Dehydration in Rural Southwestern Arizona:

An Educational Approach to Vulnerable Populations

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APPROVAL OF HONORS CAPSTONE PROJECT PROPOSAL

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Abstract

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Dehydration is a serious health issue. Dehydration may be more common in human populations that have hot, dry climates, lower educational levels, and increased numbers of youth and seniors. Documentation of data from such populations yields valuable information regarding fluid intake habits, trends, and correlations. Information regarding fluid intake and age, education level, years residing in or near Yuma County, AZ, knowledge that dehydration is more common in hot, dry climates, previous diagnosis of dehydration or recommendation to intake more fluids, and previous experience of dehydration's symptoms is useful for study. It may lead to improved awareness and adequate hydration status.

This explorative study examined data from a population in or near Yuma County, AZ, using a research survey and community educational approach. The research survey had fifty-five respondents and data were collected from an online and paper survey tool. Descriptive demographic data, frequencies, trends, and correlations were graphically represented. The educational approach consisted of the formation of educational handouts and presentation at a local school for the purpose of increasing dehydration awareness.

Demographic findings from the survey indicated that the typical respondent was a female, eighteen to thirty years, seeking or having already already obtained an Associate degree, living in or near Yuma County, AZ for five or more years. Data showed that the most common

respondent was at higher risk of dehydration, had been diagnosed as dehydrated or advised to intake fluids, and had experienced a symptom of dehydration.

Subtle trends were identified for fluid intake levels. Possible correlations were identified between fluid intake and age, education level, years lived in or near Yuma County, and knowledge that dehydration is more common in hot, dry climates and could cause damage to human health. There were insufficient data to show correlation between fluid intake and previous experience of dehydration symptoms or diagnosis of dehydration or advice to intake more fluids.

Anecdotal evidence from the educational approach showed that students that attended a dehydration awareness presentation by the author, subsequently had greater awareness of dehydration and were more cognizant of the importance of drinking fluids.

Keywords: dehydration, educational approach, fluids, fluid intake, awareness

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Soli Deo Gloria!

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Introduction

Fluids are necessary for human life; without them the human life can only last for a few days. The intake of enough fluid to sustain the proper hydration status and to maintain the fluid/electrolyte balance is a vital part of a healthy lifestyle. If this delicate status is not maintained, dehydration occurs. Taber's Medical Dictionary defines dehydration as the "clinical consequence of negative fluid balance (i.e., of fluid intakes that fail to match fluid losses)" (2005). The loss of fluid may be a loss of water or a loss of both water and a loss of solutes (Hoehn & Marieb, 2017). Dehydration is both a medical and nursing diagnosis. It is classified in the International Classification for Diseases, 10th revision (ICD-10), as E86.0.

Research Problem and Significance

Dehydration is a serious health issue. Although often considered as a result of an injury or prior health issue, dehydration may also solely occur from inadequate water intake. Dehydration has been shown to most drastically affect vulnerable populations, which may be affected by demographic factors, such as age, educational levels, and cultural background (El-Sharkawy, Lobo, & Sahoto, 2015, p. 97). In any case, the lack of hydration has drastic effects on human health, both short term and long term. Fluids have a role in all parts of the human body and no system is unaffected by dehydration (D'Anci, Popkin, &Rosenberg, 2010; El-Sharkawy, Lobo, & Sahoto, 2015; Kleiner, 1999; Texas Health and Human Services). Dehydration may be categorized two different ways: by the time it takes for dehydration to occur and by the proportion of fluids and/or solutes lost.

The time it takes for dehydration to occur is categorized as either acute or chronic. Acute dehydration occurs at certain times, when the loss of fluids is suddenly greater than what the body is used to, for instance after a bout of intense exercise. Numerically speaking, acute dehydration is more than a 2% loss of body weight due to fluids loss (Kleiner, 1999, p. 200). Chronic dehydration is the result of less than adequate rehydration of water losses over a period of time, specifically 1% and 2% loss of body weight due to fluids lost (Kleiner, 1999, p. 200).

Acute dehydration issues are more frequently the focus in health care information publications; thereby, they are made to be seen as more important than chronic. This is understandable; it is *acute* dehydration (with more dramatic sequelae such as renal failure cardiac arrest or even death) that most often is seen in the emergency rooms of hospitals across the United States of America. However, *chronic* dehydration is just as important to understand and prevent because of its impact on the general health of a much greater population. Living in hot, arid geographic regions such as the desert southwest, increases the importance of chronic dehydration, when it is compared to *acute* dehydration.

Dehydration as categorized by the proportion of fluids and/or solutes lost is known as either isotonic, hypertonic, or hypotonic. In the article "Acute and chronic effects of hydration status on health," El-Sharkawy, Lobo, and Sahota (2015) define the types of dehydration: isotonic dehydration occurs when equally water and solutes are lost. It is often associated with diarrhea, because there is equal water and sodium loss. Hypertonic dehydration occurs when more water than solutes are lost. Inadequate water intake occurs from this type of dehydration. Hypotonic dehydration is the result of more solutes being lost than water; this is often the case with patients who use diuretics or patients with renal failure.

Fluids in the Body

Dehydration is so intimately connected with fluids, so it is crucial to understand its role in the body. Fluids are responsible for a little over half of a human's body weight. It ranges with age, from 75% of infant's body weight to 55% of an elder's (D'Anci, Popkin, & Rosenberg, 2010). In a human adult body the fluid is approximately 60% - 65% of an average human's body weight (Hoehn & Marieb, 2017).

The fluids in the human body are divided into two sections: Intracellular Fluid (ICF) and Extracellular Fluid (ECF). Intracellular fluid makes up all the fluid that is in a cell. Extracellular fluid is 80% fluid that is in between cells and the remaining 20% is the fluid is the blood plasma (Hoehn & Marieb, 2017). As the majority of fluids in the human body is water, the terms water and fluids will be used synonymously.

Intake

The majority of fluid, approximately 90%, in the body is ingested; the specific amount varies by person. It is strongly influenced by personal habits. 60% of the ingested fluids come from beverages and 30% is from foods (Hoehn & Marieb, 2017). Vegetables and fruits contain the most fluids (D'Anci, Popkin, & Rosenberg, 2015). The remaining 10% of fluid in the body comes from molecular water, which is produced from cellular metabolism (Hoehn & Marieb, 2017).

Fluid Intake Recommendations

The Mayo Clinic recommends that adult males intake around 12 cups of fluid a day and adult females intake around 9 cups of fluid a day. Pregnant or breastfeeding women should drink around 10 to 13 cups of fluid a day. The Academy of Nutrition and Dietetics recommend that children, male and female, should drink around 7 cups a day from the age 4 to 8 years (2018).

Male children that are 9 to 13 years should drink around 9 cups and female children in the same age range should drink around 8 cups (Academy of Nutrition and Dietetics, 2018). Male children 14 to 18 years should drink around 12 cups and female children in the same age group should drink around 9 cups of fluid (Adapted from Academy of Nutrition and Dietetics, 2018; Adapted from Mayo Clinic, n.d.).

Thirst Mechanism

The human body has a thirst mechanism which regulates fluid intake. It is controlled by osmoreceptors (decreased saliva produced in dry mouth aids this course), or loss of blood volume (or pressure). These changes are due to the gain or loss of water. A 1% - 2% increase will activate the osmoreceptors (Hoehn & Marieb, 2017). The osmoreceptors activate the hypothalamic thirst center, and cause the sensation of thirst, which induces drinking. Once that has happened, the water ingested will be absorbed in the gastrointestinal tract and the body's water content percentage will increase. This action will stop the thirst mechanism chain.
For the thirst mechanism to be activated by a loss of blood volume (or pressure) the decrease would have to be a 5%-10% decrease, as from a hemorrhage, and would be signaled by barocreceptors (Hoehn & Marieb, 2017). Osmolality changes are the stimuli usually used to activate thirst. As the thirst mechanism does not occur until there is already a loss of water in the body, drinking when thirsty is not the best means for regulation fluid intake.

Output of Fluids

The fluid ingested is lost through sensible and insensible water loss. Insensible water loss is not measurable or at least not easily measurable. Fluids lost in insensible water loss are generally not observed (Hoehn & Marieb, 2017). These fluids are lost from the skin, through

evaporation, and the lungs, through respiration. These vary by weather and location. It is approximately 28% of the fluids that are lost. On the other hand, sensible water loss is measurable; it is observable (Hoehn & Marieb, 2017). Fluids are lost through urination, defecation, and perspiration; the percentages are approximately 60%, 4%, and 8%, respectively (Hoehn & Marieb, 2017). The amounts of lost fluids vary by geography/location (weather and altitude), diet, exercise, and illness or disease.

Factors Influencing Hydration

As mentioned before, there are many different factors that influence hydration. Demographic factors (including education levels and cultural background) influence the hydration status, as well as physiological issues. The excretion rate of humans varies. Caffeine and alcohol are natural diuretics. Fluids high in these cause higher excretion rates and may lead to faster dehydration (Kleiner, 1999, p. 201). Environmental factors also have an effect on hydration. Altitude, humidity, and temperature all can cause higher than normal loss of fluids. Age also affects fluid intake. "Older persons are less thirsty and drink less compared to younger person" (D'Anci, Popkin, & Rosenberg, 2015). According to D'Anci, et al. this is largely due to reduced osmotic thirst (2015).

Role of Fluids

Water has a role in every part of the human body. It is essential for life. "It is the most abundant compound in the human body" (Kleiner, 1999). Water, in the molecular form of H2O, is perfectly created for the human body. In the world there is much more H2O, than D2O, which is a naturally occurring isotope that has deuterium instead of protium (Waltham, 2011). D2O is commonly known as "heavy water," due to its heavier mass. If D2O had been more prevalent than H2O, the human body would be structurally and functionally different. This is true because

of the kinetic isotope effect (Donnelly, personal communication, Sept. 2018). The kinetic isotope effect "is a mechanistic phenomenon wherein isotopically substituted molecules react at different rates" (Knowles, R., 2005).

Water has structural, renal, gastrointestinal, circulatory, musculoskeletal, respiratory, and sensory nervous system functions. Structurally water fills space and helps form the structures of macromolecules such as proteins and glycogens (Kleiner, 1999). The musculoskeletal system is aided by water, where it protects and cushions vital organs and lubricates joints (Texas Health and Human Services; Kleiner, 1999). In the kidney, water acts as a "medium for safe elimination of toxins and waste products" (Kleiner, 1999). Water is a solvent (Hoehn & Marieb, 2017). Water aids in digestion, absorption, and use of nutrients and helps to convert food into energy. In the cardiovascular system, "water is the main property of blood, which carries nutrients to cells and carries wastes out of the body, which carries nutrients and oxygen to all cells in the body" (Texas Health and Human Services). It also helps regulate body temperature (Texas Health and Human Services; Kleiner, 1999). The respiration system uses water to moisten oxygen for breathing. "From energy production to joint lubrication to reproduction, there is no system in the body that does not depend on water" (Kleiner, 1999).

Dehydration: The Detriments of Not Having Enough Fluid

The issues with not drinking enough fluids are numerous. Studies have shown correlation with an increase of disease or illness, as well as physical and cognitive impairment.

Disease and Illness

Dehydration has been linked to disease/illness or an increased risk of disease/illness. Most of these are due to chronic dehydration. Some are highlighted below.

Urinary System

Although dehydration has not yet been linked directly to Urinary Tract Infection (UTI), proper hydration was shown to decrease the risk of UTIs. “Evidence largely favors the positive effects of adequate fluid intake on UTIs” (El-Sharkawy, Lobo, & Sahoto, 2015; D’Anci, Popkin, & Rosenberg, 2010).

Urolithiasis has been shown to have beneficial effects with increasing fluid intake and decreasing the occurrence of urolithiasis. (El-Sharkawy, Lobo, & Sahoto, 2015; D’Anci, Popkin, & Rosenberg, 2010).

Some evidence shows that “sustained high urine volumes with urine osmolalities below plasma osmolality accelerate the decline of glomerular filtration rate” (D’Anci, Popkin, & Rosenberg, 2010). This causes a decline in the function of the kidney and its filtration role. This may increase risks of chronic renal failure, diabetes mellitus, and salt-sensitive hypertension (Bouby, N. & Fernandes, S., 2003).

One population-based study has shown a relation between increased fluid intake and “a reduced risk of developing chronic kidney disease” (El-Sharkawy, Lobo, & Sahoto, 2015; D’Anci, Popkin, & Rosenberg, 2010).

Digestive System

Dehydration has been shown to be a cause of constipation (El-Sharkawy, Lobo, & Sahoto, 2015).

Increased water intake may inversely affect colorectal cancer (El-Sharkawy, Lobo, & Sahoto, 2015).

Distal tumors have the greatest beneficial effects when increasing water consumption (El-Sharkawy, Lobo, & Sahoto, 2015).

Circulatory System

Fatal Congestive/Coronary heart disease has evidence that with an increased fluid intake there is a lower risk of fatal events with congestive/coronary heart disease (El-Sharkawy, Lobo, & Sahoto, 2015).

Orthostatic Hypertension has "good evidence linking dehydration and orthostatic hypertension" (El-Sharkawy, Lobo, & Sahoto, 2015; D'Anci, Popkin, & Rosenberg, 2010).

Nervous System

Dehydration is "a risk factor for delirium and delirium presenting as dementia in the elderly and the very ill" (D'Anci, Popkin, & Rosenberg, 2010).

"Water deprivation can lead to the development of headache" (D'Anci, Popkin, & Rosenberg, 2010). There is not much medical literature supporting this, but some relations have been shown. The strongest evidence linking headache and lack of water is "increased water consumption help[s] limit the intensity of migraines" (El-Sharkawy, Lobo, & Sahoto, 2015; D'Anci, Popkin, & Rosenberg, 2010).

Metabolic Disorders

"Diabetes mellitus is a recognized risk factor for dehydration in the context of hyperglycemia, given the osmotic effects of glucose" (El-Sharkawy, Lobo, & Sahoto, 2015). There may be a protective effect with increasing water consumption in the development of hyperglycemia.

Respiratory System

There is strong evidence that "exercise related asthma is linked with fluid intake" (D'Anci, Popkin, & Rosenberg, 2010). Also, "inspiration of humidified air has been shown to be beneficial in obstructive airway disease" (El-Sharkawy, Lobo, & Sahoto, 2015).

There is also evidence that dehydration may cause bronchoconstriction, although no evidence has been shown between bronchoconstriction and the balance of fluids. (El-Sharkawy, Lobo, & Sahoto, 2015; D'Anci, Popkin, & Rosenberg, 2010).

Pregnancy, Labor, and Breastfeeding

Good evidence that dehydration causes reduced amniotic fluid index (El-Sharkawy, Lobo, & Sahoto, 2015). There is also evidence that 250 mL/h of intravenous fluid in women who have fasted has been shown to reduce the frequency of prolonged labor (El-Sharkawy, Lobo, & Sahoto, 2015).

Physical and Cognitive Impairment

Dehydration has been linked to physical and cognitive impairment. Issues may be due to both chronic and acute dehydration.

Physical

Physical performance in relation to proper hydration is more prevalent in medical research because of the activities of athletes and the military. One of the major issues is that people who are participating in physical performance do not remember to drink fluids. As they are already losing fluid in sweat, "it is not uncommon for [them] to lose 6% - 10% in body weight" (D'Anci, Popkin, & Rosenberg, 2010). Not replenishing fluids may lead to drastic results. This would occur due to chronic dehydration.

Physical activity (exercise or work-related activities) in a hot climate, coupled with inadequate fluid replacement, "is associated with hyperthermia, reduced stroke volume, and cardiac output, decreases in blood pressure, and reduced blood flow to muscle" (D'Anci, Popkin, & Rosenberg, 2010). Children are at high risk. Generally, drinking fluids above the normal amount is recommended for anyone exercising, especially in hot climates.

Cognitive Impairment

Dehydration has been shown to influence cognitive abilities and performance. “Mild levels of dehydration can produce disruptions in mood and cognitive functioning” (D’Anci, Popkin, & Rosenberg, 2010). Mild to moderate dehydration has also been shown to affect “short term memory, perceptual discrimination, arithmetic ability, visumotor tracking, and psychomotor skills” (D’Anci, Popkin, & Rosenberg, 2010).

Identifying and Treating Dehydration

The symptoms of dehydration are “extreme thirst, less frequent urination, dark-colored urine, fatigue, dizziness, confusion” (Mayo Clinic). Dehydration may be identified by testing “urine specific gravity, urine osmolality, plasma osmolality, plasma sodium, or hematocrit level” (Kleiner, 1999). Urine color may also be used for the patient to test dehydration.

Replacement Fluid Therapy

Replacement fluid therapy may treat acute dehydration. “The goal of replacement fluid therapy is to correct existing abnormalities in volume status and/or serum electrolytes” (Sterns, R.H., 2017). The rate of replacement depends on how much fluid is lost.

Fluid replacement, enteral, parenteral, or intravenous, continues at a rapid rate until clinical signs improve (Sterns, R.H., 2017). If the patient whose dehydration is due to either hypernatremia or hyponatremia, dehydration will be corrected slowly to avoid electrolyte imbalance (Sterns, R.H., 2017). Potassium may also need to be replaced if labs indicate a need. Patients who are dehydrated and hypoglycemic are given dextrose-containing solutions, but not in patients with diabetes mellitus or hypokalemia (Sterns, R.H., 2017).

Chronic dehydration may also be treated with replacement fluid therapy. In many cases, chronic dehydration is identified in annual medical visits. According to Leah McNair, a family

nurse practitioner in Yuma County, Arizona, dehydration may be identified in a patient's laboratory report; however, it is important to note that as many labs require fasting, it may cause a confounding variable (McNair, personal communication, November 8, 2018). Dehydration may also be identified during the physical assessment when the signs of dehydration are present. Treating may consist of replacement fluid therapy in the clinic and is followed up by educational awareness about dehydration (McNair, personal communication, November 8, 2018).

Maintenance Therapy

Maintenance therapy is used "to preserve water and electrolyte balance and to provide nutrition" (Sterns, R.H., 2017). This is a preventative measure against dehydration in cases where patients cannot eat or drink for a long period of time. They will be administered fluids containing vital electrolytes and nutrients.

Significance

Dehydration is an important health care issue; it is imperative to combat it globally, nationally, and locally. Globally, many people do not have access to safe drinking water. The World Health Organization (WHO) estimates that a little over 2 billion people do not have access to safe drinking water (2018). Of those 2 b, "423 million people tak[e] water from unprotected wells and springs" (WHO, 2018) and "159 million people collect untreated surface water from lakes, ponds, rivers and streams" (WHO, 2018).

The choice is to become dehydrated or drink the polluted, contaminated water. Either way, there is a risk of disease and death. "Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhea [sic], dysentery, hepatitis A, typhoid, and polio" (WHO, 2018).

In the United States of America, dehydration is an issue, too. 75% of the population is estimated to be chronically dehydrated (Waterlogic, 2017). No recent official data were found on how often people are treated for dehydration in hospitals. Dehydration is considered a preventable hospitalization and some information may be gathered. In Yuma County, AZ, McNair estimates that around 1 in 5 patients she sees are dehydrated, and in the summer 1 in 3.

Hydration status and habits are also significant because of correlations between education and dehydration, age and dehydration, and water intake and diet, found in a 2005-2010 study on the Center for Disease Control (CDC) website. In the United States, plain water intake was lower in non-Hispanic African American and Mexican-American youth, as well as in older, lower-income, and less educated adults. And, adolescents in the United States who drank less plain water also tended "to drink less milk, eat less fruits and vegetables, drink more sugar-sweetened beverages, eat more fast food, and get less physical activity" (CDC, 2016).

Around the country, there are specific factors influencing dehydration. Although "safe water" may be easily accessible, it may be full of minerals and some metals that can potentially cause health issues and lead to lower drinking levels. In Yuma County, which is located in Southwestern Arizona, there are specific demographic factors that influence dehydration. These include: geographical location, educational levels, cultural background, and awareness.

Literature Review

There is a dearth of scientific literature about dehydration and its effects on human health. Such few studies have been done about dehydration and its effects on human health that true understanding is limited (D'Anci, Popkin, & Rosenberg, 2010). Furthermore, Jane Brody quotes, "'Nearly all the funding of water research has been provided by industry,' Dr. Popkin said in an interview, referring to companies that sell all manner of beverages, including bottled

water" (Brody, 2017). The articles "Water, hydration, and health" by D'Anci, Popkin, & Rosenberg and "Acute and chronic effects of hydration status on health" by El-Sharkawy, Lobo, & Sahoto provided a limited overview of possible correlations between dehydration and risk of disease. "The hydration equation: Update on water balance and cognitive performance" by Riebl and Davy further provides information on water intake and output, with special consideration given to cognitive performance and environmental and individual factors. Kleiner's article "Water: an essential but overlooked nutrient" gave a succinct overview of water and its need in human physiology. The articles "Mechanisms by which dehydration may lead to chronic kidney disease" by Johnson, Lanaspa, & Roncal-Jimenez and "Mild dehydration, vasopressin, and the kidney: animal and human studies" by Bouby & Fernandes provided specific information about dehydration and its effect on the kidneys. The articles gave an overview of water and kidney function leading to specifics of study results.

There is no specific information on the occurrence of dehydration in the United States, although some information can be gathered through estimated amounts of fluid intake per day. There is also a limited amount of information may also be gathered about plain water intake in the United States. Scientific literature about dehydration in the western part of the United States is non-existent. What information is available is composed of newspaper articles and website pages mainly concerned with heat related dehydration.

Research Study

The research study consists of two parts, the former a research survey, the latter an educational approach.

Purpose

Research Survey

The survey's goal was to collect data that may indicate relations between demographics (ex. age, education levels), fluid intake habits (how much water is drunk a day) and dehydration awareness in Yuma County, Arizona. The findings of this survey will help to present a preliminary picture of dehydration in Southwestern Arizona and to show any trends of fluid intake and awareness with regard to different populations.

Educational Approach

The goal of the educational approach is to provide information in an easily way to different people, of different ages, that will aid in the maintenance of health. Specifically, to create an educational handout that targets vulnerable populations of Southwestern Arizona to increase awareness of dehydration, its effects, and ways of prevention.

Study Design

EDUCATE Model

The EDUCATE model has been used to improve the quality of patient education (Marcus, C., 2013). It is found in the article "Strategies for improving the quality of verbal patient and family education: a review of the literature and creation of the EDUCATE model" by C. Marcus; the EDUCATE model provides guidelines for verbal education. The model leads "the educator through five stages of verbal communication to reach teaching and education goals" (C. Marcus, 2013).

E – Enhance comprehension and retention

D – Deliver patient-centered education

U – Understand the learner

C – Communicate clearly and effectively

A – Address health literacy and cultural competence

T E – Teaching and educational goals

(Marcus, C., 2013).

The model was used in the creation of the educational handouts and was integral in creating the educational approach.

Methods

Research Survey

This was an experimental study confined to the population in Yuma County, Arizona from September 2018 to November 2018. The survey form questions attempted two things: to collect data about possible relations between demographics and fluid intake habits of the surveyed population, and to increase the participant's awareness of dehydration. Data were collected through a survey tool (see Appendix A) during September 2018 to November 2018. There were fifty-five respondents. Data were collected through SurveyMonkey and in paper survey forms and were then evaluated for demographical information and trends.

Educational Approach

Education has been and always should be a part of healthcare. The word "doctor" comes from the Latin word "docere", which means to teach (Duvivier & Stull, 2017). Providers "teach every day through preventive counseling, introducing new diagnoses, and negotiating treatment options" (Duvivier & Still, 2017). Today, however, medical providers are strapped for quality

time with their patients, often limited due to electronic health records documentation demands and high volume of patients. Clinicians are challenged by the need for time to perform adequate preventive medical education for their patients while meeting guidelines for reimbursement with greatly increased government and non-licensed third-party insurance demands (Mohta, Shanafelt, & Swensen, 2016; McNair, personal communication, 2018). The ability to maintain important provider-patient relationships is almost absent. What is also almost absent is the time required to provide patient education through good provider-patient communication and increasing patient health literacy. However, patient education is worth fighting for.

Patient education has been shown to improve health care outcomes (Chandrasekaran, K., Patel, Paterick, & Tajick, 2017). "Poor communication, no deficient clinical skill, is the primary driver of malpractice suits; conversely good clinical communication alone can improve patient outcomes" (Wei, P., 2013). Patient education is vital to practicing good medicine.

Use of EDUCATE Model in Educational Approach

Enhance Comprehension and Retention

- Portray information in a format that was easy to read and comprehend, highlighting important information with the use of font, font size, and color.
    - Distributed at local schools, at Arizona Western College through Honors Department and Student Health and Wellness, and local clinics.
- Present in elementary and middle schools in the local Yuma County area with follow up questions to increase awareness

Deliver Patient-Centered Education

- Identify six populations that are vulnerable and at risk of dehydration: youth, elderly, people with chronic illnesses, pregnant women, people who work

or exercise outside, and people who work or exercise outside in high heat (90 degrees Fahrenheit or above).

Understand the Learner

- Examine demographics: geographical, age, socio-economic levels and education.
  - Geographical
    - Yuma County is located on the borders of Arizona, California, and Mexico.
    - In 2017 Yuma County's Population was estimated to be 207, 534. (United States Census Bureau, 2017)
    - The weather in the area is hot and arid.
      - The yearly temperature average from 1981-2010 in Yuma, Arizona, was a high of 88.2 degrees Fahrenheit and a low of 63.4 degrees Fahrenheit (National Ocean and Atmospheric Administration, 2018).
      - The months May – September were the hottest months out of the year, with May having a high of 95.3 degrees Fahrenheit, June with a high of 103.5 degrees Fahrenheit, July 106.8 degrees Fahrenheit, August 106.2 degrees Fahrenheit, and lastly September with a high of 101.3 degrees Fahrenheit (National Ocean and Atmospheric Administration, 2018).
      - The yearly precipitation is less than 1 inch a year (National Ocean and Atmospheric Administration, 2018).

- Age
    - 7.3% of the population was under 5 years, 25.4% were under 18 years, and 18.3% of the population was over 60 years (United States Census Bureau. 2017). 49% of the population was then between 18 years and 60 years.
- Socio-Economic and Education
    - 63.9% of the population were Hispanic or Latino, 30.8% were White, not Hispanic (United States Census Bureau, 2017). These were the two main racial groups; the rest were under 5%. It is important to note, that in different seasons Yuma County has an influx of seniors in the winter and migrant/farm workers during agricultural seasons.
    - From 2012-2016, 71.7% of the population over 25 years had a high school diploma or higher, while only 14.4% had a bachelor's degree or higher (United States Census Bureau, 2017).
    - The poverty level in Yuma County was 19.3% (United States Census Bureau, 2017), which is 7% higher than the national poverty level at 12.7% (United States Census Bureau, 2017).

Communicate Clearly and Effectively

• A readability calculator was used on the education handouts to ensure that the information was communicated clearly and effectively.

Address Health Literacy and Cultural Competence

• The handouts were also reviewed by practicing providers in the Southwestern Arizona region, to ensure that the handouts were presented in a manner that was easily digestible and kept true to healthcare standards.

- The handouts were translated into Spanish to ensure cultural competence as well as spreading awareness to a broad range of populations in the community.

Teaching and **E**ducational Goals

- The Educational Approach is to provide information in an easily digestible way to different people, of different ages, that will aid in the maintenance of health. Specifically, the goal is to create and distribute an educational handout that targets five vulnerable populations of Southwestern Arizona to increase awareness of dehydration, its effects, and ways of prevention.

Ethics

Consent was obtained from all participants. Names or other identifying factors were not collected. Approval by Arizona Western's College Institutional Review Board (IRB) was deemed unnecessary by the IRB chair. Anonymity and confidentiality were strictly maintained throughout the study.

Data Analysis

Research Survey

The purpose of the statistical analysis of this study was to summarize the findings, identify significant trends, and provide data for further study and comparison. A total number of fifty-five responses were collected. Eligibility requirements were that the survey respondent live in the Yuma County, Arizona area and not answer with contradictory information.

All respondents were 18 years of age or older. The results were taken from the provided forms or online survey tool and calculated into numerical data. Frequency tables were used to describe demographic data, fluid intake information, increased risk factors of respondents, awareness of increased risk of dehydration in hot, dry climates, previous diagnosis of

dehydration or to intake more fluids, and previous experience of dehydration's symptoms. These findings were also presented in graphic format, including pie charts, bar and column graphs.

Educational Approach

The results from the school presentation were anecdotal from students and teachers. Results from the Educational Handouts were also anecdotal from medical providers. No numerical data were obtained.

Site and Sample

Research Survey

The setting of the survey was in Yuma County, Arizona. Survey respondents were people from or near the Yuma County, Arizona. There were a total of fifty-five respondents. Forty-four were female and eleven were male.

The typical respondent was a female, eighteen to thirty years, seeking or having already obtained an Associate degree, and had been living in or near Yuma County, AZ for five or more years. This group was at higher risk of dehydration, had been diagnosed as dehydrated or advised to intake fluids, and had experienced a symptom of dehydration. (See Table 1-4, and Figures 1-7, 12-23)

Table 1. Demographics: Age, Gender, Education Level, and Years Lived in Yuma County, AZ

Item	Frequency N=55)	Valid Percent %
Gender:		
Male:	11	20
Female:	44	80
Age:		
18-30 years	33	60
30-45 years	9	16
45-60 years	7	13
60+ years	6	11
Education Level, Attained or Currently Seeking:		
Associate Degree	37	67
Bachelor's Degree	8	15
Master's Degree	8	15
Doctoral Degree	2	4
Years Lived In or Near Yuma County, AZ:		
< 1 year	0	0
1-5 years	7	13
5-15 years	10	18
15+ years	38	69

Figure 1. Gender of Survey Respondents

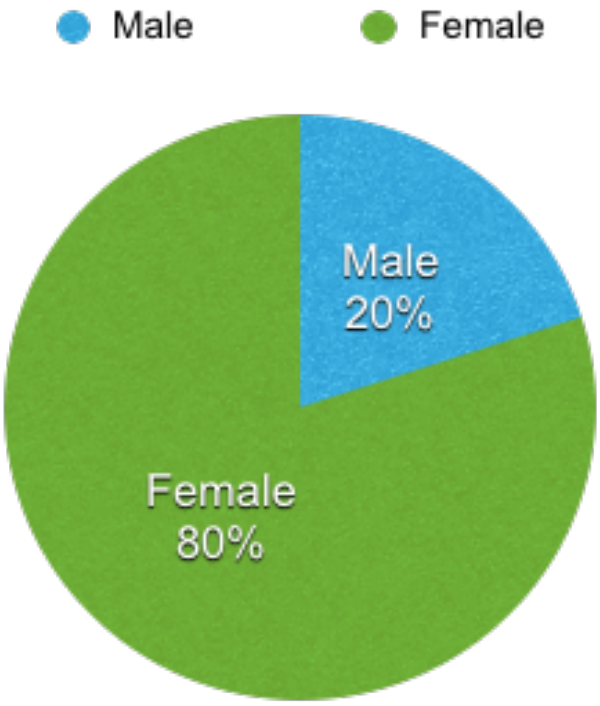


Figure 2. Gender of Survey Respondents by Age

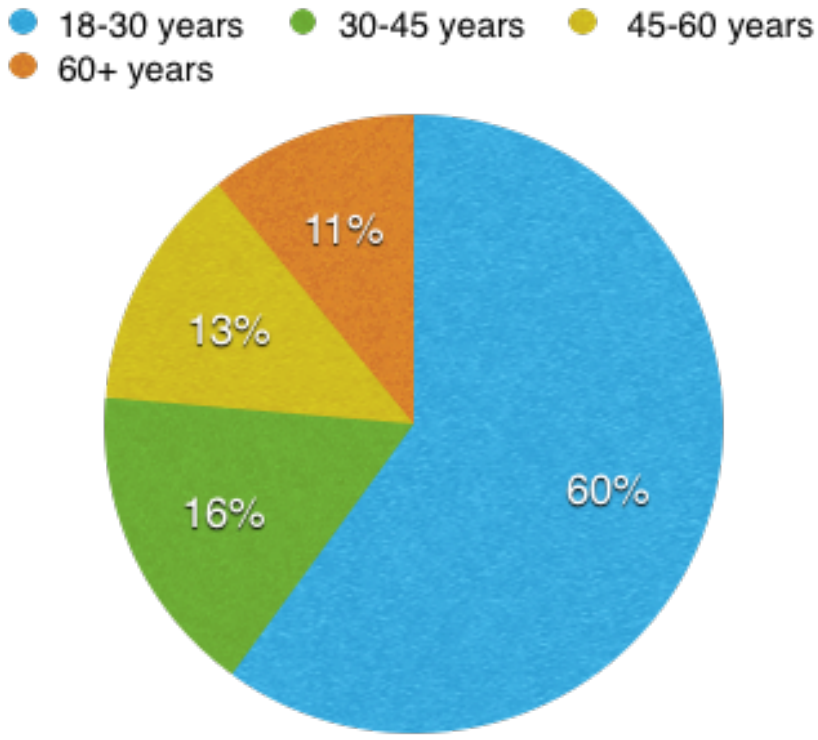


Figure 3. Gender of Survey Respondents by Age

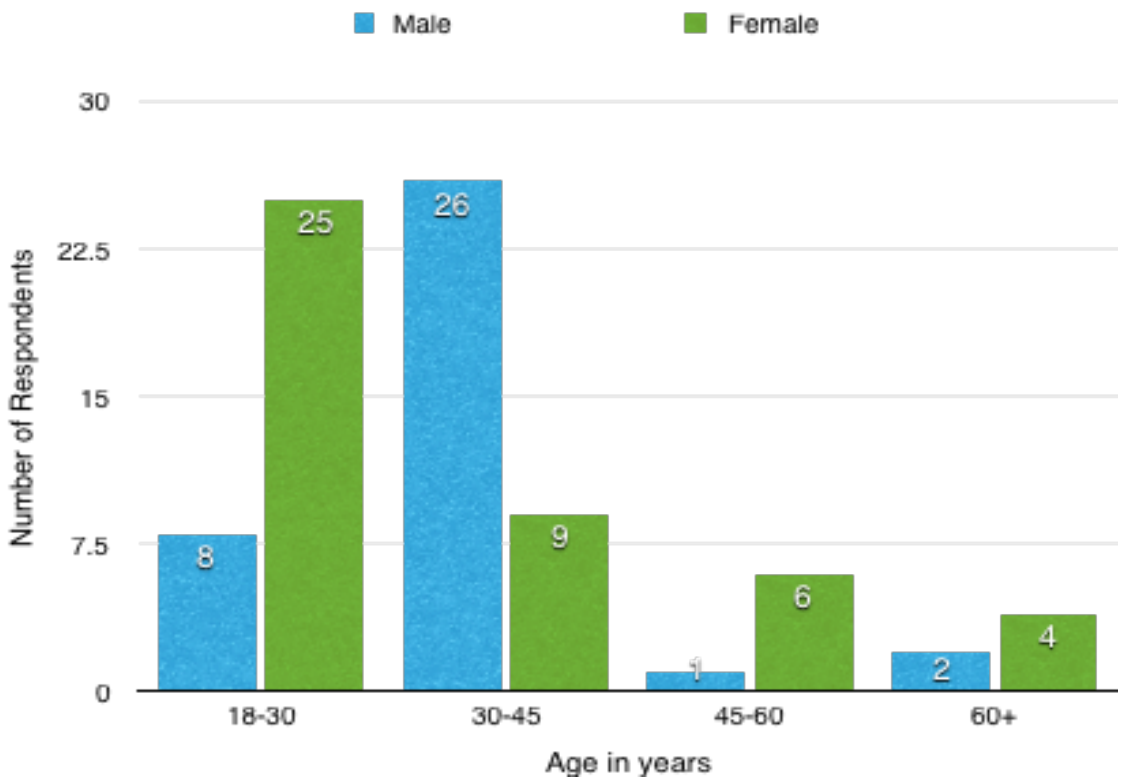


Figure 4. Male and Female Respondents' Educational Level

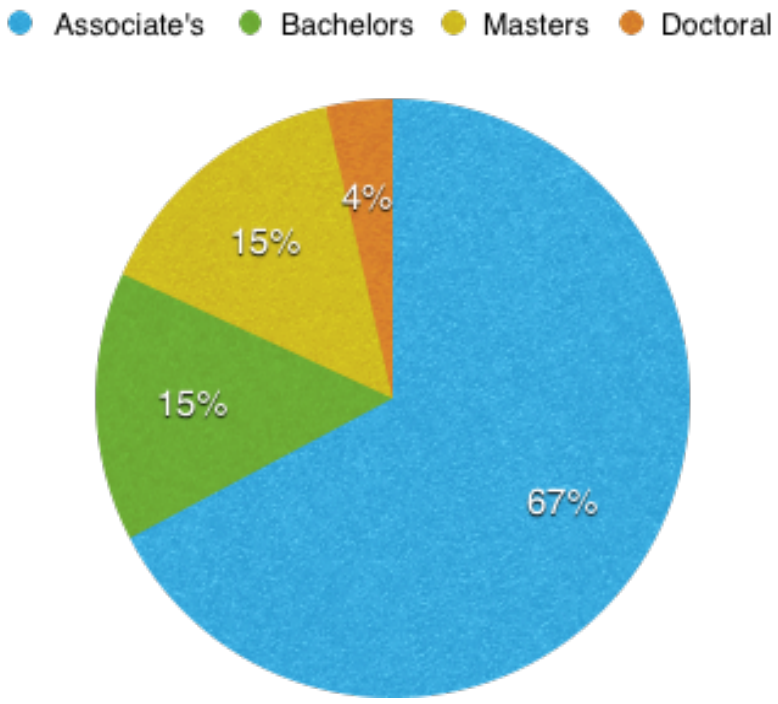


Figure 5. Male Respondents' Educational Level

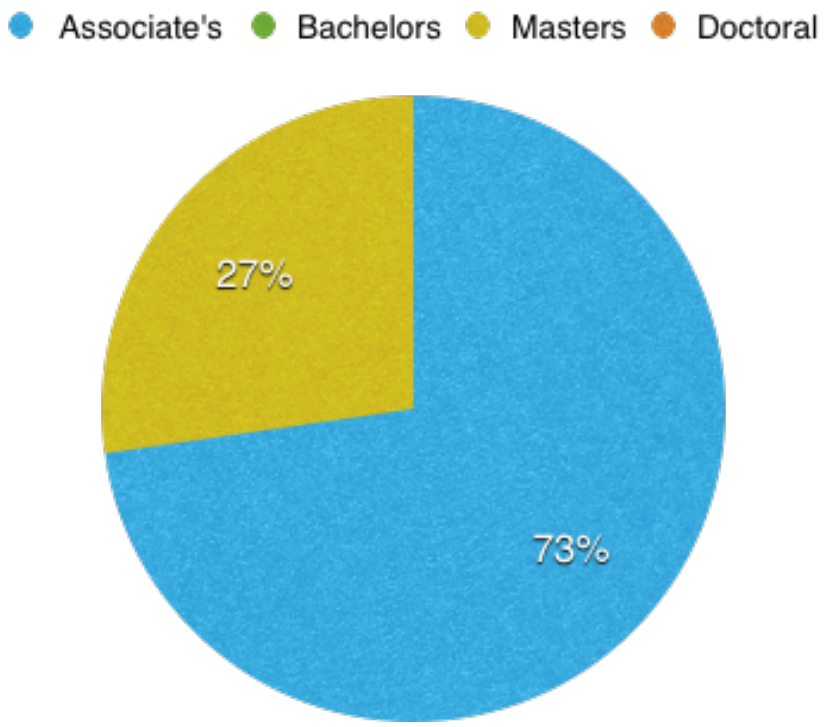
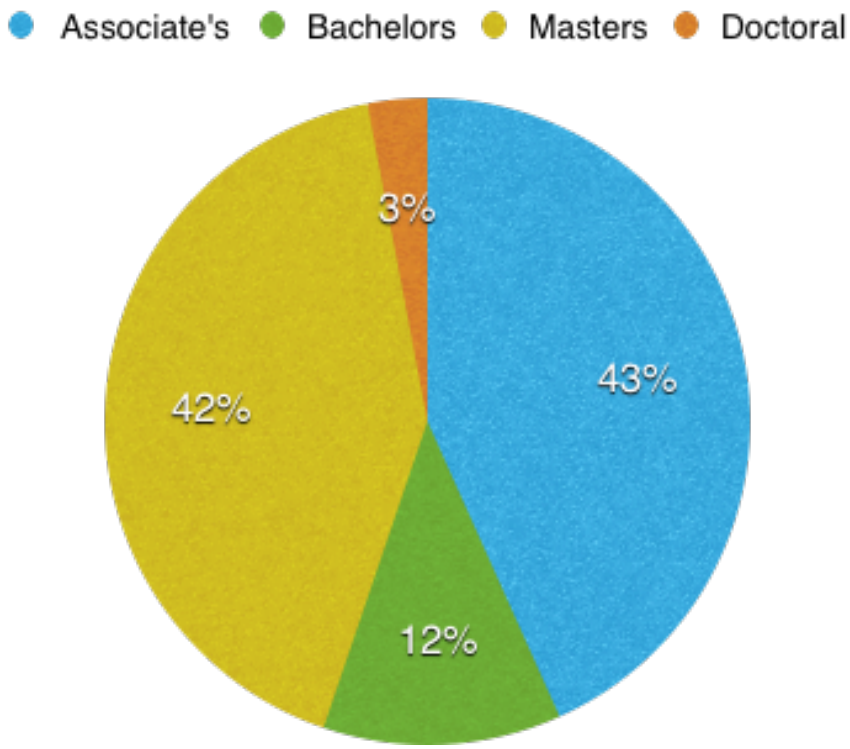


Figure 6. Female Respondents' Educational Level

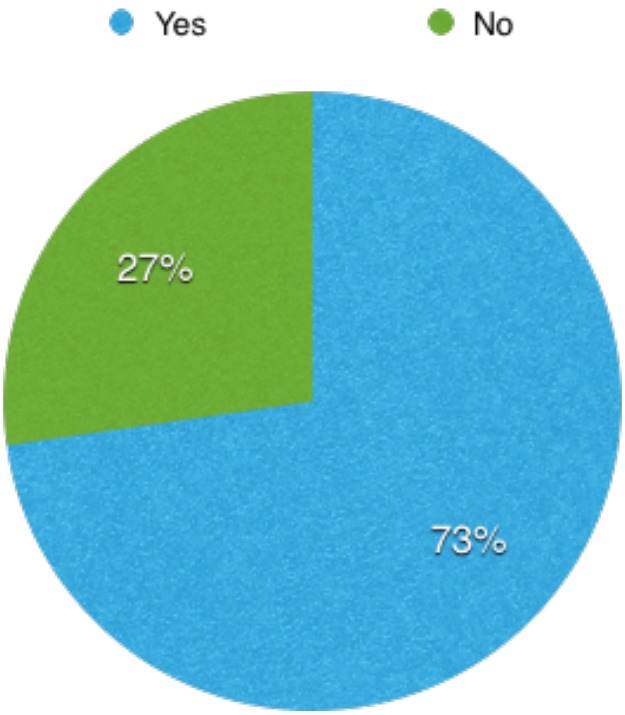


The average response to the survey question asking if the respondent met any of dehydration's risk factors (youth, elderly, people with chronic illnesses, pregnant women, people who work or exercise outside, and people who work or exercise outside in high heat (90 degrees Fahrenheit or above) was yes.

Table 2. Respondents: Meeting Dehydration's Risk Factors

Item	Frequency N=55)	Valid Percent %
Meet Risk Factors:		
Yes	40	73
No	15	27

Figure 7. Respondents Meeting Risk Factors



Educational Approach

The individuals targeted in the educational approach lived in Southwestern Arizona, specifically in or around Yuma County, Arizona. Part of the educational approach involved presenting at a local school about dehydration; a PowerPoint targeted at youth was created and presented. The other part included the creation of educational handouts targeted at increasing dehydration awareness to both English and Spanish speakers.

Results

Research Survey

Survey respondents' answers were examined for relationships between fluid intake and age, education level, years residing in or near Yuma County, AZ, knowledge that dehydration is more common in hot, dry climates, previous diagnosis of dehydration or advice to intake more fluids, and previous experience of dehydration's symptoms (See Tables 1-4, and Figures 1-23).

The average fluid intake for males was 9-12 cups of fluid per day, for females it was 6-9 cups of fluid per day (see Figure 8). Males 45 years old and older drank had a greater average fluid intake than 18-30 year old males (See Figure 10). 18-30 year old males drank an average of 6-9 cups of fluid per day. No males responded from the age range 30-45 years old. Males 45- 60 years old drank an average of 9-12 cups per day; males 60 years old drank an average of 12-15 cups per day (See Figure 10). 30 years old and older females had a greater average fluid intake than 18-30 year old females.(See Figure 9). 18-30 year old females drank an average of 3-6 cups of fluid per day. Females, both 30-45 years old and 45-60 years old, drank an average of 6-9 cups of fluid per day; females that were 60 years old and greater drank an average of 9-12 cups of fluid per day (See Figure 11).

For both males and females, as age increased so did fluid intake.

Figure 8. Male Respondents' Fluid Intake Level

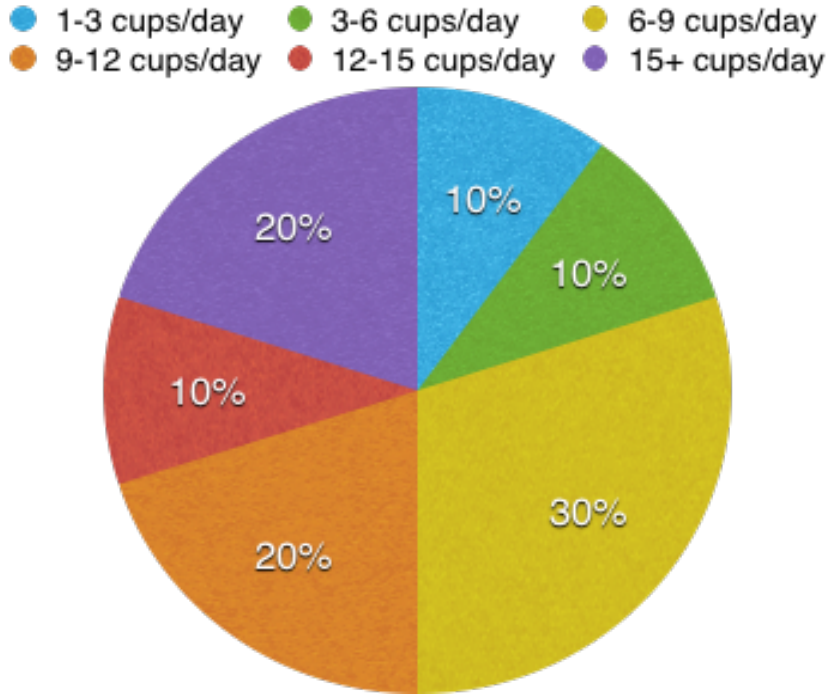


Figure 9. Female Respondents' Fluid Intake Level

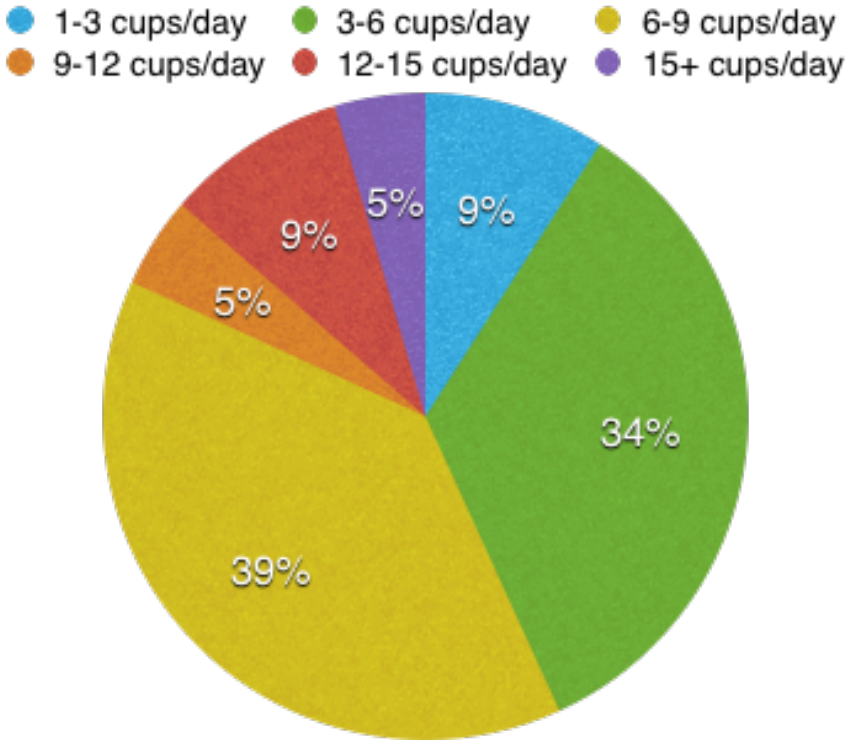


Figure 10. Male Respondents' Fluid Intake Level by Age

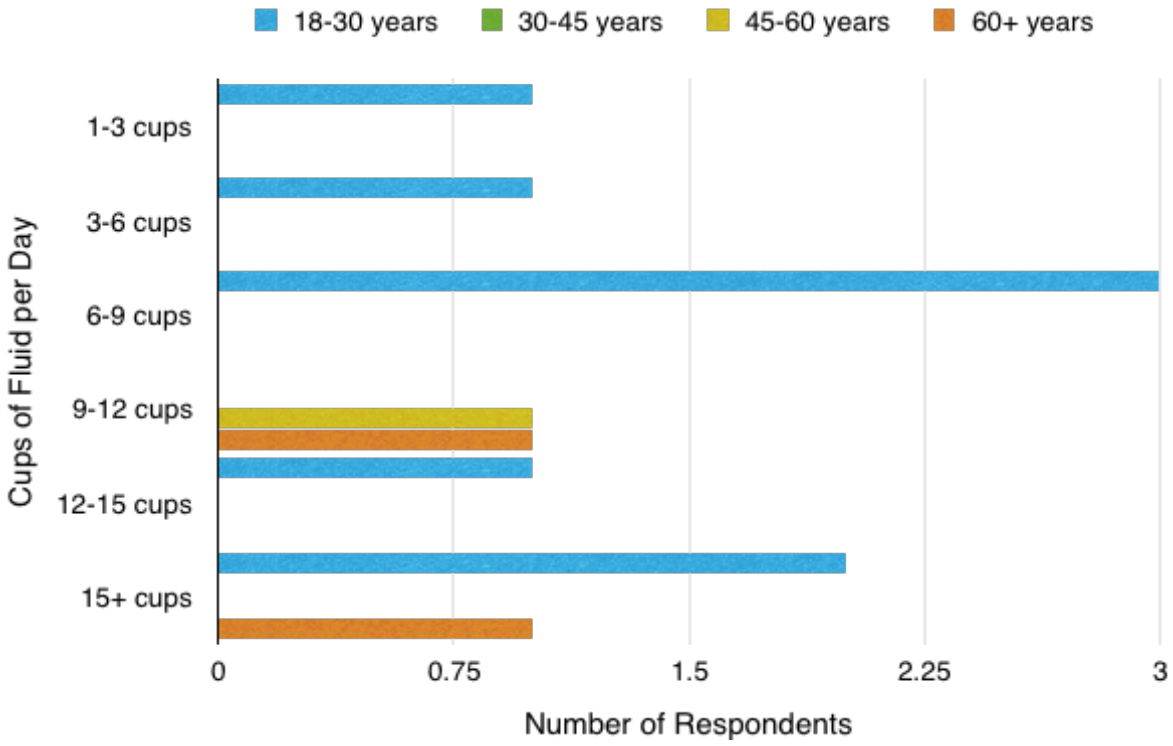
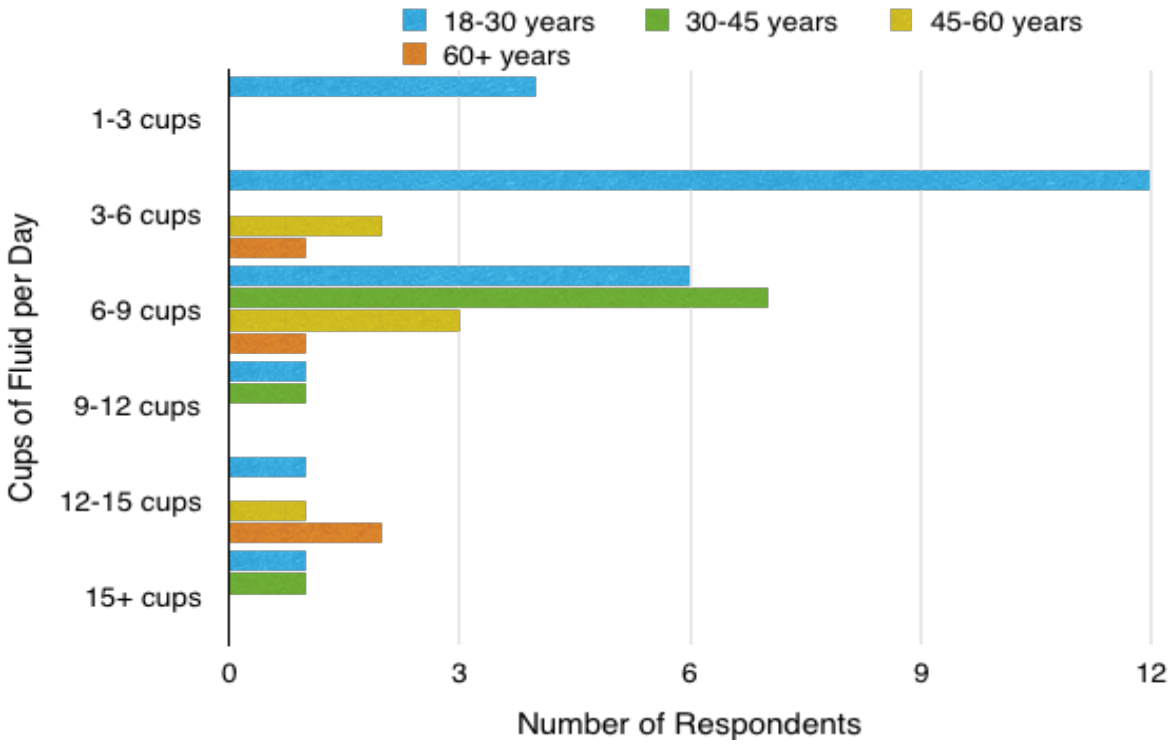


Figure 11. Female Respondents' Fluid Intake Level by Age



Males in the study had obtained or were currently seeking an associate degree, were 18-30 years old and drank an average of 6-9 cups of fluid per day (See Figure 12). Females who had obtained or were currently seeking an associate degree were of the ages 18-60 years old. They drank an average of 6-9 cups of fluid per day (See Figure 13).

In the study, there were no males surveyed with just a bachelor's degree. Females with a bachelor's degree had an average of 6-9 cups of fluid per day (See Figure 12). Males with a master's degree were in the age range of 45-60+ years old. The average fluid intake was 9-12 cups of fluid per day (See Figure 12). Females with a master's degree were in the age range of 30-45 years old and 60+ years old. Their average fluid intake was 9-12 cups of fluid per day (See Figure 13). In the study, no male had a doctoral degree. Females with a doctoral degree were in the age range of 36-60 years old. There average fluid intake was 6-9 cups of fluid per day (See Figure 13).

For both males and females, on average as educational levels increased so did fluid intake.

Figure 12. Male Respondents' Fluid Intake by Degree

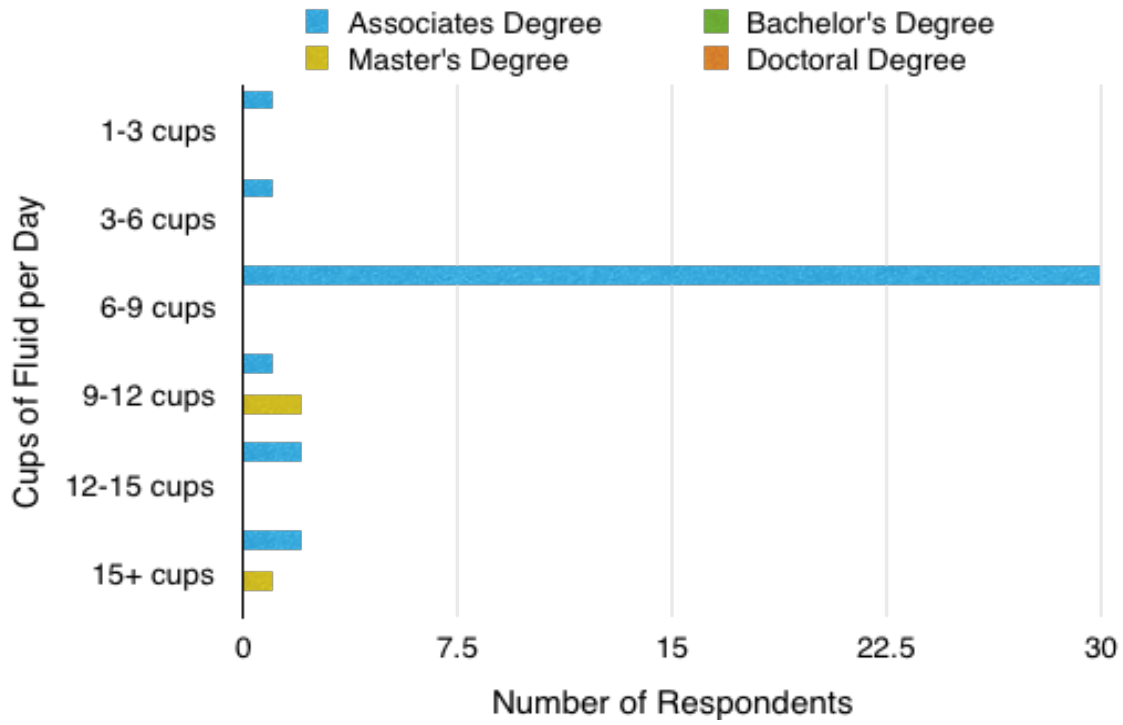
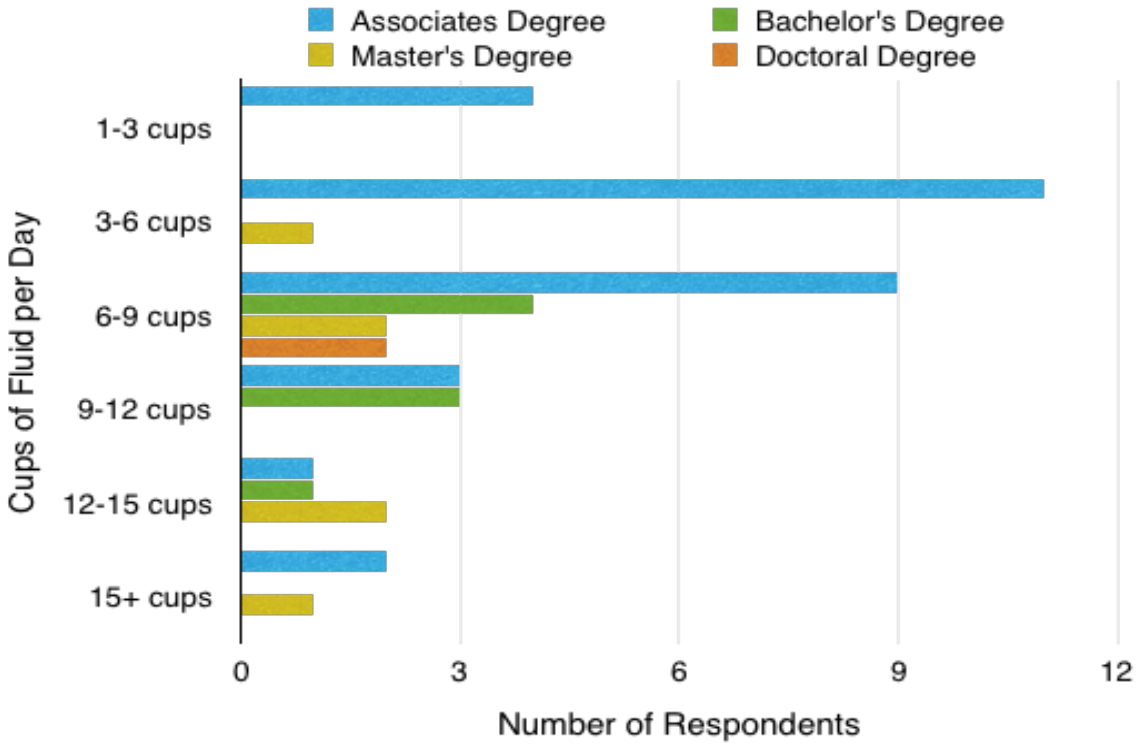


Figure 13. Female Respondents' Fluid Intake by Degree



All of the respondents had lived in or near Yuma County, AZ for more than 1 year. 18% of the male respondents had lived in or near Yuma County, AZ, for 1-5 years, 27% for 5-15 years, and 55% for 15+ years (See Figure 14). 11% of female respondents lived in or near Yuma County, AZ, for 1-5 years, 16% for 5-15 years, and 73% for 15+ years (see Figure 15).

Male respondents who had lived in or near Yuma County, AZ, for 1-5 years drank an average of 3-6 cups of fluid per day (see Figure 16). Female respondents who had lived in or near Yuma County, AZ, for the same time drink an average of 3-6 cups of fluid per day, as well (see Figure 17).

Males who had lived in or near Yuma County, AZ, for 5-15 years drank an average of 9-12 cups of fluid per day (see Figure 16). Females who had lived in or near Yuma County, AZ, for the same period of time drank an average of 6-9 cups of fluid per day (see Figure 17).

Males who had lived in or near Yuma County, AZ, for 15 years or more drank an average of 12-15 cups of fluid per day (see Figure 16). Females who had lived in or near Yuma County, AZ, for the same amount of time drank an average of 6-9 cups of fluid per day (see Figure 17).

On average, for both males and females, as the length of time the respondents lived in Yuma County, AZ increased, the fluid intake increased.

Figure 14. Male Respondents - Years Lived in Yuma County

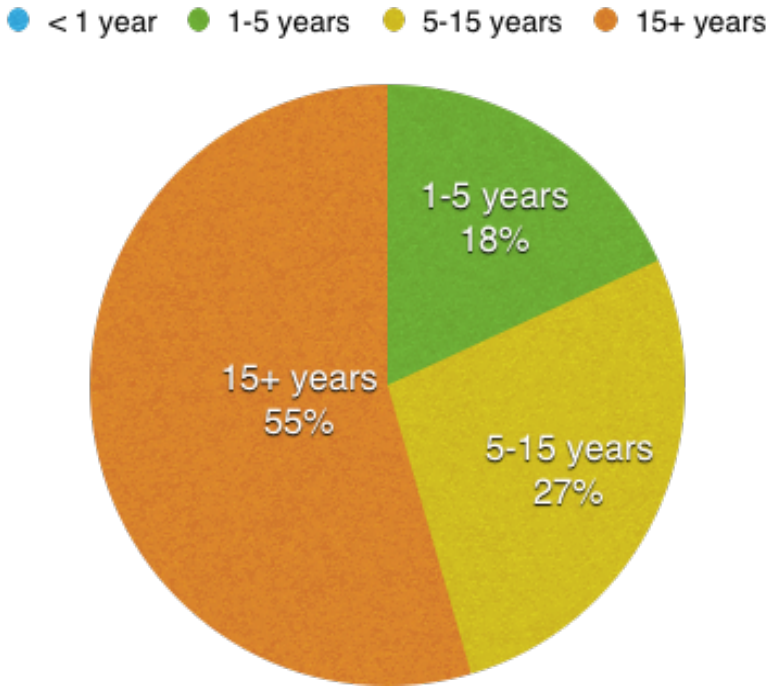


Figure 15. Female Respondents - Years Lived in Yuma County

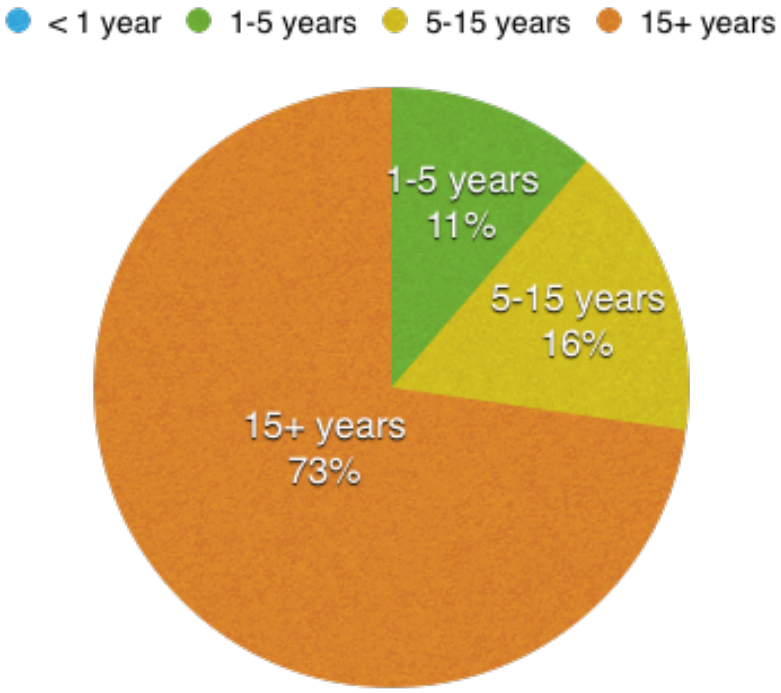


Figure 16. Male Respondents – Fluid Intake and Years Lived in Yuma County

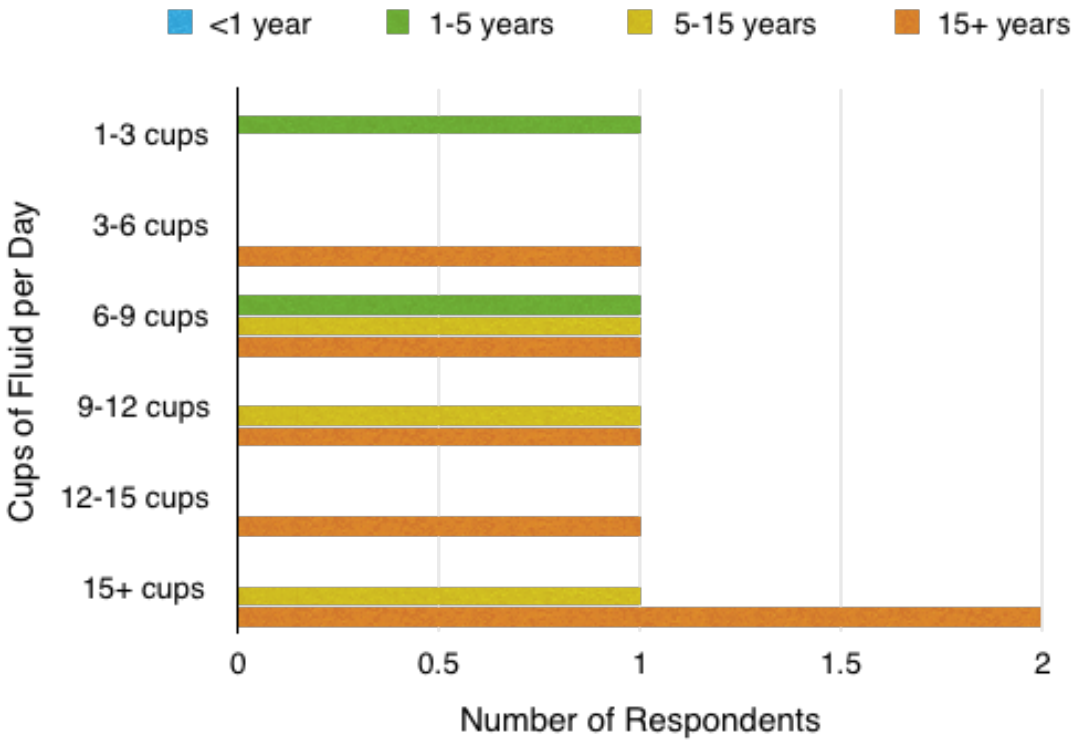
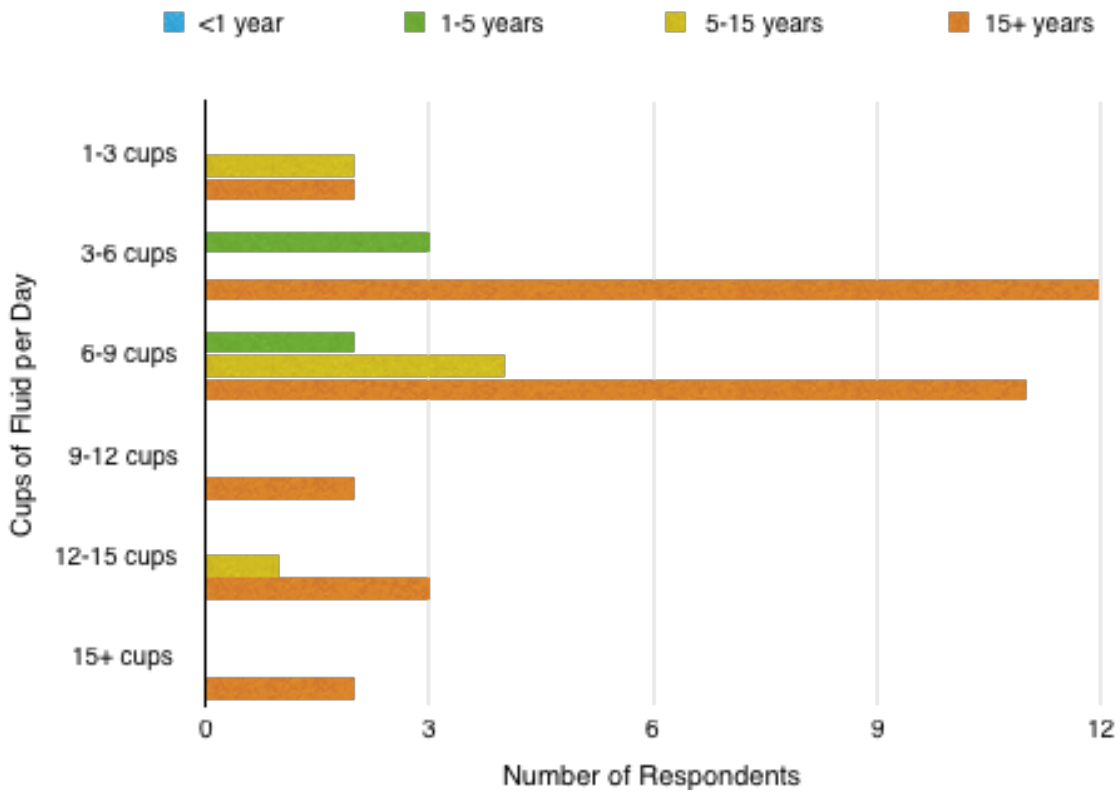


Figure 17. Female Respondents – Fluid Intake and Years Lived in Yuma County



Almost of all of the respondents knew that dehydration is more common in hot, dry climates and could cause damage to human health over time (see Table 3).

Males that answered that they did know dehydration is more common in hot, dry climates and could cause damage to human health over time drank an average of 9-12 cups of fluid per day (see Figure 18). Males that they did not have this knowledge drank an average of 15+ cups per day (see Figure 18).

Females that answered they did know dehydration is more common in hot, dry climates and could cause damage to human health over time drank an average of 6-9 cups of fluid per day (see Figure 19). Females that answered in the negative drank an average of 3-6 cups of fluid per day (see Figure 19).

Results for male respondents were too small to gain accurate information to find correlation. Female respondents' results showed that with knowledge that dehydration is more common in hot, dry climates and could cause damage to human health, fluid intake increases.

Table 3. Respondents: Knowledge that Dehydration is More Common in Hot, Dry Climates and Could Cause Damage to Human Health over Time

Item	Frequency N=55)	Valid Percent %
Knowledge about Dehydration With Regard to Climate and Time:		
Yes	51	93
No	4	7

Figure 18. Male Respondents – Fluid Intake and Knowledge about Dehydration with regard to Climate and Time

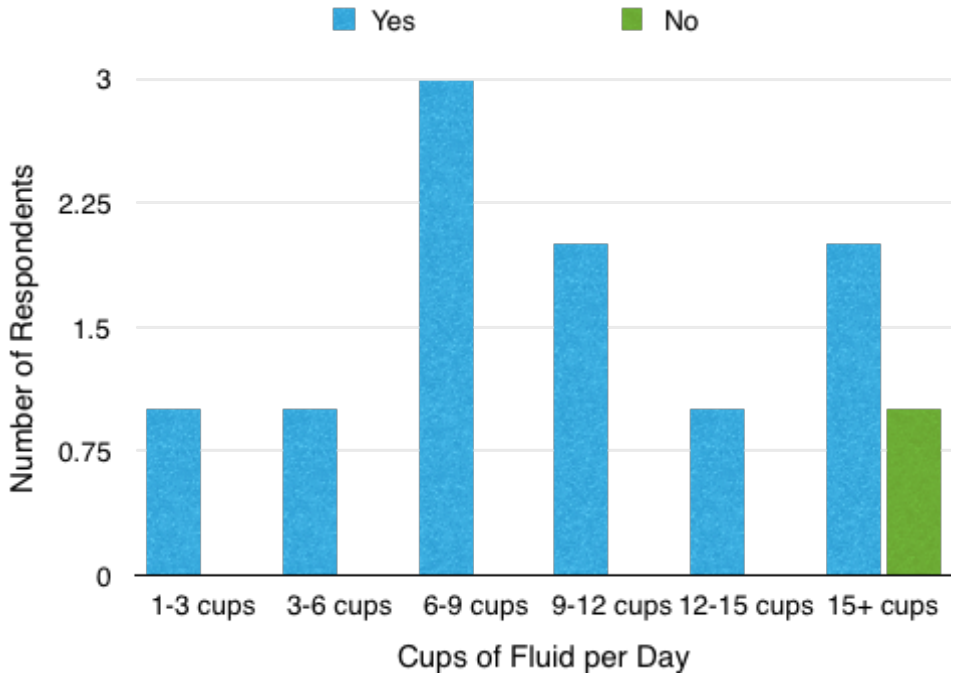
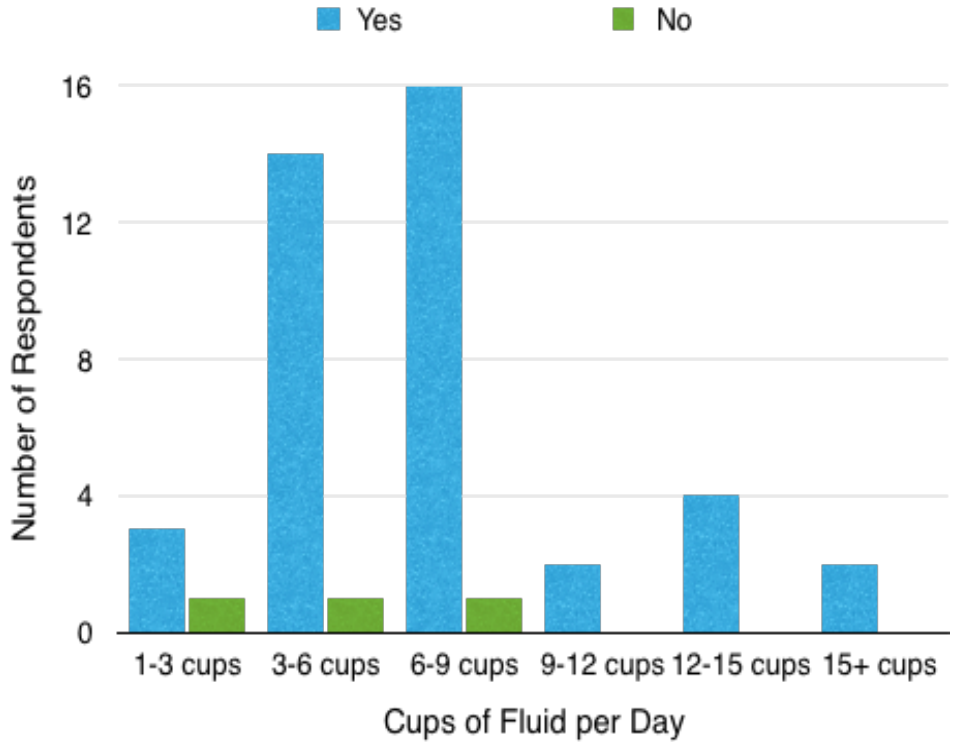


Figure 19. Female Respondents – Fluid Intake and Knowledge about Dehydration with regard to Climate and Time



Most of the male respondents had not been diagnosed with dehydration or advised to drink more fluids (see Table 4). Many of the female respondents had been diagnosed with dehydration or advised to drink more fluids (see Table 4).

Males that had been diagnosed with dehydration or advised to drink more fluids drank an average of 15 cups or more of fluid a day (see Figure 20). Male respondents that were not diagnosed with diagnosed with dehydration or advised to drink more fluids drank an average of 9-12 cups of fluid per day (see Figure 20).

Females that had been diagnosed with dehydration or advised to drink more fluids drank an average of 6-9 cups of fluid a day (see Figure 21). Female respondents that were not diagnosed with dehydration or advised to drink more fluids drank an average of 6-9 cups of fluid per day (see Figure 21).

Male respondents' responses were too small to gain accurate information to find correlation. Females that were diagnosed with dehydration or advised to drink more fluids did not have a higher fluid intake average than females that were not.

Table 4. Respondents: Diagnosed with dehydration or advised to drink more fluids.

Item	Frequency N=55)	Valid Percent %
Diagnosed with Dehydration or Advised to Drink More Fluids:		
Yes	29	53
No	26	47

Figure 20. Male Respondents – Fluid Intake and Diagnosis of Dehydration or Advice to Drink More Fluids

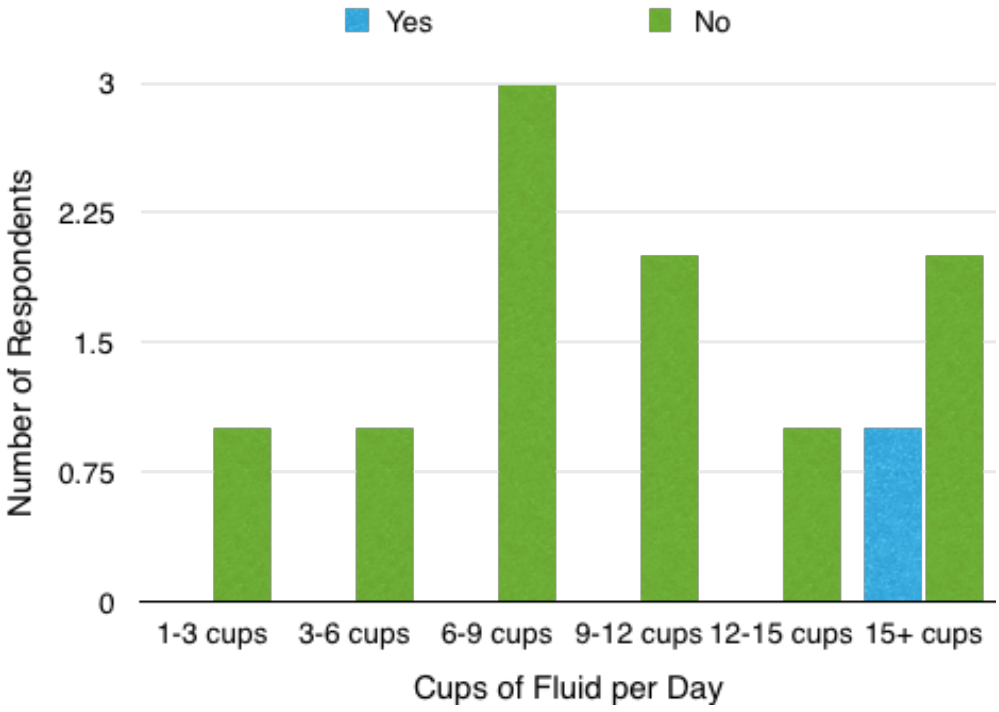
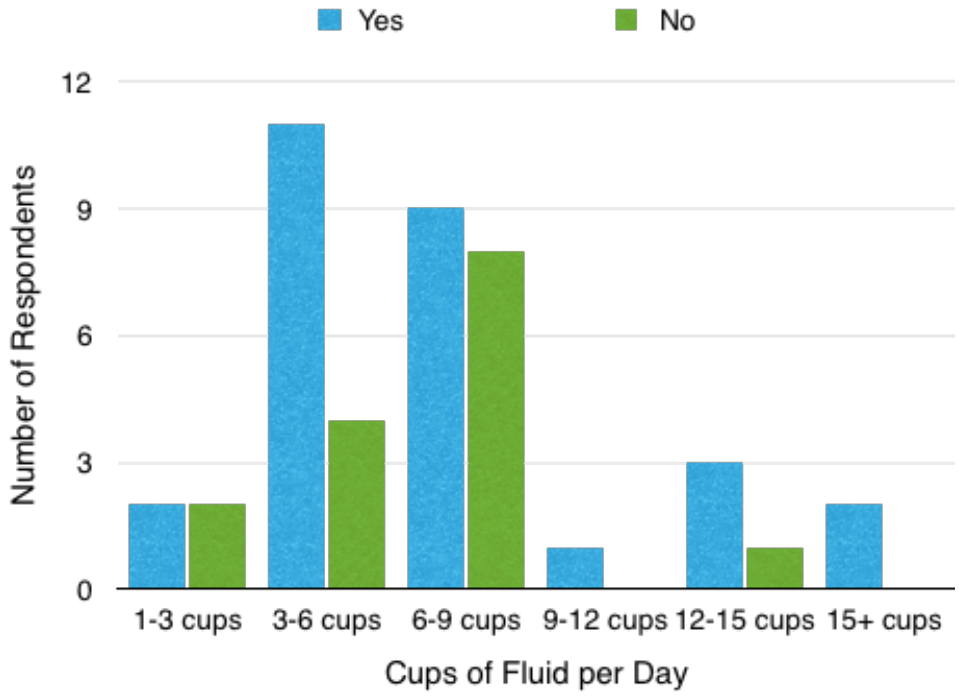


Figure 21. Female Respondents – Fluid Intake and Diagnosis of Dehydration or Advice to Drink More Fluids



All of the male respondents had experienced symptoms of dehydration. Most of the female respondents experienced symptoms of dehydration.

The most common symptom of dehydration was dry mouth and tongue, then equally recurring thirst and fatigue; the least common symptom of dehydration experienced was confusion (see Figure 24)

Male respondents had an average fluid intake of 9-12 cups of fluid per day (see Figure 22). Female respondents that had experienced the symptoms of dehydration drank an average of 6-9 cups of fluid per day (see Figure 23). Female respondents that had not experienced the symptoms of dehydration drank an average of 6-9 cups of fluid per day (see Figure 23).

Male respondents' responses were all the same, so no correlations can be shown. Female respondents' responses did not provide enough diverse information to gain accurate information to find correlation.

Table 5. Respondents: Symptoms of Dehydration

Item	Frequency N=55)	Valid Percent %
Experienced Symptoms of Dehydration:		
Yes	54	98
No	1	2

Figure 22. Male Respondents – Fluid Intake and Experience of Symptoms of Dehydration

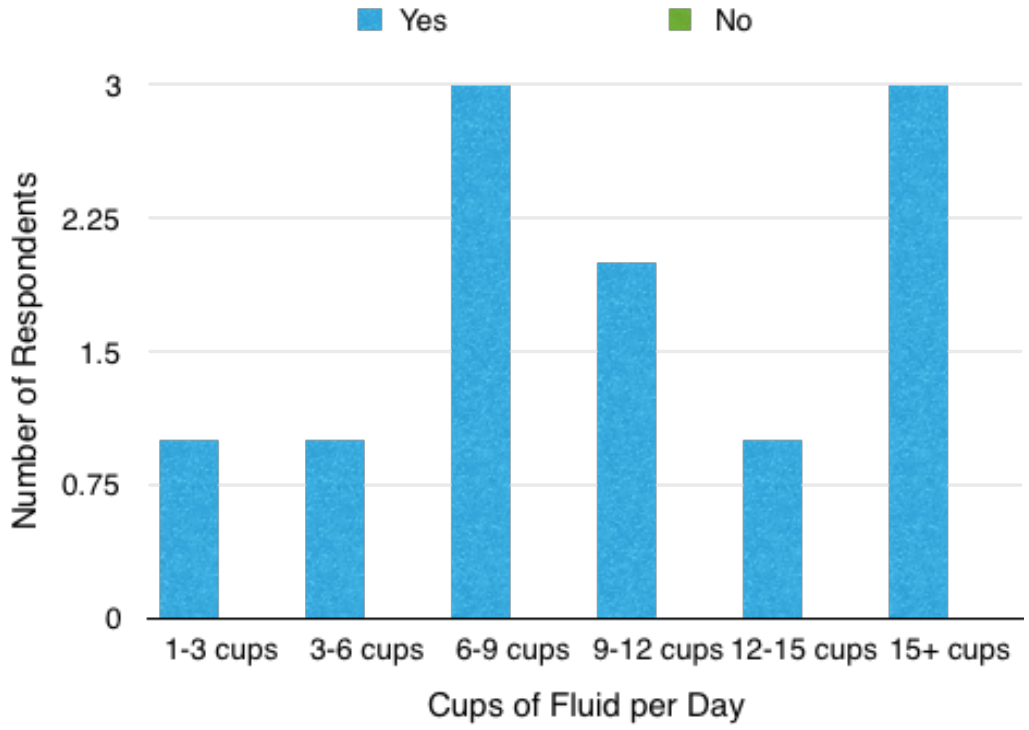


Figure 23. Female Respondents – Fluid Intake and Experience of Symptoms of Dehydration

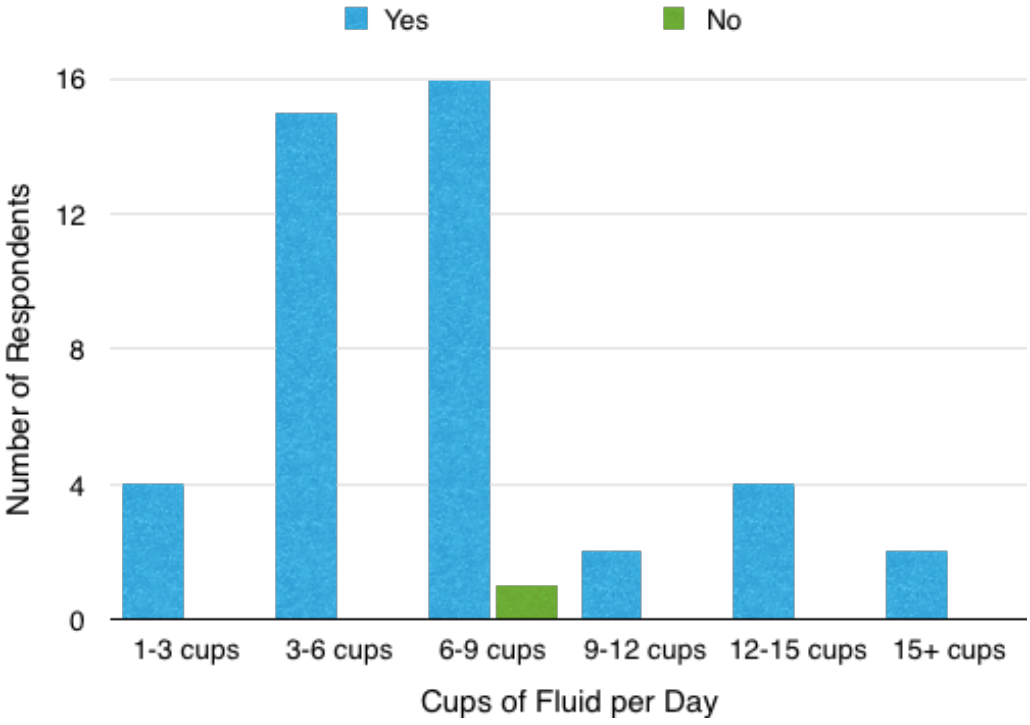
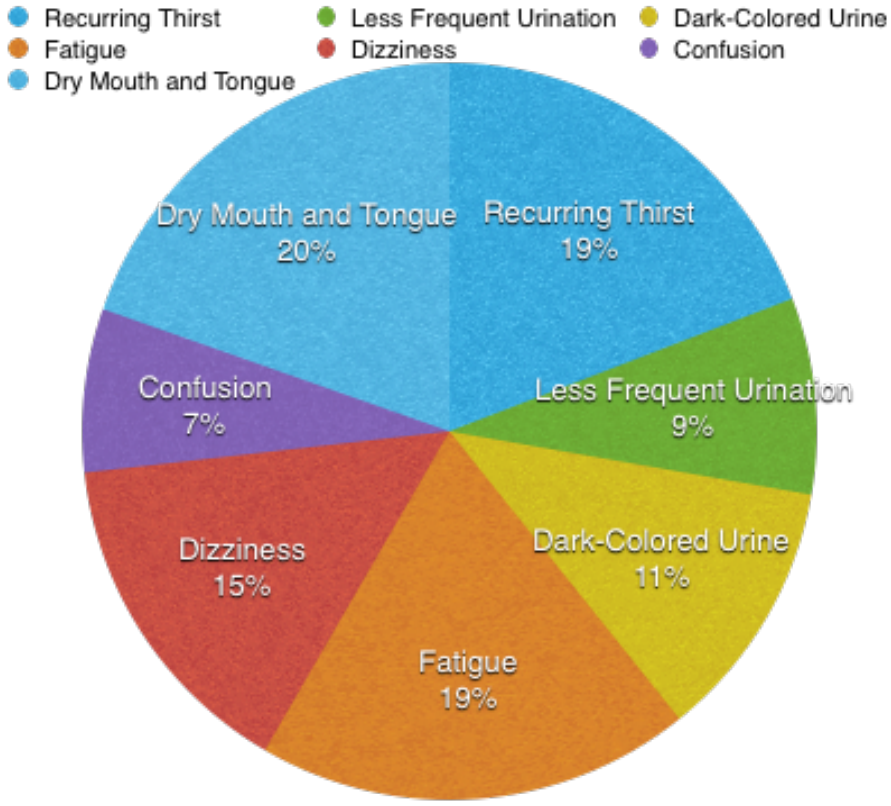


Figure 24. Experienced Symptoms of Dehydration



Educational Approach

One student that attended the presentation about dehydration said that the students who also attended now have a greater awareness of dehydration. The student added that the fellow classmates were more cognizant of the importance of drinking fluids.

Limitations

Research Study

This study has several limitations that should be considered. The sample size is not large enough to obtain the most accurate view of dehydration in Yuma County, AZ. There were no male respondents from the age range of 30-45 years. The overwhelming majority of respondents were females. Respondents with education levels higher than an obtained master's degree, or currently seeking, were few, making up only 19% of the respondents' surveys. Respondents were mainly 18-30 years old, those older only made up 24% of the respondents. Although some possible correlations may be gained, the sample size was not large enough to accurately predict them. This study also only ran from September 2018 to November 2018, so there may be bias due to time.

Educational Approach

Limitations to the Educational Approach are that they are anecdotal. No follow-up studies can be done with the presentation at school. No follow-up studies are currently planned to track the fluid intake habits of recipients of educational handouts.

Discussion, Conclusions, and Recommendations

Results from the research study and educational approach are representative of an experimental study confined to populations living in or near Yuma County, AZ. Demographical and fluid intake information were considered for relationships between fluid intake and age, education level, years residing in or near Yuma County, AZ, knowledge that dehydration is more frequent in hot dry climates, previous diagnosis of dehydration or to intake more fluids, and previous experience of dehydration's symptoms.

The typical respondent, as described from the frequency tables, was a female, eighteen to thirty years, who was seeking or had already obtained an associate degree, had lived in or near Yuma County, AZ for five or more years. This group was at higher risk of dehydration, had been diagnosed as dehydrated or advised to intake more fluids, and had experienced a symptom of dehydration.

It may be inferred that the survey's respondents were mostly female, ranging from 18-30 years of age, have the highest education level of an associate degree, and have lived in or near Yuma County, AZ, for five or more years; she is at a higher risk of dehydration, has already been diagnosed as dehydrated or advised to intake more fluids, and has previously experienced a symptom of dehydration, most likely dry mouth and tongue, recurring thirst, and/or fatigue.

It can be concluded that males and females ages 18-30 are dehydrated; they drink under the recommended amount of fluids. Males and females age 30-60+ are generally well hydrated. 18-30 year old males drink 6-9 cups of fluid a day, below the minimum daily recommendation. 30-45 year old males have no recorded data from this study. Males, 45-60 years old, drink 9-12 cups of fluid per day, the minimum daily recommendation. Males, 6o years old and older, drink 12-15 cups of fluid, above the minimum daily recommendation. 18-30 year old females drink 3-6

cups of fluid a day, below the minimum daily recommendation. 30-60 year old females drink 6-9 cups of fluid per day, the minimum daily recommendation. Females, 60 years old and older, drink 9-12 cups of fluid per day, above the minimum daily recommendation.

There were possible correlations between fluid intake and age, education level, years lived in or near Yuma County, AZ, and knowledge that dehydration is more common in hot, dry climates and could cause damage to human health. For both males and females, as age increases so did fluid intake. There were insufficient data to show correlation between fluid intake and previous experience of dehydration's symptoms or diagnosis of dehydration or advice to intake more fluids.

This information points to the population in southwestern Arizona as being on average more at risk.

Recommendations after the conclusion of this study are that for those who meet any of the risk factors should raise the recommended daily fluid intake by one unit. For instance, instead of 9-12 cups of fluid per day, males should try for 12-15 cups of fluid per day. And females should aim for a daily fluid intake of 9-12 cups of fluid per day, instead of 6-9 cups of fluid per day. Also recommended is that awareness of dehydration and its effect on human health be increased through means of distribution of educational flyers/handout, presentations at schools or health fairs, and partnerships with local clinics and health departments; awareness should specifically target vulnerable, at-risk populations.

Further research is necessary to show significant or definite trends among fluid intake and age, education level, years residing in or near Yuma County, AZ, knowledge that dehydration is more common in hot, dry places, previous diagnosis of dehydration or advice to intake more fluids, and previous experience of dehydration's symptoms. Additional

investigations are needed to measure the effectiveness of educational awareness and increasing fluid intake. Further studies are also imperative for a better understanding of the influence of fluids and human health. Continued educational awareness in or near Yuma County, AZ, about dehydration is critical for maintaining a population of healthy humans.

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Appendix A

Research Project Survey Form

Lily McNair Honors Capstone Fall 2018

Dehydration Matters Survey

[This Survey can also be taken online at:
https://www.surveymonkey.com/r/5SQMQ99]

Please Select Your Answer with a Check in the Space Provided

1: What is your age?

_____ 10-15 years

____15-30 years

____30-45 years

____45-60 years

____60+ years

2: What is your gender?

____Female

____Male

3: What is your level of education?

_____Middle School or Currently Enrolled

_____High School or Currently Enrolled

_____Associate's Degree or Currently Enrolled

____Bachelor's Degree or Currently Enrolled

____Master's Degree or Currently Enrolled

____Doctoral Degree or Currently Enrolled

4: How long have you lived in or near Yuma County, AZ, USA?

_____Less than 1 year

____1-5 years

____5-10 years

____15+ years

5: Dehydration can occur at any age when fluid intake is less than fluid loss in your body. Did you know that dehydration is more common in hot dry places and over time can damage your health?

_____Yes
____ No

6: If you meet any one of the following conditions, you may be at a greater risk of being dehydrated. Please check all that apply.

_____Youth (0-18yrs)
_____Older adults (65+ years)
____Pregnant Women
____People with Chronic Illnesses
____People who work or exercise outside
____People who work or exercise outside in high heat (90°F or above)

7: Dehydration can cause many of the symptoms below. Please check any that you may have experienced.

_____Recurring thirst
____Less frequent urination
_____Dark-colored urine
____Fatigue
____Dizziness
____Confusion
____Dry mouth and tongue

8: Have you ever been told by a healthcare provider that you are dehydrated or need to drink more fluids?

_____Yes
____No

9: Please estimate the amount of fluids you drink a day.
[A Regular Bottle of Water is about 2 cups.]

_____1-3 cups

____3-6 cups
____6-9 cups
____9-12 cups
____12-15 cups
____15+ cups

Thank you for your valued participation!

Dehydration, mild, moderate, and severe have varied symptoms. If you have comments, please leave them below. For questions and concerns, talk with your medical provider about dehydration and fluid balance.
For further reading: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086.

Appendix B

Dehydration Awareness - Educational Handouts

Dehydration Matters

Dehydration occurs when you do not drink enough fluids to match the fluids you lose everyday; it causes harm to your health.

Possible Symptoms of Dehydration:

- Thirst
- Dark-colored urine
- Less frequent urination
- Dizziness
- Fatigue
- Confusion

Are you at risk? You may be if you are a:

-Youth (0-18 years)
-Older Adult (65+ years)
-Pregnant or Breastfeeding Woman
-Person with Chronic Disease
-Person who works or exercises outside
-Person who lives in a hot, dry climate

Drink more fluids to stay healthy!

***Males**: ~12 cups a day ***Females**: ~ 9 cups a day

***Pregnant and Breastfeeding Women**: ~10-13 cups a day

The Mayo Clinic recommends that you:

- Drink a glass of water or other calorie-free or low-calorie beverage with each meal and between each meal.
- Drink water before, during and after exercise.

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

La Deshidratación Es Importante

La deshidratación ocurre cuando no toma suficientes líquidos para igualar los líquidos que pierde todos los días; causa daño a tu salud.

Posibles Síntomas de Deshidratación:

- Sed
- Orina de color oscuro
- Micción menos frecuente
- Mareo
- Fatiga
- Confusión

¿Estás en riesgo? Usted puede ser si usted es un

-Joven (0-18 años)
-Adulto mayor (65+ años)
- Mujer embarazada o lactante
-Persona con enfermedad crónica
-Persona que trabaja o ejercita afuera
-Persona que vive en un clima cálido y seco.

¡Bebe más líquidos para mantenerte saludable!

* **Hombres**: ~ 12 tazas al día
* **Mujeres**: ~ 9 tazas al día
* **Mujeres embarazadas** ~ 10-13 tazas al día
* **Las mujeres que amamantan** ~ 10-13 tazas al día

La Clínica Mayo recomienda que usted:

- Tome un vaso de agua u otra bebida sin calorías o baja en calorías con cada comida y entre cada comida.
- Bebe agua antes, durante y después del ejercicio.

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

Dehydration Matters

Dehydration occurs when you do not drink enough fluids to match the fluids you lose everyday; it causes harm to your health.

Possible Symptoms of Dehydration:

- Thirst
- Dark-colored urine
- Less frequent urination
- Dizziness
- Fatigue
- Confusion

If you are pregnant, you may be at risk of **Dehydration.**

Your body needs fluids and your baby does too!
You should drink more fluids when you are pregnant so that you and your baby stay healthy.

Pregnant women should drink about 10 cups of low sugar, low caffeine drinks a day.

If you are breastfeeding, you may be at risk of **Dehydration.**

Your body is providing fluids to your baby, so you need to drink more fluids for you and your baby.

Breastfeeding women should drink about 13 cups of low sugar, low caffeine drinks a day.

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

La Deshidratación Es Importante

La deshidratación ocurre cuando no toma suficientes líquidos para igualar los líquidos que pierde todos los días; causa daño a tu salud.

Posibles Síntomas de Deshidratación:

- Sed
- Orina de color oscuro
- Micción menos frecuente
- Mareo
- Fatiga
- Confusión

Si está embarazada, puede estar en riesgo de **deshidratación**.

¡Tu cuerpo necesita líquidos y tu bebé también!
Debe beber más líquidos cuando está embarazada para que usted y su bebé se mantengan saludables.

Las mujeres embarazadas deben tomar aproximadamente 10 tazas de bebidas bajas en azúcar y bajas en cafeína al día.

Si está amamantando, puede estar en riesgo de **deshidratación**.
Su cuerpo está suministrando líquidos a su bebé, por lo que necesita beber más líquidos para usted y para su bebé.

Las mujeres que amamantan deben tomar alrededor de 13 tazas de bebidas bajas en azúcar y bajas en cafeína al día.

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

Dehydration Matters

Dehydration occurs when you do not drink enough fluids to match the fluids you lose everyday; it causes harm to your health.

Symptoms of Dehydration:

- Thirst
- Dark-colored urine
- Less frequent urination
- Dizziness
- Fatigue
- Confusion

If you are a youth, you may be at risk of **Dehydration.**

Your body needs fluids to stay healthy!

To **grow, learn, and play.**

Each day you should drink:

Girls	Boys
* **4-8 yrs** : ~ 7 cups	* **4-8 yrs** : ~ 7 cups
* **9-13 yrs**: ~ 8 cups	* **9-13 yrs**: ~ 9 cups
***14-18 yrs** : ~ 9 cups	***14-18 yrs old** : ~ 12 cups

Drink fluids that are low in sugar and caffeine,

Choose water!

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086; https://www.eatright.org/fitness/sports-and-performance/hydrate-right/water-

La Deshidratación Es Importante

La deshidratación ocurre cuando no toma suficientes líquidos para igualar los líquidos que pierde todos los días; causa daño a tu salud.

Posibles Síntomas de Deshidratación:

- Sed
- Orina de color oscuro
- Micción menos frecuente
- Mareo
- Fatiga
- Confusión

Si usted es un joven, puede estar en riesgo de **deshidratación.**

¡Tu cuerpo necesita líquidos para mantenerse saludable!

Para **crecer, aprender y jugar.**

Cada día debes beber:

Chicas	Chicos
*4-8 años: ~ 7 tazas	* 4-8 años: ~ 7 tazas
*9-13 años: ~ 8 tazas	* 9-13 años: ~ 9 tazas
*14-18 años: ~ 9 tazas	* 14-18 años: ~ 12 tazas

Beba líquidos que sean bajos en azúcar y cafeína, ¡Elija agua!

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References: https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086; https://www.eatright.org/fitness/sports-and-performance/hydrate-right/water-go-with-the-flow

Appendix C

IRB Exempt Letter

Dear Lily McNair

Your Honors Capstone class project for the Fall 2018 semester does not require you to submit content for IRB approval. This is a class project which does not require IRB approval. You are not including personal identifiers or specific research methods thus no approval is required.

Thank you,

Aryca Marron

Interim IRB Chair

Arizona Western College