fold. It depends both on current exposures to lead as well as a cumulative exposure which is due to the absorption of lead over time. One study which looked at blood lead levels in adults showed higher levels of lead absorption in the elderly and immigrants who come from countries that still use leaded fuel, which gives ammunition to the claim of a potential cumulative absorption of

lead in the human body (McKelvey, W., et.al., 2007). Therefore any absorption of lead in the body poses a potential risk to the individual consuming the lead, and could lead them to suffer any number of adverse health effects due to their lead exposure whether from a chronic or current source. The elderly seem to be one of the populations most at risk for lead consumption due to their potential cumulative absorption of lead and increased use of calcium supplements to combat such diseases as osteoporosis.

The risk posed by calcium supplements seems to be dependent on the source of the supplement. There are approximately 5 different sources of calcium supplements for adult consumption, not including milk, which include dolomite, refined, chelated, oyster shell, and bonemeal. Based on previous studies, there appears to be a stratification of lead consumption based on the source of the calcium supplement (Amarasiriwardena, D., et.al., 1998; Ross, E., et.al. 2000; Scelfo, G. and Flegal, R., 2000; Diment, M., et.al., 1995; Bourgoin, B., et. al., 1993). There is conflicting evidence as to which type of supplement exposes individuals to the highest amount of lead, but the more natural sources, such as bonemeal and oyster shell, seem to garner the highest exposure.

CHAPTER 3

METHODOLOGY

Research Design

This study is a retrospective study that uses a combination of data collection and previous research in an attempt to ascertain the factors that influence calcium supplement usage in Las Vegas, NV. The hypothesis for this study is that the benefits of using calcium supplements will influence the frequency in which people are using calcium supplements. It is also assumed that factors such as age, sex, and race will influence the rate of consumption because of the perceived benefits of calcium usage for people of a specific age, sex, or race. In addition the aforementioned variables length of usage of supplements or multivitamins, consumption rate, and reason for taking calcium supplements, or multivitamins, was collected.

The data was collected using a survey which contained 11 questions which were believed to give a good understanding of calcium consumption in the Las Vegas valley, as well as the demographic data on the individuals consuming the supplements. Individuals age 18 and above were asked to participate in the survey, if the individual wanted to participate in the survey, he or she was allowed to participate whether or not he or she was presently taking calcium supplements or multivitamins that contain calcium. Once the data was collected individuals were separated into three groups to get a better understanding of the data, those who were presently taking calcium supplements (these individuals answered yes to question 1), those who did not presently take calcium supplements (these individuals answered no to question 1), and those who participated in the survey to do comparative statistics between the two groups. The data concerning the

amount of lead that is contained in each type of calcium supplement was collected from various articles written by researchers in the past 14-16 years on the subject in the United States. This data was used to estimate the average amount of lead in micrograms (µg) per milligram (mg) of calcium, per day, in order to estimate the potential amount of lead a person may be exposing themselves to.

A total of 250 people participated in this study. 142 participants stated that they were presently taking calcium supplements. 108 individuals surveyed replied that they were not taking calcium supplements, with varying reasons for not taking them. Participants were surveyed in front of grocery stores and inside of various malls within the Las Vegas valley. A convenience sample was used in order to obtain a large enough sample size of people to participate in the survey so that statistics could be computed for the individuals who were and those that were not participating in the survey. The locations for data collection were selected in order to represent the diverse population of people throughout the Las Vegas valley.

Study Participants

As stated above, 250 individuals were surveyed. The only requirement to participate in the study was that individuals had to be aged 18 or above. To derail recall bias, an initial screening of various brands of calcium supplements or multivitamins with calcium was conducted. Pictures of the different brands were taken, along with the names of stores where it could be purchased, the type of calcium used in the supplement, and the amount of calcium in each calcium supplement. A convenience sampling technique was used to collect the analyzed data. Surveys were collected from participants as they were

walking through grocery stores and malls, around the Las Vegas valley. In some cases permission had to be obtained from the management at certain establishments before survey data could be collected. All data was collected within the same week from various locations in Las Vegas with differing demographics of people. This sampling technique was used in order to collect a variety of surveys from people of varying sexes, races, and ages throughout the Las Vegas valley.

Measurements

The predictor variables for this study are age, sex, and race. The outcome variable is the amount of calcium being consumed each day. The primary purpose of this study is to explore the trade-off between the benefits of calcium vs. the potential lead exposure among people who take these supplements. There were a number of potential confounding variables for this study and for this reason, each of these variables, which include age, sex, and race, were tested to see what affect, if any, they had on the predictability of the amount of calcium an individual is consuming. By including all of these variables in the study, it was assumed that reliability in the validity of the statistical results could be attained. All of the analyzed data was organized into categories and contingency tables were used to test the significance of the association between variables. Statistical significance was assessed at $\alpha<.05$. Where appropriate, 2x2 contingency table analysis was used in order to obtain the relative risk and odds ratio for the data. The Chi Squared Statistic was used to approximate significance.

Data Collection

As stated above, data was collected using a survey. Once collected, the data was organized in an excel file until it was ready to be analyzed. Once it was ready to be analyzed, it was transferred to an SPSS file and analyzed using the correct statistical analyses.

Data Analysis Technique

The resulting data was analyzed using contingency tables and the Chi- Squared statistic. The statistical program known as SPSS was used to carry out the statistical analyses. This statistical technique was appropriate since all of the data analyzed was categorical.

H_o- The perceived benefits of taking calcium supplements does not significantly influence the rate of usage of calcium supplements.

H_a- The perceived benefits of taking calcium supplements influences the rate of usage of calcium supplements.

Human Subject's protections and ethical considerations

This project was submitted to the UNLV Institutional Review Board (IRB) for approval since this study involves work with human subjects. The project was declared exempt due to the lack of collection of identifiable data on the research subjects as well as the use of a survey to collect necessary data.

CHAPTER 4

DATA ANALYSIS

Study Population

A total of 250 individuals participated in this study and the demographic representation of this group of individuals can be found in Table I. Of those who participated in the study, 142 individuals stated that they were currently taking calcium supplements and 108 stated that they were not currently taking any supplements or multivitamins with calcium. The average age for those participating in the study was approximately 44 with ages ranging from 18 to 85. The average age for who were currently taking calcium supplements was slightly higher at 47, with ages that ranged from 21 to 75, and was slightly lower at 39 for those that were not currently taking calcium supplements, with ages that ranged from 18 to 85. There were significantly more women than men participating in the study. These women outnumbered men not only in total number of participants in the study but there were more women who were taking or not taking calcium supplements than their male counterparts. When looking at the number of individuals that participated in the study by race, there were a larger number of Caucasians, 184, that participated when compared to any other racial group, 15, 42, and 9 for Hispanics, African Americans, and Asians respectively.

Once all of the initial demographic data was collected, preparations were made in order to test for the significance of some of the demographic data for the entire study population. Since much of the data is categorical, age was also categorized in order to carry out a Chi-Square Goodness of fit test and race was separated into two groups, Caucasian and Other, in order to try to minimize the number of counts below 5 and

Table1. Descriptive statistics for all of the participants in the study

Variable	Total	Answered Yes	Answered No
# of participants	250	142	108
Males	94	47	47
Females	156	95	61
Average age ±SD	43.86±14.29	47.42±13.97	39.14±13.36
Caucasian	184	105	79
Hispanic	15	9	6
African American	42	24	18
Asian	9	4	5

prevent the necessity of using Yates' Correction if more than 20% of the counts were under 5. Contingency Tables were created and the results of the significance tests and risk estimates can be found in Table 2. Significance was determined at a level below.05. When analyzing the relationship between Sex and Race, significance was not found. Yet Men were .932 times as likely as women to be Caucasian and the probability of being a race other than Caucasian was 1.052 times more likely if the individual was a man rather than a women. Another analysis was conducted between race and age, and no significance was found between those two variables for the entire study population.

Table 2. Overall Statistics for the entire study population along with the variable used to group the data.

Contingency table variables	Test Statistic	P-value	Odds Ratio	Relative Risk
Sex (Male, Female) vs. Race (Caucasian, other)	Chi Square= .057	.812	.932 (Male and Caucasian)	1.052 (Other and Male)
Race (Caucasian, other) vs. Age Categories	Chi Square= 2.816	.728	N/A	N/A

Analysis of Individuals Taking Calcium Supplements

After analyzing the demographic data for the entire study, the next task involved analyzing the data collected for those individuals currently taking calcium supplements. The first part of this analysis involved obtaining a description of the data collected, which is found in Table 3 and the second part of the analysis involved a statistical analysis of

Calculation

Scelfo, G. and Flegal, R. report the amount of lead in refined calcium supplements as .73±1.60 µg/g in 37 brands.

Amarasiriwardena, D., et.al report the amount of lead in refined calcium supplements as .6± .1, .8±.1, .8±.1, and .2±.1 in 4 brands.

Calculation- .73 x 37= 27.01 n total=53

8x4=3.2 .8x4=3.2 .6x4=2.4 .2x4=.8

27.01 +2.4 +3.2 +3.2+ .8=36.61

36.61/53=.69

SD= $\sqrt{(.1^2 + .1^2 + .1^2 + .1^2 + 1.6^2)/5}$ =.32

Figure 1- Example of calculation of lead exposure mean and standard deviation for refined calcium sources

the variables obtained from the survey for those individuals who were taking calcium supplements carried out on this data, which can be found in Table 4. The data in Table 3 has been organized so that the data for each variable is separated by both the sex and race of those individuals that fall within the listed categories. The table is designed in this way, in order to give a better understanding of the type of supplements individuals are taking, the average length of time they have been taking supplements, the average number of supplements being taken each day, the amount of calcium individuals are taking daily as well as the potential lead exposure that an individual is exposed to

Table 3. Type of supplements participants are taking by type as well as the average amount of calcium, average potential lead threat, average length of time individuals have been taking supplements, and average number of supplements individuals are taking separated by sex and race.

Variable	Total Participants	Female	Male	Caucasian	Hispanic	African American	Asian
Do not know type of supplement they're taking	10	6	4	8	0	2	0
Dolomite (Calcium Magnesium Carbonate)	0	0	0	0	0	0	0
Refined Calcium (Calcium Carbonate, Calcium Phosphate, and Calcium Chloride)	112	75	37	82	8	19	3
Oyster Shell (Natural Calcium Carbonate)	6	4	2	6	0	0	0
Chelated (Calcium citrate, calcium malate, calcium, gluconate, calcium lactate, calcium aspartate, calcium ascorbate, calcium stearate, calcium fumarate, and calcium lysinate)	9	5	4	4	1	3	1
Bonemeal (hydroxyapetite)	5	5	0	5	0	0	0
Average Length of time taking supplements (months)	83.45± 85.53*	87.53± 92.17*	70.46± 68.26*	84.10± 82.80*	52.78± 71.66*	85.95± 106.32*	75± 52.19*
Average number of supplements taken daily	1.57± .87*	1.62± .88*	1.30± .56*	1.53± .81*	1.28±. 44*	1.50± .86*	2.00± 1.15*
Average amount of calcium taken daily (mg)	462.54± 347.62*	519.37 ± 339.16 *	343.63 ± 338.56 *	483.94± 341.62*	281.11± 166.67*	446.18± 427.33*	437.5± 281.0*
Average Potential lead consumption µg lead/mg calcium	.3248± .2926*	.3738± .2965*	.2268± .2610*	.3485± .3036*	.1828± .0866*	.2804± .2961*	.2939± .2033*

*= Standard Deviation

based on the amount of calcium he or she is taking. One of the first steps to organizing the data was to determine the potential lead exposure. This was done, by first collecting data from a number of different scientific papers (Amarasiriwardena, D., et al 1998; Scelfo, G. and Flegal, A. 2000) that indicated the level of lead that could be found in specific types of calcium supplements. This data was extracted from the articles and used to compute the average and standard deviation of lead found in those supplements. An example of this calculation for refined calcium can be found in Figure 1. The resulting averages were used to compute the expected lead exposure, and it was assumed that the same amount of lead would be present in calcium supplements today. The amount of lead estimated to be present in each type of calcium supplement is: .69 ± .32 for refined sources (calcium carbonate and calcium phosphate), .95 ± .27 for oyster shell (natural calcium carbonate), .53 ±.27 for chelated sources (gluconate, lactate, malate, citrate, aspartate, ascorbate, stearate, fumarate, and lysinate), and .1.43 ± .28 for bonemeal calcium (hydroxyapetite). There were no participants taking dolomite, also known as calcium magnesium carbonate. Individuals who didn't know the type of calcium they were taking, or if the type of calcium could not be found by research, were omitted from the columns looking at the average values for the amount of calcium taken each day and the potential lead exposure since there was no way to compute this data without knowing the exact supplements being taken by participants. 10 individuals were omitted from this analysis.

On further analysis of Table 3 a number of trends stand out. There are a lot of individuals taking refined calcium compared to those taking the other types of calcium, either calcium carbonate or calcium phosphate. It also appears that women seem to be

taking more supplements than men. When looking at the data by race, Caucasians are taking the majority of the supplements. Men and women seem to be taking supplements for seventy plus months on average although women appear to be taking the supplements for a longer period of time. When differentiating by race, it appears that all of the racial groups have been taking supplements for a long period of time, at least 70 months, except for Hispanics who have been taking them for almost 53 months on average. On average African Americans have been taking supplements for the longest period of time compared to the other groups, about 86 months, although Caucasians are very close to this average with 84 months. Everyone appears to be taking between 1-2 supplements each day, although Asians are the only ethnic group taking two supplements per day on average. When it comes to the amount of calcium being consumed daily, women are taking significantly more calcium than their male counterparts. When looking at racial differences, Hispanics are taking a lot less calcium than the other racial groups. When looking at a potential lead exposure, women seem to be exposed to more lead than men. Caucasians appear to be exposed to the most lead, whereas Hispanics appear to be exposed the least. Table 5 indicates that individuals aged 51 and above are consuming more calcium than those aged 19-50. The Shapiro- Wilks test for normality was used to test whether or not the data was normally distributed. Normality was not found for any of the above mentioned continuous variables, even after attempting to transform the data using the log and quadratic functions. Therefore non parametric tests were used to analyze the continuous data variables, such as age, length of time taking supplements, number of supplements being taken daily, amount of calcium being taken daily, and daily lead exposure. The other variables in the data set are categorical variables and the Chi

Table 4. Statistics for individuals who said that they take calcium supplements or multivitamins with calcium along with the variable used to group data.

Test Variables	Test Statistic	P-value	Odds Ratio	Relative Risk
Race (Caucasian, other) vs. Age	Z=-.451	.652	N/A	N/A
Sex (male, female) vs. Race (Caucasian, other)	Chi Square- .508	.476	.753 (Male and Caucasian)	1.230 (Other and Male)
Sex (male, female) vs. type supplement (Refined, other)	Chi Square- .30	.862	1.077 (Male and Other)	1.059 (Other and Male)
Age vs. Type supplement (Refined, other)	Z= -.347	.729	N/A	N/A
Race (Caucasian, other) vs. Type (Refined, other)	Chi Square- .375	.540	1.339 (Caucasian and Other)	1.259 (Other and Caucasian)
Length of time taking supplements vs. sex	Z=-1.132	.258	N/A	N/A
Race (Caucasian, other) vs. length of time taking supplements	Z=-.615	.539	N/A	N/A
Sex vs. Amount of Supplements taken daily	Z=-3.788	<.001	N/A	N/A
Race (Caucasian, other) vs. Amount of Supplements taken daily	Z= 1.092	.275	N/A	N/A
Race (Caucasian, other) vs. Potential lead exposure	Z=-1.261	.207	N/A	N/A
Sex vs. Potential lead exposure	Z=-3.950	<.001	N/A	N/A
Age Categories vs. length of time taking supplements	Z=18.71	.002	N/A	N/A
Age Categories vs. Amount of Calcium taken each day	Z=8.915	.112	N/A	N/A
Age Categories vs. Potential Lead exposure	Z=9.755	.082	N/A	N/A

Square analysis was used to calculate statistical significance for these variables. Significance was determined at an $\alpha<.05$.

Table 5. Average Amount of Calcium Taken by people in age categories

Age	Number of people	Amount of Calcium consumed per day mg
19-50	82	421.05±332.8
51 and above	60	514.58±361.47

Table 4 shows results of the statistical analyses for all of the variables used to describe the participants that were taking calcium supplements or multivitamins. The first set of data was analyzed using the Chi-Square goodness of fit test. The data was organized into contingency tables and the categorical data was then analyzed using the Chi-Square analysis. This data, along with the p-value, odds ratio, and relative risk (if attainable) were reported in Table 4. The second part of the analysis used the Mann Whitney U test to test for significance between a few categorical and continuous variables. For some of the analyses age is assessed as a categorical variable and for others it is used as a continuous variable. This distinction comes about because age could not be used as a categorical variable when using the Chi-Square test because more than 20% of the counts were less than 5 each time age was used as a categorical variable and the Yates correction wasn't used to correct this calculation. Instead the Mann Whitney test was used to assess the relationship with age being used as a continuous variable. Statistical significance was found to be present in three of the analyses, Sex vs. the amount of Calcium taken each day, women are higher than men, Sex vs. the amount of potential lead exposure, women are higher than men, and age categories vs. the length of time

taking supplements, the older the participants the longer the amount of time they have been taking calcium supplements until the participant reaches approx. 70 and older and the average amount of time taking the supplements decreases. The odds ratio and relative risks were tabulated for 3 of the relationships and it was found that the odds of being male while also being Caucasian was .753. The probability of being a race other than Caucasian is 1.230 times higher for males than for females. The odds of being a male while not consuming refined calcium, is 1.077. The probability of using a type of calcium other than refined is 1.059 times more likely for males than females. The odds of being Caucasian while using a type of supplement that is not refined, is 1.339. The probability of using a type of calcium supplement other than refined is 1.259 times more likely for Caucasians than for other races.

Analysis Individuals Not Taking Calcium Supplements

After analyzing the data for the individuals currently taking calcium supplements, it was necessary to look at the reasons why people were not taking calcium supplements and whether or not there were any significant findings for those individuals who were not taking calcium supplements. Table 6 looks at reasons why people were not taking calcium supplements and it separates the data by sex and age. The top five reasons whyindividuals were not taking calcium supplements were #1 because the individuals had no reason, #2 they said they got it from their diet, #3 they believed they didn't need # it, 4 they said that the supplements were too expensive, or #5 they never remember to take them and therefore do not bother to try. More men than women said that they did not need them and that they did not like pills, but more women than men said that they did not remember to take the supplements and that they did not take them because their

Table 6. Reasons participants gave for not taking any calcium supplements.

Reasons for not taking supplements	Total	Female	Male	Caucasian	Hispanic	African American	Asian
Too Expensive	9	6	3	6	---	3	---
No reason	37	27	10	24	3	7	3
Get it from diet	19	9	10	17	---	1	1
Do not need them	19	3	16	12	3	4	----
Take Herbs	1	1	---	---	---	1	---
In good shape	1	1	---	---	---	1	---
Exercise	1	1	---	1	---	---	---
Do not remember to take them	9	7	2	8	---	1	---
Doctor never recommended	2	2	---	1	---	---	1
Health reasons	1	1	---	1	---	---	---
Do not believe in them	2	1	1	2	---	---	---
Never thought about it	3	2	1	3	---	---	---
Do not like pills	3	---	3	3	---	---	---
Makes me hungry when take it	1	---	1	1	---	---	---

doctor's never recommended that they should take them. When looking at racial differences, the majority of each racial group was likely to give one of the top five responses mentioned above.

The last analysis conducted on this data looked at the statistical significance of the individuals who were not taking calcium supplements. The Shapiro-Wilks test for normality was used to assess whether or not age was normally distributed for the data set. Age was not found to be normal. The Mann Whitney U test was used to assess the relationship between age and either race or sex because when age was organized into categories, more than 20% of the counts were less than 5 and because age is not normal. Statistical significance was assessed at an $\alpha<.05$. The results of the analyses are listed in

Table 7. In addition to the test statistic and p-value, Table 7 also contains the odds ratio and relative risk for those relationships that allowed for it. Significance was only found for one of the tests. This test assessed sex vs. race. Race was broken into two

Table 7. Statistics for individuals who said that they do not take any calcium supplements along with the variable the data was grouped by.

Test Variables	Test Statistic	P-value	Odds Ratio	Relative Risk
Sex (Male, Female) vs. Race (Caucasian, other)	Chi-Square -6.247	.012	2.823 (Male and Caucasian)	1.465 (Caucasian and Male)
Sex (Male, Female) vs. Age	Z=-1.844	.065	N/A	N/A
Race (Caucasian, other) vs. Age	Z=-1.012	.312	N/A	N/A

categories, Caucasian vs. other. The odds of being male and Caucasian, is 2.823. The probability of being Caucasian is 1.465 times more likely for males than females.

CHAPTER 5

RESULTS

Discussion of Results and Conclusions

The main purpose of this study was to explore the trade-off between the benefits of calcium vs. the potential lead exposure among people who take these supplements. This study has shown that age plays a role in the length of time an individual spends taking calcium supplements, which is important because long term usage of calcium is necessary for the body to continuously receive enough calcium on a daily basis to carry out its everyday processes and to combat the occurrence of disease. This means that if people are educated early about the benefits of taking calcium supplements they may be more likely to continue the habit of taking them in old age. In addition to taking calcium over a long period of time, people also need to be consuming the proper amount of calcium each day. According to the U.S. Surgeon General, adults aged 19-50 should consume 1000 mg of Calcium/day and those age 51 and above should consume 1200mg/day (US Surgeon General, 2004). Based on the data reported from those who were taking calcium supplements, individuals 51 and above are consuming more mg of calcium than those aged 19-50, but neither group is at the level of calcium intake that they need to be at per day, based on the US Surgeon General's recommendations. It can only be hoped that these individuals are consuming enough calcium from their diets to meet these recommendations. Yet women as a group appear to be consuming more calcium supplements than men, probably because women are more aware than men of the benefits that they can accrue by taking calcium supplements. This explains why women were more likely than men to be Caucasian if they were taking calcium supplements

because Caucasian women are known to suffer from osteoporosis are encouraged to start taking calcium supplements early in adulthood in hope of preventing osteoporosis and/or osteopenia later in life. This also explains why men were more likely to not take calcium supplements if they were Caucasian compared to women. This is a problem because calcium is beneficial to both men and women, and both groups need to be made aware of the benefits of calcium usage, especially with the proposed benefits of calcium in a number of diseases, such as hypertension, a precursor to cardiovascular disease, the leading cause of death in this country. Yet although there are a lot of benefits to taking calcium supplements, the question remains as to whether these benefits outweigh the potential for lead exposure.

It appears that the average amount of exposure to lead is highest amongst those groups who are consuming a lot of mg of calcium, from supplements, each day, such as women and Caucasians and is least amongst those who are taking the least amount of calcium each day, which may cause some to conclude that taking calcium supplements is a behavior that may cause some to suffer adverse health effects associated with lead consumption. Yet this may not be the case. As it is still unclear as to whether or not calcium competes with the lead found in the supplements, thus preventing the absorption of lead by the body, and it may be some time before this question can really be answered. In addition to this fact, the average amount of lead being consumed daily is approximately .32µg of lead/mg of calcium which is very small. Although this amount is small, the federal government has not set an acceptable level of lead that can be consumed by the people of the United States. The subject of calcium supplements containing lead is still a hot topic as just last year a scientific paper which looked at lead

in calcium supplements, was published (Rehman, S. et.al, 2010). It seems hasty to jump to a conclusion and decide that people should not take calcium supplements due to the fact that they may be exposed to lead as a result of taking the supplements before it is concluded, with a high degree of certainty, that the exposure actually poses a significant health problem to those individuals consuming them. More research is needed in this field to solve this dilemma, but until then people who are unable to consume enough calcium from their diets, should be encouraged to consume calcium supplements unless they can find a better alternative to deliver the necessary amount of calcium each day.

If people are going to be encouraged to take calcium supplements, researchers must also understand the reasoning behind why some individuals choose not to take calcium supplements. For this reason, data was collected to try to understand these reasons. Statistical significance could not be assessed because the sample sizes were too small to carry out a Chi-Square analysis, therefore the top five reasons why people chose not to take calcium supplements was given in order to better understand them and to figure out a solution to combat these reasons. The top five reasons are as follows: #1 no reason, #2 they said they got it from their diet, #3 they believed they did not need to take calcium supplements, #4 they said that the supplements were too expensive, or #5 they never remember to take them and therefore did not bother to try to take them. These reasons give insight into potential solutions to getting people to take calcium supplements. For those who have no reason, do not remember to take them, or do not believe they need them, education may work best. If the public is educated about the benefits of taking calcium supplements, they may be more likely to put more effort into getting the supplements so that they can take them. For those individuals who say calcium

supplements are too expensive, the above method may work to convince these individuals to buy them in spite of the price, but if they still cannot afford them public health projects could be put into place to help subsidize the cost of the supplements so that everyone can have the ability to take calcium supplements, no matter their socio-economic status. For those who say they get the necessary amount of calcium from their diet, they should also be educated about the benefits of calcium consumption and the daily recommended amount of calcium to be consumed for their age group. They should also be encouraged to calculate their own calcium consumption rate to make sure that they are meeting this requirement.

Limitations and Recommendations for Further Study

There were a few limitations to this study. One of these limitations was a small sample size. Due to the sample size obtained, trends based on race could not be calculated. A second limitation to the study was the use of previous data to determine lead burden, instead of determining it in the lab by using approved methods to figure out the amount of lead in calcium supplements. A third limitation to this study is the omission of individuals who refused to participate in this study. A final limitation was the confinement of the study to the Las Vegas valley. The demographic with the Las Vegas valley may not be similar to others throughout the country, making the data difficult to be generalizable to a larger segment of the population of the United States. Further research is necessary to verify whether or not the data is truly representative of the calcium consumption rate and potential lead exposure for individuals consuming calcium supplements in the Las Vegas Valley and throughout the United States. Further study will

also be necessary in order to continue to understand the reasons why people chose to take or not to take calcium supplements.

APPENDIX

SUPPLEMENTAL DATA

Contingency Tables

Yes and No Only

Crosstabs

[DataSet1] E:\Tanesha Flash drive\Thesis\Thesis yes and no 2.sav

1=male, 2=Female * 1=Caucasian, 2=Other (African American, Asian, Hispanic) Crosstabulation

Count

		1=Caucasian, 2=Other (African American, Asian, Hispanic)		
		1.00	2.00	Total
1=male, 2=Female	1	68	26	94
	2	115	41	156
Total		183	67	250

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.057[a]	1	.812		
Continuity Correction[b]	.008	1	.928		
Likelihood Ratio	.057	1	.812		
Fisher's Exact Test				.883	.462
Linear-by-Linear Association	.057	1	.812		
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.19.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.015	.063	-.237	.813[c]
Ordinal by Ordinal	Spearman Correlation	-.015	.063	-.237	.813[c]
N of Valid Cases		250			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1=male, 2=Female (1 / 2)	.932	.524	1.658
For cohort 1=Caucasian, 2=Other (African American, Asian, Hispanic) = 1.00	.981	.839	1.147
For cohort 1=Caucasian, 2=Other (African American, Asian, Hispanic) = 2.00	1.052	.692	1.601
N of Valid Cases	250		

Crosstabs

[DataSet4] E:\Tanesha Flash drive\Thesis\Thesis yes and no 2.sav

1=Caucasian, 2=Other (African American, Asian, Hispanic) * 1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above Crosstabulation

Count

		1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above						Total
		1	2	3	4	5	6	
1=Caucasian, 2=Other (African American, Asian, Hispanic)	1.00	33	39	45	36	19	11	183
	2.00	14	19	12	11	8	3	67
Total		47	58	57	47	27	14	250

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.816[a]	5	.728
Likelihood Ratio	2.833	5	.726
Linear-by-Linear Association	.711	1	.399
N of Valid Cases	250		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 3.75.

Crosstabs

[DataSet4] E:\Tanesha Flash drive\Thesis\Thesis yes and no 2.sav

1=Caucasian, 2=Other (African American, Asian, Hispanic) * 1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above Crosstabulation

Count

		1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above						Total
		1	2	3	4	5	6	
1=Caucasian, 2=Other (African American, Asian, Hispanic)	1.00	33	39	45	36	19	11	183
	2.00	14	19	12	11	8	3	67
Total		47	58	57	47	27	14	250

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.816[a]	5	.728
Likelihood Ratio	2.833	5	.726
Linear-by-Linear Association	.711	1	.399
N of Valid Cases	250		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 3.75.

Yes Only

Crosstabs

[DataSet3] C:\Documents and Settings\Ron B\My Documents\Tanesha Flash drive\Thesis\Thesis yes only.sav

1=male, 2=Female * 1= Caucasian, 2= Other (Hispanic, Asian, African American) Crosstabulation

Count

		1= Caucasian, 2= Other (Hispanic, Asian, African American)		Total
		1.00	2.00	
1=male, 2=Female	1.00	33	14	47
	2.00	72	23	95
Total		105	37	142

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.508[a]	1	.476		
Continuity Correction[b]	.259	1	.611		
Likelihood Ratio	.501	1	.479		
Fisher's Exact Test				.544	.303
Linear-by-Linear Association	.504	1	.478		
N of Valid Cases	142				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.25.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1=male, 2=Female (1.00 / 2.00)	.753	.345	1.646
For cohort 1= Caucasian, 2= Other (Hispanic, Asian, African American) = 1.00	.926	.745	1.152
For cohort 1= Caucasian, 2= Other (Hispanic, Asian, African American) = 2.00	1.230	.699	2.165
N of Valid Cases	142		

Crosstabs

[DataSet4] E:\Tanesha Flash drive\Thesis\Thesis yes and no 2.sav

1=Caucasian, 2=Other (African American, Asian, Hispanic) * 1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above Crosstabulation

Count

		1=18-29, 2=30-39, 3=40-49, 4=50-59, 5=60-69, 6= 70 and above						Total
		1	2	3	4	5	6	
1=Caucasian, 2=Other (African American, Asian, Hispanic)	1.00	33	39	45	36	19	11	183
	2.00	14	19	12	11	8	3	67
Total		47	58	57	47	27	14	250

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.816[a]	5	.728
Likelihood Ratio	2.833	5	.726
Linear-by-Linear Association	.711	1	.399
N of Valid Cases	250		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 3.75.

Crosstabs

[DataSet3] C:\Documents and Settings\Ron B\My Documents\Tanesha Flash drive\Thesis\Thesis yes only.sav

1=male, 2=Female * 1= Caucasian, 2= Other (Hispanic, Asian, African American) Crosstabulation

Count

		1= Caucasian, 2= Other (Hispanic, Asian, African American)		Total
		1.00	2.00	
1=male, 2=Female	1.00	33	14	47
	2.00	72	23	95
Total		105	37	142

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.508[a]	1	.476		
Continuity Correction[b]	.259	1	.611		
Likelihood Ratio	.501	1	.479		
Fisher's Exact Test				.544	.303
Linear-by-Linear Association	.504	1	.478		
N of Valid Cases	142				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.25.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1=male, 2=Female (1.00 / 2.00)	.753	.345	1.646
For cohort 1= Caucasian, 2= Other (Hispanic, Asian, African American) = 1.00	.926	.745	1.152
For cohort 1= Caucasian, 2= Other (Hispanic, Asian, African American) = 2.00	1.230	.699	2.165
N of Valid Cases	142		

Crosstabs

[DataSet3] C:\Documents and Settings\Ron B\My Documents\Tanesha Flash drive\Thesis\Thesis yes only.sav

1=male, 2=Female * 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined Crosstabulation

Count

		1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined		
		1.00	3.00	Total
1=male, 2=Female	1.00	11	36	47
	2.00	21	74	95
Total		32	110	142

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.030[a]	1	.862		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.030	1	.862		
Fisher's Exact Test				1.000	.510
Linear-by-Linear Association	.030	1	.862		
N of Valid Cases	142				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.59.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1=male, 2=Female (1.00 / 2.00)	1.077	.469	2.472
For cohort 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined = 1.00	1.059	.558	2.009
For cohort 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined = 3.00	.983	.812	1.190
N of Valid Cases	142		

Crosstabs

[DataSet3] C:\Documents and Settings\Ron B\My Documents\Tanesha Flash drive\Thesis\Thesis yes only.sav

1= Caucasian, 2= Other (Hispanic, Asian, African American) * 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined Crosstabulation

Count

		1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined		Total
		1.00	3.00	
1= Caucasian, 2= Other (Hispanic, Asian, African American)	1.00	25	80	105
	2.00	7	30	37
Total		32	110	142

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.375[a]	1	.540		
Continuity Correction[b]	.147	1	.701		
Likelihood Ratio	.385	1	.535		
Fisher's Exact Test				.650	.358
Linear-by-Linear Association	.372	1	.542		
N of Valid Cases	142				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.34.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1= Caucasian, 2= Other (Hispanic, Asian, African American) (1.00 / 2.00)	1.339	.525	3.419
For cohort 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined = 1.00	1.259	.595	2.663
For cohort 1= Other (Don't know, Dolomite, Oyster Shell, Chelated, Bonemeal), 3=Refined = 3.00	.940	.778	1.135
N of Valid Cases	142		

No Only

Crosstabs

1=male, 2=Female * 1= Caucasian 2=Other (Hispanic, Asian, African American Crosstabulation

Count

		1= Caucasian 2=Other (Hispanic, Asian, African American		Total
		1.00	2.00	
1=male, 2=Female	1.00	35	12	47
	2.00	31	30	61
Total		66	42	108

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.247[a]	1	.012		
Continuity Correction[b]	5.291	1	.021		
Likelihood Ratio	6.392	1	.011		
Fisher's Exact Test				.017	.010
Linear-by-Linear Association	6.189	1	.013		
N of Valid Cases	108				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.28.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for 1=male, 2=Female (1.00 / 2.00)	2.823	1.236	6.446
For cohort 1= Caucasian 2=Other (Hispanic, Asian, African American = 1.00	1.465	1.087	1.975
For cohort 1= Caucasian 2=Other (Hispanic, Asian, African American = 2.00	.519	.299	.901
N of Valid Cases	108		

Note: Chelated=Calcium (gluconate, lactate, malate, citrate, aspartate, ascorbate, stearate, fumarate, and lysinate

Calcium Supplement Survey

1. Are you currently taking supplements? (Please circle one)
   Yes No
2. How long have you been taking Calcium supplements?
   _____years _____months
3. In the past year, how often did you/do you take the supplements? (Please circle one)
   a) Every day b) almost every day c) once a week
   d) occasionally e) rarely
4. How many supplements do you take at one time?_____
5. Why do you take calcium supplements?_____
6. What brand of supplements do you take?_____
7. What type of calcium supplements are you taking? (Please circle one)

   Don't know Dolomite (Calcium Magnesium Carbonate) Calcium Carbonate

   oyster shell

   chelated (see note on top of page) bonemeal (hydroxyapatite) Calcium

   Phosphate
8. How old are you? _____
9. What is your sex? (Please circle one)
   Male Female
10. How would you classify your race? (Please circle one, if you choose other, please fill it in)
    Caucasian Hispanic African- American Asian

    Other:_____

Thank you

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR). (2007). Toxicological Profile for Lead. Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service.

Amarasiriwardena, D., et. al. (1998). Determination of lead concentration and lead isotope ratios in calcium supplements by inductively coupled plasma mass spectrometry after high pressure, high temperature digestion. Fresenius' journal of analytical chemistry, 362, 493-497.

Bourgoin, B., et.al. (1993). Lead Content of 70 brands of Dietary Calcium Supplements. American Journal of Public Health, 83(8), 1155-1160.

California Environmental Protection Agency (CEPA). 2002). Technical Support Document for Describing Available Cancer Potency Factors. Sacramento, California: Office of Environmental Health Hazard Assessment, Air Toxicology and Epidemiology Section.

Diment, M., et. al. (1995).Lead Content of Calcium Supplements. Canadian pharmaceutical journal. 128(8), 21, 52.

Environmental Protection Agency. (1993). Reference Dose (RfD): Description and Use in Health Risk Assessments, Background Document 1A. Last updated November 2, 2007. Retreived: May 18, 2009 from http://www.epa.gov/iris/rfd.htm.

Ettinger, A., et.al. (2009). The Effect of Calcium Supplementation on Blood Lead levels in Pregnancy: A Randomized Placebo-Controlled Trial. Environmental Health Perspectives, 117(1), 26-31.

Fullmer, C. and Rosen, J. (1990). The Effect of Dietary Calcium and Lead Status on Intestinal Calcium Absorption. Envirnomental Research, 51, 91-99.

Gulson, et.al. (2001). Contribution of Lead from Calcium Supplements to Blood Lead. Environmental Health Perspectives, 109(3), 283-286.

Gulson, et.al. (2003). Lead from Calcium Supplements Minimally to Blood Lead Concentrations. Journal de physique IV, 107(1), 597-600.

Gulson, et.al. (2006). Low Blood Lead Levels Do not Appear to be Further Reduced by Dietary Supplements. Environmental Health Perspectives, 114(8), 1186-1191.

McKelvey, W., et.al. (2007). A Biomonitoring Study of Lead, Cadmium, and Mercury in the Blood of New York City Adults. Environmental Health Perspectives, 115(10),1435-1441.

Moyad, M. (2003). The potential benefits of dietary and/or supplemental calcium and vitamin D. Urologic Oncology: Seminars and Original Investigations, 21, 384-391.

National Center for Health Statistics (NCHS). (2011). Health, United States, 2010: With Special Feature on Death and Dying. Hyattsville, MD. Retrieved: March 28, 2011 from http://www.cdc.gov/nchs/data/hus/hus10.pdf#032.

Power, M. et.al. (1999). The role of Calcium in health and disease. The American Journal of Obstetrics and Gynecology, 180, 1560-1569.

Rehman, S. et.al. (2010). Calcium Supplements: An additional Source of Lead Contamination. Biological Trace Element Research. Retrieved: October 18, 2010 from http://www.springerlink.com/content/783t138481167314.

Ross, E., et.al. (2000). Lead Content in Calcium Supplements. Journal of the American Medical Association, 284(11), 1425-1429.

Scelfo, G. and Flegal, A. (2000). Lead in Calcium Supplements. Environmental Health Perspectives, 108(4), 309-313.

Sunyecz, J. (2008). The use of Calcium and vitamin D in the management of osteoporosis. Therapeutics and Clinical Management, 4(4), 827-836.

U.S. Department of Health and Human Services, Office of the Surgeon General. (2004). The 2004 Surgeon General's report on Bone Health and Osteoporosis: What it means to you. Washington, D.C.: National Institutes of Health Osteoporosis and Related Bone Diseases.

VITA

Graduate College
University of Nevada, Las Vegas

Tanesha Nicole Moss

Degrees:

Bachelor of Science, Biochemistry, 2007
University of California, Los Angeles

Thesis Title: Calcium Supplement Usage and Potential Health Issues Associated with the Rate of Usage in Las Vegas, NV

Thesis Examination Committee:

Chairperson, Dr. Michelle Chino, Ph.D.
Committee Member, Dr. Chad Cross, Ph.D.
Committee Member, Dr. Shawn Gerstenberger, Ph.D.
Committee Member, Dr. Timothy Bungum, Ph. D.
Committee Member, Dr. Sally Miller, Ph.D.