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# Measuring the Impact of a Comprehensive Health and Wellness Initiative

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**CLAREMONT McKENNA COLLEGE**

**Measuring the Impact of a Comprehensive Health and Wellness Initiative**

SUBMITTED TO

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BY

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FOR

SENIOR THESIS

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## **Abstract**

As healthcare costs continue to rise across the country more companies are beginning to look for new strategies to cut costs. The evolving health and wellness industry has been shown to reduce expenditures from costly medical services by improving long term healthy behaviors in the work force, aiming to impact the demand and supply sides of healthcare. This paper looks at the history behind the health and wellness movement and specifically evaluates Healthy Incentives, King County's own health and wellness initiative and the impact such a program has on direct medical expenditures as well as key health risk factors that are affecting millions of working Americans.

**Acknowledgements:**

I would like to take this opportunity to thank the people that were fundamental to the success of this project. First, I want to thank King County, John Scoggins, Kerry Schaefer, and Greg Wilson for allowing me access into the world of the Healthy Incentives initiative. Their help and cooperation gave me the chance to evaluate real life data that ultimately led to a great learning experience. I would especially like to thank John for being my insight and guide to the vast amount of data provided. Finally, I would like to thank my reader Professor Darren Filson. Without his support and willingness to continually help me no matter what the problem this project would not have been possible.

**Table of Contents:**

Introduction.....	6
Lit Review.....	9
Empirical Analysis.....	20
Conclusion.....	25
Figures and Tables.....	28
References.....	32

**Introduction:**

The health of each American individual is a topic extensively evaluated and debated today in the public sphere. The controversial debate starts from the very top of society as the president has made healthcare a top issue by creating a nationwide healthcare initiative. This stretches all the way down to the growing trend of more informed individuals looking out for their own health and well-being. It is no secret that American citizens are suffering from several potential life threatening diseases and conditions such as high cholesterol and blood pressure, obesity, alcohol abuse, mental health, and smoking. Not only are large percentages of people suffering from these conditions but the amount that is being paid for treatment and healthcare causes even more problems. This raises questions about how we can improve health and at the same time cut costs that are consequences of these epidemics and have caused premiums for health insurance to increase by 78% since 2001 (Leoppke et al. 2008). Throughout the United States the frequency of problems regarding health has skyrocketed, causing more and more money to be spent on healthcare. This is especially evident for employers as the cost of their employee's healthcare benefit packages have risen and continue to rise at alarming rates due to the health of the working population. One solution to this problem has been the emergence of health and wellness programs that employers can introduce in order to try and keep workers healthier, therefore cutting down on the cost the company pays for overall healthcare costs. Such programs offer solutions to the employees who suffer from health issues as well as the employer who often pays for the major portion of the costs correlated with these health issues. By working together health and wellness

initiatives have the potential to accomplish goals of both the individual and the company who is reliant on their employee's healthy working hours.

In 2005 King County in Washington State launched a health initiative of their own, aiming to cut healthcare costs by encouraging their employees to participate in a voluntary program called the Healthy Incentives Benefit Program. The program aims to reduce employee's demand for healthcare by providing a system that incentivizes individuals to improve and maintain healthy behaviors. By taking a yearly wellness assessment and completing an individual action plan employees achieve incentives that reduce out of pocket expenses while the employer still offers them the same coverage as before. By incentivizing the employees to complete a voluntary health assessment and follow through on an action plan over a couple month period these employees are more likely to demonstrate and maintain healthy behaviors, therefore benefitting the employer and themselves. While attempting to decrease demand for healthcare by the employees the other goal of the program also intends to affect the supply side of the healthcare. The theory is that by reducing the amount of healthcare demanded by the employee the quality of healthcare services should improve as duplicate visits are eliminated and more of each healthcare dollar is efficiently spent improving health. A key to the program producing results is the cooperation of the program in the work environment by all involved parties, offering tools such as gym discounts, flu shots, healthy snack vending machines, health and benefit fairs, and other educational seminars. A commitment from the employer to improve employee health has the potential for monetary savings as well as human capital benefits.



**Theory:**

With the prevalence of health and wellness initiatives increasing nationwide, data has become more readily available to evaluate the effects of such programs. King County has been considered an innovator for incorporating tools to increase healthy behaviors, thus making the results of their initiative a valuable case study to evaluate the benefit that a large public company can provide to its employees and itself no matter how large. Based on previous research and the theory behind previous health and wellness initiatives, the hypothesis for this paper is that an organization who introduces a fully committed health and wellness initiative will see the key health risk factors most commonly affecting employees decrease year to year and over time. With the decrease of these key health risks the employees should benefit from lower out of pocket direct medical expenses due to King County's incentive program and the employer (King County) will pay less in expenditures for their healthcare packages provided for the employees.

Behind the theory and expectation that health and wellness initiatives will provide the benefit of healthy behaviors and decreased expenditures it is important to understand the realistic expectations of such an initiative. According to Tu and Mayrell (2010) a general guideline for expectations requires commitment to a program that will often result in a financial loss in the first two years, a breakeven point around the third or fourth year, and finally a financial benefit at or after the fourth year and beyond. This paper will therefore look at King County's Healthy Incentives data to see how their program has

performed in financial outcomes and the impact it has had on the key health risk factors since it was introduced in 2006.

### **Lit Review:**

Health and wellness initiatives are not a new phenomenon. Even though there has been increased prevalence of such programs being introduced into the workplace in recent years, initiatives with employee health goals have been implemented for over 25 years. While the presence of such programs is not new, the focus and commitment to employee health and wellness has increased and progressed from results being evaluated by a couple of simple variables such as absenteeism and job satisfaction. More recent programs aim for more encompassing goals that incorporate the company's expenditures and profit as well as increasing long term healthy behaviors for employees. Despite there being corporations who have introduced programs in the past, different techniques and procedures have made it difficult to compare the effect of wellness programs against one another. This allows opponents to such business strategies to question whether there are enough measurable factors that are being impacted or improved to validate the often costly implementation of such programs. This section will take a closer look at the progression of health and wellness programs including the general goals, typical characteristics of a successful program, what previous studies tell us about the effectiveness of such programs, and specifically how King County and their Healthy Incentives initiative compares to other programs at major corporations who are leading the field in health and wellness for their employees.

In the late 1980's and through the 1990's large corporations were the first to introduce health and wellness reform programs because they had the money to pay for the services and would not be financially crippled by a program that did not carry many variables to deduce statistical evidence of benefits. Even though there have been drastic changes in the industry due to the increased publicity that the health sector has received in recent years, some fundamental constructions have remained the same. When health and wellness programs were initially introduced employers would either choose to implement a fitness only or comprehensive program as they similarly do today. Fitness only or fitness oriented programs are generally understood to provide a membership to a gym or workout facility that is likely not in the office or work environment. At these facilities employees are expected to partake in activities such as group classes like aerobics or spinning classes and membership gives them access to equipment to lift weights and work out on their own. On the other hand employers may choose to select a comprehensive wellness program that most often includes a fitness aspect as well as an educational aspect. This may include classes and seminars that educate employees on various topics such as nutrition and workplace stress and often offers other services that may help identify key health risks (Parks and Steelman 2008). In the past research was unable to show the extent that programs like this have on long term employee health and it was even more unclear on the effect such programs may have on financial variables such as health care expenditure and profit margins. Due to the lack of measurable outcomes, programs of the past were often focused on observable variables that were easier to define and measure such as absenteeism and job satisfaction that included overall happiness and feeling better physically. According to Parks and Steelman (2008),

historically the hope was that if the employees felt better mentally and physically the benefit to the company could be seen through employee retention and recruiting which is more generally referred to as the Perceived Organizational Support (POS), or the extent to which the employees feel like the management appreciates their contribution as well as contributes to and supports their well-being as individuals.

Today health and wellness programs have been refined and procedures have become much more detailed as better tools for evaluation and more data samples have been made available. Even smaller companies have access to wellness programs as the industry has seen the rise of health and wellness vendors that have capitalized on the growing demand and have shown the tangible benefits to increasing employee wellness. Along with the growth of the industry there has been legislation such as the Patient Protection and Affordable Care Act (PPACA) that includes money grants for smaller businesses to introduce health and wellness programs as well as offering services from the Centers for Disease Control and Prevention to help evaluate the program's strategy and effectiveness. The increase in research and data means that most employers who are serious about improving their employee's health and are committed to implementing a long term initiative are choosing comprehensive programs that are detailed and catered to the individual. Despite the influx of frequency and information it is still believed that while many are implementing health and wellness programs only a small amount of the population are actually accomplishing goals of return on investment, long term steady increases in healthy behaviors, and diminishing the effects of key health risks. Varying from the broad and simpler goals of the older health initiatives, today's desired

attainments are much more specific due to the fact that larger samples of data can be evaluated in much more detail. Tu and Mayrell (2010) generalize the goals of most current programs as desired improvement in targeted categories such as direct medical costs, employee productivity, reduction of indirect medical costs, and improving professional reputation to entice prospective employees as well as better relationships with other companies.

With health and wellness initiatives becoming so advanced and detailed the degree of variation that can exist between programs is very large. However, there are several key distinctions that can impact overall effectiveness, as well as similarities in top programs that have been accepted as good practice to effectively impact the employee work force. Similar to when health and wellness initiatives were just beginning to surface in large corporations due to cost advantage, these large corporations again have found a new advantage. Even though their program must reach out to a wider demographic and larger amount of employees than many smaller businesses, having large amounts of money has enabled such corporations to create intuitive and effective initiatives. Even with the amount of specialized third party vendors filling a large portion of the industry some large corporations have been able to staff their own wellness programs in house, often including resources such as in house wellness executives as well as clinicians. This is certainly not the only effective way of introducing effective initiatives as many companies use the vendors or partner with a vendor to create a specialized program aimed at the specifications of their employees. Regardless of the way that the program is introduced it is widely agreed what characteristics a program must have to constitute a

legitimate benefit to the company. These characteristics include risk identification tools such as a health risk assessment (HRA) and biometric screenings for blood and cholesterol levels. Also included are educational programs targeting health coaching, tobacco cessation, weight management, nutrition and diet, and exercise (Tu and Mayrell, 2010). Along with extensive online resources and access to health advice from certified doctors and nurses, a transformation of the workplace environment is also instrumental for success. This would include changes such as offering healthier food choices in vending machines and cafeterias and encouraging physical activity throughout the workday by decorating and opening up stairwells for more use (Tu and Mayrell, 2010). These tactics are important for creating a culture that encourages and supports the healthy behaviors of the initiative, however these actions can only take the program so far. It is often the case that employers offer different incentives to participate in the program as the overall benefits are important for the company not just the individuals. These tactics often include compensation or financial incentives for completing certain portions of the program. Tu and Mayrell (2010) report that it is common for programs to offer employees anywhere from 50 to 500 dollars to complete the initial HRA thus incentivizing employees to partake in the program and potentially boosting participation numbers by up to 40 percent.

King County and their Healthy Incentives program is recognized as being on the forefront of health and wellness programs due to their overall commitment to the program through financial and office setting implementations. What may draw the most acclaim to the Healthy Incentives program are their alternative financial incentives for

employees to participate. Similar to many programs across the country Healthy Initiatives encompasses many if not all of the benefits that have been identified as key contributions to a successful program. This includes benefits such as flu shots, gym discounts, healthy snack alternatives in the vending machines, the Healthy Workplace Funding Initiative (HWFI) that contributed to making the workplace an environment committed to the program, Weight Watchers at Work, and various health events and education seminars (King County Health Matters). King County has also been recognized for other parts of their program that are not as common in other programs and increases the effectiveness of the employees wholeheartedly buying into the program. This includes introducing an increased level of flexibility to the workplace that gives even more opportunity to the employees to exercise. For example, King County and a few other programs include time during their workday for the employees to use on site workout facilities during normal work hours (Tu and Mayrell, 2010). To show the success of the program and to keep the employees engaged and informed, Healthy Incentives also sends out a monthly newsletter that includes health tips and spotlights a current employee who has increased healthy behavior and produced results to prove it. The main component that sets King County and Healthy Incentives apart from others is the way that they financially incentivize their employees to participate. The Healthy Incentives Benefit Plan design encourages their employees to participate by creating a three tier price reduction in their out of pocket expenses for medical coverage for the following year. The bronze level is the lowest and default level, it represents the employee not partaking in the program and therefore paying normal out of pocket medical expenses. The silver level is the second highest level and is reached by completing the HRA wellness

assessment before a given deadline early in the year, therefore the employee receives lower out of pocket expenses for that year compared to the normal bronze level. Gold is the highest level and is reached by first completing the HRA assessment and then completing a 10 week individual action plan that they choose from and may include focus on a specific goal such as weight management, nutrition, physical activity, stress management, or tobacco cessation (King County Health Matters). These employees enjoy the lowest out of pocket expenses for the upcoming year and simultaneously are taking advantage of the great opportunity that their employer has given them to improve their overall wellness. It is not only the employees that are experiencing the benefits of a healthier lifestyle. King County realized that employees are accounting for roughly 40 percent of health care costs and what many fail to realize or act on is that the employee's families are accounting for most of the other chunk of health care costs (Tu and Mayrell, 2010). To add to that, Leoepke et al. (2008) estimates that approximately 60 percent of the US population is covered under employer sponsored health programs, therefore Healthy Incentives is not only aimed at the employee but also spouses, domestic partners, and families in order to reduce health care costs as much as possible. Even though this is another aspect of the program that adds extra costs, giving those covered by the company's medical care a chance to complete the HRA and individual action plan means that the more participation there is in the program by the employees the greater likelihood that this carries on to the spouses and families. The result and benefit to this approach is reducing the risk for chronic medical conditions and eventually creating better quality of life for entire families while King County continues to decrease costs for medical care (King County Health Matters).



To measure the success of health and wellness programs there are multiple platforms to tangibly observe the impact that is being made on the employer as well as the employees. There is not, however, an industry wide standard for measuring the success of a program, so it is up to the vendor or company to measure results and come to a conclusion about the benefits of their program. One popular way to evaluate return on investment (ROI) is to look at the outcomes in terms of hard ROI, meaning the evaluation measures savings only under direct medical costs and often looks for a ratio to which each dollar invested yields healthcare savings such as 3:1, for example. Soft ROI would include the same measurements of hard ROI but would also include the analysis of softer benefits such as productivity gains that the program accounts for due to factors such as healthier lifestyles leading to fewer days of employee absence (Tu and Mayrell, 2010). An example of measuring benefits can be shown by assessing the impact of the health and wellness initiative of Johnson & Johnson who introduced their program in 1979, making them one of the first major corporations to introduce such a program. According to Goetzel et al. (2002), even in the 1980's and 1990's studies evaluating the Johnson & Johnson program found positive results from their employee's healthier lifestyle that lead to better overall health, decreased absenteeism, and better attitudes, meanwhile the company was benefitting from reduced inpatient health care expenditure. Similar to King County's Healthy Incentives, Johnson & Johnson's program put a strong emphasis on health promotion and decreasing chances of developing chronic health conditions generally falling under a few major health risks such as high cholesterol or blood pressure as discussed earlier. In 2000 when Johnson & Johnson began extensive review of their program they found that when they examined over 4,500 of their employees and their risk

factors over a two and a half year period there was statistically significant improvement in eight of thirteen risk categories. This included decreases in categories of low dietary fiber intake (50% to 41%), high cholesterol (66% to 43%), poor exercise habits (46% to 35%), cigarette smoking (33% to 24%), high blood pressure (10% to 1%), lack of seat belt use (5% to 3%), and drinking and driving (4% to 3%) (Goetzel et al. 2002). The study also reveals that not all results were positive as five of the risk factors did not significantly lower or actually worsened. This included the risk factors of high body weight, risk for diabetes, high dietary fat intake, and cigar smoking all which are generally correlated with the increasing age of the workforce. It is also important to understand the limitations of evaluation that will be present in almost any evaluation of health and wellness programs. These are issues that are often unavoidable such as the HRA's being self reported, financial incentives that may lead some individuals not to answer all questions truthfully on the HRA's, and for Johnson & Johnson's program specifically, the lack of a control group due to such high percentages of their employees participating in the program (Goetzel et al. 2002). The research has shown that the Johnson & Johnson program has been effective in changing employee risk factors and other softer evaluation categories. To evaluate variables more connected with hard ROI the Berry et al. (2010) Harvard Business Review evaluating Johnson & Johnson's program found that their success in areas such as the lowering of employee risk factors has saved the company an estimated \$250 million on direct health care costs over the past decade. They also reveal that when evaluating the program over a six year period, 2002 to 2008, the hard ROI was \$2.71 for every dollar spent on the wellness program (2.71:1). Johnson & Johnson has also done internal research and evaluation on their program and

the effect it has on the company's goal to lower the cost of health care. Their findings show that there has been significant savings in four overall utilization measures of health care expenditure per employee. First off they found that annually each employee was actually spending \$10.87 more on emergency room visits than they were without the program, this in their view was offset by the next measure of outpatient or doctors office visits that saw savings of \$45.17 per employee annually. Next they looked at mental health visits where they saw a decrease of \$70.69 per employee and a decrease of \$119.67 saved on inpatient days. Fikry (2004) reports that overall these changes in utilization measures accounted for a weighted average savings across the four years after program implementation of \$224 per each employee annually after implementing a program at one of their facilities.

DIRECTV has implemented a health and wellness initiative that has seen success on similar platforms that King County's Healthy Incentives also uses. One component, for example, assigns participants into three different risk categories based on the amount of risk factors that are currently affecting them. Low risk assumes employees are impacted by 0-2 risk categories, medium risk is for employees with 3-4 relevant risk categories, and high risk is for five or more relevant risk categories. DIRECTV found that over a two year period 87.2% of those categorized in the low risk category remained low risk, 11.3% moved to medium risk, and 1.5% moved to high risk. The medium risk category found that 30.2% remained at the medium risk category, 59.5% moved down to the low risk category, and 10.3% moved to the high risk category. The high risk category saw 52.8% remain at high risk, 25 % move to medium risk, and 22.2% moving all the

way down to the low risk category (Loeppke et al. 2008). These results show an overall trend of employees being able to move from higher to lower risk categories with a very small amount of employees who reversed paths and moved to a higher risk category, therefore drawing the conclusion that DIRECTV's program is effective in reducing health risk factors for their employees.

After examining the previous research and a couple of the most well known and properly implemented health and wellness programs, clearly Healthy Incentives is not the only program to see success. However, despite the evolution of the health and wellness industry it is important to understand that typical programs do not see the positive ROI numbers especially within the first couple of years. The goals of the program also may encompass benefits that are not easy to measure or include in financial outcomes. This could be increases in soft ROI categories such as employee satisfaction and loyalty or a better company reputation that may entice others to use their product or create a beneficial partnership. From this evaluation the Berry et al. (2010) Harvard Business Review sums up the effectiveness of such programs by concluding "the ROI data will surprise you, and the softer evidence may inspire you."

**Empirical Analysis:****Data:**

The data used for statistical analysis was provided by King County and their Healthy Incentives program. Employee's self-reported HRA questionnaires provided variables containing the prominence of key health risk factors as well as expenditures for King County, the employer, and the out of pocket expenses for themselves, the employees, through their insurance co-payment. This sample contained multi-dimensional observations that were grouped together and organized as panel data. Panel data was used for this particular set of data as many of the employees provide multiple observations due to their participation in the program for multiple years, up to six years for employees who have participated since the program was initially introduced.

To evaluate the hypothesis presented in this paper the six years of data from the Healthy Incentives program was significant as previous research suggested that consistent results needed multiple years in order to see a measurable positive impact. In order to analyze the data for all six years it needed to be consolidated as they switched vendors after the third year of the program. Starting in 2006 and continuing until 2009 Healthy Incentive's HRA questionnaires were provided by Health Media, Inc., in 2010 King County switched providers and the HRAs for 2010 and 2011 were provided by WebMD Health Services, Inc. Because there is no standard format of an HRA the two questionnaires were formatted differently and organized in their own specific fashion. Despite the differences the general nature of HRAs meant that both providers included

the basic medical evaluations needed for this analysis as well as matching expenditure components. Once the two HRAs were consolidated to match up together for the desired measurable variables an extensive sample of King County employees was available to analyze the effects Healthy Incentives had on the participants in terms of their health risk factors as well as healthcare expenditures.

**Procedure:**

Using the six years of the Healthy Incentives' program data, analysis of medical expenditure savings and reduction of key health risk factors were done by a year to year evaluation. For each year involved, either at the gold or silver level, expenditures are represented by the variable *Med\_Employer*<sup>1</sup> for the expenses the employer pays and *Med\_CoIns* for the employees out of pocket medical expenses through their insurance co-payment. To measure the effect of being in the *Gold* or *Silver* tiers a ratio was created for the variable by performing a natural logarithm on the ratio of the desired expenditure variable (See Figure 1). A total expenditure variable was also created in similar fashion and consisted of combining employer and employee expenditures to measure the effect of all direct medical expenditures. After generating these variables regressions were run for expenditure variables against the effect of the different tiers of the Healthy Incentives program, giving a model for interpretation (See Figure 2). Health risk factor variables were created in the same fashion as the expenditure variables, a natural logarithm was taken for the ratio of the given health factor for year to year analysis. The health factors included in this study were alcohol use, BMI (Body Mass Index), glucose level, diastolic

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<sup>1</sup> All variables mentioned in text will be italicized

and systolic blood pressure levels, HDL and LDL cholesterol levels, total cholesterol, occurrence of feeling depressed in the last two weeks, cigarettes smoked per day, waist measurements (in inches), and weight measurements (in pounds). Regressions were run for each of the health risk factors as they were for expenditures, investigating the effect the program has on decreasing these factors through increasing healthy behaviors. In order for the regressions to show the effect of being in the program the variable *gold\_or\_silver* was generated by combining all participants that were classified in either the gold or silver levels and they were run against the given variable such as expenditure or any of the health risk factors in order to evaluate the effect that voluntarily participation in the program had. Along with this variable all regressions included the *Gold* variable which designates which employees met requirements for the gold level and shows how these employees are impacted versus those on the silver tier. Some of the variables did not show significant results in the *gold\_or\_silver* variable however did show significant results for the *Gold* variable alone. This suggests that getting employees to reach the silver level is not enough to see a significant improvement in that measured variable and getting them to reach the gold tier is required if results are to be significant. To confirm this, the regression is run again but it drops the *gold\_or\_silver* to check to see whether the *Gold* tier effect is still significant and the change matches what is expected (the coefficient is the right sign). All regressions that were run contained a fixed effect estimator that involves time independent effects for each measured data point that relates to the regressed variable and the participation in the program. The regressions also contain a *vce(robust)* component that is a variance estimator that provides robust standard

errors for the given parameter estimates in order to control for violations of the assumption that the variance equals the mean.

### **Results:**

Table 1 provides descriptive statistics for the Healthy Incentive program participants included in this study regarding expenditures on medical expenses. Employees who participated in the program saw a significant reduction in out of pocket expenses as shown by the *P* values that were calculated by the average percentage change for each participant. The out of pocket employee expenditure variable, *Med\_CoIns*, generated a *P* value of .003 for *gold\_or\_silver* making the decrease of out of pocket expenditures significant at the 95% confidence level for all program participants. The employer expenditure variable, *Med\_Employer*, also saw similar significant results. Employer expenditure was shown to significantly decrease for *gold\_or\_silver*, generating a *P* value of .041. It also showed the strong effect of *Gold* alone with a *P* value of .025. To show the effect of the program on total expenditure a regression was run to show the significance of overall savings. This resulted in a significant decrease in total healthcare expenditures at the 95% confidence level with a *P* value of .024. These expenditure results show that King County's Healthy Incentives program confirms the hypothesis that such a program can significantly decrease expenditure by the employer and employee for direct healthcare costs year to year. It exceeds generalized expectations because significant savings are not expected in this year to year evaluation from the very beginning as was discussed earlier when talking about industry expectations.



The Table 2 results evaluate the effect that the health and wellness program had on the key health risk factors. This data overall did not show the significance year to year that the expenditures did above. The health factor measuring the changes in systolic blood pressure ( $P = .026$ ) was the only variable to see a significant decrease for either the silver or gold level of the program, *gold\_or\_silver*. The measurements for feelings of depression ( $P = .034$ ) and waist measurement in inches ( $P = .031$ ) were both significant at the gold level of participation only and were regressed again for only the *Gold* variable as mentioned in the procedure section. For both of these variables their coefficients for *gold\_or\_silver* were not significant and also carried the wrong coefficient sign, suggesting the health factor was actually getting worse and that only those in the gold level of the program would see results for these factors. These results were confirmed as significant at the 95% confidence once ran with only *Gold* as the tier level of interest. Measurements for alcohol usage, BMI, diastolic blood pressure levels, all cholesterol level readings (HDL, LDL, and total cholesterol), and amount of cigarettes smoked per day all yielded results that had the correct coefficient sign. This suggests that while the results were not statistically significant there was still some amount of decrease in the health risk factor. The health risk factor measurements for glucose levels and weight in pounds showed results with the wrong coefficient and unlike depression and waist measurements were not significant for *Gold* outcome either, therefore showing the opposite of the desired effect on the variable.

**Conclusion:**

This study of King County's Healthy Incentives program and health and wellness programs in general details the strengths of a thought out and committed health and wellness initiative and the benefits it can provide. Through the commended strategies of the Healthy Incentives program, a large portion of King County's employees have shown that a culture can be created even within the largest public companies to increase the healthy behaviors of the employees, in turn creating an overall healthier workforce. Previous research has shown that this commitment not only leads to benefits for the employee in terms of their individual health and decreased spending on medical expenses but can benefit the employer with greater employee satisfaction, production, and the obvious benefit of decreasing healthcare costs. Executives who may have questioned such practices due to the upfront costs of committing to a supportive and comprehensive healthy work environment should consider the substantial benefits that can be seen through this study and the growing amount of research and data that supports the investment in health and wellness of their workforce.

The models above provide statistical analysis of the Healthy Incentives program and evidence as to why such programs are successful even within the first years, despite what the overall industry standards may expect. Even though the data presented on key health risk factors did fully support the hypothesis of significant decreases to key health risks in the given year to year analysis, expenditures for direct medical expenses show a tangible benefit to incorporating such a program in the workplace. With the cost of medical care rising with no sign of slowing down such tactics can be a valuable asset for

companies trying to reduce the cost of paying for their employee's healthcare benefit packages.

Although the analysis provided was able to find positive and some statistically significant results it is imperative to understand the limitations of this study. As mentioned previously, one cause for concern for this data sample is that the administered HRAs are all self-reported. Due to the nature of the medical components of the study, self-reporting causes concern that certain results are not entirely accurate or employees are in some way incentivized to lie about their health measures. This is not however a problem that only affects King County and the Healthy Incentives program, based on previous research almost all if not all programs that are introduced rely on self-reported HRAs no matter which vendor or approach the company decides to take. One factor that may benefit King County is the fact that there is no monetary or financial reward for performing better or showing the most positive results. Their program offers the benefit of lower out of pocket expenditures from first completing the voluntary HRA but then reaching the gold level by completing a 10 week action plan that does not mandate specific results. One of the other major issues with this study was the lack of a control group. The sample provided from King County consisted of data from employees who were voluntarily participating in the program, meaning that they had reached either the silver or gold level. Those employees who choose not to participate voluntarily chose not to fill out the designated HRA, therefore not giving the medical data that is provided for those who chose to participate. While the results still show the benefit of implementing a health and wellness program it would be more convincing if these results were compared

to the group who did not choose to participate, what the Healthy Incentive program refers to as bronze level employees.

The future of health and wellness initiatives appears to be bright, and further research can help aid the movement of increasing long term healthy behaviors. This study used one form of evaluation to measure the effects of the Healthy Incentives program specifically, however previous research shows that there are many ways to judge the effectiveness of any given health and wellness program. With more and more companies choosing to target and improve their employee's health, the more strategies of comprehensive programs can be evaluated to see what the real measurable impact of such programs are. With these positive results and similar expected outcomes in future research, health and wellness awareness will only grow as the cost of healthcare continues to rise. In a never ending pursuit to maximize profits and cut wasteful spending the health and wellness industry will continue to develop and flourish, creating meaningful impacts including but not limited to monetary benefits.

## Figures and Tables:

### Figure 1:

$$P_1 = f(z)P_0$$

$$\frac{P_1}{P_0} = f(z)$$

$$\ln\left(\frac{P_1}{P_0}\right) = \ln f(z)$$

### Figure 2:

Basic model for xtreg regression:

$$Y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it}$$

For this model the alpha coefficient shows the variation by the individual Healthy Incentives program participant and includes outside influence that may impact results. The beta coefficient shows the impact of the program itself and more specifically the plan or level that the employee has reached either silver or gold.

**Table 1:**

<b>xtreg ln_MedCoIns_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 55242				
Group Variable: Member_ID		Number of Groups = 17232				
ln_MedCoIns_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.2150083	0.0711580	-3.02	0.003	-0.3544853	-0.0755313
Gold	0.5138084	0.0455670	11.29	0.000	0.4246106	0.6030061
_cons	-0.1708934	0.0583803	-2.93	0.003	-0.2853248	-0.0564620

<b>xtreg ln_MedEmployer_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 76105				
Group Variable: Member_ID		Number of Groups = 22316				
ln_MedEmp_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.1253282	0.0614721	-2.04	0.041	-0.2458179	-0.0048386
Gold	-0.0902717	0.0403604	-2.24	0.025	-0.1693809	-0.0111624
_cons	0.2634239	0.0496561	5.30	0.000	0.1660945	0.3607533

<b>xtreg ln_TotalExpenditures_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 54958				
Group Variable: Member_ID		Number of Groups = 17170				
ln_TotalExp_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.3165029	0.1398394	-2.26	0.024	-0.5906024	-0.0424035
Gold	0.4849436	0.0897491	5.40	0.000	0.3090261	0.6608610
_cons	0.0235208	0.1150994	0.20	0.838	-0.2020760	0.2491175

**Table 2:**

<b>xtreg ln_Alcohol_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 31517				
Group Variable: Member_ID		Number of Groups = 12273				
ln_Alcohol_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0184508	0.0283711	-0.65	0.515	-0.0740625	0.0371610
Gold	0.0037119	0.0152841	0.24	0.808	-0.0262474	0.0336712
_cons	-0.0342364	0.0245767	-1.39	0.164	-0.0824106	0.0139378

<b>xtreg ln_BMI_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 68206				
Group Variable: Member_ID		Number of Groups = 20864				
ln_BMI_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0005597	0.0018769	-0.30	0.766	-0.0042386	0.0031191
Gold	-0.0010775	0.0019856	-0.54	0.587	-0.0049695	0.0028144
_cons	-0.0002649	0.0023737	-0.11	0.911	-0.0049175	0.0043876

<b>xtreg ln_GlucoseLevel_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 10582				
Group Variable: Member_ID		Number of Groups = 5190				
ln_GlucoseLevel_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	0.0942055	0.0403011	2.34	0.019	0.0151984	0.1732127
Gold	-0.0211024	0.0207137	-1.02	0.308	-0.0617099	0.0195052
_cons	-0.0845287	0.0409897	-2.06	0.039	-0.1648858	-0.0041717

<b>xtreg ln_DiastolicBP_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 31031				
Group Variable: Member_ID		Number of Groups = 12114				
ln_DiastolicBP_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0065422	0.0088377	-0.74	0.459	-0.0238655	0.0107810
Gold	-0.0018947	0.0049502	-0.38	0.702	-0.0115979	0.0078085
_cons	0.0035461	0.0078574	0.45	0.652	-0.0118556	0.0189478

<b>xtreg ln_SystolicBP_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 31092				
Group Variable: Member_ID		Number of Groups = 12123				
ln_SystolicBP_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0171707	0.0077189	-2.22	0.026	-0.0323011	-0.0020404
Gold	-0.0026043	0.0041935	-0.62	0.535	-0.0108243	0.0056157
_cons	0.0173653	0.0068473	2.54	0.011	0.0039434	0.0307872

<b>xtreg ln_HDLCholesterol_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 11637				
Group Variable: Member_ID		Number of Groups = 5526				
ln_HDLCholes_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0436553	0.0343881	-1.27	0.204	-0.1110696	0.0237590
Gold	0.0223523	0.0209658	1.07	0.286	-0.0187488	0.0634534
_cons	0.0246057	0.0292135	0.84	0.400	-0.0326642	0.0818756

<b>xtreg ln_LDLCholesterol_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 7416				
Group Variable: Member_ID		Number of Groups = 4419				
ln_LDLCholes_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.1010056	0.0843948	-1.20	0.231	-0.2664616	0.0644504
Gold	0.0163338	0.0355469	0.46	0.646	-0.0533559	0.0860236
_cons	0.0747848	0.0724954	1.03	0.302	-0.0673425	0.2169122

<b>xtreg ln_TotalCholesterol_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 16264				
Group Variable: Member_ID		Number of Groups = 7112				
ln_TotalCholes_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0090848	0.0144666	-0.63	0.530	-0.0374437	0.0192741
Gold	0.0024113	0.0108802	0.22	0.825	-0.0189171	0.0237396
_cons	-0.0036362	0.0112671	-0.32	0.747	-0.0257231	0.0184508

<b>xtreg ln_LifestyleDepress_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 37089				
Group Variable: Member_ID		Number of Groups = 16043				
ln_Depression_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	0.0180265	0.0173624	1.04	0.299	-0.0160058	0.0520588
Gold	-0.0234180	0.0098690	-2.37	0.018	-0.0427624	-0.0040736
_cons	-0.0161826	0.0154344	-1.05	0.294	-0.0464358	0.0140705

<b>xtreg ln_LifestyleDepress_Ratio Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 37089				
Group Variable: Member_ID		Number of Groups = 16043				
ln_Depression_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
Gold	-0.0189756	0.0089332	-2.12	0.034	-0.0364857	-0.0014655
_cons	-0.0026350	0.0081124	-0.32	0.745	-0.0185362	0.0132661

<b>xtreg ln_SMKICIGSPERDAY_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 3075				
Group Variable: Member_ID		Number of Groups = 2155				
ln_CIGSDAY_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	-0.0124663	0.0544686	-0.23	0.819	-0.1192828	0.0943503
Gold	0.0127646	0.0492072	0.26	0.795	-0.0837341	0.1092632
_cons	0.0020961	0.0549872	0.04	0.970	-0.1057375	0.1099296

<b>xtreg ln_WaistInches_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 58939				
Group Variable: Member_ID		Number of Groups = 19428				
ln_WaistInches_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	0.0001706	0.0021549	0.08	0.937	-0.0040533	0.0043945
Gold	-0.0053930	0.0027128	-1.99	0.047	-0.0107105	-0.0000756
_cons	0.0027542	0.0024300	1.13	0.257	-0.0020088	0.0075173

<b>xtreg ln_WaistInches_Ratio Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 58939				
Group Variable: Member_ID		Number of Groups = 19428				
ln_WaistInches_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
Gold	-0.0053414	0.0024828	-2.15	0.031	-0.0102079	-0.0004750
_cons	0.0028797	0.0022571	1.28	0.202	-0.0015445	0.0073039

<b>xtreg ln_WeightInLBS_Ratio gold_or_silver Gold, fe vce(robust)</b>						
Fixed-effects (within) regression		Number of obs = 68314				
Group Variable: Member_ID		Number of Groups = 20876				
ln_WeightLBS_Ratio	Coef.	Std. Err. (Robust)	t	P> t	[95% Conf. Interval]	
gold_or_silver	0.0033049	0.0040188	0.82	0.411	-0.0045723	0.0111820
Gold	-0.0016500	0.0017997	-0.92	0.359	-0.0051776	0.0018775
_cons	-0.0031451	0.0037917	-0.83	0.407	-0.0105772	0.0042869



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