Free Water Access
on the
University of Washington
Campus

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Executive Summary

The University of Washington School of Public Health Nutritional Science 2013 students investigated the current state of free water access sources throughout the Seattle campus. Our results allowed us to recommend new policies to promote drinking water intake and to ensure that existing policies are complied with. Due to the increasing prevalence of obesity and the link to sugary drink intake, we acknowledged that an assessment of the condition of free water access sources was a necessary step in ensuring alternatives to sugary drinks were available on campus.

Methods

An analysis of 277 free water access sources was conducted among 36 campus buildings. Assessments of water temperature, rate of flow, water clarity, and source cleanliness were completed. Reviews of current policies on the federal, state, and local levels were also conducted via internet-based resources and personal communication with Gene Woodard in Building Services and Charles Easterburg of the Environmental and Occupation Health Department to identify existing policies and opportunities for new policy generation. These policies were summarized and assessed to examine adequacy of free water access sources and promotion of drinking water consumption.

Results

Our assessment showed that the majority of water sources on campus are desirable. The average time to fill a 24-ounce water bottle was 27.04 seconds which was considered fast, the average water temperature was desirable (14.5°C) and more than 95% of the fountains were free of mold, mildew, undesirable odors and colors, and fluid wastes. After reviewing current policies, four policy and promotional aims were developed.

Recommendations

- Create new Freshman Orientation module to promote drinking water consumption
- Adopt a campus-wide healthy meetings policy or guideline
- Enforce current free water access source cleaning and maintenance practices
- Develop a marketing campaign directed at students to increase drinking water consumption

Limitations

The limitations of this study include lack of comprehensive water assessment characteristics, primarily due to time and budgetary constraints, spatial access, and possible differences in data collection methods between data collection groups.

Conclusion

The free water access assessment revealed that the condition of water access on the campus is adequate and conducive to the standards of use acceptable to many students, staff, and visitors to the campus. However, impending budget constraints imposed on maintenance staff pose a threat to continued cleanliness to these water access sources.

Introduction

Goal of this Project

The 2013 Nutritional Sciences Graduate students in the School of Public Health at the University of Washington recognize that obesity and overweight status is a significant problem in the health of Americans and the consumption of sugary drinks is closely linked to excess weight [1]. The goal of the project was to address policy needs in response to the results of the free water access assessment.

Statement of Purpose

The purpose of the 2013 Free Drinking Water Access Project was to assess publicly-accessible sources of drinking water in various University of Washington Seattle campus buildings. In this assessment we evaluated the ease of using the fountain, quality of the water, and the appearance of the fountain. Additionally, we reviewed current public health practices and policies to better understand the barriers and solutions to issues that may prevent access or use of free drinking water sources on campus. We also devised a promotional campaign to support the policy recommendations to increase usage of public water sources by students, university employees, visitors, and other stakeholders.

Project Objectives

- To assess the access and quality of free drinking water at fountains and bottle fillers in buildings at the University of Washington Seattle campus
- To evaluate current policies that support safe and healthy free drinking water as well as policies that promote drinking water for public health
- To develop a marketing campaign that supports the policy recommendations for free drinking water access and consumption at the University of Washington, Seattle

Through the assessment of free drinking water sources, the main outcome of the Water Access Project was an understanding of the condition of campus free drinking water facilities. Other outcomes included mapping of current policies in place relating to water access, and identifying relevant policies to address free drinking water access and promotion.

Importance of Water Access on Campus

To determine water access on campus, the current state of campus free drinking water sources was assessed. This included recording the building, floor, time to fill a pre-measured volume (3 fluid ounces), temperature, and aesthetic qualities of the water and fountain or bottle filler. Information yielded through data collection clarified the picture of the condition of free drinking water access points throughout the campus.

Epidemiologic Data on Sugary Drink Use

In order to better understand what drives access and promotion of free drinking water sources on campus, we assessed public health data on the role of consuming caloric beverages, specifically sugary drinks, on health outcomes. Sugary drinks—in particular, carbonated soft drinks—have high sugar content, low satiety, and incomplete compensation for total energy [1]. Epidemiological evidence reveals greater intake of sugary drinks is associated with weight gain and obesity [1]. In the past 20 years, rates of overweight and obesity have increased, as has the intake of carbohydrates, mostly in the form of added sugars [2, 3]. Thirty percent of carbohydrates consumed in the US by those over 2 years of age came from caloric sweeteners in 1994-1996 [4]. Present estimates indicate 15.8% of the total energy in the diet is accounted for by added sugar, and sugary drinks account for 47% of those added sugars [5].

Obesity prevalence in the United States has increased dramatically in the past several decades. Public policy may be a powerful tool in changing the health environment and population-level behavior. The causes of the rise in obesity are multi-faceted. Weight gain from excess energy intake is a major factor in obesity, and evidence suggests that average caloric intake in the United States is higher now than during any period in the last century [6, 7].

Increased energy intake is exacerbated by consumption of sugary drinks [8]. Healthy People 2020 Goals include creating social and physical environments that promote health for all people [9], which is echoed by the Institute of Medicine (IOM). The IOM has made a number of recommendations for policies and practices to reduce and prevent obesity [10]. These recommendations include creating food and beverage environments that ensure that healthy options become the routine, easy choice. The IOM suggests policies that reduce consumption of sugary drinks and make clean potable water freely available in public places, worksites, and recreation areas [10]. Policies that discourage sugary drink consumption and encourage water consumption in the population are a logical step toward decreasing obesity prevalence [8, 10]. Assessment of access to free drinking water on the University of Washington, Seattle campus was the first step toward developing policies on increasing water access and consumption.

In a study of college students, 95% reported consuming sugary drinks in the last month [6]. Those who reported daily use of sugary drinks averaged 65%, with males reporting a higher daily use (74%) than females (61%) [6]. A standard 12-ounce serving of soda provides 150 calories, and if consumed daily without a reduction in calories elsewhere in the diet, could yield a weight gain of 15 pounds in a year [7].

These data indicate that the promotion of water intake in a university campus community may lead to the displacement of sugary drinks in the diet. As indicated, greater consumption of sugary drinks is associated with increased likelihood of being overweight or obese. Elevated weight is also linked to decreased productivity and quality of life as they impose higher medical, psychological, and social costs [11, 12]. It is also associated with higher risk of chronic diseases such as diabetes, heart disease, high blood pressure, depression, and some cancers [11, 12].

Studies of Perceptions of and Access to Drinking Fountains

Relevant to our assessment of free drinking water access, other studies have examined similar issues regarding water access and perceptions regarding access to available water sources. A California study interviewed various stakeholders in a large school district and included administrators, school staff, nutrition and health agency representatives, students, and parents [13]. Many of the respondents stated students did not want to drink from tap sources because of safety concerns, and believed that parents might influence this perception in students [13]. Additionally, perceptions of poor taste and appearance of the water from drinking fountains influenced stakeholder views of free water sources [13]. Further concerns included the thought that the fountains were too few in number to serve the student population and were not located near athletic fields or temporary classroom structures [13].

Purdue University surveyed students and found that undergraduates consume more tap water than graduate students, faculty, or staff [14]. Women drank significantly more bottled water than men [14]. Perceptions of cleanliness and safety of tap water were the main drivers for whether tap water or bottled water was selected [14]. Additionally, some respondents cited preferring the taste of bottled water over tap water sources [14].

The results of a similar report conducted at Western Michigan University yielded student perceptions much like those of the Purdue study. Many students perceived bottled water to be superior to tap water with regard to purity, taste, and convenience [15]. Students also cited lack of cleanliness, water pressure problems, and lack of functioning machines as barriers to drinking fountain usage [15].

Methods

Data Collection of Water Access on the University of Washington, Seattle Campus

Assessment Design

Water fountains and hydration stations were selected for sampling in thirty-six buildings throughout the University of Washington (UW) campus (n=277). These buildings were chosen from a 2010 list of UW campus buildings based on the year the building was built. Two to three buildings were chosen from each decade encompassing 1895-2010.

Data was collected by Nutrition 531 students in groups of 2-4 on January 25 and February 5, 2013. Calibrated thermometers, stopwatches, 3-ounce collection vials, and reference sample vials containing water from a fountain in Raitt Hall were used for water sampling. Before sampling began, students were instructed to press the water fountain button, or lever, until a constant flow rate was achieved. At optimal flow rate, stopwatches were used to calculate the time it took to fill a vial with 3 ounces of water. Thermometers were immediately inserted into the vial to determine temperature to the nearest degree. The samples were evaluated for clarity, smell, and color and assigned a score on a scale of 1-3 (1=ideal, 3=poor). Each water fountain was also evaluated for cleanliness and for liquid and/or solid waste visible on the fountain.

Data Analysis

The data collected were summarized for each building. Three of the 277 fountains were excluded from the analysis because they were out of order. Because there was such a wide range in flow rate, the data was split into three groups: 0-4.99 seconds (fast), 5-8.99 seconds (medium), and 9+ seconds (slow.) These designations were determined to understand the amount of time it would take to fill a typical 24 ounce water bottle. The fast group was desirable, meaning a 24 ounce bottle would be filled in less than 40 seconds. The medium and slow groups, which exceeded this fill time, were considered undesirable. In addition, desirable temperature ranges were determined based on previous literature, which showed people prefer water that is 15 degrees Celsius (°C) +/- two degrees [16]. A large variability in temperature was observed, so data was split in 0-15°C (cold), 15.5-20°C (medium), and 20.5+°C (warm.) Water in the coldest group was defined as desirable and anything above 15°C was defined as undesirable. Lastly, the appearance of the water fountains was defined as either clean and desirable or dirty and undesirable. Clean fountains had no waste or stains, but included fountains with mineral deposits. It was determined that mineral deposits would not be a deterrent of drinking from the fountain. Dirty and undesirable fountains were fountains that contained solid waste, liquid waste, stains, or rust.

The percentage of fountains with undesirable smell, clarity, and color was calculated in addition to the percentage of fountains with undesirable appearance, temperature, and time to fill. In order to better understand the relationship between temperature, fountain appearance, and time to fill a 24-ounce bottle, percentage of fountains that fell in the undesirable categories of each characteristic was calculated to compare fountains with overlapping, undesirable characteristics.

Assessments of Lessons Learned

The measurement of water quality and access is multifactorial, and not all of these factors could be addressed by our study. It was only practical in this study to measure water temperature, clarity, color, flow rate (time to fill a 3oz vial) and qualitative measures of fountain cleanliness. Some limitations include how we selected fountains, difference in implementing the methods used, and measurements of access and quality that were not made in this study. In most buildings, every fountain was assessed. In the Magnuson Health Sciences building, fountains were chosen at random due to the size and complex layout of the building. This particular building has different wings built in different years, which may result in variations in water access in the building that is not completely described by our sample.

Taste, pH, bacterial load, lead and other metal or mineral content of the water are important measures of water quality which we did not assess [17]. We were not able to measure these qualities due to constraints in time, training, and the equipment necessary for an accurate assessment. Measures of spatial access to fountains within buildings were not addressed, but we did note that several buildings only had access points at one end of a building. The density of available fountains compared to population, the number of individuals usually in a building at one time compared to drinking fountains, was also not accessed.

Perceptions of water access point cleanliness and ease of use would have been difficult to measure. A large majority of the fountains tested were scored as clean with clear and cold water. Perceptions of water access points may provide important information on typical use of fountains, whether the measured flow is adequate for drinking or filling bottles and other insight into why fountains are or are not used.

Finally, there were slight discrepancies between groups in the measurement of water quality. Poor lighting in some buildings and the presence of air bubbles in water at some access points made it difficult for groups to assess clarity and color. In addition, temperature measurements could be artificially inflated by the heat transferred by holding the vial in the hand between measuring fountains, and the length of time before the fountain cooling system turned on. Some groups noted that water temperatures measured before the audible start of the cooling system were higher than a second measurement taken after the cooling system had turned on. This issue would be mimicked in a real world scenario. Some groups rinsed their vials first to avoid artificially inflated temperatures due to heat transferred from the hand to the vial, while others did not. Finally, time to fill measurements were likely different between groups due to differences in vial-filling techniques or human error in stopwatch use.

Review of Current Public Health Policy on Water Access

Methods of Nationwide Policy Search

To identify the existence of water policies focused on increased water consumption in place at university campuses and workplaces, popular search engines (i.e. Google, Bing) were utilized using the following search terms: “water access policy,” “water consumption policy,” “water intake public health,” “water university,” and “water consumption campaign.” In PubMED, the following search terms were used: “water obesity,” “water policy,” “water workplace policy,” “dehydration cognitive,” “chronic mild dehydration,” “sugar sweetened beverage obesity,” and “water sugar sweetened beverage.”

Methods of Washington Policy Search

To identify the existence of water policies in Washington, WAC 246-290, WAC 246-291 to WAC 246-296 were investigated from the Washington State Legislation website [19]. For drinking fountain related policies, WAC 51-50-2900 [20], from the State Building Code of plumbing fixtures, and the University of Washington’s Building Services Department’s green cleaning guidelines [21] were investigated. Finally, other potential drinking fountain related codes were investigated through the American Society of Mechanical Engineers (ASME) [22], Air-Conditioning, Heating, & Refrigeration Institute (AHRI) [23], and National Sanitation Foundation (NSF) [24] websites.

Results

Data Collection of Water Access on University of Washington, Seattle Campus

The survey results illustrated that the majority of water sources on campus have at least one desirable characteristic including clear, odorless, colorless, cold water, fast water flow rates, and clean water access points. Over half of the water access points (58%) had all of the desirable qualities and no issues. However, the survey also showed patterns of less desirable qualities including dirty fountains, slow flow rates, and warm water temperatures.

Out of the 274 fountains included, 97.5% of the fountains had clear water, 96.7% had no undesirable odors, and 99.6% were colorless. The average time to fill a 24-oz. bottle was 27.0 seconds and the average water temperature was 14.5°C. 98.5% of the fountains had no mold or mildew. 99.3% of the fountains did not have any fluid waste in them. Also, 99.3% of the fountains were damage free. 21.5% of the fountains had mineral deposits. 13.1% had solid waste. 9.9% of the fountains had rust. For time to fill, 254 fountains fell in the fast flow rate category, 18 fell in the medium flow rate category, and 2 were in the slow flow rate category (Figure 1). For temperature, 185 fountains fell in the most desirable, less than 15°C category, 58 fell in the 15-20°C range, and 31 were greater than 20°C (Figure 2).

Forty-two percent of the water fountains had undesirable qualities. Of the fountains with undesirable qualities, 33.5% of fountains had a temperature greater than 15°C, 6.1% took greater than 40 seconds to fill a 24-ounce bottle, and 13.1% of the fountains were dirty (liquid/solid waste or rust). Figure 3 describes the distribution of different cleanliness issues and compares the amount of dirty fountains to clean fountains.

Of the total fountains samples, 1.8% had undesirable temperature and took greater than 40 seconds to fill a 24-oz bottle (Figure 5). 6.6% had temperature greater than 15°C and solid or liquid waste. Out of the fountains that took greater than 40 seconds, zero had solid or liquid waste. 1% of the fountains were undesirable in all three categories.

Figure 1: Time Required to Fill a 24-oz. Bottle

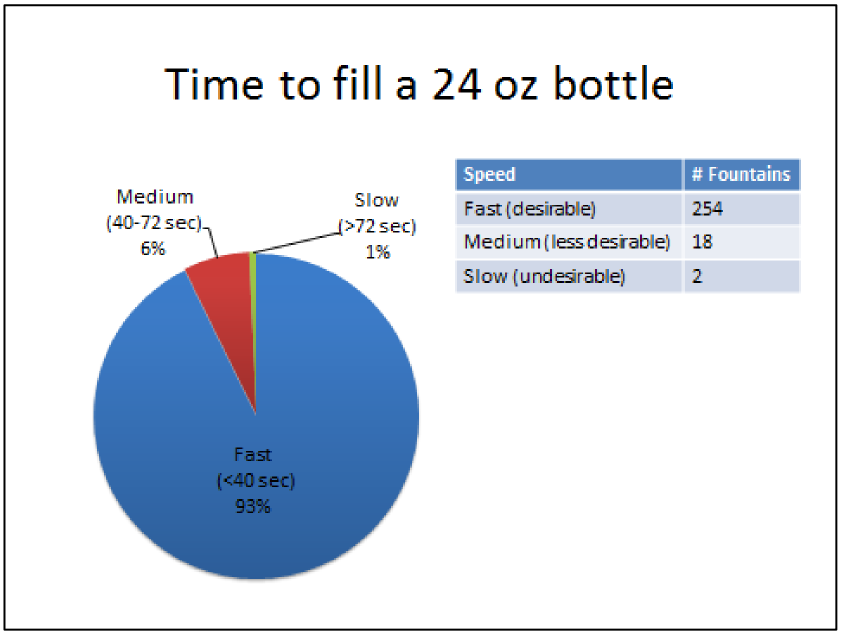


Figure 2: Water Temperatures of Sampled Water Sources

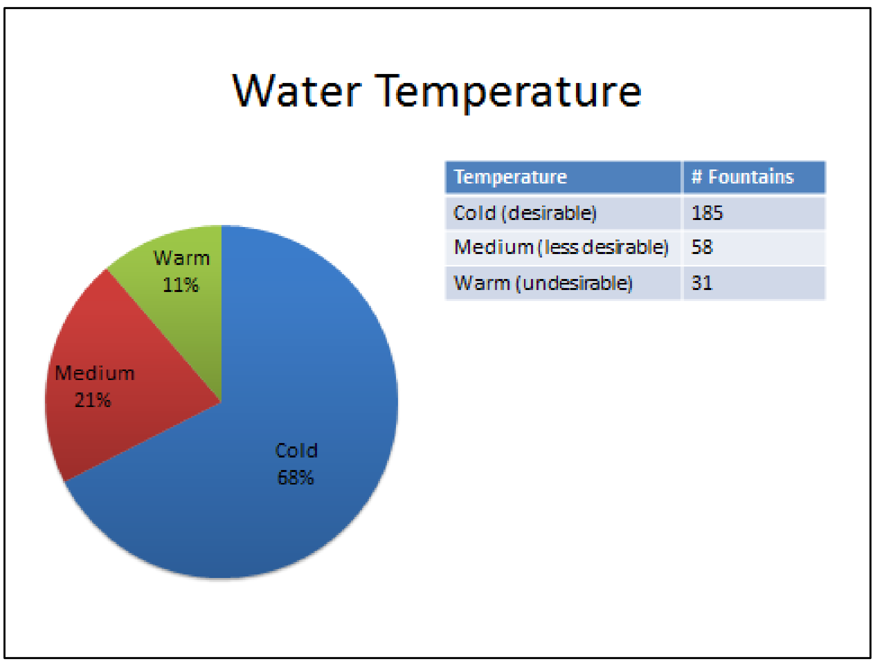


Figure 3: Water Fountain Appearance and Cleanliness

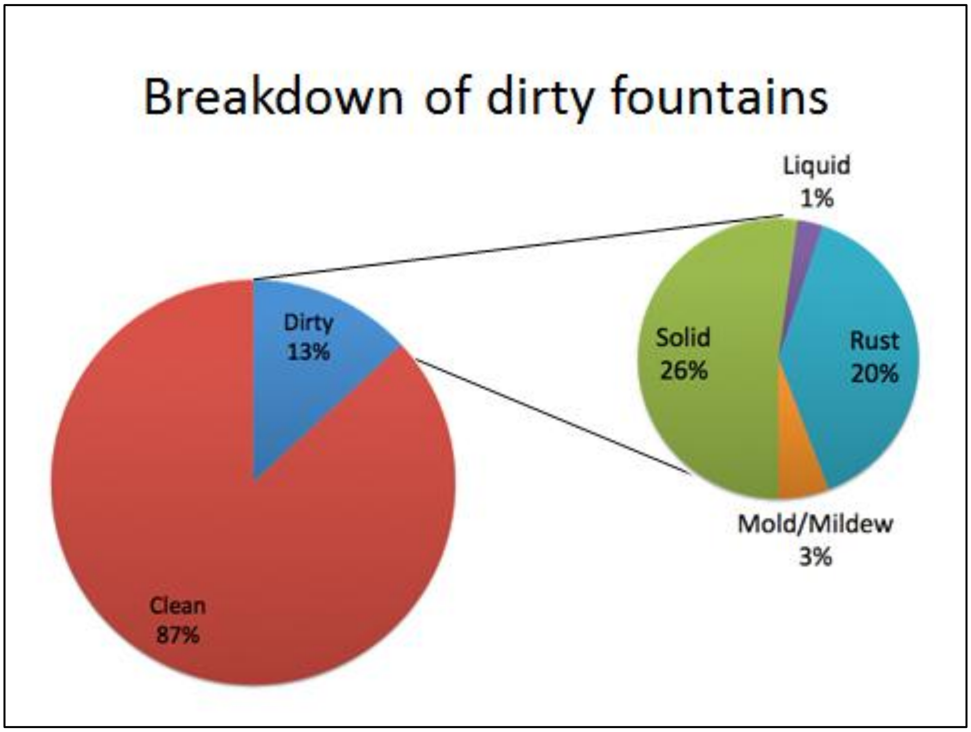
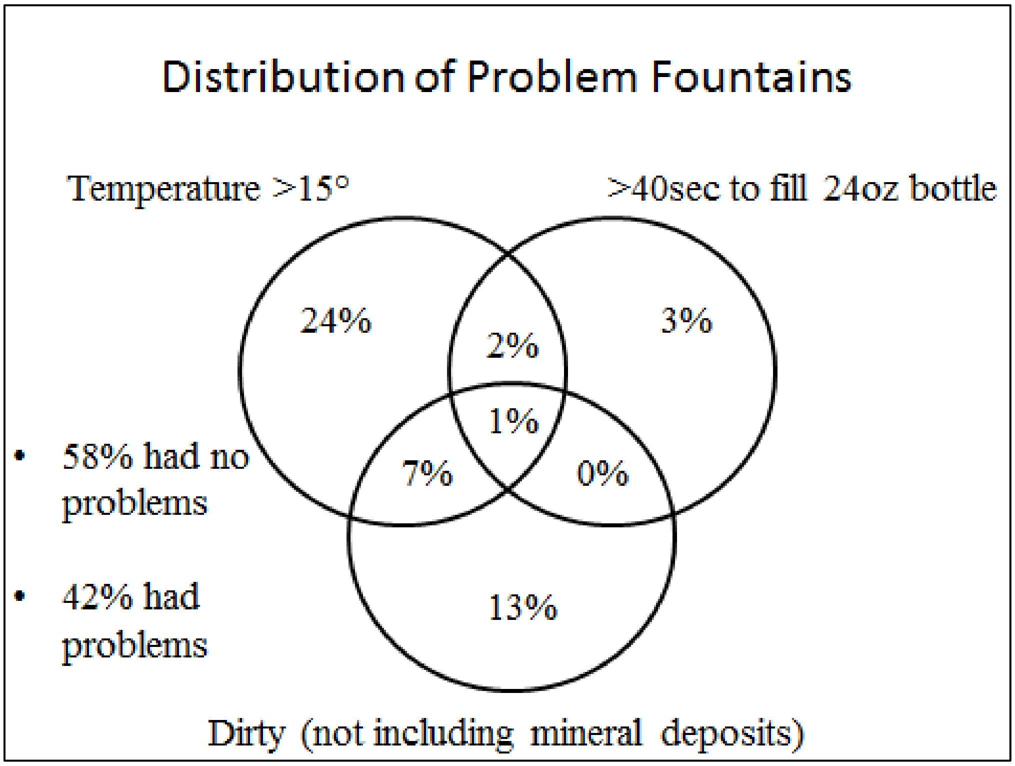


Figure 4: Summary of Undesirable Characteristics in Total Sampled Water Fountains



Current Public Health Policy on Water Access

Results of Nationwide Policy Search

Policies in place aimed at increasing water consumption by school-age children are directed by the Healthy, Hunger-Free Kids Act of 2010 [25], which requires all schools participating in federally funded meal programs to make water available during meal periods at no cost to children and requires childcare facilities to make water available to children throughout the day. Strategies for implementation, success/failures of these strategies, and effective marketing campaigns for enhancing water consumption were noted. Data supporting improved health outcomes in children provided with free access to water cannot fairly be applied to adults, and have not been included in this report.

The majority of policies were identified in mainstream media (New York Times, USA Today, etc.) and followed to the cited institutions to obtain formal policy statements. The few policies pertinent to universities focused on eliminating bottled water from campuses in the name of environmental health. These policies, driven by the student body, involved educational efforts, decreased access to bottled water, and increased access to water by providing refillable water bottles and posting maps of access points [26]. Other universities and workplaces enacted policies restricting the sale and distribution of sugary drinks on site. These efforts have largely been modeled after a 2013 city-wide ban of sugar drinks in New York and Boston [27]. These policies were of limited use because their goals were to restrict sugary drink access rather than enhance water consumption. However, the data generated from these policies may be of value presuming the restriction of sugary drinks may lead to increased water consumption.

The search of PubMed revealed a relevant study of beverage consumption patterns on college campuses. A 2006 publication concluded, "Self-reported sugar sweetened beverage consumption among undergraduates is substantial and likely contributes considerable non-nutritive calories, which may contribute to weight gain…Obesity prevention interventions targeting reductions in sugar-sweetened beverages in this population merit consideration." [7]

"Frequent drinking of commercial beverages was associated with frequent snacking (P = 0.002), meal skipping (P = 0.006), eating out (P = 0.003), eating delivered foods (P = 0.000), processed foods (P = 0.001), and sweets (P = 0.002), and drinking alcoholic beverages (P = 0.029). The frequent consumption group tended to have a higher threshold of sweet taste without reaching statistical significance. The results provide information for developing strategies for evidence-based nutrition education program focusing on reducing consumption of unnecessary sugar-sweetened commercial beverages." [28]

The most comprehensive study to date, conducted at six colleges throughout Massachusetts and Louisiana between April and June 2010, determined that "taste and price were the most important factors in choosing beverages" and "health and nutritional content of beverages are of limited interest." [29]

Valuable information resulting from these surveys and focus groups included the perception that bottled water is cleaner than tap water, the consistent lack of appreciation for the health benefits of water, and irreverence for the consequences of drinking sugary beverages. These publications contributed to our recommendation to support a university-wide educational campaign promoting tap water consumption.

Chronic mild dehydration also emerged from the PubMed search as an unappreciated public health concern. According to the International Life Sciences Institute (ILSI) North America Conference on Hydration and Health Promotion in November 2011, chronic mild dehydration of 1-2% of body mass affects average citizens with sedentary lifestyles and occupations [30]. A 2003 study of chronic mild dehydration suggests an association between "a low habitual fluid intake and some cancers, cardiovascular disease, and diabetes. There is some evidence of impairments of cognitive function at moderate levels of hypohydration…lead to reductions in the subjective perception of alertness and ability to concentrate and to increases in self-reported tiredness and headache." [31]

Data collected from the Nurses' Health Study and the Health Professionals Follow-up Study supported a role for increasing water consumption for preventing weight gain.

"We estimated that replacement of 1 serving per day of SSBs [sugar-sweetened beverages] by 1 cup per day of water was associated with 0.49 kg (95% CI: 0.32-0.65) less weight gain over each 4-year period, and the replacement estimate of fruit juices by water was 0.35 kg (95% CI: 0.23-0.46). Substitution of sugary drinks by other beverages (coffee, tea, diet beverages, low-fat and whole milk) were all significantly and inversely associated with weight gain. Our results suggest that increasing water intake in place of sugary drinks is associated with lower long-term weight gain." [32]

Results of the Washington Policy Search

According to the Washington State drinking water regulations, water supply to drinking fountains on the Seattle campus of the University of Washington is under group A non-transient non-community water system. This state policy applies to sites that provide service to twenty-five or more of the same nonresidential people for one hundred eighty or more days within a calendar year (WAC 246-290-020) [19].

In Washington, all public water systems should provide an adequate quantity and quality of water in a reliable manner (WAC 246-290-420) [19]. A municipal water supplier has a duty to provide retail water service to all new service connections within its retail service area (WAC

246-290-106) [19]. For the water distribution system, the minimum diameter of all distribution mains should be six inches (150 mm). New public water systems or additions to existing systems should be designed with the capacity to deliver water at 30 psi (210 kPa) for the designed peak hourly demand (WAC 246-290-230) [19]. Every purveyor should obtain drinking water from the highest quality source feasible (WAC 246-290-130) [19]. According to the federal policy, all materials that have substantial contact with potable water, such as filter media and water tanks, should meet the acceptable materials criteria. Drinking water should be disinfected, fluoridated, and meet the drinking water criteria [24]. The Green Cleaning Guidelines at University of Washington [21] request that drinking fountains should be sanitary and clean.

With regard to regulations of drinking fountains, buildings with occupant loads over 30 should have one drinking fountain for the first 150 occupants, then one per each additional 500 occupants (WAC 51-50-2904.4) [20]. Sporting facilities with concessions serving drinks such as the Intramural Activity Building, should have one drinking fountain for each 1000 occupants. For multistory buildings, drinking fountains should be provided on each floor having more than 30 occupants in each building. The drinking fountain should not be located in restrooms. Based on our assessment, drinking water fountains and filling stations on the University of Washington campus did meet current local, state, and federal regulations and policies.

Discussion

In light of the association between obesity and sugary drinks, the goal of the 2013 Nutritional Sciences Graduate students at the University of Washington was to evaluate factors related to free water consumption and the reduction of sugary drink consumption in order to reduce the prevalence of obesity and other chronic diseases. The purpose of this report was to evaluate access to drinking water on the University of Washington Seattle campus, identify barriers to free water access, and identify opportunities for policies that encourage free drinking water consumption.

The analysis of a sample of 277 water fountains and bottle fillers in 36 buildings on campus revealed that the overwhelming majority of fountains were clean and had desirable flow rates, and the water obtained from them was colorless, odorless, clear, and cold. The fountains that were undesirably dirty, had an odor, or produced cloudy, colored, or warm water did not cluster in any particular buildings on campus. Uncleanliness and poor water quality did not appear to group together. Anecdotal data suggest that perceptions of uncleanliness and water contaminants rather than actual water quality or fountain appearance may prevent consumption of free water.

An analysis of current state and local regulations governing drinking water and other policies for increasing free water consumption was conducted to inform drinking water policy recommendations for the University of Washington. Nutritional Sciences students recommend the following four policies be adopted/implemented to increase free water access and consumption on campus:

- Include promotion of free drinking water as part of the Freshman Orientation curriculum.

- Adapt the Washington State Department of Health's "Energize Your Meeting," healthy meeting guidelines to adopt a campus-wide healthy meeting policy to promote healthy food and beverage consumption including requiring tap water to be served in lieu of sugary drinks or bottled water.
- Fully implement existing drinking fountain cleaning and maintenance policies.
- Create a free water promotional campaign to increase free drinking water on campus among students and support the above policy changes.

The Institute of Medicine and Healthy People 2020 recommend creating environments that make healthy choices easy and encourage people to choose water over sugary drinks. Increasing access to free drinking water is an important step in reducing consumption of sugary drinks and preventing obesity and other chronic diseases. This report is the first step toward understanding both environmental barriers to free drinking water consumption and identifying opportunities to use policy to encourage increased consumption of free drinking water at the University of Washington.

Recommendations

Recommendations Based on Water Policy Research Review:

Currently, incoming University of Washington Freshmen attend a two-day orientation prior to autumn quarter. During the first day, there is Health and Wellness session during which students learn about health and safety services available on campus. Adding a module to this session will specifically address the benefits of hydration and drinking tap water. Additionally, it is important to educate the students on research surrounding sugary drink and energy drink consumption and to dispel myths about cleanliness of tap water versus bottled water. Students would also be provided with a refillable stainless steel water bottle and a map indicating the location of fountain and 'hydration stations' around campus [33].

- Incorporate a Health and Wellness session into one day of UW Freshman Orientation including a 30-minute module highlighting the health benefits of increasing free drinking water consumption while decreasing sugary drinks.
    - This will increase awareness of all health concerns associated with inadequate free drinking water consumption and dispel myths regarding poor water quality in drinking fountains.

The Washington State Department of Health, as part of the 'Health Education Resource Exchange' program, publishes free-access online materials for public use. Funded in part through a CDC grant, the Energize Your Meetings materials offer tips and suggestions to make meetings more productive. The rating system outlines standards that should be met at each level in order to receive the indicated 'number of stars'. For example, a three-star event should include fruit and vegetables as a light refreshment and water at breaks and meals. The standard should be revised to indicate that tap water specifically should be included at all times during meetings from one to five stars, regardless of whether other refreshments will be served [34].

- Adapt the Washington State Department of Health's "Energize Your Meeting," healthy meeting guidelines to adopt a campus-wide healthy meeting policy to promote healthy food and beverage consumption including requiring tap water to be served in lieu of sugary drinks or bottled water.
    - This will make tap water freely available and accessible to increase free drinking water consumption during meetings.
- Fully implement existing policies surrounding water fountain maintenance and cleaning because our data show that fountain cleanliness is not desirable in some areas.
    - These clean fountains will promote the consumption of water.
- Implement a UW campaign supporting policy change and to promote campus wide free drinking water consumption (Appendix D).
    - This will provide a fun and creative strategy to increase free drinking water consumption and awareness of water fountain access and quality.

Conclusion

Through conducting an assessment of free water access on the University of Washington, Seattle campus and current water access policies, 2013 Public Health Nutrition graduate students were able to provide recommendations to ensure continued free drinking water access and encourage increased use of access sources. Increased usage of water access sources is of particular concern due to the link between obesity and sugary drink intake. Free drinking water access serves as a healthier alternative to sugary drink options. Assessment of water access sources included the evaluation of temperature, flow rate, clarity, and source cleanliness. Average values for flow rate, temperature, and cleanliness were found to be in acceptable ranges.

Policies regarding water access were assessed through internet-based sources and communication with building services and environmental health staff locally on campus. Four recommendations were identified from the information yielded from these sources. These recommendations aim to increase free water access use and sustained standards of cleanliness for free drinking water access sources. Limitations of the assessment included budget restrictions and differences in data collection methods between groups in assessing water access sources. Overall, the condition of free drinking water access on the campus was determined to be adequate at present, but future decreases in the budget for environmental cleaning and maintenance may threaten continued cleanliness of free water access sources.

Appendices

Appendix A: Map of University of Washington Campus

Appendix B: List of Buildings Surveyed and Year Built

BUILDING	DATE BUILT	NUMBER OF FOUNTAINS SURVEYED
DENNY	1895	4
ARCHITECTURE	1909	9
SAVERY	1917	14
SUZZALLO LIBRARY	1926	18
HALL HEALTH CENTER	1936	8
ART BUILDING	1949	8
MUSIC BUILDING	1950	5
COMMUNICATIONS BUILDING	1951	8
CHEM LIBRARY BUILDING	1957	2
BURKE MUSEUM	1962	2
MARINE SCIENCES	1966	7
INTRAMURAL ACITIVITIES (IMA)	1968	27
KANE HALL	1971	2
KINCAID HALL	1971	7
GOULD HALL	1972	9
SOUTH CAMPUS CENTER	1975	5
HITCHCOCK HALL	1982	11
ALLEN LIBRARY NORTH & SOUTH	1991	16
CHEMISTRY BUILDING	1995	10
ELECTRICAL ENG BUILDING	1998	12
FISHERY SCIENCES	1999	6
WILLIAM H GATES HALL	2003	24
W.H. FOEGE GENOMIC SCIENCES & BIO ENGINEERING	2006	16
HEALTH SCIENCES A WING	1949	3
HEALTH SCIENCES B WING	1949	2
HEALTH SCIENCES C WING	1949	1
HEALTH SCIENCES F WING	1950	2
HEALTH SCIENCES H WING	1950	8
HEALTH SCIENCES I WING	1964	1
HEALTH SCIENCES J WING	1965	4

HEALTH SCIENCES K WING	1995	4
HEALTH SCIENCES T WING	1973	13
HEALTH SCIENCES BB WING	1952	3
HEALTH SCIENCES CC WING	1959	2
HEALTH SCIENCES RR WING	1960	2

Appendix C: Water Access Project Inventory Tool

Information Sheet:

University of Washington Public Health Nutrition Course 531 students are doing a group project to learn more about access to free drinking water on the University of Washington Seattle Campus. The purpose of this project is to assess the availability of free drinking water to students, staff and visitors on campus as well as to better understand the policies and regulations that control drinking water access and infrastructure. The results of this assessment will be used to support student education and to make suggestions for improvement or promotion of drinking water for good health.

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Acknowledgements: This beverage inventory tool was modified from the University of Washington, Center for Public Health Nutrition's Beverage Inventory Tool which was adapted from the Beverage Audit Protocol developed by the Harvard School of Public Health Prevention Research Center (http://www.bphc.org/programs/cib/chronicdisease/healthybeverages/Forms%20%20Documents/toolkit/AppendixG_Tool-for-Assessment-of-Beverage-Access-in-City-Agencies.pdf)

RECORDS:

Building Name: ____

Date of survey: ___________

Names of surveyors: ____

____

Assessment Objective:

Determine access to free drinking water in University of Washington – Seattle Campus buildings. Two people will complete the survey at each building.

Materials to Bring:

3 oz. cup	Pens / Pencils	Clipboard
Stopwatch	Reference water sample	Thermometer

Sources of free water to sample

Water fountain- ejects a jet of water for drinking straight from the fountain, without using a cup. Water fountains are usually connected directly to the municipal water supply (tap water)

Hydration Station- dispenses filtered water into cups or water bottles. The dispenser looks like the soda fountains at fast-food outlets and to get water, a cup or water bottle is pressed against the filler.

Free Water Access Points:

No. of Water Fountains: = ______________

No. of Hydration Stations: = ______________

Other Water Access Points: = ______________

Please specify type(s):____

Free Water Assessment: This section of the tool will assess the availability of water fountains, hydration stations and other sources of free water. Water quality of each option will also be assessed.

Try to sample ALL points of water access.

Note the location of each water access point. Write the directional location in the building (e.g. NE corner) under "hallway" or "other". If you are in a location other than a hallway, specify the type of "other" location such as cafeteria, lounge area, etc. Add the floor to the location data. For the Health Sciences building, add which Wing in addition to the floor.

When sampling, complete the following chart:

- Fill the 3 oz. cup from the water access point, and use the stopwatch to time how long it takes. Record this.
- Once the cup is full, use your thermometer to measure the temperature. Record this.
- Compare the water in the cup to the reference sample, noting water clarity, smell, and color. Rank the quality of the sampled water using the following scale:
    - 1- Indistinguishable from reference sample (clear, no smell, no color)
    - 2- Worse (slightly more cloudy, smell, color) than reference sample
    - 3- Much worse (more cloudy, smell, color) than reference sample
- Note the appearance of the water access point, record the presence of anything in or on the fountain, water cooler or hydration station.
- If water access point does not work or is out of order, NOTE THIS. This counts as the access point having been "sampled."

After sampling is complete, record the total number of non-functioning water sources (including visibility non-functioning ones and non-working ones from the audit) – see below.

Free Water Access- Water Fountains					
Building: **Water fountain #:**	**Location** (e.g. directional in building such as NE corner and whether in a hallway or somewhere else)	**Time to fill 3 oz cup (sec)**	**Temp (C)**	**Water quality compared to reference sample** 1-3 scale	**Appearance of fountain (note any debris, rust, gum, mold etc)**
1	Floor hallway ____ other _____			clarity: smell: color:	
2	Floor hallway ____ other _____			clarity: smell: color:	
3	Floor hallway ____ other _____			clarity: smell: color:	
4	Floor hallway ____ other _____			clarity: smell: color:	
5	Floor hallway ____ other _____			clarity: smell: color:	
6	Floor hallway ____ other _____			clarity: smell: color:	

Free Water Access- Water Fountains					
Building: **Water fountain #:**	**Location** (e.g. directional in building such as NE corner and whether in a hallway or somewhere else)	**Time to fill 3 oz cup (sec)**	**Temp (C)**	**Water quality compared to reference sample** 1-3 scale	**Appearance of fountain (note any debris, rust, gum, mold etc)**
7	Floor hallway ____ other _____			clarity: smell: color:	
8	Floor hallway ____ other _____			clarity: smell: color:	
9	Floor hallway ____ other _____			clarity: smell: color:	
10	Floor hallway ____ other _____			clarity: smell: color:	
11	Floor hallway ____ other _____			clarity: smell: color:	

Free Water Access- Water Fountains					
12	Floor hallway ____ other _____			clarity: smell: color:	

Free Water Access- Hydration station/bottle filler					
Building: **Water fountain #:**	**Location** (e.g. directional in building such as NE corner and whether in a hallway or somewhere	**Time to fill 3 oz cup (sec)**	**Temp (C)**	**Water quality compared to reference sample** 1-3 scale	**Appearance of station (note any debris, rust, gum, mold etc)**
1	Floor hallway ____ other _____			clarity: smell: color:	
2	Floor hallway ____ other _____			clarity: smell: color:	
3	Floor hallway ____ other _____			clarity: smell: color:	
4	Floor hallway ____ other _____			clarity: smell: color:	
5	Floor			clarity:	

Free Water Access- Water Fountains					
	hallway ____ other _____			smell:	
				color:	
6	Floor hallway ____ other _____			clarity:	
				smell:	
				color:	

Free Water Access- other (describe): ______________________________________					
Building: / **Water fountain #:**	**Location** (e.g. directional in building such as NE corner and whether in a hallway or	**Time to fill 3 oz cup (sec)**	**Temp (C)**	**Water quality compared to reference sample** 1-3 scale	**Appearance of access point (note any debris, rust, gum, mold etc)**
1	Floor hallway ____ other _____			clarity:	
				smell:	
				color:	
2	Floor hallway ____ other _____			clarity:	
				smell:	
				color:	
3	Floor hallway			clarity:	
				smell:	

Free Water Access- other (describe): ______________________					
	____ other _____			color:	
4	Floor hallway ____ other _____			clarity:	
				smell:	
				color:	
5	Floor hallway ____ other _____			clarity:	
				smell:	
				color:	

Total Number of non-Functioning water sources: ______________________

Water Access Points Notes:

Appendix D: Promotional Campaign Materials

This appendix entry details the methodology for development of our water access promotion campaign. This is based on the CDC framework for developing a public health promotion campaign. We conducted a SWOT analysis, evaluating the audience and the feasibility of the intervention strategies. The second part of the appendix summarizes several previously developed tap water drinking campaigns.

Marketing Plan: Free Drinking Water Access Project

Problem Statement

The health problem, free drinking water access, represents the gap between an acceptable or desirable health status, normal BMI, and the current status, increasing BMI of students at the University of Washington, Seattle. People should drink more water, especially clean, free tap water [1] [2]. Currently, people are not drinking appropriate amounts of water when compared to their consumption of sugary drinks [3]. Sugary drinks (SD) are those sweetened with caloric sweeteners like sugar and high fructose corn syrup [4]. This project is interested in the clean tap water consumption rates on the University of Washington, Seattle campus compared to the SD consumption rates in Seattle. The greatest populations affected by free water access on campus are UW students, faculty, staff, and employees. In essence, this report concerns the University of Washington, Seattle community: 42,570 students, 3,752 faculty, and approximately 15,000 employees. If this problem is not addressed, obesity risk will continue to increase. Furthermore, hydration is essential for quality of life [5]. As of 2004, 5.1% or 710,000 adults have been diagnosed with diabetes in King County, Washington. In 2010, 21%, or 318,000 adults in King County were obese.

Perceived Causes

For every problem there are direct and indirect causes. Direct factors of low drinking water consumption include attitudes towards tap water, not enough water fountains, low access to actual water due to quality issues such as temperature, flow rate, fountain appearance, and low education on benefits of water. Indirect factors of low drinking water consumption on campus include people choosing SD over water, cleaning and maintenance of water machines occurring irregularly, too many SD machines as a result of contracts with large companies, and commercials for SD that increase consumption, specifically direct-to-child marketing of high sugar products. Pragmatic action that will result in change on campus would include increasing the University of Washington community's access to high quality tap water and changing people's attitude towards tap-water consumption. The primary audience for the healthy marketing intervention is students. The secondary audiences are faculty, staff and facilities management employees.

SWOT analysis

- Strengths [internal]:
  - Knowledgeable, health related professionals
  - Credible to the topic
  - Excellent faculty resources
  - Intragroup and intergroup communication, teamwork
  - Planning strategies and usage of a timeline
- Weaknesses [internal]:
  - Weakness and lack of data
  - Lack of funding to support research and project efforts
  - Narrow scope of the effect
  - Lack of power, influence to change policy
- Opportunities [external]:
  - Outreach to stakeholders
  - Other campus, community groups will exemplify our efforts to improve health elsewhere
  - Implementing a free water access campaign in the larger Seattle area
- Threats [external]:
  - SD companies will form another health campaign claiming that SD can be healthful
  - SD companies will fund exercise programs to claim they are addressing obesity epidemic
  - Public attitudes towards water machines will not change
  - Lack of resources to encourage Facilities Management to clean water machine with greater frequency
  - Dwindling water resources worldwide will drive up the cost of providing free water.

Target Audience

The demographics of the student population of University of Washington, Seattle are comprised of 52% female, 48% male, 13,308 graduate and professional Students, 27,838 undergraduate students, 1,424 non-matriculated, with an average age of 24 years, as of Autumn 2012. The percentages of race/ ethnicity are detailed in Table A.

Table A: Race and Ethnic Characteristics of UW-Seattle Student Enrollment, Autumn 2012

Ethnicity	Number	Percentage
Africa-African	1,305	3.1%
American Indian	560	1.3%
Asian	9,512	22.3%
Caucasian	20,888	49.1%
Hawaiian/ PI	320	0.8%
Hispanic/ Latino	2,632	6.2%
International	5,500	12.9%
Not Indicated	1,853	4.4%

The cultural preferences of the student population regarding drinking water consumption are essential to the understanding of drinking water consumption on campus.

Behavioral determinants that distinguish "doers" from "non-doers" regarding drinking water consumption are thirst level, easiest access, which source of a beverage is closer to student, perceptions of tap water, amount of time to fill a bottle with water compared to time to purchase SD from machine, and time and distance between classes.

The benefits of increasing free water consumption are low cost, thirst satisfaction and convenience. Several competitive behaviors contribute to the consumption of SD instead of water, such as serving SD at meetings and conferences and a higher availability of SD compared to free water. The following information channels are available to access the target population of interest (students): shocking posters, peers (word of mouth), social norms, Rainy Dawg (student radio), and Freshmen Orientation. Most of the student body is in the contemplation stage of change; promotional campaign will move students into preparation and action stage of change

Target Audience Behavior Pairs

Behaviors that may be altered in the short run are increasing frequency of maintenance of water fountains and increasing drinking water consumption by faculty and staff. It may be possible to provide incentives such as water bottle fillers, free water bottles, music or artwork around water fountains, or a freshmen dorm water consumption competition. If students increase their water consumption to a minimum of 64 fluid ounces per day this will have a measurable impact by improving quality of water fountains and help with changes in social environment in attitudes towards tap water. There are several risks to achieving the behavior change such as hazing to win competition, deficiency in micronutrients (e.g. minerals and vitamins), losing social standing, no caffeine, or a perceived threat of disease transmission. These changes are feasible by increasing the availability of water fountains. Politically, the free water access marketing strategy may lead to uneasiness with SD companies who have contracts with vending machines, and redistribution of facilities maintenance employees and limited budgets.

Methods and Outcomes

Students will be specifically affected by the promotional materials (e.g. posters, word-of-mouth, orientation). The promotional intervention will aim to increase their water consumption and decrease their SD consumption. This will contribute lower weight gains for students entering university life and lower King County obesity rates. The final outcome will be reached when all students on University of Washington, Seattle campus will increase their water consumption to 64 fluid ounces of water per day by December 2014. Specific marketing activities to students will include a poster campaign, free-refillable water bottle handouts, and increased water bottle fillers.

Timeline:

1. Develop hypothesis regarding the mechanisms of water consumption on the Seattle Campus of UW
2. Collect and analyze data
3. Contact stakeholders, prepare report of findings
4. Present findings to stakeholders
5. Begin developing marketing materials for intervention, order water bottles
6. Intervene with posters, social marketing, and water bottle handouts
7. Evaluate intervention and performance of water machines on UW Seattle

A detailed budget is not available at this time. Social marketing interventions tend to take four forms, reflecting the strategy used to achieve the desired outcomes. Previously developed tap water campaigns will be modeled to prevent duplication of materials. Exemplary campaigns include:

- Are You Pouring on the Pounds – New York City [6]
- I Love Tap Water – University of Wisconsin-Stout [7]
- I Love Tap Water – University of California-Berkeley [8]

Conclusion

We recommend the develop of a promotional campaign with poster materials, free water bottles for students, campus announcements through Rainy Dawg Radio and The Daily, a Freshmen Orientation presentation on the benefits of tap water consumption, and a social media campaign for the internet. These materials are reasonable considering the limited resources available to graduate students. Through evaluation we will continue to develop the campaign. We anticipate support from multiple departments within the School of Public Health and the graduate student administration through collaboration with the Graduate and Professional Student Senate. The next steps of this campaign necessitate commitment from stakeholders in moving forward to increase tap water consumption on campus.

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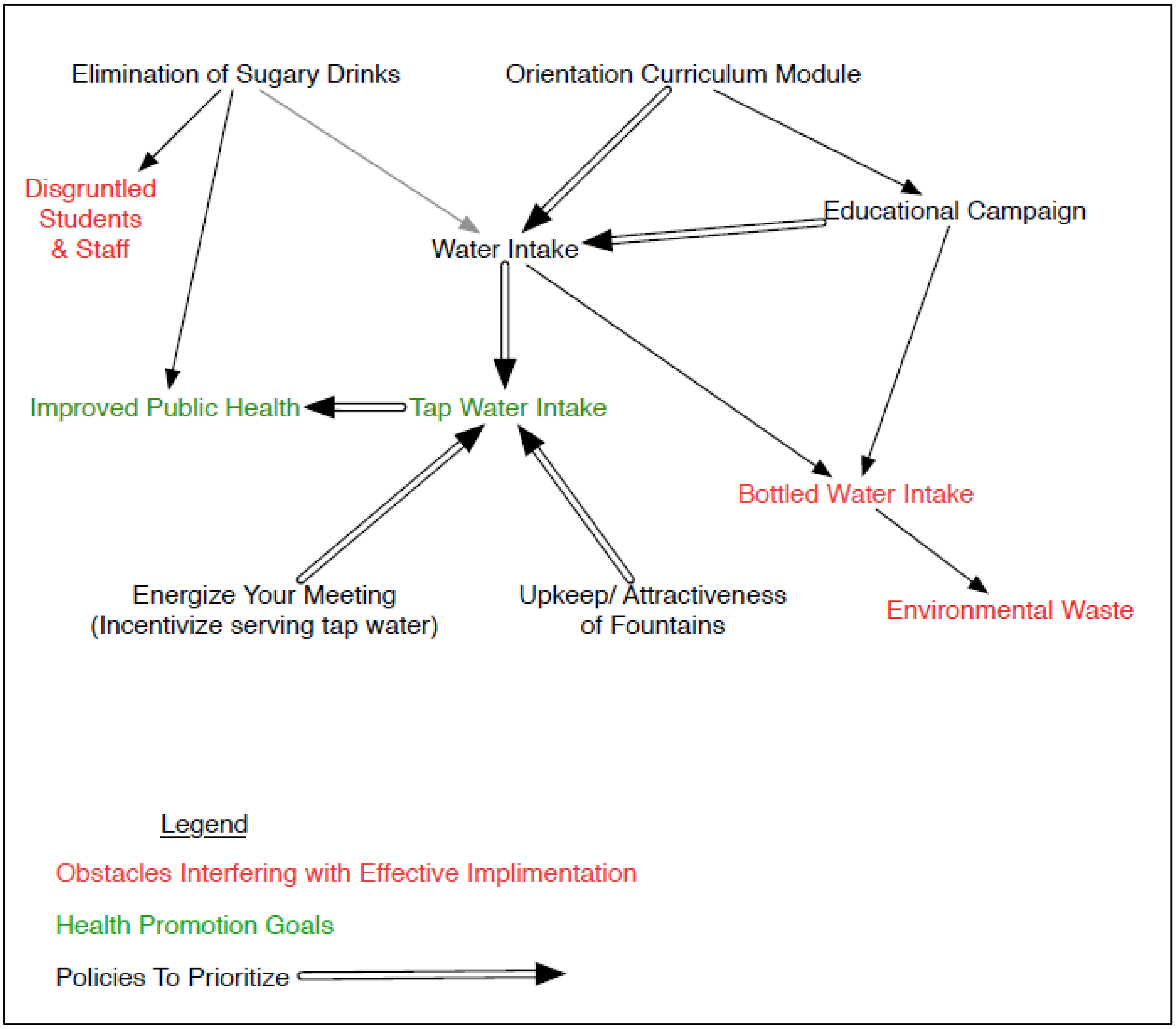
Appendix E: Policy Recommendation Schematic



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