

PLANNING FOR SUSTAINABLE ALTERNATE TRANSPORTATION PROGRAMS:
GASOLINE PRICES AND BEHAVIOR IN HUMBOLDT COUNTY, CA

HUMBOLDT STATE UNIVERSITY

By

Anna Rose Schwarzbach

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By

Anna Rose Schwarzbach

Approved by the Master's Thesis Committee

Dr. John M. Meyer, Major Professor	Date
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Dr. Gregg J. Gold, Committee Member	Date
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Dr. Anthony Silvaggio, Committee Member	Date
---	------

Dr. Elizabeth Watson, Graduate Coordinator	Date
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Dr. Jená Burges, Vice Provost	Date
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ABSTRACT

PLANNING FOR SUSTAINABLE ALTERNATE TRANSPORTATION PROGRAMS: GASOLINE PRICES AND BEHAVIOR IN HUMBOLDT COUNTY, CA

Anna Rose Schwarzbach

Since Humboldt County is a somewhat isolated region, community members may feel limited by their ability to access available modes of transportation, which can be restricted by high gasoline prices and fixed annual incomes. During the last several years, the price of gasoline has fluctuated across the country. This trend was consistently prominent, even more so for a rural area like Humboldt County, as consumers willingly, or reluctantly, accept higher-priced gasoline to power their automobiles. Using a socio-psychological framework that looks at behavioral intention, this research explores the relationships between gasoline prices and behavioral intention within a rural area. More particularly, the research question asks: How do people change their behavior in response to high gasoline prices in the rural area of Humboldt County; and at what price might people begin to make alternate transportation choices? By drawing on the Theory of Planned Behavior (Ajzen, 1991; Fishbein & Ajzen, 1980), it is understood that by measuring individuals' intentions, we obtain the most accurate predictor of behavior. This research will use Fishbein & Ajzen's framework to determine if Humboldt County resident's intentions and behavior parallel their response to high gasoline prices in Humboldt County. I postulate that as gasoline prices remain high, people's intention to

purchase less gasoline and use alternate modes of transportation locally will become more prominent. However, considering the rural isolation of Humboldt County, these behavior changes may not necessarily be feasible for everyone. Data will be collected via survey that will be distributed to local organizations, city institutions and by hand to study how past and current behaviors, personal costs, accessibility, affordability and sustainability plays a role regarding individuals' behavior intention and choices in transportation is determined by gasoline prices. This exploratory research can provide insight into whether or not high gasoline prices have an effect upon local commuting behavior among community members. Once behavior among individuals have been analyzed, it will be more clear on whether or not individuals will continue to use their automobiles or will transition towards the use of alternate modes of transportation. If that is the case, efforts for promoting more local alternate transportation options can be emphasized.

Key words: behavior change, gasoline prices, consumption, alternative modes of transportation, exploratory research, Theory of Planned Behavior, behavioral intention, sustainable transportation

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Chapter I: Introduction

Background

When I moved to Humboldt County, I found myself instantly missing the mass transportation programs readily available in the Bay Area, where I grew up. The desire to make use of mass transit programs was heightened by the high price of gasoline in Humboldt County. I found myself unable to utilize similar alternate transportation systems in Humboldt County because public transportation exists here on a much smaller scale. Humboldt County has no Muni or BART system, only busses that run infrequently, with patchy areas for safe bicycling. Due to this, I was forced to adapt, walking and riding a bike more frequently. In doing so, I found I was able to reduce how much gasoline I consumed, and thus, the amount I spent on gasoline each month. This was significant as it relieved some financial pressure that rested upon my shoulders as a full time student. Becoming aware of this led me to more questions: Did gasoline prices influence my ability to be mobile? Where could I go without an automobile in Humboldt County? What (if any) impact do gas prices have on the mobility of the broader community?

In Humboldt County, California, community members have a different experience than other counties in California when they go to the gasoline pump. Historically, Humboldt has encountered consistently higher gasoline prices compared to other California cities and other areas in the United States (Bailey, 2001; Eschker & Remake, 2004; Skryja, 2012). Local residents continuously express their frustration and discomfort

regarding higher priced gasoline (Bailey, 2001; Times-Standard, 2011; Goodyear, 2011). Despite local prices, the majority of Humboldt county residents are heavily dependent upon automobiles as a mode of personal transportation as there is a lack of a strong alternate transportation infrastructure. When it comes to planning alternate transportation programs in rural areas such as Humboldt County, and encouraging individuals to make use of alternate transportation programs provided by the county as gasoline prices increase, resistance towards change may be a cause for concern. Residents may or may not adapt easily, making policy and infrastructure change far from a sure thing.

Additional concerns about residents' abilities to change their commuting behavior easily also are associated with Humboldt County's location and proclaimed "redwood curtain," which creates a reality of higher costs of living due to the isolation and separation from any major California city (Bailey, 2001). The high price tag of gasoline and all products transported with gasoline is often exacerbated by the added costs of barging the gasoline from San Francisco Bay to Humboldt Bay, overnight expenses for truckers who bring gasoline up Highway 101 from the Bay Area, state environmental taxes and investor demand fees (Times Standard, 2011; Burns 2012). In addition to these causes for high gasoline prices, locals speculate that regional politics and gasoline station owners plays a role regarding the set price of gasoline (Times Standard, 2011).

Taking these factors into consideration, it becomes necessary to consider how local politics, available local transportation programs, and behavior affect Humboldt County community members' abilities and desires to commute via automobile or alternate modes of transportation. Hypothetically, community members who have resided

in Humboldt County for any given period of time may or may not have already adapted to local gas prices in some way. However, it is unclear how, and if, individuals have changed their behavior. There is little literature available that explores the relationships between transportation, gasoline prices, and behavior for a rural area such as Humboldt County. This relationship presents itself as a gap that I have sought to fill through my research.

The Research Questions

The objective of this thesis is to explore the following questions: how have, and do, community members of rural Humboldt County change their behavior in response to high gasoline prices; and at what hypothetical future price of gasoline may we notice further potential shifts in behavior? For instance, is there a change in gas prices that will lead individuals to drive less, use the bus, walk, carpool and/or bike more? What price per gallon will be too high for individuals to continue to use personal automobiles as a main mode of transportation (how high is too high)? In order to answer my research questions, I used a survey to explore local commuting habits that residents have and may choose, and how they may be affected by the price of gasoline.

While Humboldt County currently has small-scale public transit systems and bicycle lanes, they are currently inadequate and inefficient. The systems are currently inadequate and inefficient in the sense that public transit programs do not effectively provide enough routes, stops, direct and specific city-to-city connections, and weekend times to cater to a prospective audience. These issues arose from my own observations

and experience when this research began. For instance, the five public transit bus systems that operate in Humboldt County include Amtrak, Greyhound, Humboldt Transit Authority (HTA), Redwood Transit System (RTS), and the Arcata & Mad River Transit System (A&MRTS). However, only HTA and RTS operate on a daily basis and span the county. Although those two operating systems stay in close proximity to California Highway 101 (North and South), they do not spread out to the entire county (East and West), further isolating those in Eastern and Western sections of the county. In addition to a lack of connectivity, the operating hours, with the exception of Amtrak and Greyhound buses that operate under a different administration, are also inefficient and infrequent in comparison to public transportation systems previously experienced in the San Francisco Bay Area. This ill-timed system is more noticeable in more rural areas of the county, which further isolates those community members.

Therefore, my research questions aims to explore commuting behavior changes that might result as gasoline prices remain high. Community members' ability to choose various modes of transportation may become increasingly limited over time unless Humboldt County is able to adapt to changes in gasoline prices and offer more efficient alternate modes of transportation. Until then, limitations can vary across place and time-based contextual factors as well as individual's disposable income and personal opinions. Regardless of these factors, I anticipate that increases in gasoline prices have some impact upon Humboldt County residents, but I am unsure of the magnitude.

Purpose of Research

The overall purpose of this study is to explore whether and how residents of Humboldt County respond and alter their commuting behavior in a short-term manner to high gasoline prices, and potential increases. With this research question I hope to investigate the potential for the expansion of existing alternate transportation programs in Humboldt County to accommodate future demand. For instance, if it is clear that individuals will not change their behavior in any significant manner in response to gasoline prices, then perhaps it offers evidence that individuals may or may not change their behavior for reasons other than changing gasoline prices. On the other hand, if it is apparent that individuals in Humboldt County will make a shift towards using more alternate transportation programs as gasoline hits a certain price per gallon, then I hope my research can provide grounds for local organizations and transportation programs to boost alternate transportation programs. My research does not aim to change individuals' behavior, but rather understand how gasoline prices in Humboldt County contribute to changes in commuting habits and/or other lifestyle adaptations. I hope to contribute to the scant literature on gasoline prices and commuting behavior in rural geographic areas, and hopefully catalyze and advocate for some change towards more accessible and sustainable modes of transportation in Humboldt County.

Organization of Thesis

The remainder of this thesis is organized as follows: I begin with the literature review. The literature reviewed provides illustrations from socio-psychological, economical, and behavioral standpoints that provide a lens of how to measure and understand what issues and trends currently exist with gasoline prices among Americans as well as those who reside in rural areas. The theoretical framework that I use to review this literature is the concept of behavior intention, which is drawn from Fishbein and Ajzen's Theory of Planned Behavior.

Next is the methodology chapter, in which I explain my survey design, which was adopted to collect information and data necessary for this research.

Following the methods chapter is the results and analysis chapter, respectively. The results and analysis chapter will elaborate on the outcomes found through the survey done for this research. These results will be reported in two ways: descriptive statistics and thematic categories to provide an overall perspective of how respondents self-reported on their behavior and opinions regarding the issue at hand. These results will be analyzed and reported to show any existing patterns, resistances and suggestions desired by the community.

Last but not least, is the conclusion, where I will discuss the overall relationship between oil (gasoline) and community members and the types of behavior transitions that are feasible in a rural area such as Humboldt County.

CHAPTER II: THE LITERATURE REVIEW

Introduction

This chapter will focus on how prices of gasoline are increasing all over the nation, how people in rural Humboldt County are reacting and changing their behavior in response to high gasoline prices, and some obstacles to changing behavior in response to high gasoline prices. The following research questions are used to explore the relationship between gasoline prices and behavior throughout the literature discussed in this section: How do people change their behavior as a result of increases in gasoline prices in the rural area of Humboldt County, CA; and at what price might we see a shift towards the use of alternate modes of transportation at the local level?

Theoretical Framework

The objective of this study is to utilize the concept of behavioral intention to investigate a specific type of action/behavior change in response to high gasoline prices in a rural geographical region, during a specific moment in time. To study behavioral intention, the best theoretical framework for my research comes from the Theory of Planned Behavior (TPB). The TPB is a framework proposed by Icek Ajzen in his 1991 article, *Theory of Planned Behavior*, and most recently in Ajzen and Martin Fishbein's 2010 book, *Predicting and Changing Behavior: The Reasoned Action Approach*. The variables chosen and discussed for my research are those that are also generally understood to be relevant for understanding changes and/or behavioral influences. The

TPB dictates that the best way to predict behavior is by way of intentions. Intentions to behave are determined by three variables: attitude, subjective (perceived) norms, and perceived behavioral control. These three variables are significant because they emphasize the degree of likeliness that an individual or a group of individuals will complete a behavior in question (see FIGURE 1 below). Thus, the variables that will be reviewed for my research include: attitudes, perceived norms, perceived behavioral control and behavioral intentions. Attitudes, perceived norms, perceived behavioral control are all a prelude to behavioral intentions. Each of these variables, which were identified by Fishbein and Ajzen, provide insight into decision-making behavior as a result of intention. To be precise, these variables are significant because the “more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavior control, the stronger should be an individuals’ intention to perform a behavior under consideration” (Ajzen, 1991, p. 188). In addition to these three variables, I will also examine voluntary simplicity due to its relatedness to the topic of my research.

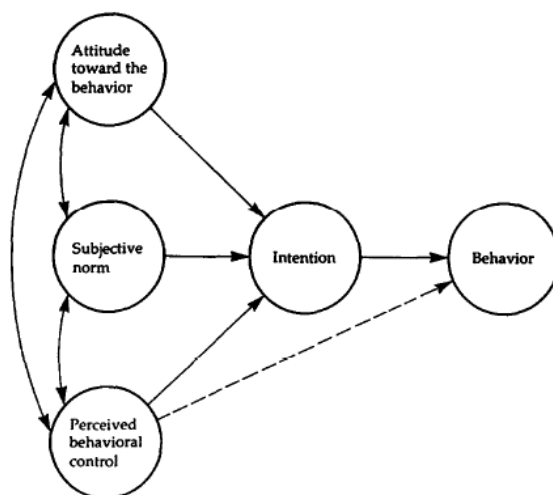


FIG. 1. Theory of planned behavior.

FIGURE 1
(Ajzen, 1991, p. 182)

Attitudes

An attitude is a mental predisposition, favorable or unfavorable, towards a person, object, or issue (Ajzen, 1991, p. 188; Fishbein & Ajzen, 2010, p. 76). While attitudes play an important part in long-term measurement of predicting behavior, alone they are generally a poor predictor of behavior, even more so for short-term predictions (Fishbein & Ajzen, 1980, p. 18).

Subjective (perceived) norms

Subjective norms, or perceived norms, are the environmental and social factors or pressures, and others' beliefs that influence an individual to perform a behavior in question (Ajzen, 1991, p. 188). Perceived norms are formed after observing and/or experiencing something that can influence individuals' decision to accept or not accept information and use it towards their behavior (Fishbein & Ajzen, 1975, p. 306). There are two kinds of subjective norms that are currently accepted in the definition: descriptive (perceptions of what other individuals are doing) and injunctive (perceptions of behaviors that other individuals consider to be proper) norms (Gold, 2012, p. 2). Overall, subjective norms play a part in determining how a person behaves in conjunction with how their community members expect they should behave (Fishbein & Ajzen, 1980; p. 7). In other words, subjective norms are the supposition that an individual will behave the way that they think the people most important to them feel or think they should behave.

Perceived behavioral control

Perceived behavioral control can be understood as the best lead in to an individuals' intention to behave given certain control, resources and capabilities. Perceived behavioral control is the level of individuals' perceived ease or difficulty of performing a behavior in question (Ajzen, 1991, p. 183). The perceived ease or difficulty of completing a behavior in question depends on the individuals levels of resources and opportunities that are available to a person at a given time, and how well one perceives they can achieve a behavior in a given situation (Ajzen, 1991, p. 183, 185; Bandura, 1982, quoted in Ajzen, 1991, p. 184). It is understood that there are three main factors that play a role in a person's intended behavior: their attitudes, subjective norms, and perceived behavioral control (Fishbein & Ajzen, 1975, pp. 288-289, 301). Thus, the TPB dictates that by taking into account attitudes, perceived behavior control, and subjective norms, one can come up with an excellent predictor of a person's behavioral intentions.

Behavioral intentions

A behavioral intention is the best and most accurate predictor of an individuals' behavior (Fishbein & Ajzen, 1975, p. 372; 1980, p. 5; 2010, pp. 21-22, 39-41). Intentions are the motivations and efforts that individuals intend to take to perform a behavior in question (Ajzen, 1991, p. 181). An individuals' intention is an important variable in studying behavior, and takes in account attitude, subjective norms and perceived behavioral control. Though the best measure available, it is not perfect. Unpredictable

and/or limited factors can all contribute to an individual's inability or resistance toward behaving a certain way. Due to life's erratic ways, individuals and communities often encounter problems, which can hinder their ability to follow through with an intended behavior.

Voluntary simplicity

Voluntary simplicity is defined as lifestyle changes that individuals may take throughout their lifetime in order to minimize consumption levels and maximize positive lifestyle benefits (Leonard-Barton, 1981, p. 244; Dillman, 1983, p. 300). Voluntary simplicity is also understood as something that provides "singleness of purpose, sincerity and honesty within" (Gregg, 1936, as cited in Leonard-Barton, 1981, p. 243). The level of participation of voluntary simplicity varies with an individual's income, education, age, and what they consider to be socially acceptable behavior (e.g. normative beliefs) (Leonard-Barton, 1981, p. 247). Other participation variations are readily accessible resources that can aid or prevent intended behaviors from occurring.

Themes Seen Within the Literature

The objective of this section is to explore how commuting behavior is related to gasoline prices, accessibility of alternate transportation programs, and as a result of social and economic limitations. Furthermore, the goal of this section is to explore how intentions are indeed the best predictor of behavior throughout the literature explored.

The following section will be organized into four themes: perspectives of petroleum, consumption and prices; how individuals across the nation are responding to higher gasoline prices; obstacles that individuals often encounter when attempting to change their transportation and commuting behavior; and gasoline prices in a rural versus urban area, and how it can make a case for behavior changes, or lack of behavior changes in Humboldt County. The focus within these four themes start from a broad perspective and tapering to focus upon a rural geographical region to provide insight into what may or may not be observed in Humboldt County.

Petroleum perspectives: national consumption and local prices

During this economic recession, it may appear to be more important to boost the economy by keeping gasoline at the lowest price possible rather than to encourage the transition toward complete energy independence in transportation sectors (Friedman, 2008, p. 21). Access to cheap gasoline from various sources (e.g. oil, biofuels, tar sands and shale deposits) can be an economic political component that continues to prevent America from developing more systematic energy, and thus transportation, structures (Goodyear, 2011; Gatti, 2011; Campbell, 1998, p. 82; Friedman, 2006, p. 30-32).

American political leaders and the oil market can be hostile to proposals for more efficient energy systems such as nationwide transportation programs because it can include a large shift of production and consumption (Roberts 2004, p. 309). Shifting current levels of oil production and consumption is not currently ideal or feasible because the demand for energy and other products increase exponentially as the global population

grows, calling for more resources to be available. For instance, Americans consume oil for a multitude of products at an impressive rate, which makes it difficult to predict whether or not we will run out of oil before a dependable efficient renewable energy source is developed to replace oil (Roberts, 2004, p.51).

Oil is not just consumed by way of automobiles, but is used to produce high-density fuel for other machines as well as being a main ingredient in everything produced from Tupperware to asphalt to opera tickets (Steiner, 2009, p. 43; Roberts, 2004, p. 6). With that high consumption level, it is not surprising the average American directly and indirectly burns through an estimated 7,500 gallons of oil per year, and this consumption rate is likely to continue to increase (Roberts, 2004, p. 151, 232). In addition to this, the amount of oil Americans currently consume trumps the amount of new oil found and produced. Since 1994, 9.6 billion barrels per year has been found on average, while at least 24 billion barrels of oil have been consumed annually (Roberts, 2004, p. 51). While these numbers have changed since, it stands to show how rapid we are diminishing remaining global oil reserves which threatens our ability to meet future energy demands to for technological, population and transportation needs. Essentially, as our oil reserves are exhausted, the price of oil will increase, as will the price of everything produced and transported with oil.

However, not all is lost. As will be discussed throughout this research, there has been a slight response to increased oil prices among consumers in the last few years. Americans are gradually driving less and the death of large gas-guzzler SUVs may be in the near future (Steiner, 2009, p. 29).

With that said, towards the end of this research, in the year 2012, Eureka, California had the record highest gasoline price of any average mid-sized city in the entire nation, and Humboldt County continued to document some of the highest average gasoline prices in the state (by county) (Burns, 2012; Eschker, 2004, p. 2; Skryja, 2012). A chart comparison showing monthly prices from 1998 to 2011 shows that Eureka consistently had higher gasoline prices compared to San Francisco (Eschker, 2011; also see Appendix VII)

In my research, Eureka is representative of Humboldt County to demonstrate that community members endure higher priced gasoline compared to other areas in the state. For instance, in March 2011, the average price of gasoline for the United States was \$3.52 per gallon, California's average was \$3.91 per gallon and Humboldt County's average was \$4.06 per gallon (Times-Standard, 2011). Additionally, in July 2011, the average price of gasoline in Eureka was \$3.98 per gallon while San Francisco had gasoline priced at an average of \$3.90 per gallon (Eschker, 2011; also see Appendix VII). The most recent (April 2012) information released by the American Automobile Association (AAA) indicate that:

The least expensive average price in Northern California can be found in Ukiah where regular is \$4.07 per gallon. Of all the metro areas in Northern California where gas prices are tracked by AAA, Eureka has an average price of \$4.50, the highest in Northern California. This is also the highest price in the lower 48 states. The least expensive gasoline in the country is found in Casper, Wyoming. The average price of gas in that metro area is \$3.45. Wailuku, Hawaii, holds the dubious crown for the highest average price in the nation, at \$4.85 per gallon. (Skryja, 2012)

The difference in price between Eureka and San Francisco may have some impact upon consumers who reside in the rural area of Humboldt County. Eschker's dataset also shows the historic differences, up to December 2011, in the average price of gasoline between Eureka and San Francisco has been between 1-58 cents per gallon, while the price difference between Eureka and California has been between 0-46 cents per gallon (Eschker, HAI, 2011). Eureka continues to top San Francisco and California on average gasoline prices, whether it is a slight or significant gap. As prices of gasoline are estimated to remain high during the current economy in Humboldt County as well as across the state and the country (Goodyear, 2011; Times-Standard, 2011; White, 2012), accessibility to various types of transportation may become increasingly difficult among Humboldt County residents, be it personal transportation or public. This situation is worsened by the fact that it seems that there is not much one can do to lobby for changes in the price of local gasoline prices due to local politics, price gouging, and the extra costs associated with shipping gasoline from the San Francisco Bay to Humboldt Bay (Eschker, 2004, p. 4-5; Bailey, 2001). However, there is potential for effective and well-organized localized action and behavior change in Humboldt County. Localized action can include city and countywide requests for increased bicycle lanes, safer pedestrian walkways, increased trips and schedule changes for mass transit (public buses) and the expansion of automobile share programs such as ZipcarsTM, which has recently been implemented at the Humboldt State University Campus (Times-Standard, 2011). Advocating for any of these actions can be done at any time, and is being done so by the University, and some local organizations such as GreenWheels (<http://www.green->

wheels.org/) and the Humboldt Bay Bicycle Commuter's Association (<http://humbike.org/>).

Responses and potential categories of behavior changes that may or may not be occurring among Humboldt residents will be expanded in the discussion and analysis portion of my thesis. However, it is critical to introduce at this time that behavior changes in response to gasoline prices among Humboldt County residents may or may not be evident at the current gasoline price, but may shift in the future, if gasoline prices rise in Humboldt County.

How people are responding to higher gasoline prices

As noted in the previous sections, gasoline prices are high in Humboldt County. Prices have gone up and down numerous times over the last few years, but gasoline prices are, overall, trending upwards, which will affect individuals and their ability to commute independently (See Appendix). In response to higher gasoline prices, individuals are reacting in various manners, some positive and some negative:

In 2008 the American Association of Retired Peoples (AARP) compiled a report, *Is the Cost of Gas Leading Americans to Use Alternate Transportation?* to explore alternate policies and transportation programs for older drivers. This research surveyed 1,000 Americans aged 50 years and older to inquire whether or not those surveyed changed their commuting habits as a response to rising gasoline prices (Skufca, 2008, p. 3). This report targeted a particular age group in order to gain insight into transportation

accessibility and issues that often occur with aging. Some of the key findings include the following (Skufca, 2008, pp. 1-3):

- Approximately 40% of respondents claimed that since gasoline prices have increased, they have walked, ridden a bicycle or used public transit systems more often.
- Approximately 29% of respondents claimed they walked more frequently as a result of higher gas prices.
- Approximately 67% of respondents claimed they reduced and/or limited their daily driving as a result of higher gas prices, while 61% reported they cut back on other expenses in order to accommodate higher gas prices.
- Most respondents (85%) claimed that they are very concerned with the increase of gas prices over time.
- Residents living in *urban* areas were more likely to use public transportation, while those living in *rural* areas limited their daily driving as a result of higher gas prices.

The results of the AARP report showed that many participants attempted to make commuting adjustments to accommodate gasoline prices in 2008 (at the time this survey was completed). Subjects changed their behavior by reducing their everyday driving, demanding more mass transit and/or altering lifestyle choices; such as rearranging their personal budget to accommodate the higher prices of gasoline (Skufca, 2008, p.2; Robinson, 2008). Gasoline prices in 2008 are significant to note since it was the last time

the United States experienced peak gasoline prices that topped four dollars a gallon, shocking many consumers across the nation (Robinson, 2008).

Considering past peak gasoline prices, which has an association with oil production, we must bear in mind oil and/or gasoline infrastructures. These systems are relevant to consider since oil production is expected to taper off, causing gasoline and crude oil prices to skyrocket (Campbell, 1998, p. 78). Even though oil production has yet to decline significantly, consumers across the country are feeling the “pinch” of increased oil prices and are responding by changing their behavior, resulting in declining American gasoline consumption levels as a result of post 2008 prices and economic recession (Rich & Clifford, 2011; White, 2012; Williams-Derry, September 2011). American drivers consumed 36 million fewer gallons of gasoline in 2011 than they did the previous year and forecasts for future gasoline consumptions through 2027 are projected to drop considerably (White, 2012; Williams-Derry, September 2011).

The average American consumes a substantial amount of gasoline, estimated at an average of 1,200 gallons per year per person in 2011 (Krauss, 2011). Regardless of the high level of individual consumption, US Department of Energy (US DOE) reported that spikes in gasoline prices might be the largest contributor to Americans changing their behavior (White, 2011). General behavior changes included “driving less, consolidating trips, moving closer to where they work, and buying higher mileage vehicles” (White, 2011). The seeming contradiction between increasing demand for gasoline and the behavior changes noted by the US DOE is significant because it demonstrates a response from the average American consumer towards gasoline prices regardless of the demand

for gasoline (which can simply be a result from more individuals – higher population – demanding more oil).

Speaking of which, shifts in commuting behavior can be examined with some indications of recent reports in vehicle miles traveled (VMT). Studies from the U.S. Department of Transportation show that in 2001 the average driver travels about 12.1 miles to work while the average estimated distance traveled for shopping/errands is about 7.0 miles (NHTS 2006, p. 2). Moreover, the percentage of individuals who chose to work at home in order to reduce their commuting needs decreased from 14.7% in 1995 to 12.9% in 2001, but the average distance traveled to work increased from 14.7 miles in 1995 to 17.5 miles in 2001 (NHTS, 2008). These numbers provide compelling information regarding how commuting distances and habits changed between 1995 and 2001, but how the changes may be a direct response to increasing gasoline prices as the overall cost per mile in 2001 increased from 7 cents to 15.6 cents in 2006 (NHTS, 2006, p. 1: Exhibit 2). Commuting changes could also simply be related to changing cultural and social needs, such as working from home, staying home to care for children, whereas less driving is done because it is not necessary.

However, since transportation fuel needs account for an estimated 70% of all petroleum used in the United States, it is intriguing to see how changes in personal VMT and increases in bus, train and public transit travel has occurred simultaneously with an overall increase in gasoline prices since the 1990's (NHTS, 2006, p. 1; Matteson et. al, 2010, pp. 109-110). In this case, my speculation is that the large-scale increase in VMT seen among average Americans may be short lived while public transit use will continue

to expand as gasoline prices increase nationwide. In the short run, VMT is not responsive to gasoline prices, and instead simply causes a short-term shift to public transportation (Hughes et al., 2006, p. 15; Schreiber, 2010, p. 2-3). For instance, there was a 50-year high in mass transit use in 2008 during the last gasoline price spike, and in California, there is an association between high gasoline prices and greater public transit ridership (Robinson, 2008; Schreiber, 2010, p. 3). Furthermore, a recent report and news article released in 2011 by the Office of Financial Management predict a dip in long-term gasoline consumption (an annual 9% decline) through 2027, as indicated by previous years' projections (Williams-Derry, September 2011). The prediction that the oil consumption trend will decrease indicates that individualistic behavior may change as a result of gradual increases in national gasoline prices, calling for a lower demand of gasoline. The dip in long-term gasoline consumption is further verified by some polls done by the Gallup Organization.

Gallup revealed that Americans expect gasoline prices to continue to increase over the next few years (Jones, 2011). With that, about 54% of Americans self-reported a change in behavior such as driving less, cutting back on vacation travel, being more careful in planning errands and/or have (or plan to) purchased a fuel-efficient vehicle (Saad, 2011). By the same note, those Americans who have reduced their driving also reported using one or more of the following alternate modes of transportation as a substitute for personal transportation: carpooling, using public transit, walking, and biking (Saad, 2011). Alternatively, those (about 12%) that were unable to reduce their driving, due to personal and/or work purposes, reported that they adjusted their financial

budget in some way in order to allocate more funds to pay for the differences in gasoline costs (Saad, 2011).

These behavior changes suggest a general response toward gasoline prices, which suggests that Americans are progressively acknowledging and responding to the price of gasoline, which is reflected in their intended commuting behavior. At the beginning of March 2012, a poll done by AAA found that 84% of drivers have changed their driving habits in response to recent increases in gasoline prices, and that 87% would further change their driving habits if prices stayed high (Hymas, 2012). The driving habits that have been most adopted as of March 2012 include combining trips and errands (60%) and purchasing a fuel-efficient vehicle (16%) (Hymas, 2012).

Furthermore, a report provided by the US Congressional Budget Office supports this notion by corroborating that commuting and/or lifestyle changes made by an individual is recognized as a direct result of gasoline prices (Schreiber, 2010, p. 2). The observed commuting and/or lifestyle changes and behaviors mentioned above parallel behavior changes suggested by Fishbein & Ajzen's behavioral intention concept by way of individuals following through with their promised behavior change. Behavior achieved by individuals via an individual's intention to change their current behavior matches given financial, social and contextual circumstances in society today which can develop from attitudes, subjective norms and perceived control. However, there exists no magical gasoline price that might finally push most consumers and commuters over the edge and completely abandon automobile commuting. However, it is estimated that \$5.30 per gallon or \$6.00+ will be the breaking point for many commuters (Hymas, 2012). The

estimate that Hymas reaches comes from an analysis of a Gallup poll done in early March 2012 where eighteen percent of polltakers asserted that it would take six dollars a gallon gasoline for them to change their behavior (Hymas, 2012). This estimate is significant because it is a price that is a new high for consumers, which makes the situation a bit different. Whatever the price, consumers and commuters may not make the shift until prices hit a new high, which has yet to be determined.

In conclusion, there is a noticeable shift in behavior among Americans in response to increasing gasoline prices that often can be further reinforced by social, financial and political constraints. With this, we can conclude that these behavior changes show that the economic price of gasoline can play a strong role in individuals' intentions to change their commuting behavior.

Obstacles to changing behavior

When it comes to changing behavior in response to some change in one's environment, the transition is not always smooth. There are many obstacles that can hinder an individual's ability to shift their actions.

The first obstacle I will discuss comes from the larger financial and economic standpoint. In the national energy market, gasoline prices are set according to demand levels, exported barrel prices and costs associated with transporting oil to each location alongside other market dictations. With that in mind, a study done by researchers at the University of California, Davis showed that both long-run and short-run price elasticity

(describing a level of measurement that takes into consideration any changes in driving behavior among consumers as a result of gasoline price fluctuations) has decreased in today's society (Hughes, Knittel & Sperling, 2006, p. 16-19). This inelasticity essentially means that society's response to increasing gasoline prices has slowed down to a point where changes in gasoline prices has very little effect upon consumption and automobile commuting behavior. In other words, this one possibility shows that the increase in gasoline prices today is gradual enough for drivers to justify reasons (e.g. gasoline prices will come back down eventually) to continue to purchase gasoline as commuters.

This must be taken into consideration especially bearing in mind previous discussions of how individuals are changing their commuting behavior on various levels, suggesting greater elasticity. This inelasticity is also key to consider when looking at urban and rural communities, and how one makes decisions to purchase, or not purchase, gasoline, which will be later discussed.

Another component that ties back to the commuting standpoint of individual behavior changes, includes the fact that households respond more by reducing miles traveled rather than gallons consumed (Puller, 1999, p. 39). Additionally, despite high priced gasoline causing shifts in driving behavior, the amount of vehicle miles traveled (VMT) and the amount of weekend driving are both non-responsive to gas prices (Schreiber, 2010, p. 2, 4). Personal transportation use may be higher during the weekend due to recreational and travel driving as opposed to weekday driving. Weekday driving can vary due to area and availability of alternate transportation options such as carpooling

and mass transit available during the weekday commute. Thus, the use of public transportation for the daily commute can act as a temporary cause for a decrease in gasoline consumption during the week, but is not significant enough to influence gasoline prices seen within the larger supply and demand curve (Schreiber, 2010, p. 3-4; Puller, 1999, p. 50).

The US CBO report mentioned earlier can further attest to the argument that it is difficult to pinpoint, and encourage, individual driving behavior and whether or not it is in fact, a direct cause of gasoline prices (Schreiber, 2010). While gasoline prices themselves are not largely affected by individualistic changes in behavior and/or demand, drivers are most likely to adjust to changes in gasoline prices and/or find alternate justifications (e.g. rearranging their disposable income or giving up movie night) for their purchases of gasoline rather than making long-term commuting behavior changes that reduces or eliminates the need for gasoline consumption (Puller, 1999, p. 39; Schreiber, 2010, p. 2).

Following the theme that not everyone would be willing, or able, to make the long-term changes necessary to reduce dependency on gasoline, the AARP report, mentioned above, also emphasizes this point. The AARP report highlighted that not everyone was willing, or was in a position, to give up driving altogether, which was often a result of geographical residency. Survey participants who lived in a more rural area or were physically unable to use alternate modes of transportation often opted to reduce the overall amount of total driving instead of abstaining from driving (Skufca, 2008). Reducing overall driving is a behavior change nonetheless, and one that I somewhat

anticipated, assuming that it would be the most realistic behavior change for a majority of individuals. However, reducing overall driving is not always realistic due to subjective norms, perceived behavioral control (e.g. previous negative or positive experiences with public transit) as well as other circumstances such as accessibility to alternate transportation programs, retirement status, disabilities, labor purposes, age and rural isolation. These factors can be common barriers that prevent individuals from making a permanent shift to reduce the amount of driving.

In conclusion, there can be many obstacles to changing commuting behavior. These barriers can vary from economic, geographic, social and personal reasons. Granted, other underlying issues of general resistance and stubbornness against giving up one's vehicle and depending on an entirely different transportation system can also come into play. Furthermore, it is important to consider the demographics of a community and how the differences in gasoline prices and access to transportation infrastructures can vary.

Gasoline prices: in rural vs. urban areas, making a case for Humboldt County

The literature on the subject of my research often pointed to the distinct differences between people's behavior changes in urban as opposed to rural areas. The difference in behavior between urban and rural areas can often be attributed to a lack of alternate transportation options and limited access to other resources (NHTS 2006, 2008).

The differences in urban and rural areas are recognizable from different standpoints, especially those of driving distances and economic perspectives. For

instance, between 1969 and 2006, the average annual VMT by Americans increased from 12,423 miles to 21,187 miles, but the average VMT by Americans residing in a *rural* area is higher, clocking in at 28,238 miles, but there is no 1969 rural area figure for comparison (NHTS, 2006, p. 2-3, my emphasis). The number of VMT in a rural area can be a result of living in a rural area and commuting to town as well as having fewer alternate transportation systems available and/or desire to live away from those transportation systems. This behavior makes sense, as individuals intended to continue to drive because there might have been no alternate choices, resulting in a higher VMT.

To support this notion, I want to touch back upon the issue of inelasticity mentioned in the last section. The inelasticity observed among short-run and long-run gasoline prices, in all probability, is more applicable for rural areas, such as that of Humboldt County, due to isolation, geographic location and smaller population. This inelasticity, in addition to an estimate that current national increases in overall gasoline prices are slow enough for consumers to justify spending money on gasoline and choosing transportation choices, supports the notion that individuals residing in rural areas may not change their commuting behavior in response to high gasoline prices (Puller, 1999, p. 45; Hughes, Knittel & Sperling, 2006, p. 18).

Those who live in a rural area may have an intention to change their behavior to relieve the stresses of high gasoline prices, but may not be able to do so, or be ready to commit wholeheartedly, or simply do not have an intention to adopt a new transportation behavior pattern (Skufca, 2008). Committing to a new behavior can be difficult in rural

areas simply because rural areas have a tendency for having poor public transportation infrastructures which makes it more difficult to adjust or intend to adjust behavior.

With the focus upon rural areas established, I would now like to concentrate upon Humboldt County and make a case for how individuals may or may not change their commuting behavior as a result of high gasoline prices. Due to experiencing higher priced gasoline, residents of Humboldt may behave in a similar manner to that of the NHTS reports, where increases in VMT may be prominent. However, at the same time, Humboldt County residents may also behave in the same manner as those from the AARP report where individuals can intend to behave one way and change their commuting behavior as gasoline prices continue to stay high.

However, the data provided by the NHTS and the AARP report offer a sense of uncertainty where gasoline prices may not yet have a strong enough effect upon participants to prompt behavior changes that would impact long-term commuting behavior regardless of the literature suggesting that rural residents have higher VMT and are attempting to reduce their overall driving. The lack of potential long-term adaptations as a direct result of experiencing a jump in gasoline prices is a concern in my research, even more so in areas where there is a lack of alternate transportation programs. A lack of behavior change as a result of high gasoline prices is troubling because it suggests that residents of Humboldt County may not necessarily change their commuting behavior in a positive and sustainable manner until gasoline hits a certain price.

Again, to emphasize, the difference in behavior reported and observed between urban and rural areas is pivotal to my research due to Humboldt County's rural character.

With limited alternatives available in Humboldt County, residents may not be able to follow through with their intention to reduce their gasoline consumption by taking the bus to work because Humboldt County's public transit is weak. While well intended, an optimistic perspective comes from the vantage point that rural residents may develop a different approach and/or solutions to the lack of alternate transportation programs. Rural residents could adapt by embracing different commuting techniques such as community-developed rideshare systems or simply stressing reductions in daily driving (Skufca, 2008). Humboldt County can provide a valuable case in which rural residents demonstrate levels of behavior intentions as result of high gasoline prices.

Regardless of whether or not behavioral changes will be prominent among individuals in Humboldt County, it is significant to note why behavior intentions may or may not exist. Thus, in review, the TPB provides a framework in which we can extract the behavior intention concept and its affiliated variables to allow for comprehension and analysis of commuting behavior. I anticipate that individuals in Humboldt County may intend to change their commuting behavior, as gasoline prices remain high, and potentially increase, and obstacles to gaining access to alternate modes of transportation are conquered. As discussed earlier, the TPB assumes that human behavior parallels their beliefs and intentions that people have about their behavior, which thus leads them to develop the decision-making process necessary to perform, or not perform, the behavior in question (e.g. change commuting behavior once gasoline prices hit a certain dollars per gallon) (Fishbein & Ajzen, 2010, p. 20, 79).

The variables put forth by this research may be pretty much beside the point for individuals residing in rural areas, as there are not very many alternatives available that are accessible or attainable for everyone. Distances and rough terrain can preclude walking and biking, lack of demand for mass transit makes it less efficient, leaving self-transportation, carpooling and staying home the only options for some, for the time being.

Behaviors in response to gasoline prices, or any other external factor, can generally be formed by the four variables discussed earlier: attitudes, subjective norms, perceived behavior controls and voluntary simplicity (Fishbein and Ajzen, 1975, p. 288-289; Fishbein and Ajzen, 1980, p. 6, 80; Gold, 2011, p. 3). By incorporating these variables and the literature outlined above, we can posit that people's intention to behave a particular way, such as purchasing gasoline or a bicycle or carpooling, is the best predictor of intended behavior. I will attempt to use this framework as a baseline with my research questions and survey to determine if individuals intend to, will, or will not change their behavior at the current or hypothetical future gasoline prices in Humboldt County.

The Literature: In Review

As mentioned earlier, Humboldt County has been shown to have higher priced gasoline compared to other regions in the state of California (Times Standard, 2011; Bailey, 2001; Ecchker, 2010). As a result of experiencing higher priced gasoline while living in a rural area, residents of Humboldt may develop commuting behavior(s) that are

different than those seen in urban areas. The literature recently discussed demonstrates information that portrays that Humboldt County are not the only victims to higher priced gasoline, that individuals across the nation are slowly changing their behavior in response to increasing prices of gasoline and other items whose prices are influenced by the price of gasoline, and that rural areas tend to bear the brunt of high gasoline prices due to insufficient and inefficient alternate transportation systems.

First, the literature brings forth interesting particulars (that can be seen as a contradiction, but not necessarily so in my research) between the statistics that demonstrate that rural areas have a higher level of average annual vehicle miles traveled (NHTS, 2006) and those who self-report a positive behavior change that reduces the need for automobile commuting (Skufca, 2008). It is a complex relationship that makes it difficult to distinguish which will dominate the other. Based on this literature, it is difficult to determine what behavior intentions and shifts will be reflected among local community members in Humboldt County.

Secondly, the AARP report provided notable information that can parallel the results seen in my research. While the report has some limitations concerning the age factor and lack of advocating for permanent behavior changes, the results from the AARP provided an example for how individuals followed through with their intention to behave. It was clear that subjects were, to some extent, uncomfortable with the increases in gasoline prices that occurred at the time of the survey (2008), and chose to adjust their behavior, thus showing that their behavior intentions were the best predictor for behavior.

Respondents exhibited no gap between their intention to behave and how they proceeded to behave.

Lastly, the behavior changes described in the literature serves as sufficient evidence to show that the behavior observed can become predictive over time, as consistent with Fishbein and Ajzen's research. This kind of observable behavior can be predictive due to previously established environmental factors (e.g. one's values, skills, abilities and access to resources), attitudes, subjective norms, voluntary simplicity and control based factors regarding the situation at hand (Fishbein and Ajzen, 2010, p. 21-22). Taking the literature discussed into account, it will be possible to predict, to some extent, the amount of behavior changes among Humboldt County residents as a result of fluctuating gasoline prices as compared to this study (Puller, 1999, p. 45; Hughes, Knittel & Sperling, 2006, p. 18). Thus, the literature plays out as an excellent illustration for predicting future driving (commuting) and fuel purchasing behavior that may occur among Humboldt County community members as the price of gasoline continues to fluctuate or remains high.

What to expect next

As I determine the behavior intention and behavior in Humboldt County, issues will inevitably arise surrounding the contentious topic of gasoline prices. Delicate issues include sensitivity to countrywide and local gasoline prices, politics and distribution may cause individuals to develop negative perspectives and experiences. Developing negative perspectives may play a risk within the research because personal opinions may affect

individuals' desire to behave in a specific way and/or bias their self-reports of behavior (Kollmuss & Agyeman, 2002 p. 243, 244, 249; Blake, 1999, p. 265-266; Gold, 2011, p. 3). Income, political affiliation, and/or a predeposition to environmental and other related issues can all play a role in determining levels of behavior changes in response to increased gasoline prices. These associations can potentially put a dent in determining whether or not intentions to behave can truly be predictors for behavior in Humboldt County in response to high gasoline prices.

The biggest gap in the literature relevant to this research is the lack of correlations, evidence, or knowledge regarding gasoline prices and intended behavior for a *rural* area such as Humboldt County. By studying community members' behaviors, I aim to fill this gap by gaining insight to how individuals are changing, or not changing their behavior in response to their behavior intention toward high gasoline prices. This data then can be used to provide information that can assist and improve upon community, city and county and transportation programs in Humboldt County.

I postulate that as gasoline prices continue to increase, people's intention to purchase less gasoline will increase. This prediction is also based on the earlier review of the variables and literature that clearly stated that behaviorial intention, subjective norms, perceived control, in addition to any personal experiences and efforts, contributes to the subjective likelihood that the behavior will be completed by the individuals (Fishbein & Ajzen, 2010, p. 40). However, given the rural isolation and lack of alternatives in Humboldt County, these behavior changes may not necessarily be feasible, even if desired.

While transportation options may be currently limited in Humboldt County, there is potential for shifts in behavior and utilization of alternate modes of transportation if local residents express intentions to change their behavior over time. Fishbein and Ajzen potentially reinforce this concept by stating:

...once a set of beliefs is formed, it provides the cognitive foundation from which attitudes, perceived norms, and perceptions of control - and ultimately intentions and behaviors - are assumed to follow in a reasonable and consistent fashion... (2010, p. 24)

This statement, in addition to the literature already discussed, suggests that the best way to predict someone's behavior is to take a qualitative approach, such as utilizing a survey, by asking an individual what his or her intentions are. While this approach might not be consistent across the time and space due to unpredicted external factors, fluctuating gasoline prices, U.S. oil politics and geographical isolation in Humboldt County, individuals' intention to behave should prove consistent.

In conclusion, the literature shows how behavioral intention from the TPB is the best predictor of behavior, and is the optimal framework for identifying intentions among people in Humboldt County. I hope to use these frameworks to achieve results that provide insight into how individuals of Humboldt County behave, do not behave, or may behave as gasoline prices remain high and/or increase. With the outcomes made available by the survey, propositions for community and city transportation programs and projects can be developed. These projects can contribute towards the alleviation of of financial,

political and social pressure as well as encouraging more sustainable ways to travel, gasoline conservation incentives, and other environmental benefits.

Chapter III: Methodology

This research adopts a quantitative methodology approach by administering a survey to collect data among community members. This research also employs an explorative approach to determine how gasoline prices have influenced commuting behavior among residents of Humboldt County, California.

Survey

I chose a quantitative approach to gathering data because it provided the best techniques to obtain the data necessary to answer my research questions. The survey method was chosen to address my research questions because a survey is great for asking many smaller questions that pertain to my main research questions. I used my survey instrument to collect feedback and self-reported behaviors from community members in regards to gasoline prices in Humboldt County.

Surveys provide a concrete method for collecting data from individuals because it allows for a scientific approach to collecting information, which allows for interaction between my research questions and individuals, building upon exchanges of contextual knowledge (Dillman, 2009, p. 16). However, I recognize that surveys can have limits as a means of data collection. Limits can include lack of coverage, lack of representativeness of the target population, nonresponse error, biases, and measurement/analysis errors (Dillman, 2009, pp. 16-17).

I chose to use surveys over other research methods because of the topic of this

research, desire to get a large number of respondents to have a better representativeness of the community, and hesitation of doing interviews in fear of potentially misunderstanding interviewees due to my severe hearing loss. Although a survey was my primary method of data collection, I also utilized my own observation of individuals as well as keeping track of local reporting on gasoline prices as prices themselves fluctuated over the period of this research (October-December 2011).

This section will first elaborate on the survey design strategies and techniques for analysis. The discussion then turns to the barriers encountered and how each barrier was overcome.

Survey design

The survey was designed by taking the following steps. First, to determine the actual survey questions, I came up with a long list of questions that I felt were relevant to my research questions in some manner. These questions ranged from demographics, transportation choices, average distance in commuting, prices of automobiles, opinions on California transportation infrastructures, and the prices of gasoline that one might be willing to pay at a given time. To narrow down my questions, I chose those that were most relevant to my research question by choosing questions that could provide insight in how Humboldt County residents currently behave and could potentially behave, commuter-wise, with given gasoline prices; current choices for commuting; and questions in regards to community members' perspectives of Humboldt County's high gasoline prices.

Once my survey questions were narrowed down, and I had a more definite set of questions, I arranged them in an order that I thought would have a nice transition from one question to the next. Beginning with questions regarding perspectives of how one feels about high gasoline prices in Humboldt County, I hoped that these first questions would hook the survey taker and encourage them to finish the survey. Beginning with perspective questions, the survey continues on and transitions to asking the survey taker about any past and current behavior changes that might have been a result of gasoline prices, their commuting habits, and so on. I chose to place these questions in an order that would encourage and prompt the survey-taker to think about the various ways of how they have, in the past, and currently commute.

Once I had a full survey draft, I pre-tested the survey with several people. I asked several neighbors, two co-workers, and peers from a research methods class to take the survey. I asked each survey-taker to first take the survey as if someone they did not know gave them it. Once each person completed the survey, I sat down with each individually (time permitting, otherwise, they wrote down comments on the paper survey), to discuss any grammar errors, unclear wording, or any other general concerns that appeared. After editing the survey and consulting with my advisors, this survey was submitted to Humboldt State University's Institutional Review Board for approval. After IRB approval the survey was distributed by hand and electronically.

Paper surveys were conducted within the following cities in Humboldt County: Eureka, Arcata, McKinleyville, Blue Lake, Orick, Garberville/Redway, and Trinidad (See Appendix V for a chart of places I went to, days and times of the week where paper

surveys were completed). In some of these larger cities (i.e. Eureka and Arcata), surveys were completed at more than one location so there would be a wider dispersion of surveys. Surveys were completed outside of grocery stores, coffee shops, and miscellaneous stores (i.e. CVS Pharmacy and Farmers' Markets) after obtaining permission from the store manager/owner.

The survey was also distributed electronically by use of the Survey Monkey website (www.surveymonkey.com). A link to the electronic survey was shared with local and countywide organizations to obtain an anonymous sample of respondents. The sample collection was anonymous and widely dispersed among organizations and thus, around the county. This sample is anonymous since I was unaware of which individuals actually obtained the survey within these organizations and who shared (forwarded) the survey with other organizations and/or individuals.

Those organizations, which were contacted via email with an introductory letter that expressed interest in my research, offered their cooperation in exchange for a summary of the research results once completed. The following organizations shared the survey with their in-house employees, volunteers and when appropriate (and desired), their email membership list:

1. Redwood Coast Action Agency
2. Greenwheels
3. Northcoast Environmental Center
4. Southern Humboldt Working Together
5. Redwood Alliance
6. Friends of the Dunes

7. City of Ferndale, California
8. Humboldt Community Access and Resource Center
9. Redwood Community Radio (KMUD)
10. Democracy Unlimited
11. Humboldt County Republicans
12. Friends at the Arcata Marsh

I acknowledge that this list is not completely representative of Humboldt County. I wished to include more organizations, city establishments, and local Native American tribes. However, due to a lack of direct research or community connection to their mission and goals, other organizations were uncomfortable asking their employees and/or memberships to take a survey on a topic they were not affiliated with. When this survey first went out, I contacted many organizations (See Appendix IV for a complete list of original contactors) across the political, community and cultural spectrum but many did not wish to participate due to a lack of interest and/or an inability to reach them.

With both the participation from the list of organizations mentioned above combined with my own efforts at paper surveying, a convenience sampling of respondents was achieved (N=227). This population sample is confirmed by the distribution of zip codes. Using zip codes was the principal method for constructing my sampling frame rather than income, political affiliation and/or educational status. The aspiration was to focus on the geographical region due to the differences in “urban” (the cities of Arcata, Eureka and McKinleyville) versus “rural” (Everything outside Arcata, Eureka and McKinleyville) areas of Humboldt County and how those two distinct areas

can provide various levels of feedback.

In addition to direct data obtained from the community via surveys, secondary information and data was also of interest for this research. A dataset obtained from Erik Eschker, a professor of Economics at Humboldt State University, with a list that tracked average gasoline prices over time in Eureka. This list, in addition to updated information from his Humboldt Economic Index newsletters, I integrate statistical information with my own observations and experiences in order to shape and compensate for my bias of the likelihood of having more ‘green’ participants, and my research frameworks.

Obstacles to validity

This project confronted several barriers. First and foremost, as noted above, was a lack of general representativeness among organizations that were willing to share the survey among their associated members. This was counterbalanced with responses from paper surveying since paper surveys were targeted at the public who may or may not be affiliated with an organization. All responses, both electronic and paper surveys, were anonymous as I am not aware of who individually answered each survey.

Secondly, I recognize the mistake of a biased introduction email (See Appendix I) at the beginning of the survey process, suggesting that only individuals who were upset about high gasoline prices should take the survey. This was irreversible, but the survey results in response to this prompt were clearly separated from all subsequent emails and paper surveys. After this error was recognized, all succeeding emails sent to individuals associated with organizations were bias-free (See Appendix II). Responses from the two

datasets (1. Biased email responses and 2. Unbiased email responses plus paper survey responses) were kept separate and later analyzed to determine if they could be combined, which they were (see subsequent section regarding analysis strategy).

Regardless of the issues that presented itself throughout the survey collection phase, utilizing surveys was the best option to collect data for my research. Furthermore, by employing a survey methodology, this research attained a level of objectivity, neutrality and open-mindedness (Mills et al, 2006, p. 10). Lastly, this survey allowed for a variety of questions, both closed- and open-ended, to be asked with the intent of gaining a better sense of how the community responds to changes in gasoline prices.

How the survey will be analyzed

The surveys were analyzed using descriptive statistics inputted into the Statistical Package for Social Sciences program (IBM SPSS). Before utilizing most of descriptive statistics from the data, I first ran tests to determine if there was a statistically significant difference between the two (those with the biased email introduction versus the rest) datasets. The tests that I chose to run were: Pearson's Chi-square tests and T-Tests. These were executed to determine if the two datasets could be combined or if one had to be excluded because of a statistically significant difference due to the biased email inadvertently sent out at the beginning of the survey period. These two tests were chosen to test for normal distribution based on sample variances and a test statistic. To test the two different databases, I chose the first seven questions to test because most survey respondents answered at least up to question number ten.

To test the two datasets with the chosen seven questions, I separated the urban (all zip codes within the cities of Eureka, Arcata and McKinleyville) from the rural (all zip codes outside the cities of Eureka, Arcata and McKinleyville) zip codes from each dataset. I separated the responses by zip code, as per suggestion of a thesis advisor and because by looking at residency area, I can more accurately compare answers of the survey. By extracting all the rural zip codes, from both datasets, I had a new dataset with responses from residents who live in a rural area from both original datasets (the one with the biased email introduction versus the rest). With that, I had two appropriate sets of data to compare.

To determine if I could combine all my results together, I took the newly formed dataset of all rural respondents from both my biased email introduction and the remainder of my responses and ran both chi-square and T-Test tests, respectively, on the chosen seven questions. The tests showed no statistically significant difference between the two datasets. With no statistical significant difference between each question between each dataset, I was able to combine the two original datasets (the one with the biased email introduction and the rest) to produce a larger sample size to analyze (N=227).

Once the datasets were combined, I reviewed the descriptive percentages for how each question was answered, and analyzed how community members of Humboldt County replied to the various questions I posed regarding their driving, commuting, and purchasing gasoline behavior (see Appendix III for survey questions). Furthermore, by utilizing the descriptive statistic percentages of answers summarized, I developed relationships between variables that can contribute to the explanation of one's behavior

changes (or the lack of behavior changes). In order to determine relationships between variables in this research, I developed questions in order to determine relationships.

These questions include the following:

1. At what price per gallon do we see an intention to reduce driving among local residents?
2. Do the community feel that gasoline prices are too high in Humboldt County, do they provide sufficient reason why, and any attempts that are taken by community members to overcome the barrier of expensive gasoline, if any?
3. Is there a correlation between those who think gasoline prices are too high, the type of alternate transportation programs they are most likely to use as prices increase, and how concerned they are about current and future gasoline prices in Humboldt County?
4. What proportion of the respondents reported a type of behavior change and/or what is the most popular behavior change reported?
5. What are the common obstacles (social, familial, political, financial) for individuals who report opposition to choosing alternate transportation over a privately-owned automobile regardless of the price of gasoline?

These questions were critical for how I measured, analyzed, categorized, and grouped themes generated by the data results. These questions are critical because they

can provide a deeper understanding of commuting behavior and intentions to change behavior among residents in Humboldt County while adding to the literature regarding this topic. Understanding behavior change(s) is crucial in this research because it allows me to advocate for future improvement of transportation systems and other assistance for Humboldt County residents. This will be of importance if gasoline prices continue to increase at a rate that community members are unable to afford.

Exploratory Research

My use of the survey can be best understood as an exploratory research design. Exploratory research essentially helps fill gaps that exist within the literature and society by attempting to target a relatively new problem or better understand an existing one (Grinnell, 1997, p. 62). By gradually taking the nationwide issue of increasing gasoline prices and narrowing it down to a specific geographical area that struggles with complex political and transportation infrastructures, I aim to draw attention to an essential imbalance in the community. In sum, my methodological approach provides me with the flexibility to precipitate common interests and community feedback to achieve a better understanding of how individuals respond behaviorally to increasing gasoline prices in Humboldt County.

Chapter IV: Results & Analysis

The survey returned a convenience sample of 227 responses (N=227) from throughout Humboldt County. The zip code distribution seen in the results ensured that this survey reached out to both “urban” and “rural” areas of Humboldt County. Fifty-three percent of respondents reported to live in “urban” areas (everything inside the larger Eureka-Arcata-McKinleyville area), 26.43% reported living in “rural” areas (everything outside the larger Eureka-Arcata-McKinleyville area), while the remainder (20.26%) did not report a zip code (see Appendix VI, for a list of zip codes and number of responses per zip code). The distribution of zip codes was balanced with responses from both “urban” and “rural” areas, as well as at least one response from a multitude of “rural” cities across the county, permitting for a larger distribution and input from the general rural areas. The following statistics that are reported do not distinguish the rural from the urban, but rather collectively shows the overall results.

The objective of this section is to summarize the survey responses. Throughout this summary, I will analyze and describe how these statistics are relevant to my research questions and how they tie in to my theoretical framework. Following the descriptive statistics, I will discuss themes that emerged through the survey. These themes reflect common responses to open-ended questions regarding how gasoline prices have affected individual’s behaviors, and additional comments individuals had about the general topic of Humboldt County gasoline prices. This analytical approach will allow me to employ Fishbein and Ajzen’s prognosis of behavior intention being the best predictor of

behavior, from their Theory of Planned Behavior, and my data, experiences and observations to reach a conclusion of how people change their behavior and intend to change their behavior in response to increasing gasoline prices in Humboldt County, California.

Total Descriptive Statistics: What the basic numbers say

Positions on gasoline prices

The survey results show that Humboldt County residents are aware that they are paying more for gasoline prices and are somewhat bothered by it. Approximately seventy percent of respondents feel they are currently paying too much for gasoline in Humboldt County as opposed to 22.5% who disagree (see FIGURE 2).

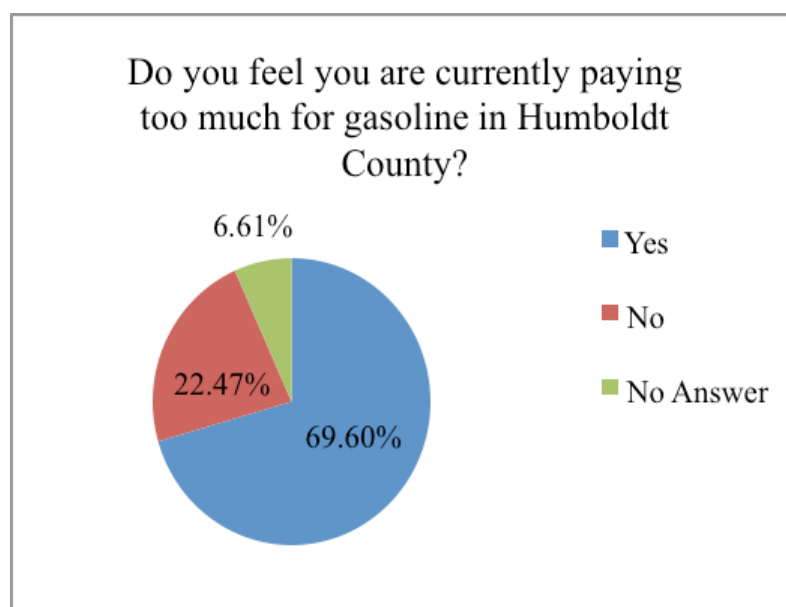


FIGURE 2

Over ninety percent of respondents rated gasoline prices in Humboldt County as very expensive or expensive compared to other areas in the state of California (see FIGURE 3).

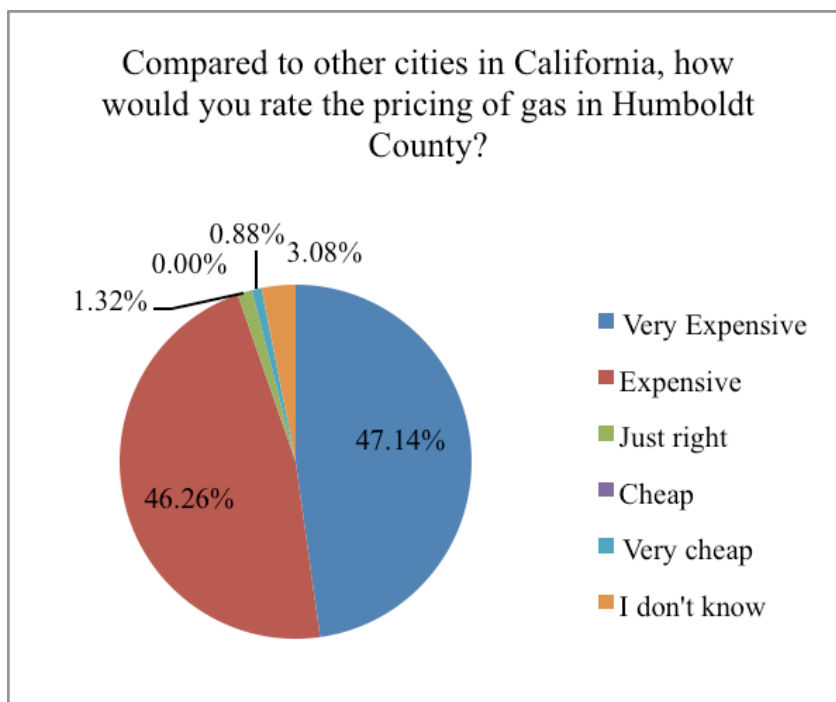


FIGURE 3

I was intrigued to see if respondents attributed high gasoline prices with something that had to do with the Humboldt area. More than sixty percent and thirty percent of respondents attributed the higher gasoline prices to the isolation and rural characteristics of Humboldt County, respectively. Respondents were allowed to choose more than one answer in this question (a “choose all that applies” option). Other responses to possible reasons for the high gasoline prices included stations fixing prices, highways being too small, and gasoline demand being high for a small region (see FIGURE 4). Responses that fell into the “other” category (31.3%) included: a monopoly

exists, there is limited distribution and competition among gas stations, there is price profiling, there are high transportation costs, and there is greed by “big oil”.

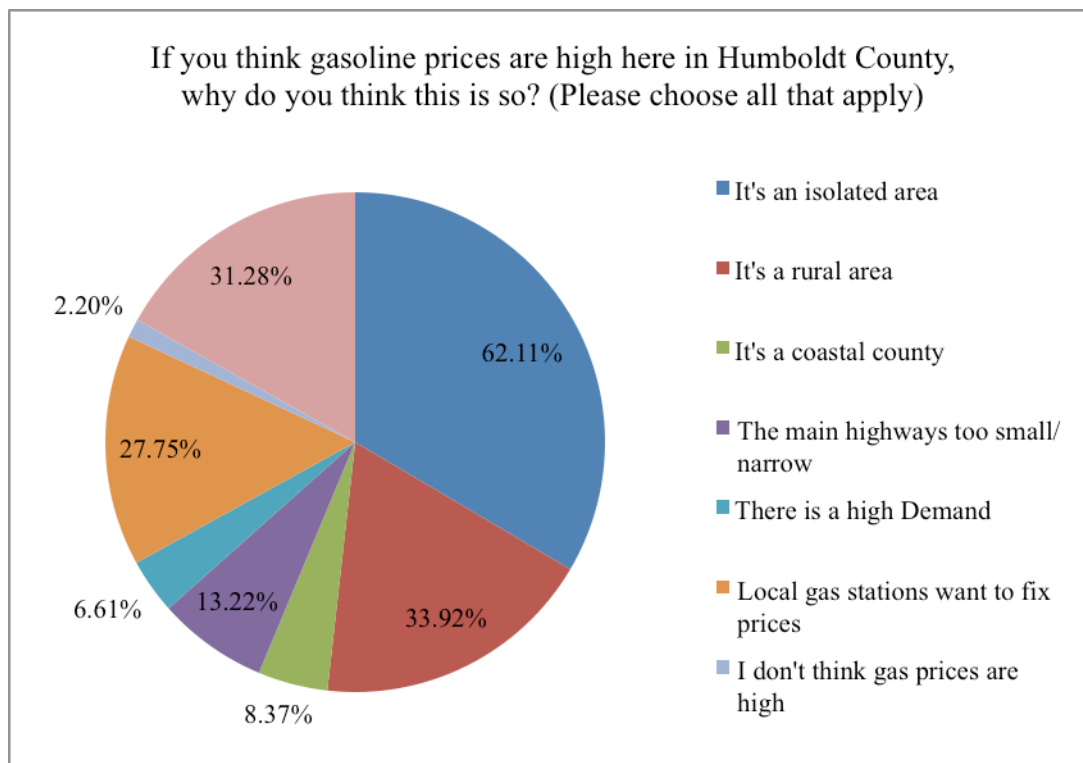


FIGURE 4

As mentioned in the literature review chapter, while the retail price of gasoline in Eureka remains higher than San Francisco, they rise and drop concurrently with prices in other areas (Eschker & Remke, 2010). With Humboldt County's prices higher than the state average gasoline prices, and taking into consideration current and future gasoline prices, respondents reported (on a likert scale of Extremely Concerned to Not Concerned at all) that a quite a few (N=100, 44.0%) are extremely and very concerned about current gasoline prices, 33% (N=75) are somewhat concerned about current gasoline prices, and

19.4% (N=44) are either not very, or not concerned at all about current gasoline prices (see FIGURE 4 and 5 below).

On the other hand, over half of the respondents (N=118, 52%) reported that they are extremely or very concerned, 26.4% (N=60) are somewhat concerned, and 12.8% (N=29) are not very or not concerned at all about future gasoline prices in Humboldt County (see FIGURE 5 and TABLE 1 below).

With those responses, it is evident that most Humboldt County residents are apprehensive about gasoline prices now and even more so in the future.

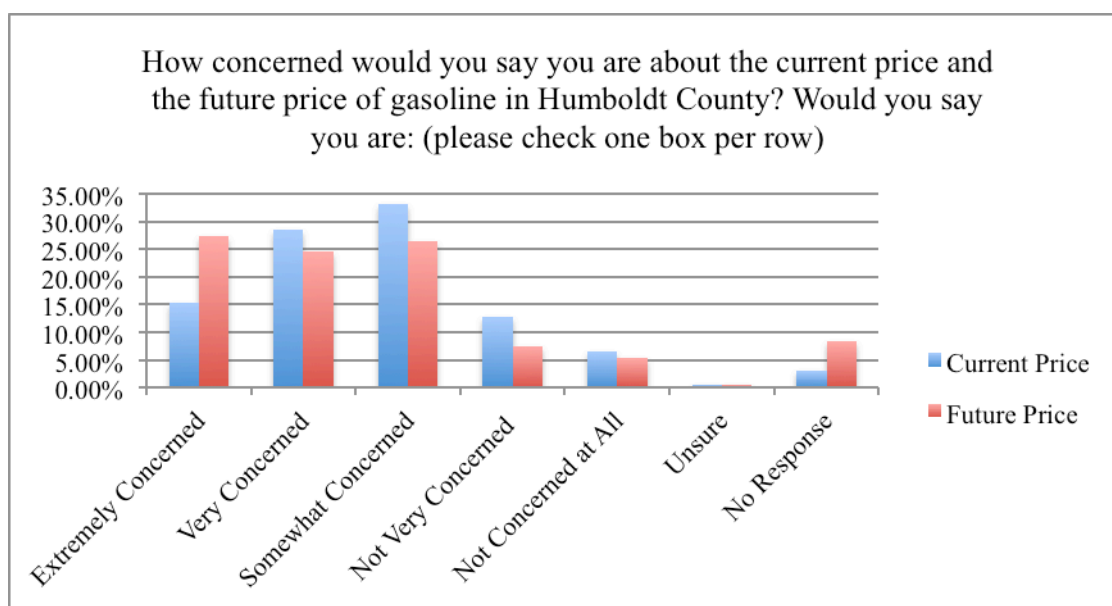


FIGURE 5

How concerned would you say you are about the current price
and the future price of gasoline here in Humboldt County?

Would you say you are: (please check one box per row)

	Current Price	Future Price
Extremely Concerned	15.42%	27.31%
Very Concerned	28.63%	24.67%
Somewhat Concerned	33.04%	26.43%
Not Very Concerned	12.78%	7.49%
Not Concerned at All	6.61%	5.29%
Unsure	0.44%	0.44%
No Response	3.08%	8.37%
TOTAL	100.0%	100.0%

TABLE 1

Gasoline prices and past behavior

In terms of current gasoline prices, 75.3% (N=224) of respondents reported that gasoline prices had affected their behavior (See FIGURE 6).

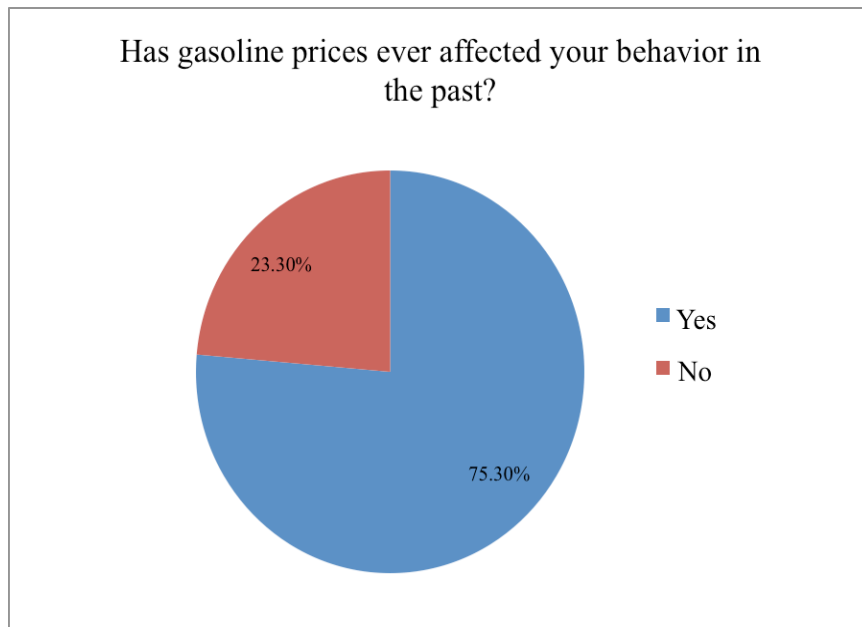


FIGURE 6

Self-reported (through an open-ended question) behavior changes in the past included:

- 31.7% (N=72) of respondents drive less. This includes travel less (in and out of town and out of the country) and being selective about where and how far one travels.
- 22.5% (N=51) use alternate modes of transportation when possible and feasible, such as carpooling, bicycling, using public transit and/or walking.
- 14.5% (N=33) of respondents increased the amount of conscious driving trips they take, in which all errands are done in one trip, and/or trips are more carefully planned.
- 8.4% (N=19) of individuals said they stay at home and reduce their social outings.
- 7.5% (N=17) of individuals switched over or plan to purchase a vehicle that has a higher mileage capacity.
- 5.3% (N=12) of individuals readjusted their personal disposable budget in some manner (e.g. buying less food, not going out with friends as often).
- 3.1% (N=7) of individuals planned ahead and filled up their tank in Del Norte or Mendocino County, where gasoline is cheaper, when departing or returning to Humboldt County.
- 2.6% (N=6) of individuals said they seek out the cheapest gasoline in the area, such as Costco or Renner.

Most individuals responded in a similar manner that allowed these themes to be clumped together. Some answers that struck me as very personal included: "...missed opportunities for employment," "I have even stayed home and not purchased food

because I did not have fuel,” and “I can’t go where I[‘d] like to... [because I] feel trapped.”

To reinforce the abovementioned themes found in respondent’s self-reported behavior changes, the following statistics show how much gasoline prices have affected local commuting and/or travel habits in the last year (see FIGURE 7). Over 50 percent of respondents were affected on a considerable level (examining those who answered “extremely”, “very much” and “somewhat”).

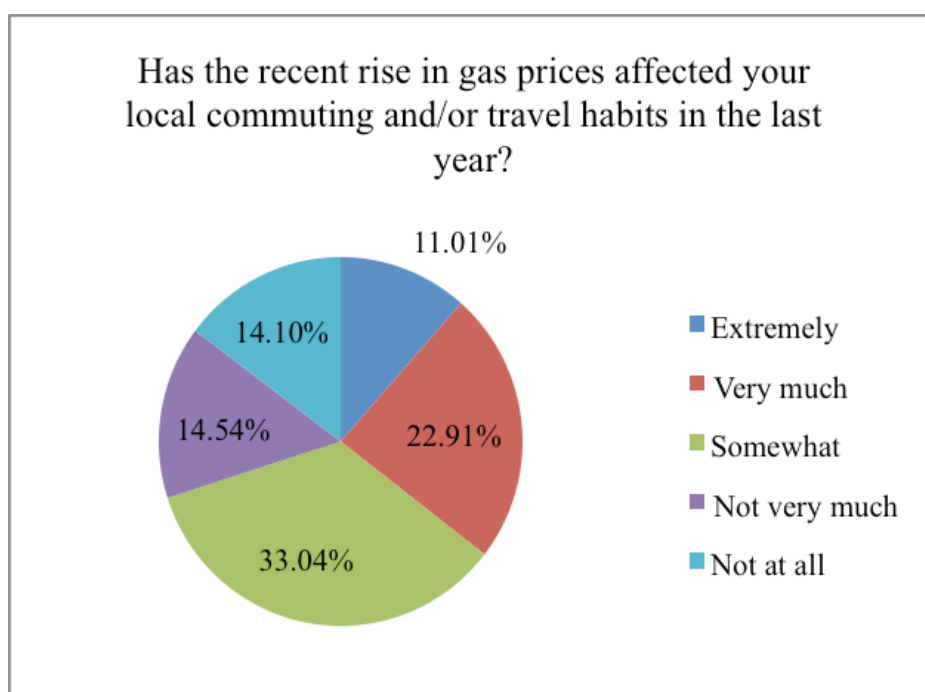


FIGURE 7

With an idea of how much gasoline prices have affected local residents, the following show what options for changing behavior respondents chose from a follow-up

question where they were given a set of options for how gasoline prices had affected their local commuting. This question was posed after the open-ended question of whether or not their local commuting and/or travels had been impacted by gasoline prices, and individuals were allowed to choose all that applied to them. These statistics are reported here to give us more insight into how many individuals have adopted a particular behavior change in the past up to this point (see FIGURE 8):

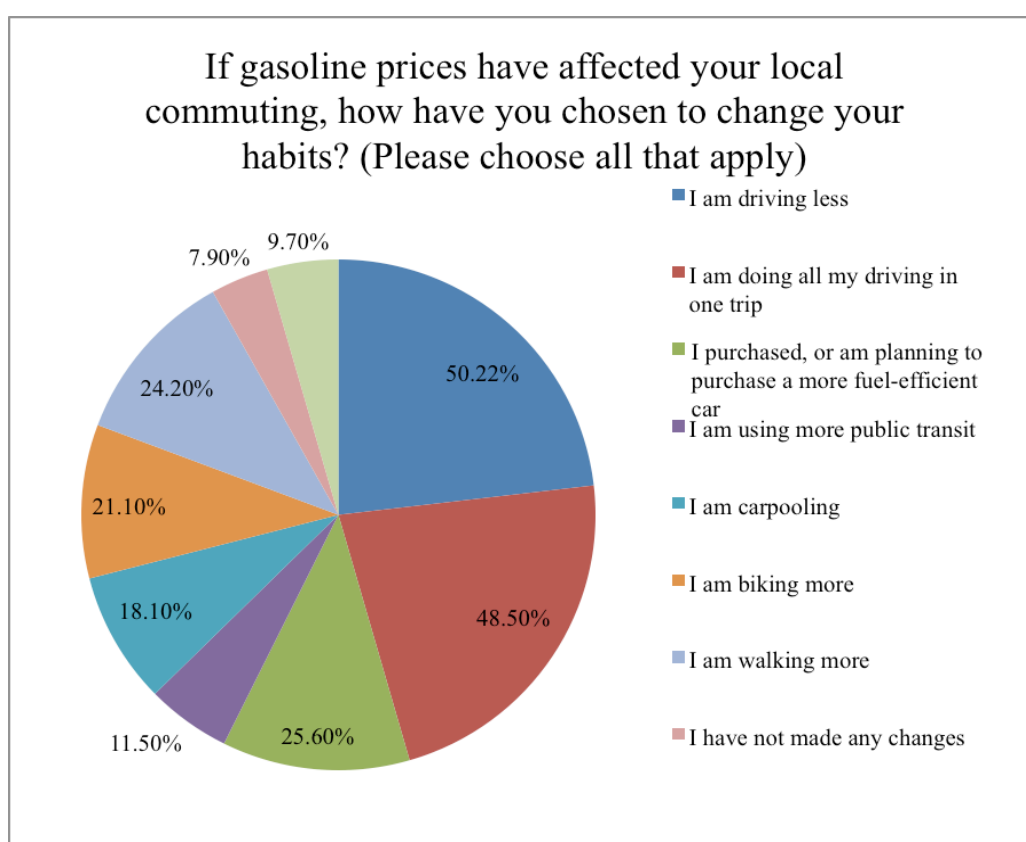


FIGURE 8

These numbers reinforce the 31.7% of self-reported declarations of reductions in driving show that many Humboldt County residents are taking action to decrease the

amount of driving they are doing, thus saving on gasoline and money. This particular result shows that, when compared to a nationwide Gallup poll from 2011 (see below), Humboldt County residents are ahead of the curve regarding reducing their driving to deal with high gasoline prices. Approximately 50.2% of Humboldt residents are claiming to be reducing their driving, while only 32% of American adults in the Gallup survey have adopted similar behavior changes.

What are some of the specific major changes you have made?

Based on adults who have made major changes to deal with high gas prices (53%)

	May 12-15, 2011
	%
Drive less/Stay home more	32
Less travel/vacations	16
Getting a more fuel efficient car	15
Be more practical about errands/trips (fewer, closer to home)	15
Less leisure driving	12
Cut back on other expenses	12
Carpool	8
Change employer/school	6
Use public transportation	4
Walk more	3
Use a bicycle	3
Cut back on energy usage	2
Driving slower/less aggressively	1
Move to a more convenient location	1
Other	6
No opinion	1

USA Today/Gallup, May 12-15, 2011

Percentages add to more than 100% due to multiple responses.

GALLUP

TABLE 2 (Saad, 2011)

In light of the various transportation modes that respondents choose to utilize, the following statistics (see TABLE 3 and FIGURE 9 below) reflect upon the types of transportation chosen among respondents for local commuting.

In an average week, what types of transportation do you use the most for local commuting to get to work, school, errands, etc? (Please choose one per row)

	Driving own car	Driving own motorcycle	Carpooling	Public transit	Walking	Biking
I use this the most	63.44%	0.88%	4.85%	5.29%	14.98%	17.18%
I use this often	8.37%	2.20%	7.93%	3.52%	16.30%	7.49%
I use this sometimes	6.61%	0.88%	9.69%	4.41%	18.50%	9.25%
I use this seldom	8.37%	3.08%	13.66%	11.89%	12.78%	8.37%
I do not use this at all	5.29%	51.98%	24.23%	35.24%	9.69%	22.91%
No Response	7.92%	40.98%	39.64%	39.65%	27.75%	34.8%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 3

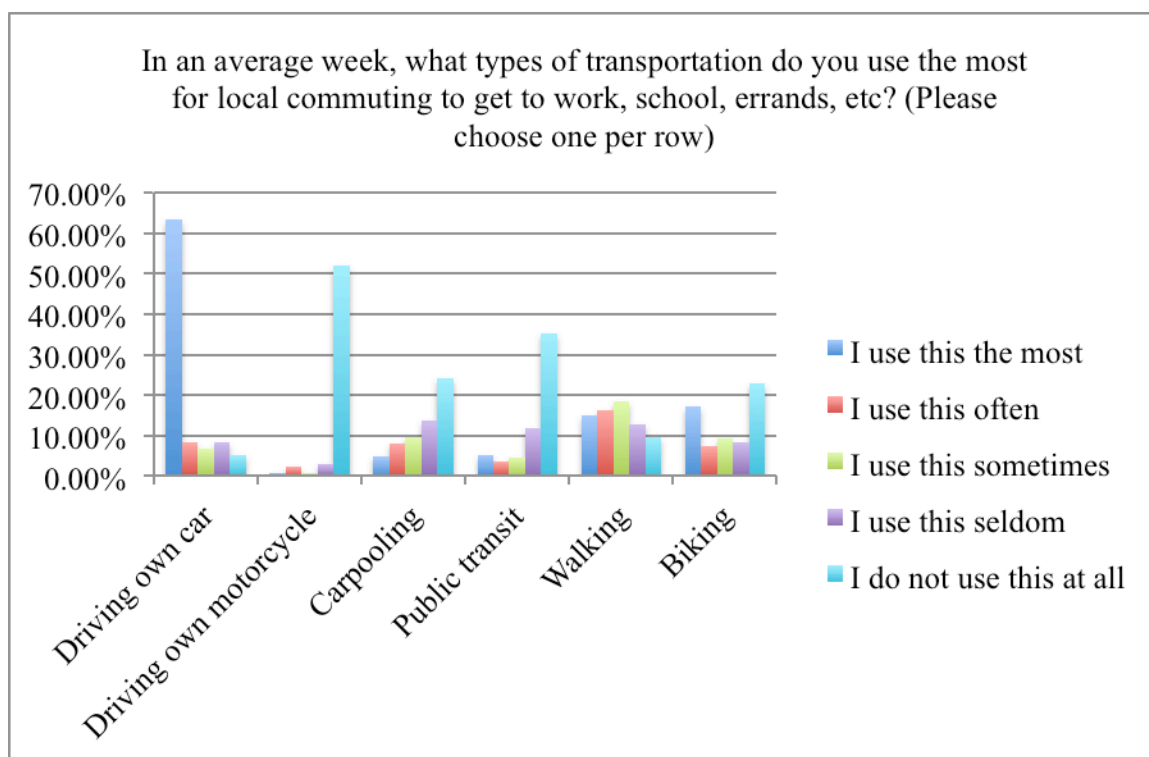


FIGURE 9

These statistics show that most people, as expected, drive an automobile as a primary mode of transportation in the rural area of Humboldt County. However, this question allowed individuals to choose multiple answers, indicating that they use other modes of transportation when appropriate and other circumstances permitting. What proves most interesting are the percentages of individuals who walk and bicycle. This may be evidence to support future development of more pedestrian and bicycle lanes in the County. Furthermore, something that I anticipated was the high percentage of individuals who do not use public transit at all. This was reflected in this question (29%), and is reinforced by the existing weak public transportation infrastructures such as insufficient stops, routes and times (as discussed in the literature review chapter), as well

as eleven comments from open-ended questions that revealed that residents are discomforted or find riding the bus inconvenient. For instance, one respondent expressed uncomfortable feelings towards riding a bus that allows homeless people on, and another stated that it is difficult to encourage his employees to use the bus to commute to work because most of his employees must travel 40+ miles and the bus schedules are untimely, which would cause his employees to arrive late.

Current gasoline prices: behavior intention & future behavior

Two questions proved either difficult or burdensome to answer, due to the difficulty and confusion of filling out the charts (survey questions 11 and 12, in III). Unfortunately, these two questions proved to be one of the most critical aspects of this research. Thus, it is challenging for me to report and analyze the following statistics. In any case, the following two charts show and discuss the percentages for: (1) how much individuals are willing to pay per gallon for gasoline while using a particular mode of transportation; and (2) how much individuals would be willing to pay per gallon of gasoline before the price of gasoline causes them to intend to change their behavior in a given way, respectively.

The following table (TABLE 4) intends to measure the price per gallon of gasoline that individuals might be willing to pay for with a given transportation mode that is available. Individuals were asked to choose one answer per row, to get an idea of the highest price per gallon an individual might choose for each given mode of transportation. Due to this method of evaluation, not everyone filled out this question

completely (e.g. choosing an answer for each row, for the entire table). Regardless, the intention of this chart is to obtain an idea of what price individuals will shift over to a different mode of transportation based on the price of gasoline. Not only does this provide us with an idea of what transportation choices individuals will make, it allows us to measure behavior intention in the sense that individuals intend to use a different mode of transportation at a certain price per gallon.

What mode(s) of transportation are you likely to choose today if gas was ____ per gallon?

	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	<\$8.00	Won't use regardless of price	TOTAL
Drive a Car	41.9%	54.7%	58.2%	64.8%	67.4%	69.2%	71.0%	76.7%	82.9%	5.7%	88.6%
Carpooling	19.4%	34.8%	42.7%	52.0%	57.7%	62.1%	64.7%	73.5%	81.0%	6.2%	87.2%
Motorcycle	6.6%	8.8%	10.6%	11.0%	12.8%	16.3%	17.2%	19.0%	22.1%	31.3%	53.4%
Public Transit	15.4%	22.0%	28.6%	35.6%	40.9%	46.2%	49.3%	53.3%	61.2%	8.8%	70.0%
Walk	33.5%	44.1%	48.9%	56.8%	61.2%	66.9%	71.7%	77.0%	83.2%	5.7%	88.9%
Bike	29.1%	37.0%	44.0%	49.7%	55.9%	62.5%	66.5%	71.3%	76.6%	7.0%	83.6%
Bike Share	8.8%	11.0%	12.8%	17.2%	19.4%	22.5%	23.8%	26.0%	27.8%	15.9%	43.7%

TABLE 4

This chart shows that for most modes of transportation, the willingness to pay¹ for gasoline to use automobiles and carpooling drops significantly after \$4.50 a gallon, and again around \$5.50 and \$6.00 a gallon. This responsiveness provides insight into individuals' behavioral adjustments and their behavior intentions with the price of gasoline. For instance, if gasoline was hypothetically at \$6.00 a gallon, about 64.8% (cumulatively) of Humboldt County residents would continue to use their automobile, implying that those 64.8% are willing to continue to purchase gasoline for their car up to \$6.50 a gallon instead of adopting a cheaper alternate. After \$6.00 a gallon, the percentage increases in purchasing gasoline slows down until \$8.00.

At eight dollars a gallon, there is another spike in willingness to purchase gasoline, which suggests there are still a number of people who would be willing to purchase gasoline up and over at least eight dollars a gallon. This spike could portray populations in Humboldt County who may have the disposable income to continue to purchase gasoline as opposed to others. Aside from the individuals who would be willing to purchase eight dollar gallon gasoline, these percentages seen in FIGURE 10 are good indications that individuals are less likely to purchase fuel as the price of gasoline goes up, indicating a shift in behavior where individuals intend to purchase less gasoline and use other modes of transportation.

¹ The willingness to pay framework is a concept in which a measurement is done to determine a dollar value that individuals are willing to pay for a product or a service (Guagnano et al., 1994, p. 411). This value depends on personal preferences, potential for greater benefits, income, substitution effects, market values and initial measures of valuation that an individual develops (Knetsch & Sinden, 1984, pp. 511-513; Shogren et al., 1994, p. 256).

I expected to see higher numbers in public transportation, biking and walking as the hypothetical price of gasoline became higher, hinting a shift to using those types of transportation as an alternate. However, this was not clear in the results of this question, suggesting that individuals may not be ready, able, or want to use these alternate modes of transportation. This suggests a potential gap where the current public transportation systems that exist in Humboldt discourage ridership, or simply there is a lack of interest among residents to ride the bus.

To follow up with this chart just discussed, the following chart (TABLE 5) proposes to measure the behavior changes that an individual may choose at a given price of gasoline. Thus, this chart measures the intention to change behavior, and which transportation behavior might be selected. This chart, as the last one, as proposed in the survey, asked individuals to choose one answer per row. The goal was to see which cumulative price range individuals might adopt the proposed behavior change. Again, due to this method of measurement, not everyone chose an answer per row, or chose an answer for every row, leading to erratic summations.

How much per gallon of gasoline would you be willing to pay today before you _____? (Please choose one per row)

	>\$4.50	\$4.51-5.00	\$5.01-5.50	\$5.51-6.00	\$6.01-6.50	\$6.51-7.00	<\$7.00
Cut back on local mileage	39.2%	52.4%	64.3%	70.9%	74.4%	76.2%	82.8%
Cut back on local commuting	31.3%	43.6%	51.5%	58.5%	63.3%	65.5%	75.2%
Cut back on recreational commuting	27.8%	47.6%	58.6%	67.9%	71.0%	71.9%	78.9%
Purchase efficient vehicle	22.0%	28.2%	38.8%	47.6%	52.9%	54.2%	67.4%
Purchase a bicycle*	32.6%	37.9%	41.9%	49.4%	51.6%	52.0%	53.3%
Purchase bus pass(es)*	13.2%	22.0%	29.5%	37.0%	40.1%	42.3%	56.0%
Walk more	38.8%	47.6%	55.1%	60.4%	61.7%	63.5%	70.0%

* To use occasionally (as posed in survey question)

TABLE 5

For the proposed prices per gallon that were provided by this survey question, it is evident that \$4.50 a gallon, or less, is high enough to shift commuting behavior toward something else. For every behavior change option provided in this survey question, \$4.50 a gallon or lower resulted in the highest original percentages, indicating that individuals have already adopted those behavior changes and are doing so as per their claim through choosing that option; and by choosing that option, there is the evidence that \$4.50 gasoline is expensive enough to cause Humboldt County residents to adjust their

transportation behavior at this time. In doing so, residents proclaim their intention to behave in a particular way once gasoline reaches a certain price, in which they have some financial, social or personal grounds to do so.

This chart can also suggest that behavior shifts may already be taking place since throughout the duration of this survey, and a few months prior, gasoline prices fluctuated between \$3.50 and \$4.10 a gallon. When the price tag tipped over \$4.00 a gallon, some residents may have started to consider how that price may affect their long-term transportation behavior. This explanation could explain the higher percentages of transportation behavior choices favored among residents for \$4.50 a gallon or lower and can be an indicator of an intention to behave given a high price tag of gasoline.

However, as I previously mentioned, this chart is not consistent. I acknowledge this and attribute it to two reasons: not everyone chose an answer (per row) and once they did, other choices are not picked because the respondent had already picked a lower (or higher) price, demonstrating their intention to choose that behavior change near or at that price per gallon. Thus, with these responses, it is difficult to actually report on true behavior intentions based on initial intentions and self-reporting estimations.

However, with respect to these results, I see high response rates indicated in the lower gasoline price ranges, suggesting that these behavioral intention changes will be the first to be adopted by most people. These results parallel the literature that discusses behavior changes that have generally been adopted by Americans thus far (Skufca, 2008; Robinson, 2008; Rich & Clifford, 2011; White, 2012; Williams-Derry, September 2011; NHTS, 2008; Hughes et al., 2006; Schreiber, 2010; Saad, 2011; Hymas, 2012). For

instance, there are corresponding behavior changes for responses in reducing miles traveled as opposed to gallons consumed as gasoline prices increase. This is indicated in the three categories: ‘cutting back on local mileage,’ ‘cutting back on local commuting,’ and ‘cutting back on recreational driving’ as the percentage responses are relatively high up to six dollars a gallon, as well as through the self-reported behavior changes that individuals gave in the open ended question (31.7% of responses claiming they “drive less” in some manner).

These results provide some insight into Humboldt County residents’ intention to behave regarding transportation with high gasoline prices in the sense that their perspectives on gasoline being expensive parallels their claims of: what behavior changes have been adopted thus far (at the current “high” price) and intentions to change their behavior once gasoline reaches a hypothetical higher price. Recalling that almost 70% of respondents feel that gasoline is expensive, the results for this survey question satisfies my hypothesis that individuals may intend to change their behavior now or in the future as a result of high gasoline prices. Consequently, these results of what behavior changes individuals in Humboldt County can further reveal their behavioral intentions for embracing new methods of transportation.

Transportation behavior at the current gas price

This section will analyze why respondents might (behavior intention) choose to use alternate modes of transportation at the current price of gasoline. During the time of this survey, gasoline averaged \$3.98 and \$3.94 (in October and November 2011,

respectively). Several answer options were provided to get a sense of what behavior changes have been adopted and the reasons affiliated with the behavior change. These questions were asked and answered using a Likert scale of strongly agree to strongly disagree (see TABLE 6 and FIGURE 10):

Using the matrix below, please tell me why you may choose to use alternate modes of transportation at the current gas price? (Please choose one per row)

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	No Answer	TOTAL
Car is expensive (ownership & maintenance)	13.2%	18.5%	31.3%	15.4%	5.3%	16.3%	100.0%
Fuel is expensive	17.2%	39.2%	17.2%	10.1%	1.8%	14.5%	100.0%
Healthy Benefits	14.1%	15.4%	14.1%	19.8%	15.0%	21.6%	100.0%
Convenience of Alt. Transportation	36.6%	27.8%	15.4%	3.5%	2.2%	14.5%	100.0%
Environmental Reasons	44.1%	25.6%	11.5%	2.2%	2.6%	14.1%	100.0%
Short distances necessary for travel	22.0%	17.6%	12.8%	11.9%	15.4%	20.3%	100.0%

TABLE 6

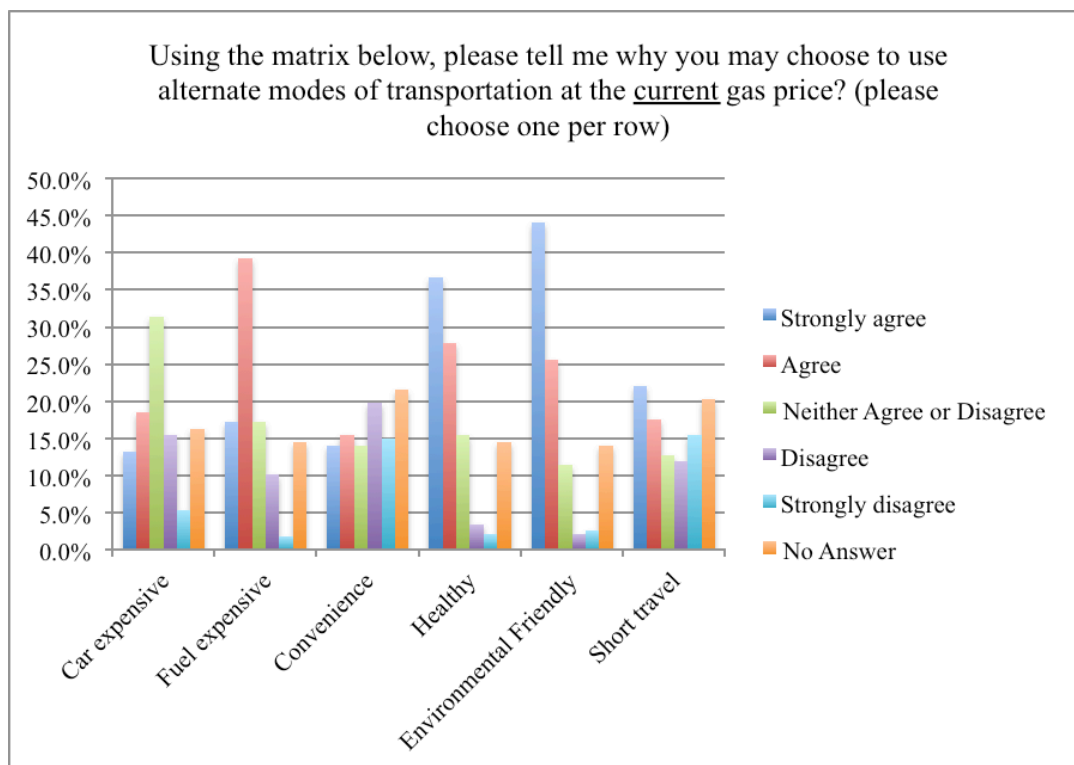


FIGURE 10

These results provide an understanding of what intentions are correlated with what behavior. By indicating why they would use alternate modes of transportation at the current gasoline price, we can further attribute behavior changes to social, environmental, health, and financial contexts, which can affect an individual's intention (what I am aiming to measure) to use alternate transportation. These reasons also are justified by the variables that contribute to behavior intention since they derive from individuals' personal attitudes, subjective norms and perceived behavioral controls.

The most interesting, and important, results are those that claim that respondents choose to use alternate modes of transportation based on the health benefits,

environmental reasons, and the costly fueling of a car. While this question was posed where respondents could choose all answers that apply to them, and based on the area's reputation for being more liberal and "green," and the more environmental predisposition from particular organizations' participation, choosing to use alternate transportation based on personal health advantages (i.e. exercising) and environmental (i.e. polluting less) reasons are not surprising, nor do they necessarily have a direct connection to the other. Each response option provided in this particular question does not have to have a correlation to the other, but simply were clumped together due to the theme of the question.

Regardless of how this question was posed, the results show that those who chose to use alternate transportation based on costly fuel parallels the near 70% of residents who feel that gasoline is expensive in Humboldt County. Furthermore, these findings emphasize that individuals acknowledge high gasoline prices and those prices can be a reason to intend to utilize alternate transportation options.

Obstacles to potential future behavior changes

The results just described touch upon reasons why an individual might choose alternate modes of transportation instead of using a car. However, this decision may not always come easily nor could it be feasible for some individuals. The following data report reasons to why an individual say they would *avoid* (not intend to) using alternate modes of transportation (respondents were allowed to choose all that applied to them) (see FIGURE 11). This question was phrased: "Currently, what might prevent you from

using alternate modes of transportation (e.g. public transit, biking, walking), regardless of the price of gasoline? (Please choose all that apply).” Since I allowed more than one response to be chosen to this question, responses do not add up to one hundred percent because not everyone chose an answer, or chose more than one reason for not using alternate modes of transportation.

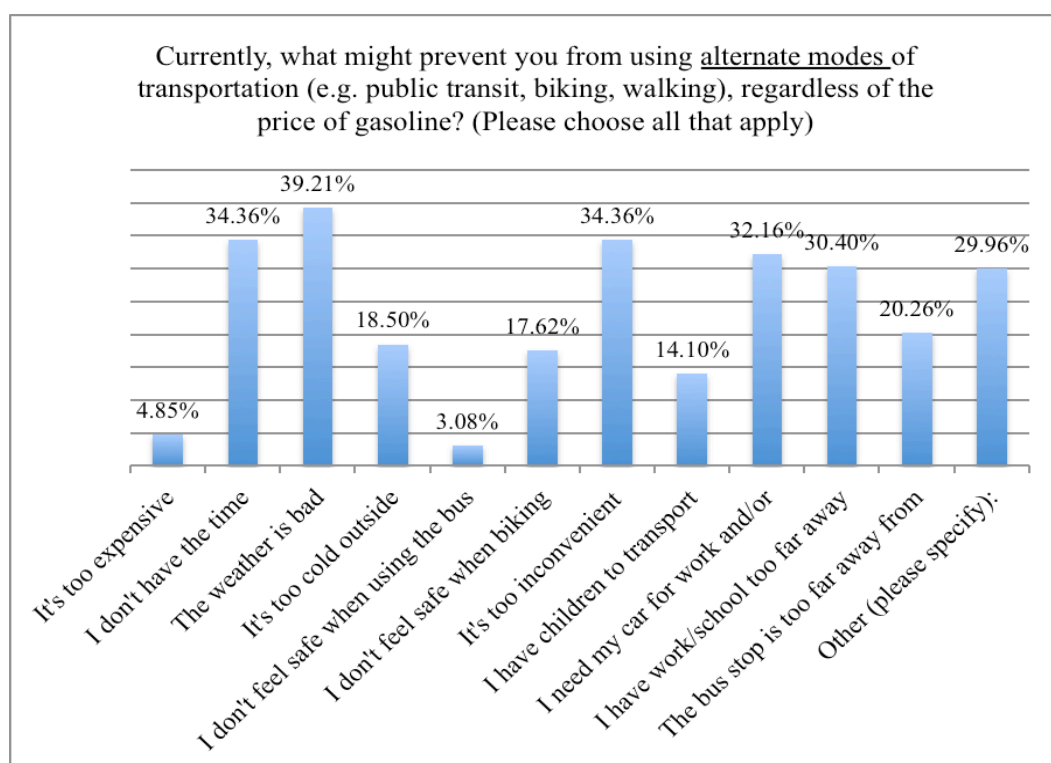


FIGURE 11

The 29.96% that reported on other reasons for not using alternate transportation gave reasons such as: having a disability, the bus schedule is too infrequent (e.g. does not run on weekends, or go through town enough), there are insufficient or unsafe bicycle

paths through town, being retired, and for personal choices (e.g. does not like to encounter homeless people on the bus).

This question was followed up with a few inquiries into whether or not individuals felt that they had equal access to various modes of transportation. The question was phrased: “Overall, do you feel you have equal access to each of the following modes of transportation here in Humboldt County?” My implication of “equal access” was to imply whether or not individuals felt they were able to access various modes of transportation equally (across each mode of transportation), easily and at any time. This question was asked because I acknowledge that not all modes of transportation are readily available, or feasible, for every single individual in Humboldt County. Regardless of whether or not modes of transportation are readily available, individuals may or may not feel that they have ‘equal’ access to given modes of transportation that may or may not be available. Having or not having access may contribute further to barriers toward using alternate modes of transportation (see TABLE 7 and FIGURE 12):

Overall, do you feel you have equal access to each of the following modes of transportation here in Humboldt County? (Please choose one per row):

	Yes	No	Sometimes	N/A
Car (N=198)	87.4%	4.0%	5.6%	3.0%
Public Transit (N=183)	35.0%	30.1%	31.7%	3.2%
Bike (N=188)	31.4%	28.7%	35.1%	8.0%
Walk (N=195)	40.5%	18.5%	36.4%	4.6%

TABLE 7

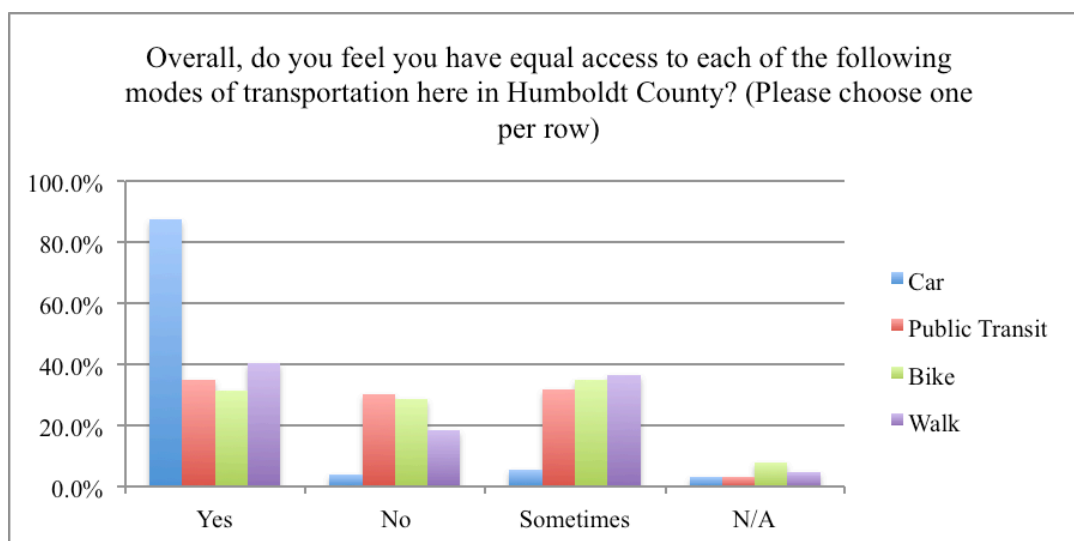


FIGURE 12

The high percentages of those who said they do not have access to public transportation, bicycling areas, and safe pedestrian walking paths is important to take in account when considering individuals' intention to use alternate modes of transportation. As mentioned in the introductory chapter, Humboldt County lacks substantial public transportation programs, and these results, to some extent, support this. With individuals' claims that they do not have access to various alternate transportation programs, we see that the insufficient alternate transportation programs available in the area cause a barrier to accessibility and are acknowledged by the community as problematic (more on this in the Common Themes of Concern, see section IV, ii section below).

Bearing in mind the levels of accessibility to various modes of transportation, this led me to ask what mode(s) of transportation an individual would choose if time or

money were not an issue at all. The objective of this question is to gain a sense of what kind of transportation the community would choose given an ideal situation. Approximately thirty percent reported they would continue to use their own car, 5.29% reported they would prefer carpooling, 8.81% would prefer using public transit, 10.57% would walk, 25.11% would ride a bike, 1.76% would use a motorcycle, and 9.69% reported they would use a combination of the choices provided (the most common choice combination was a mix of public transit-bike-walk) (see FIGURE 13 below). With those results, we can see the community's potential for choosing alternate modes of transportation if ideal circumstances presented itself more often.

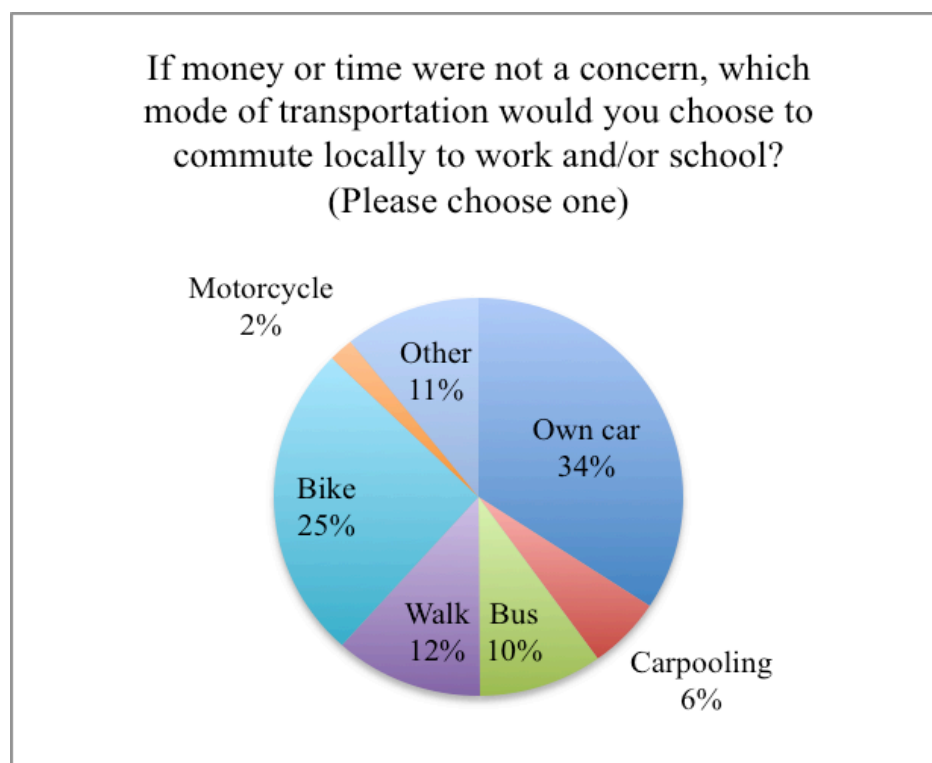


FIGURE 13

With these results revealing that community members would choose different modes of transportation, such as biking (25%) and walking (12%) if it were feasible for them, it is interesting to note that community members might actually be more likely to use that alternate mode of transportation if the infrastructure were improved in Humboldt County, consistent with a “if you build it, they will come” philosophy. With that, the following table provides a connection for what kinds of transportation an individual would use if there were no financial and time constraints, and what kinds of transportation they would choose in Humboldt County if it were available. The following results (TABLE 8) are based on the whether or not an individual would use a given mode of transportation if it were available, given a scale of Extremely Likely to Not Likely At All:

If there were more and/or better _____ in Humboldt County, how likely would you use that kind of service over personal transportation?						
	Extremely likely	Very Likely	Somewhat Likely	Not very likely	Not likely at all	TOTAL
Bus (N=193)	30.57%	26.42%	23.32%	11.40%	8.29%	100.0%
Bike (N=182)	33.52%	15.93%	25.27%	14.29%	10.99%	100.0%
Walk (N=176)	20.45%	21.59%	27.84%	16.48%	13.64%	100.0%
Bike Sharing (N=166)	17.47%	10.24%	20.48%	27.71%	24.10%	72.3%

TABLE 8

It is clear that community members of Humboldt County wish to use more public modes of transportation, and would intend to do so if it were available. These percentages also indicate that more alternate modes of transportation are sorely needed in the County.

In conclusion, individuals' intention to behave is shown in these results as they have already acknowledged the circumstance of living in a geographical location with high gasoline prices and are adapting in any way they possibly can; as well as intending to change their behavior in the future once gasoline prices hit a price that may become too much. Thus, these statistics show that, given my use of the TPB and the substantial evidence of behavioral intention as a predictor of future behavior, that considerable percentages of respondents would use alternate transportation if it were more readily available if gasoline prices remain high in Humboldt county. These shifts in behavior can include more ridership on public transit, the establishment of shared carpooling programs among groups of people, demands for bicycle lanes and an increase in public transit times.

Additional Themes of Concern

The final question in my survey was open-ended. It asked for any additional comments about gas prices in Humboldt County, their transportation choices, or any opinions that they want to share. This question sparked a few responses (N=93) of various opinions, comments, criticism, encouragement, and reflections. I chose to cluster the useful answers given by respondents together in themes that parallel those discussed in the literature review so the themes stay complementary.

Petroleum perspectives: national and local prices of gasoline

There are mixed feelings towards high gasoline prices. Respondents expressed feelings such as:

I always find it frustrating that whenever you leave Humboldt County in any direction, gas prices seem to be lower.

2 years ago my husband & I went cross country via automobile... There is no place along the country that we saw higher prices for gasoline than when we returned home after six weeks on the road. Figure that one out!

Regardless of this frustration, there was also a recognition/aspiration (N=7) for the price of gasoline going up locally and nationwide in order for stronger transportation and energy infrastructures to be developed. Some particular responses shaped this well: “Gas prices should be this high everywhere,” and “...we won’t see real change until gas prices are unaffordable.” A couple of responses (N=3) on this similar issue also expressed that gas “... is too cheap. Tax the hell out of it and spend the difference on transportation,” and that gas should be “heavily taxed, with the revenue going to subsidize low-carbon alternatives” such as “us[ing] the proceeds for bike trails”.

Other responses also that fell into this category indicated that gas prices should be similar to those of European countries as it might encourage individuals to advocate for stronger political policy and renewable energy alternates:

I look forward to \$10/gallon gas, as I hope it will wake people up. If we ended corporate petroleum subsidies, we would already be paying close to that... Alas we need to re-engineer our communities such that life is not hard without driving - urban planning is KEY!!!

Concerns with price manipulation & distribution

On the other hand, bearing in mind the geographical location of Humboldt County, there were a few comments regarding potential price manipulations, issues with distribution and low competition among gasoline station owners. For instance: “Humboldt County fuel prices should not be this high. They should be less as most of it is shipped/barged in. How is it that Costco has one station here and the fuel is trucked in at a higher cost and the end user pays less than all the other stations and still profits?!?”, “Renner [gas distributor] needs competition,” and, “I think gas prices should be high; it reflects a diminishing supply and need for other options.” These responses were noteworthy and suggest that research into how gasoline is distributed throughout Humboldt County might be of interest.

Nevertheless, these responses suggested that strict control over gasoline in Humboldt is another repercussion of living in a rural area as opposed to an urban area. Residents recognized that in- or near- “town” residents have better access to alternate modes of transportation options compared to those who live further away. Thus, residents who live further away from town acknowledge that alternate modes of transportation may not be as feasible in certain areas of Humboldt County due to obstacles such as rough roads. While this claim seems at odds with the rest of my results, it is in fact, true and will be further discussed in the next section.

Obstacles to changing behavior & how people are responding to higher gasoline prices

As mentioned previously, there is a general acknowledgement that alternate modes of transportation are especially challenging in the more rural portions of Humboldt County. One respondent framed these issues well:

Unless one lives in a town or the Humboldt Bay area, bicycling and walking are generally not feasible modes of transportation for work/school/etc. Cars are essential for the rural folks to get to town for shopping, and people come to town infrequently enough that it can be very inconvenient to carpool or rideshare with multiple people needing to do multiple errands. Public transportation from the rural areas to the Humboldt Bay MIGHT be useful for students, but not very useful for folks coming into town for work or errands. Multiple trips per day for buses into the rural areas seems impractical, and both buses and bicycles on some of the rural roads might be downright unsafe.

This kind of reaction, suggests that people do what they can to change their behavior, but often struggle due to barriers such as socio-cultural needs, time impediments, financial limitations or other obstacles already mentioned throughout this analysis. One individual said: “If it wasn't for the "time" factor, I would use my car far less - and will definitely do so when retired in a few years. I think today's youth gets it. At least in this area.” This person’s reaction was interesting because it reflects a behavior change that will occur sometime in the future, but is not necessarily in response to high gas prices, but instead for a personal reason such as retirement. However, this person’s comment about younger generations taking a different approach to commuting behavior is thought-provoking, as it is something that has been recently been observed among under-30 year olds (Zabarenko, 2012; Davis & Dutzik, 2012; Williams-Derry, August 2011). However, other respondents had different perspectives regarding what they can, cannot do, or might do. For instance, one respondent said:

I have a car because of the convenience for running errands on short notice/short lunch breaks. It also comes in handy for going out to Eureka and recreational spots on the weekends. But, having already purchased a parking permit from my employer, I'm dissuaded from making an additional purchase for a bus pass, even though there is a stop right outside my residence. Additionally, the bus route near my residence gets me to work either a half hour early or twenty minutes late, which on a strict 8 - 5 schedule is not as convenient. However, the environmental and social costs of producing gasoline are the biggest factor in my decision to walk more around town. Bad/unpredictable weather and safety concerns about walking alone at night limit the amount I walk.

Some residents (N= 5) remarked on the fact that individuals who live in the rural area of Humboldt (i.e. Southern Humboldt) tend to come across more obstacles, such as “some difficulty in the Mattole [Valley] are the poorly designed roads for bikes, etc.”, and “public transit needs to flow better so people can reach point A to B to C. We do not connect the routes properly here!” These kinds of responses tell us that obstacles exist (and possibly resistance) in the area that can inhibit behavior change. Regardless of the added obstacles that can come with living in a more rural area, some respondents (N=11) expressed a desire for more stops (bus stops and times), tighter schedules, weekend routes, late night stops and more city-to-city connections. In addition to pointing out weaknesses in the public transit system, respondents communicated that they do what they can to reduce their gasoline consumption (e.g. walk when they can) but it is seemed to them to be almost preposterous to not own and use an automobile. Additionally, a respondent mentioned that they would encourage the use of alternate transportation among his employees if there were a lesser risk of them being late to work if public transit were more flexible with arrival times, or if there were more bus stops around.

Social disadvantages and other barriers

Considering high gasoline prices nationwide and locally, social disadvantages can result from these high gasoline prices such as being unable to purchase food, social entertainment and gaining access to social services. A few (N=6) respondents echoed this concern clearly. For instance:

...I couldn't afford to pay for gas and purchase all my monthly groceries

I often can not afford to fill up my tank. I have even stayed home and not purchased food because I did not have fuel. Gas is cheap considering how much energy it provides, but I am miles from anywhere so going somewhere is a serious economic investment.

I think communities that are far from full service communities should be given more funding for social service/food programs - as the cost to provide these kinds of services are driven up by the cost of fuel.

As for social disadvantages, it can be even more difficult to maintain specific lifestyle choices. Some individuals indicated that gasoline prices also prohibit them from having active travel, social and entertainment cultural exposures. For instance, responses regarding being limited in social interactions included individuals who live in the more rural areas of the county giving up going out for fun, being stuck at home (particularly, "high gasoline prices have left me stranded"), having to take fewer trips into town and traveling out of town. Additionally, one respondent from a very small town, Loleta, mentioned that it is difficult to maintain a nightlife considering it is difficult to find "transportation after dark [since it is] car dependent if you don't live in town." Other

concerns revolved around social and health issues, particularly regarding children and the handicapped:

Whenever I think about taking the bus, I am held back because it takes so long. My son goes to school 4 miles away and bikes (there are no school buses) but when weather is bad; I often have to drive him... [also] there are no bike lanes leading into Healthsport/community center and lots of people, including children bike there. Bike lanes are often full of glass and need to be cleaned more often.

Rough sidewalks are unhealthy and dangerous for wheelchair people.

These responses are of concern because when it comes to encouraging behavior change among certain population groups, such as the young, the physically disabled or the elderly, there must be more safe areas to travel as well as programs that cater specifically to those groups.

Transit programs needed.

With the recognition that Humboldt County residents would be supportive of improved transportation infrastructures, especially considering the needs for certain community groups and the fact that that the average distance traveled for local needs among Humboldt County residents is between 0-10 miles, but a substantial percentage of residents travel over 20 miles to do errands (20.41%) and go to work (14.53%) (see TABLE 9 and FIGURE 14 below), indicating that residents either choose to live close to town so they have easier access to resources, or they have chosen to live in the countryside away from the city. Consequently, residents live close to things that they frequent (e.g. grocery stores, work, schools), or they live a ways from quick access

places. For instance, one respondent who lives in the Mattole Valley, a distant and very rural area of Southern Humboldt County mentioned: “Some of the difficulties in the Mattole are the poorly designed roads for bikes, etc. I work in town; go home to Petrolia on weekends. I bike in town all the time, I don't in Petrolia area as roads are not good and distances are too far.” These comments were common for those who responded from Southern Humboldt as well as other rural areas (Eastern and far Northern parts of the county).

Regardless of your mode of transportation, on average, how far do you travel to get to:

	0-5 miles	5-10 miles	10-15 miles	15-20 miles	More than 20 miles
Work (N=179)	41.90%	18.44%	15.64%	9.50%	14.53%
School (N=63)	47.62%	23.81%	26.98%	4.76%	14.29%
Errands (N=196)	34.18%	25.00%	19.90%	5.10%	20.41%

TABLE 9

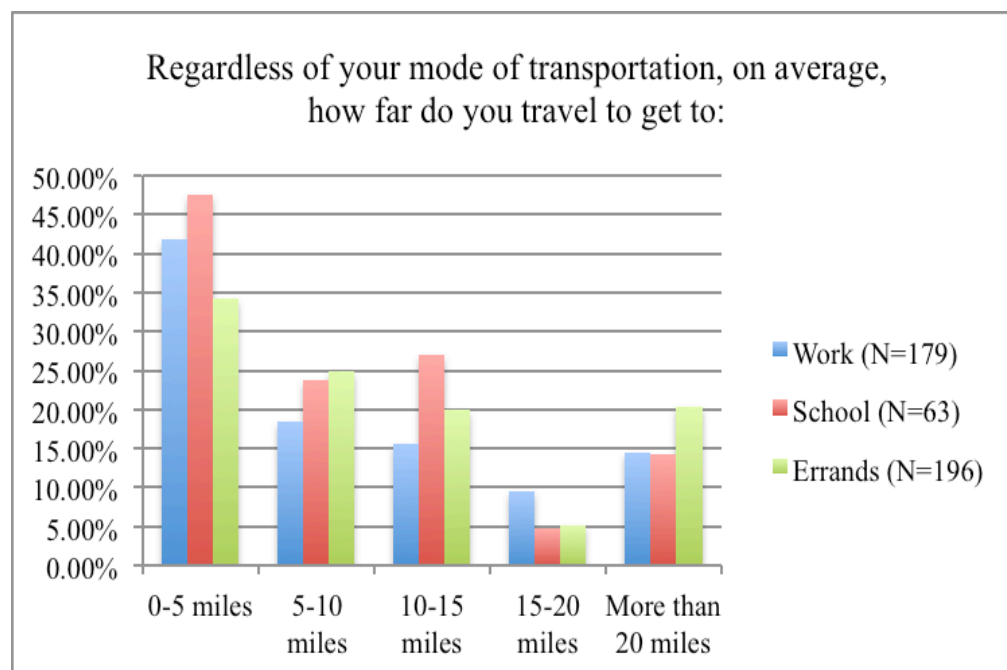


FIGURE 14

However, as mentioned earlier, several members of the community (N=11) expressed interest for programs such as a bike-sharing program, rails-to-trails (especially away from the highway), and a railroad system going up the coast. These programs would require a reengineering of pedestrian and bicycle paths to make them safer and less dangerous, the payoff being they would allow for safer travel for children and night travel. In addition to a desire for those types of programs, a couple of remarks regarding improvements or a need for public transit programs in and around Humboldt County, such as:

Some kind of public transit (daily bus?) from Petrolia to town (Ferndale?) preferably tied into the current bus system might help although same day round trips are very difficult out here. Also some kind of small van between Garberville and Petrolia might be worth looking into (probably low demand

however). Bus system around Humboldt Bay seems quite capable (more weekend/late evening last run might be good). Bike safety is terrible everywhere (rails to trails would help).

I live in a rural area so I would love to see a train or more buses connecting the small towns of Humboldt Country.

With that said, it is clear that improving existing transportation programs are needed in order to encourage intentions to change behavior that can lead to less gasoline consumption, more alternate transportation programs to be established and to stimulate more healthy lifestyles in Humboldt County while there remains high gasoline prices. However, further analysis of the survey also suggests that local residents who live in more rural areas (i.e. Southern and Eastern Humboldt) accept higher gasoline prices as a tradeoff for the serenity and peaceful living area. Further results indicate that those who live in these particular rural areas may develop and execute local systems to offset gasoline prices such as establishing rideshares and carpooling networks. One person, who says that they use online forums to offer rides on long distance trips, indicated these rideshare programs are in effect. These systems could have been developed as these rural communities disapprove of large mass transit programs, because it could disrupt the tranquility of the landscape, or simply because transit programs have not been developed in those areas.

The conclusion will draw on these themes in review to make recommendations for how individuals' can reduce their gasoline usage in Humboldt County, as gasoline prices remain high.

Chapter V: Conclusions & Recommendations

The results of my study indicate that there are a variety of different responses to rising gasoline prices in Humboldt County, California. Many report that their commuting behavior has changed as a result of high gasoline prices. People changed, or plan to change, their behavior in a manner that best fits their needs and wants, such as driving less, walking, or purchasing, or planning to purchase, a more fuel-efficient vehicle, or a combination of several options of transportation. Some report that high gasoline prices affect their everyday ability to commute, purchase gasoline, purchase food and have access to necessary social resources.

Regardless of the behavior changes that residents have already adopted, or intend to adopt when gasoline prices hit a certain price per gallon, it seems as if residents who choose to live in the more rural areas of Humboldt County may accept the high gasoline prices as opposed to areas that are perceived as being more “urban,” such as Arcata and Eureka. This acceptance of high gasoline prices as a trade off for living in rural areas would be interesting to research further. This would be interesting because of the open-ended comments where individuals expressed frustrations that come from living in more rural areas. With this, it might be interesting to see if other areas in the survey would show differing answers based on zip code residency, such as opinions of gasoline prices, preference of transportation method, and whether or not these individuals would use a given mode of transportation if it were more readily available in their area.

In the more “urban areas,” alternate modes of transportation are more readily available and are taken advantage of due to the heavily populated area near the Bay as well as the proximity of the Humboldt State University campus. Even though alternate transportations are found in these urban areas, they are not always the most practical option for varying needs and utilization by local residents.

Future Research

Nudging behavior: what is practical?

In this research, short-term commuting behavior and behavior intention in response to high gasoline prices was explored in the hopes of discovering what kinds of commuting behavior can be best utilized in the future. By better understanding existing behavior and behavior intention, we can better comprehend what types of sustainable, local, and relatively inexpensive transportation programs to advocate. By looking at past self-reported behavior as well as intended short-term future behavior, this research aimed to develop a better sense of individuals’ behavior in response to high gasoline prices in the Pacific Northwest. Short-term behavior was ideal for this research as opposed to long-term behavior studies because comparatively, it is difficult to predict long-term behavior change, even more so regarding sensitive issues that can influence many aspects of one’s life (Ehrhardt-Martinez, 2009, p. 6; Fishbein and Ajzen, 1980, p. 57). It is also pertinent to state that as the price of gasoline remains high, the relationship that exists between individuals and their automobiles may change further because individuals lose interest or

the capacity to purchase gasoline (Steiner, 2009, p. 89). Steiner (2009, p. 89) and Hymas (2012) hypothesized that once gasoline rises to the six dollars to ten dollars a gallon range, the relationship that Americans have with petroleum will begin to fracture and a shift toward sustainable methods of transportation will be more evident. The six to ten dollar prediction by Steiner seems consistent by the results that showed individuals would begin to choose an alternate mode of transportation with a hypothetical price tag of about six dollars a gallon. Thus, by taking in account individuals' intentions to behave positively, given available infrastructure, that uses less gasoline, serves as a good predictor for increased future use of alternate transportation programs in a rural area where gasoline prices remain high. The relationship between individuals and gasoline prices may vary between different rural areas in America, but the results from this research show that rural areas similar to Humboldt County may exhibit a shift towards more sustainable choices in transportation.

However, this is not to say that completely abandoning automobile use will immediately be adopted locally. Rather, encouraging local commuting via providing alternate transportation options can slowly motivate individuals to become agents of social and economic change. By utilizing common interest and rational collective action, community members can directly and indirectly demand upgraded services that the County of Humboldt can provide that meets their needs (Ostrom, 1990, p. 6). Some of these transportation services include improved mass public transportation that provides weekend stops, increased routes, times and expansion across the county. Additional alternate transportation options that can be created or improved upon include safer

pedestrian and bike pathways, centralized bikeshare and car sharing programs, as well as educational outreach classes that can advocate for the use of these programs.

To provoke sustainable behavior changes among individuals from the ground up, we first must understand what catalyzes behavior change, and how best to encourage that adjustment. From this research, I understand that individuals can adapt their behavior over time in response to variables such as their attitudes, subjective norms and perceived behavioral control, which contributes to their behavior intention. For instance, individuals' claims that they will switch over to using bicycles or public transit once gasoline hits \$5.50 or \$6.00 a gallon shows how transitions may be starting to take place for changing commuting behavior once gasoline hits that particular price range. Granted, these changes will vary given geographical region, proper infrastructures, individuals' ideal situations and circumstances that will permit more use of alternate transportation use depending on individualized lifestyles and preferences. Other contributions to behavior change can include changes that can be seen in one's environment such as economic setbacks or changes in income (Dopplet, 2008, p. 70). Thus, gradual changes in one's environment (in this case, high gasoline prices that remain high over a period of time) allows time to familiarize oneself with the circumstances at hand and develop an understanding of how best to change their behavior (if feasible). This concept is illustrated by the principle of compatibility also put forth by the Theory of Planned Behavior that allows for an individual's behavioral intent to be measured in a multitude of ways. However, both Dopplet (2008) and Barr et al. (2005) emphasize that personal incentives, self-interest and social values are effective tools that contribute to both short

and long term behavior change. Thus, this research illuminates short-term behavior and predictions of individuals' behavioral intention for gasoline prices and provides some insight into what to expect in commuting behavior in Humboldt County in the future.

Future Recommendations

The 1970s oil crisis pushed people to buy more fuel-efficient vehicles (Hughes et al., 2006, p. 15). While the current oil market does not necessarily put us in another oil crisis, the economy does put things in a different perspective. The current economic recession makes things tough for everyone, and not just the purchase of gasoline. However, the high cost, and constant use, of gasoline can be motivation for the changes that are seen with commuting behavior. A change in transportation behavior can depend on the price of gasoline and other factors that make driving unattractive (Schreiber, 2010, p. 2). However, the results of this research do not exhibit any indication that Humboldt County residents find driving unattractive as opposed to finding high gasoline prices a hindrance.

The results from this research as well as other polling data suggests that individuals and communities are beginning to shift their behavior; it also indicates the possibility of increased awareness concerning gasoline/oil prices and consumption. The results of this research verified that it is the case for Humboldt County. Residents are indeed cutting back, driving less, carpooling, walking and using other modes of transportation when it is feasible for them. To encourage more use of alternate transportation programs, demanding more efficient transportation infrastructures will be

the best move. Efficient types of transportation that fall into this category do not necessarily have to focus on automobiles and/or buses that use less gasoline, but rather systems that are accessible, user-friendly and practical. In order to salvage and utilize efficient sustainable transportation infrastructures, individual and community behavior must be revamped simultaneously with the development of said infrastructures. The verification of how people have changed their behavior as seen in this research can be used as a justification to develop and maintain new transportation programs.

While Humboldt County residents experience some of the highest average gasoline prices in the country, it is pertinent to encourage individualistic behavior change as a starting point in what can be a transportation revolution. While prices themselves are not something that Humboldt County residents can immediately change, local action is possible by way of changing driving behavior and by demanding improvements to existing alternate transportation systems. While some citizens may claim they enjoy the sparse local public transportation infrastructures as part of the countryside charm, it may inevitably become a larger issue when gasoline hits a certain price per gallon. At some point in the future, gasoline may become even more expensive, and the amount needed for gasoline may reduce, or may be eliminated from one's budget completely, depending on the person. If this time arrives, there must be appropriate structures to support the transportation needs for Humboldt County residents as well as other rural geographical areas that suffer from similar disadvantages.

The results from this research can be interpreted in a variety of ways that can provide a good deal of information. It would be interesting to do another full comparative

analysis of the survey data by only contrasting results from the “rural” and the “urban” areas (via zip codes). With this separate analysis, it might also be beneficial to explore the possibilities and potential for developing alternate transportation programs in the more “rural” areas (e.g. Southern Humboldt). It would also be fascinating to repeat this survey if gasoline prices arrive at twice the price it was at during the time of this research (around seven or eight dollars a gallon). Furthermore, it might also be informative to do some in-depth interviews with local residents, organizations, alternate transportation representatives and County or City representatives to gain a sense of how transportation programs are proceeding, or not proceeding towards a more sustainable structure via community demand or via the County’s budget.

With that said, my recommendations are simple and straightforward. Humboldt County must work toward a more flexible transportation structures. It is my hope that the data provided by this research can not only give Humboldt County an idea of how current residents commute, but also provide some discernment into how residents will commute in the future, in order to prepare to accommodate such behavior. Additional recommendations are to focus on areas in Humboldt County that have a more severe lack of alternate transportation options (those areas outside of Eureka, Arcata and McKinleyville); build on programs that are currently liked by the community (e.g. bike paths in Eureka and Arcata), encourage transit and educational programs to be developed (such as with the Humboldt County Association of Government’s upcoming 2012 release of the Humboldt Regional Bicycle Plan) (e.g. Rails to Trails, ZipCarsTM, and carpool

lanes) to provide Humboldt County community members with more alternate options for commuting.

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Appendix I – Biased Email to Organizations

Sick of ridiculous gas prices? Do you grimace at the gas pump? Do you see yourself using more public transit and/or bike lanes? Take about 10 minutes and tell me what you think [HERE](#)!

My name is Anna Schwarzbach, a HSU graduate student, and I am doing my master's thesis research on gasoline prices here in Humboldt County! I am writing to all Humboldt County residents, organizations and community members today to gain an understanding of how people are adapting to gasoline prices. Any information you can share will greatly help my research as well as local organizations efforts to improve alternate transportation projects and reduce greenhouse gases. I hope you enjoy the questionnaire and take the opportunity to voice your thoughts and opinions regarding gasoline prices! Contact me at ars189@humboldt.edu if you have any questions or would like more information.

Thank you again for your cooperation!!!

Best,
Anna Schwarzbach

Appendix II – Unbiased Email to Organizations

Dear whom it may concern,

Hi! My name is Anna Schwarzbach, and I am a Humboldt State University graduate student doing my master's thesis research on gasoline prices here in Humboldt County! I am writing to all Humboldt County residents, organizations and community members today to gain an understanding of how people have and are adapting to gasoline prices as they continue to increase as well as exploring various types of alternate transportation options that might be viable for particular areas of the county. Any information and feedback you can share with me will greatly help my research! I hope you enjoy the questionnaire and take the opportunity to voice your thoughts and opinions regarding gasoline prices [HERE](#)! Please feel free to contact me at ars189@humboldt.edu if you have any questions or would like more information.

Sincerely,
Anna Schwarzbach

Appendix III - Survey

Sustainable Perceptions: Gasoline Prices in Humboldt County, CA

Dear Humboldt County community member,

You have been randomly chosen to participate in this survey, conducted by a graduate student at Humboldt State University. The purpose of this survey is to gather feedback on local perspectives and behaviors in response to increasing gasoline prices in Humboldt County. Your answers will be completely anonymous and the survey results will be released only in summary form so your answers will be fully confidential.

This survey will take an estimated 15-20 minutes to complete. Your participation is completely voluntary and you may decline to answer any questions or opt out of the survey at any time. Your input is of great value and will help this research be successful!

If you have any questions or concerns regarding this survey; or want to know the results of this survey, you may contact the principal researcher of this survey, Anna Schwarzbach, Environment & Community Master's Program at Humboldt State University at ars189@humboldt.edu or her faculty advisor, Dr. John Meyer at john.meyer@humboldt.edu.

BY CONTINUING AND COMPLETING ANY PARTS OF THIS SURVEY, YOU HAVE AGREED TO PARTICIPATE IN THIS SURVEY.

1. Do you feel you are currently paying too much for gasoline in Humboldt County?

☐ Yes ☐ No

2. Compared to other cities in California, how would you rate the pricing of gas in Humboldt County?

- ☐ Very expensive
☐ Expensive
☐ Just right
☐ Cheap
☐ Very cheap
☐ I don't know

3. If you think gasoline prices are high here in Humboldt County, why do you think this is so? (Please choose all that apply):

- ☐ It's an isolated area
☐ It's a rural area
☐ It's a costal county
☐ The main highways are too small/narrow
☐ There is a high demand
☐ Local gas stations want to fix prices
☐ I don't think gasoline prices are high
☐ Other (please specify): _____

4. How concerned would you say you are about the current price and the future price of gasoline in Humboldt County?

Would you say you are: (Please check one box each row)

	Extremely Concerned	Very concerned	Somewhat concerned	Not very concerned	Not concerned at all	Unsure
The current price of gasoline						
The future price of gasoline						

5. Has gasoline prices ever affected your behavior in the past?

- ☐ Yes ☐ No

6. If yes, how would you say gasoline prices has affected your behavior?
(Please feel free to write as little or as much as you would like).

--

7. Has the recent rise in gas prices affected your local commuting and/or travel habits in the last year?

- ☐ Extremely
☐ Very much
☐ Somewhat
☐ Not very much
☐ Not at all

8. If gasoline prices has affected your local commuting, how have you chosen to change your habits? (Please choose all that apply)

- ☐ I am driving less
☐ I am doing all my driving in one trip (e.g. shopping, work, school, errands)
☐ I purchased, or am planning to purchase, a more fuel-efficient car
☐ I am using more public transit
☐ I am carpooling
☐ I am biking more
☐ I am walking more
☐ I have not made any changes
☐ Gasoline prices has not affected my local commuting
☐ Other (please specify): _____

9. In an average week, what types of transportation do you use for local commuting to get to work, school, errands?

(Please choose one answer per row)

	1 I use this the most	2	3	4	5 I don't use this at all
Driving my own car					
Driving my own motorcycle					
Carpooling with Others					
Public Transit					
Walking					
Bicycling					

10. In the past month, how many days would you say you have used each of the following modes of transportation in Humboldt County? (Please choose one per row)

	0 Days	1-5 Days	5-10 Days	10-15 days	15-20 days	20 or more days
Car						
Motorcycle						
Public Transit						
Walking						
Biking						

11. How much per gallon of gasoline would you be willing to pay today before you _____?
(Please choose one per row)

	Less than \$4.50	\$4.51- \$5.00	\$5.01- \$5.50	\$5.51- \$6.00	\$6.01- 6.50	\$6.51- \$7.00	More than \$7.00
Cut back on automobile mileage?							
Cut back on your local commuting?							
Cut back on your recreation (e.g. traveling, sports, vacation) driving							
Purchase a vehicle with better mileage							
Purchase a bike to use occasionally							
Purchase a bus pass to use occasionally							
Walk more							

12. What mode of transportation would you choose today if gas was _____ per gallon? (Please choose one per row)

	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	More than \$8.00	N/A
Drive a car										
Carpool with others										
Drive a motorcycle										
Public Transit										
Walking										
Bicycling										

13. Using the matrix below, please tell me why you may choose to use alternate modes of transportation at the current gas price? (Please choose one per row)

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
Its too expensive to own a car					
Its getting too expensive to fuel a car					
Its more convenient for me					
It's a healthy choice for me					
Its environmentally friendly					
I don't need to travel far for work/school					

14. Currently, what might prevent you from using alternate modes of transportation (e.g. public transit, biking, walking), regardless of the price of gasoline? (Please choose all that apply)

- | | |
|--|---|
| <input type="checkbox"/> Its too expensive | <input type="checkbox"/> I don't feel safe when using the bus |
| <input type="checkbox"/> I don't have the time | <input type="checkbox"/> I don't feel safe when biking |
| <input type="checkbox"/> The weather is bad | <input type="checkbox"/> Its too inconvenient |
| <input type="checkbox"/> Its too cold outside | <input type="checkbox"/> I have children to transport |

- ☐ I need my car for work and/or hobbies
- ☐ I have work/school too far away

- ☐ The bus stop is too far away from my home
- ☐ Other (Please specify):
-

15. Overall, do you feel you have equal access to each of the following modes of transportation here in Humboldt County? (Please choose one per row)

	Yes	Sometimes	No	N/A
Car/Truck				
Motorcycle				
Public transportation				
Bike/Bike Lanes				
Walking/pedestrian walkways				

16. If neither money nor time were not a concern, which mode of transportation would you choose to commute locally to work and/or school? (Please choose one)

- ☐ Driving my own car
- ☐ Motorcycle
- ☐ Carpooling with other individuals
- ☐ Public transit (bus route)

- ☐ Walking
- ☐ Bicycling
- ☐ Other (please specify):
-

7. Regardless of your mode of transportation, on average, how far do you travel to get to:

	0-5 miles	5-10 miles	10-15 miles	15-20 miles	More than 20 miles	N/A
Work						
School						
Errands						

18. If there were more and/or better _____ in Humboldt County, how likely would you use that kind of service over personal transportation?

	Extremely likely	Very likely	Somewhat likely	Not very likely	Not likely at all
Bus systems and routes					
Bike lanes					
Pedestrian walkways					

19. Do you feel that _____ as a whole could provide better public transit programs if given the financial means?

	Yes	No	I don't know
The USA			
California			
Humboldt County			

(Survey continues on the next page)

20. How long have you lived in Humboldt County? (Please choose one)

- ☐ 0-2 years
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ More than 10 years

21. What is your estimated yearly income? (Please choose one)

- ☐ Less than \$11,000
- ☐ \$11,000-\$24,999
- ☐ \$25,000-\$39,999
- ☐ \$40,000-\$69,999
- ☐ \$70,000-\$99,999
- ☐ More than \$100,000
- ☐ Prefer not to answer

22. Politically, how would you identify yourself? (Please choose one)

- ☐ Very conservative
- ☐ Moderately conservative
- ☐ Neutral
- ☐ Moderately liberal
- ☐ Very liberal
- ☐ Prefer not to answer

23. What is the highest level of education you have completed?

- ☐ Less than High School
- ☐ High School Diploma
- ☐ Some college
- ☐ Bachelor's Degree
- ☐ Graduate Degree (MA, MS, MBA)
- ☐ Doctorate Degree

24. What is your racial/ethnic background? (You may choose more than one)

- ☐ White/Caucasian/European American
- ☐ African American
- ☐ Native American
- ☐ Hispanic or Latino American
- ☐ Asian
- ☐ Pacific Islander
- ☐ Prefer not to answer
- ☐ Other (please specify):

25. Do you currently have a valid driver's license in the state of California?

- ☐ Yes ☐ No

26. What type(s) of community group in Humboldt County do you most identify with? (Please choose all that apply).

- ☐ Resident
- ☐ Student/Academic
- ☐ Organization
- ☐ Agriculture
- ☐ Business
- ☐ Other (please specify): _____

27. What is your zip code?

28. Please provide any additional comments about gas prices in Humboldt County, your transportation choices, or any opinions you might have?

--

Thank you so much for all your help! Your input is much appreciated!

Appendix IV

List of organizations originally contacted for both electronic and paper survey:

Name of Org/Business	Paper or Electronic	Participation: Yes/No
North Coast Journal	Electronic	No
Humboldt Bay Bicycle Commuters Association	Electronic	Yes
Greenwheels	Electronic	Yes
Center for Environmental & Economic Development	Electronic	No
City of Eureka	Electronic	No Response
City of Arcata, CA	Electronic	Yes
City of Ferndale, CA	Electronic	Yes
City of Blue Lake, CA	Electronic	No
City of Trinidad	Electronic	No
City of Fortuna, CA	Electronic	No
McKinleyville Chamber of Commerce	Electronic	No
United Indian Health Services	Electronic	No
Humboldt Area Foundation	Electronic	No
Redwood Coast Energy Association	Electronic	No Response
Humboldt Community Access & Resource Center	Electronic	Yes
Southern Humboldt Working Together	Electronic	Yes
Humboldt Healthy Coalition	Electronic	No
Environment Protection Information Center	Electronic	No
Redwood Alliance	Electronic	Yes
Northcoast Environmental Center	Electronic	Yes
Humboldt County Fair Bureau	Electronic	No
Friends of the Dunes	Electronic	Yes
Greenway Partners	Electronic	No Response
Humboldt Transit Authority	Electronic	No
Peak Oil Action Network	Electronic	No – Out of business
Bayshore mall, Eureka, CA	Paper	No

CVS in Eureka, CA	Paper	Yes
Starbucks in Eureka, CA	Paper	Yes
North Coast Grower's Association, Arcata and Eureka, CA	Paper	Yes
Farm Stand: Mad River Brewery	Paper	Yes
Murphy's Groceries in Trinidad, CA	Paper	Yes
Beachcomber Café in Trinidad, CA	Paper	Yes
Orick, CA	Paper	Yes
Ray's Groceries in McKinleyville, CA	Paper	Yes
Murphy's Groceries in Redway, CA	Paper	Yes

Appendix V - Paper survey times and locations

October/November 2011

<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>
	Oct 17.	18	19	20 Mad River Brewery 4-7pm	21	22
23	24	25	26	27 Eureka Farmer's Market 11:30- 1pm	28	29 Arcata Plaza Farmer's Market 10am- 1:30pm
30	31 Eureka CVS 1-3:30pm	Nov. 1	2	3	4 McKinleyville Ray's Grocery 10-2pm	5
6	7 Trinidad Murphy's General Store and Beachcomber Café 12:30- 3:30pm	8	9 Eureka Starbucks on Myrtle Ave. 4-6pm	10	11 Orick General Market 10am- 1pm	12
13	14	15	16	17	18	19
20	21	22	23 Eureka Starbucks on Myrtle Ave. 4-6pm	24	25	26
27 Garberville Murphy's General Store 3- 5:50pm	28					

Appendix VI – Zip Codes given by survey respondents

Rural	# Per Rural Zip	Urban	# Per Urban Zip
95540 (Fortuna)	2	95521 (Arcata)	53
95558 (Petrolia)	11	95518 (Arcata)	1
95573 (Willow Creek)	2	95524 (Arcata- Bayside)	6
	6	95519 (McKinleyville)	13
95560 (Redway)			
95559 (Philipsville)	1	95501 (Eureka)	23
95542 (Garberville)	9	95503 (Eureka)	24
95536 (Ferndale)	1	95502 (Eureka)	
95525 (Blue Lake)	4		
95570 (Trinidad)	11		
95526 (Bridgeville)	1		
95556 (Orleans)	1		
95553 (Miranda)	1		
95589 (Whitehorn)	1		
95571 (Weott)	1		
95587 (Piercy)	1		
95542 (Honeydew)	1		
95551 (Loleta)	1		
95555 (Orick)	3		
95548 (Klamath)	1		
95511 (Alderpoint)	1		
TOTAL	60		120

APPENDIX VII

Price per gallon of regular unleaded self-serve
gasoline
as reported by AAA (www.csaa.org)

Erick Eschker
HSU Economics

Month	Eureka	Northern California(SF)	Difference Eur/N.CA	California	Difference Eur/CA
98 Jun	1.30	1.28	0.02		
July	1.29	1.27	0.02		
Aug	1.27	1.23	0.04		
Sep	1.27	1.22	0.05		
Oct	1.27	1.20	0.07		
Nov	1.25	1.17	0.08		
Dec	1.23	1.16	0.07		
99 Jan	1.21	1.15	0.06		
Feb	1.19	1.14	0.05		
Mar	1.27	1.20	0.07		
Apr	1.78	1.68	0.10		
May	1.67	1.59	0.08		
99 Jun	1.58	1.46	0.12		
Jul	1.75	1.59	0.16		
Aug	1.79	1.65	0.14		
Sep	1.68	1.56	0.12		
Oct	1.64	1.49	0.15		
Nov	1.53	1.43	0.10		
Dec	1.53	1.44	0.09		
00 Jan	1.53	1.43	0.10		
Feb	1.58	1.47	0.11		
Mar	2.00	1.83	0.17		
Apr	1.85	1.81	0.04		
May	1.87	1.73	0.14		
00 Jun	1.87	1.71	0.16		
Jul	2.02	1.88	0.14		
Aug	2.04	1.86	0.18	1.71	0.33
Sep	2.05	1.98	0.07	1.86	0.19
Oct	2.06	1.95	0.11	1.85	0.21
Nov	2.10	1.92	0.18	1.82	0.28
Dec	1.93	1.90	0.03	1.74	0.19
01 Jan	1.79	1.78	0.01	1.65	0.14
Feb	1.79	1.75	0.04	1.65	0.14
Mar	1.98	1.77	0.21	1.72	0.26

Apr	2.13	1.90	0.23	1.84	0.29
May	2.12	1.98	0.14	2.00	0.12
01 Jun	2.12	1.99	0.13	2.00	0.12
Jul	1.96	1.83	0.13	1.83	0.13
Aug	1.90	1.63	0.27	1.63	0.27
Sep	2.00	1.80	0.20	1.73	0.27
Oct	1.89	1.70	0.19	1.60	0.29
Nov	1.75	1.57	0.18	1.44	0.31
Dec	1.60	1.38	0.22	1.24	0.36
02 Jan	1.50	1.27	0.23	1.22	0.28
Feb	1.49	1.28	0.21	1.29	0.20
Mar	1.68	1.45	0.23	1.45	0.23
Apr	1.86	1.67	0.19	1.66	0.20
May	1.84	1.63	0.21	1.62	0.22
02 Jun	1.88	1.63	0.25	1.64	0.24
Jul	1.89	1.68	0.21	1.64	0.25
Aug	1.85	1.65	0.20	1.63	0.22
Sep	1.86	1.62	0.24	1.62	0.24
02Oct	1.86	1.59	0.27	1.52	0.34
02Nov	1.86	1.66	0.20	1.63	0.23
02Dec	1.86	1.62	0.24	1.59	0.27
03 Jan	1.74	1.66	0.08	1.64	0.10
Feb	1.88	1.80	0.08	1.79	0.09
Mar	2.10	2.10	0.00	2.10	0.00
Apr	2.20	2.10	0.10	2.12	0.08
May	1.84	1.91	-0.07	1.91	-0.07
June	1.88	1.85	0.03	1.82	0.06
July	1.97	1.89	0.08	1.82	0.15
Aug	1.92	1.84	0.08	1.77	0.15
Sept	2.10	2.10	0.00	2.09	0.01
Oct	1.89	1.88	0.01	1.86	0.03
Nov	1.85	1.75	0.10	1.72	0.13
Dec	1.82	1.67	0.15	1.67	0.15
Jan	1.82	1.70	0.12	1.70	0.12
04 Feb	1.94	1.89	0.05	1.90	0.04
Mar	2.18	2.14	0.04	2.16	0.02
Apr	2.26	2.19	0.07	2.21	0.05
May	2.36	2.29	0.07	2.31	0.05
Jun	2.40	2.32	0.08	2.32	0.08
Jul	2.39	2.22	0.17	2.23	0.16
Aug	2.35	2.09	0.26	2.09	0.26
Sep	2.31	2.09	0.22	2.09	0.22
Oct	2.49	2.34	0.15	2.34	0.15
Nov	2.42	2.36	0.06	2.36	0.06

Dec	2.17	2.15	0.02	2.16	0.01
Jan	2.06	1.90	0.16	1.94	0.12
Feb '05	2.27	2.05	0.22	2.09	0.18
Mar	2.42	2.28	0.14	2.28	0.14
Apr '05	2.82	2.62	0.20	2.63	0.19
May '05	2.65	2.55	0.10	2.53	0.12
Jun '05	2.49	2.35	0.14	2.36	0.13
Jul '05	2.70	2.58	0.12	2.59	0.11
Aug '05	2.91	2.75	0.16	2.77	0.14
Sep '05	3.19	3.05	0.14	3.03	0.16
Oct '05	2.86	2.93	-0.07	2.92	-0.06
Nov '05	2.50	2.56	-0.06	2.58	-0.08
Dec '05	2.42	2.25	0.17	2.29	0.13
Jan '06	2.57	2.31	0.26	2.36	0.21
Feb '06	2.80	2.56	0.24	2.56	0.24
Mar '06	2.78	2.56	0.22	2.57	0.21
Apr '06	2.99	2.84	0.15	2.86	0.13
May '06	3.52	3.32	0.20	3.38	0.14
Jun '06	3.44	3.23	0.21	3.26	0.18
Jul '06	3.38	3.20	0.18	3.26	0.12
Aug '06	3.39	3.18	0.21	3.22	0.17
Sep '06	3.15	2.93	0.22	2.96	0.19
Oct '06	2.92	2.61	0.31	2.60	0.32
Nov '06	2.78	2.47	0.31	2.32	0.46
Dec '06	2.64	2.50	0.14	2.51	0.13
Jan '07	2.71	2.62	0.09	2.61	0.10
Feb '07	2.81	2.70	0.11	2.66	0.15
Mar '07	3.25	2.70	0.55	3.11	0.14
Apr '07	3.47	3.34	0.13	3.34	0.13
May '07	3.60	3.47	0.13	3.48	0.12
Jun '07	3.49	3.32	0.17	3.30	0.19
Jul '07	3.42	3.18	0.24	3.15	0.27
Aug '07	3.18	2.96	0.20	2.93	0.21
Sep '07	3.08	2.88	0.15	2.87	0.17
Oct '07	3.24	3.09	0.08	3.07	0.11
Nov '07	3.50	3.42	0.16	3.39	0.19
Dec '07	3.52	3.36	0.16	3.33	0.17
Jan '08	3.52	3.36	0.27	3.35	0.30
Feb '08	3.42	3.15	0.11	3.12	0.47
Mar '08	3.70	3.59	0.07	3.23	0.08
Apr '08	3.80	3.73	0.07	3.72	0.08
May '08	4.79	4.58	0.21	4.59	0.22
Jun '08	4.52	4.14	0.38	4.32	0.20
Jul '08					

Aug '08		3.86	0.02	3.68	
Sep '08	3.02	3.28	0.58	3.03	0.01
Oct '08	2.49	2.41	0.08	2.28	0.21
Nov '08	2.21	2.07	0.14	2.03	0.18
Dec '08	2.29	2.15	0.14	2.11	0.18
Jan '09	2.58	2.30	0.28	2.27	0.31
Feb '09	2.52	2.24	0.28	2.20	0.32
Mar '09	2.66	2.42	0.24	2.20	0.46
Apr '09	2.96	2.86	0.1	2.20	0.76
May '09	3.18	3.08	0.1	2.93	0.98
Jun '09	3.13	3.00	0.13	3.04	0.93
Jul '09	3.33	3.14	0.19	3.04	0.29
Aug '09	3.39	3.20	0.19	3.01	0.38
Sep '09	3.19	3.13	0.06	2.99	0.20
Oct '09	3.10	3.08	0.02	2.96	0.14
Nov '09	3.07	3.02	0.05	2.98	0.09
Dec '09	3.16	3.08	0.08	3.03	0.13
Jan '10	3.16	3.08	0.08	2.98	0.18
Feb '10	3.23	3.17	0.05	3.11	0.12
Mar '10	3.25	3.18	0.07	3.11	0.14
Apr '10	3.25	3.15	0.1	3.12	0.13
May '10	3.28	3.25	0.03	3.12	0.16
June '10	3.29	3.25	0.04	3.12	0.17
July '10	3.29	3.25	0.04	3.15	0.14
Aug '10	3.28	3.12	0.16	2.98	0.30
Sep '10	3.34	3.23	0.11	3.12	0.22
Oct '10	3.44	3.33	0.11	3.23	0.21
Nov '10	3.48	3.39	0.09	3.31	0.17
Dec '10	3.58	3.50	0.08	3.33	0.25
Jan '11	3.87	3.82	0.05	3.73	0.14
Feb '11	4.20	4.12	0.08	4.02	0.18
Mar '11	4.39	4.28	0.11	4.21	0.18
Apr '11	4.26	4.14	0.12	4.03	0.23
May '11	4.11	3.90	0.21	3.81	0.30
June '11	4.07	3.90	0.17	3.81	0.26
July '11	3.98	3.90	0.08	3.82	0.16
Aug '11	3.98	3.9	0.08	3.82	0.16
Sep '11	4.08	3.94	0.14	3.87	0.21
Oct '11	3.98	3.91	0.07	3.84	0.14
Nov '11	3.94	3.79	0.15	3.71	0.23
Dec '11	3.81	3.66	0.15	3.6	0.21