Public Perception and Utah’s Clinical Health Information Exchange

A Report
Based on Consumer Focus Groups Conducted By HealthInsight
June 2011-February 2012
Utah’s Clinical Health Information Exchange, or cHIE, began operating in late 2011. One of the first state-run Health Information Exchanges (HIEs), cHIE allows healthcare providers to share their electronic health records (EHRs) to better coordinate patient care. CHIE functions as an opt-in system; consumers must fill out a form and choose a consent status before any information about them can be shared through cHIE. When filling out the consent form, consumers can choose to opt in, opt out, or choose the Limited Option, which gives consent for emergencies or a single office visit only. Utah Health Information Network (UHIN), cHIE’s administrator, and its partners face a significant challenge to enroll providers, coordinate complex technology, and gather consent from Utah’s nearly 3 million people.

In late spring of 2011, the Utah Department of Health contracted HealthInsight to conduct a series of focus groups to determine consumer attitudes toward the cHIE as part of a statewide assessment of health information technology initiatives. This project was completed by HealthInsight’s Consumer Engagement team: Clare Tobin Lence, Korey Capozza, Ryan Brown, and Nelly Bello. The twelve groups, one in each of the local health districts, began prior to cHIE’s launch and coincided with the early months of public relations efforts. Though not related to cHIE, it should be noted that a serious breach of state-held Medicaid beneficiary data occurred shortly after these groups were completed¹ and as such there may be recent changes in consumer attitudes toward health information technology that are not captured in this report.

Methods

One focus group was conducted in each local health district, for a total of twelve. Groups had an average of nine participants. Methods of recruitment included newspaper ads, listservs, communicating with local health officials, and hanging flyers at libraries, recreation centers, senior centers, colleges, and

¹ Stewart, Kirsten. “Scope of Medicaid Data Breach Explodes.” The Salt Lake Tribune. 9 April 2012.
gym, laundromats, and other local gathering places. Groups were held at lunchtime on Fridays, usually at the local library, and $25 gift cards were offered as incentives. Discussion lasted about one hour.

The following questions were asked:

1. If you could do one thing to improve your experience at the doctor's office, what would it be?
2. Are you familiar with electronic health records and if so, where have you heard about them? What might one be used for? Would you be in favor or against your doctor using one?
3. How do you feel about your doctor storing your information in an electronic health record? What are the plusses and minuses, as you see them?
4. Have you or your family or friends ever had to get your records, such as test results or x-rays, transferred from one doctor to another doctor or hospital? What aspects of the experience were positive or negative?
5. Imagine there was a way for all of the doctors that you see to link their electronic health records, so one doctor could access information about, for example, treatments and tests that you had while visiting another doctor; how would you feel about that? What would the advantages be? What would your concerns be?
6. The state of Utah has created a system that links medical information in this way, called the Clinical Health Information Exchange, or cHIE. What, if anything, have you heard about the cHIE?
7. The way that the cHIE is set up requires everyone to choose to opt in to the system; otherwise, your information cannot be accessed through cHIE. Based on what you know about cHIE, what are your thoughts on opting in or not? If you would, what are the benefits as you see them? If you wouldn’t, what are the concerns you have?
8. The cHIE consent process also offers a third option, called the Limited Option, which allows you to opt in for a single office visit only, or to allow access to your records only in case of an emergency. Is this an option that you would consider? Is it a useful option? Why or why not?
9. Based on what you know about the cHIE, by a show of hands, how many of you would opt in to the cHIE? How many would opt out? Why?
10. What specific concerns need to be addressed to make you comfortable with joining CHIE? What are some ways that people could be encouraged to join the CHIE?
11. Of all the things we discussed today, what to you is the most important?

Question 1 was an icebreaker, to start participants thinking about their healthcare experiences. Because the public has limited or no knowledge of cHIE, we attempted to build up to the concept by beginning with the discussion of EHRs. Toward the end of the discussion we asked for a show of hands of who would opt in to cHIE and who would not. A question about the Limited Option was added during the sixth group, the Salt Lake group, and continued for the remaining groups.

We aimed to recruit a broad cross-section of the population for participants; over age eighteen was the only restriction. Demographic characteristics of age, gender, ethnicity, level of education, employment status, insurance status, and number of visits to a doctor in the past year (as a proxy for
chronic disease status) were recorded. On balance our participants mirrored the Utah population, particularly by ethnicity:

**Ethnicity of Participants by Percentage**

*Compared to the State of Utah*

Recruiting men was among the most challenging aspects: they comprised only 35% of the study population. However, evidence shows that women make 80% of the healthcare decisions for their families, suggesting that engaging them would be a more effective strategy for gathering consent. The full chart of participant demographics is available in Appendix 1. Demographic characteristics were also analyzed for association with participants’ response as to whether they would opt in or out of cHIE, based on their knowledge at that time. This analysis was completed using Spearman correlations or chi-squared tests, where appropriate, and logistic regression in Stata 12.

The content of each focus group was analyzed using the same process. Groups were audio-recorded and professionally transcribed. Unidentified transcriptions were pasted into Excel for organizational purposes and comments were assigned to the speaker using the audio-recording and assistant moderator’s notes. Participants were de-identified at this point. The first number of the

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participant code identifies the group, numbered in order of completion, and the second number denotes the individual. Comments were broadly sorted into benefits and concerns, and then into "themes" such as privacy, security, coordination of care, and convenience. The subsets of these themes formed the individual "comment categories" to which each relevant comment was coded. These categories include, for example: saves paperwork, less repetition of tests and procedures, potential loss of employment, and wanting to view own record. Each comment category was assigned a numbered code between 100 and 190. Only comments related specifically to cHIE were coded. The full chart of comment categories is available in Appendix 2.

**Sample:**

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Comment Code</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.8</td>
<td>105</td>
<td>Make sure you have no allergies to medications.</td>
</tr>
<tr>
<td>4.2</td>
<td>134</td>
<td>It could help reduce the – just when you have to go to any doctor you have to arrive early to fill out all the paperwork. That would be reduced, I believe, if it was on a record that they already had sent over to them.</td>
</tr>
<tr>
<td>4.1</td>
<td>171</td>
<td>I like the way it is now that it’s our decision whether to opt in or not, that it’s not something that is just going to automatically happen, but we have the choice to make that decision for ourselves.</td>
</tr>
</tbody>
</table>

Comments assigned to a particular category in a single focus group were added up to represent the “frequency” of that idea in that group. Though this number gives a rough estimate of salience of an idea in a particular group, there are some methodological concerns. There is the inherent vagueness of oral communication, especially with unfamiliar topics, subjectivity of classification, and various circumstances that do not lend themselves to obvious coding protocol. If a participant was discussing a single idea and was interrupted by another participant, the first person’s two statements were combined into one for the purpose of counting frequency; if an individual repeated an idea ten minutes later it was counted separately. If participants said “yeah” or nodded their heads in agreement to someone else’s comment, those affirmations were not counted as separate comments because of the difficulty in discerning intention and the unreliability of documenting head nods absent a video recorder. When

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discussing EHRs, participants sometimes brought up positives or negatives that related only to a network like cHIE, not an individual EHR, in which case those comments were counted in this analysis. If comments, such as "saves paperwork," were brought up during the discussion of EHRs, prior to the discussion of cHIE, those comments were not counted in this analysis. When a comment fit two categories and could not be separated, it was counted once for each category. Throughout the process, new comment categories were added or old ones collapsed together, both of which sometimes required review of previously coded groups. Coding of comments was accomplished by the same researcher to maintain consistency in evaluation of comments and definition of categories, though this method has inherent reliability limitations. Analysis could be performed again by another researcher to increase reliability.

A more robust measure of overall consumer perceptions of cHIE is the “extensiveness” of a given comment category across all groups, rather than simply the sum of the frequencies. For this measure, each category was assigned a number from 1 to 12 based on how many groups discussed it. This measure is the primary one used for evaluation in this report to identify the most important perceived benefits and concerns among consumers statewide.

**Sample:**

<table>
<thead>
<tr>
<th>Codes</th>
<th>Comment Category</th>
<th>Weber-Morgan</th>
<th>Davis</th>
<th>Summit</th>
<th>…</th>
<th>Bear River</th>
<th>Tri-County</th>
<th>Total Number Made</th>
<th>Made in How Many Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>134</td>
<td>Saves Paperwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>111</td>
<td>Unconscious/Other Emergency</td>
<td>2</td>
<td></td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>116</td>
<td>Errors Perpetuated</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>128</td>
<td>Insurance Co.: Deny Coverage or Higher Costs</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>17</td>
<td>9</td>
</tr>
</tbody>
</table>
Results – Opt In V. Opt Out

Despite concerns expressed during the groups and the desire for further information about the cHIE, the vast majority of participants said that they would opt in, based on their current level of knowledge:

Participants Said They Would:

There was, however, variation across groups:

- Weber-Morgan
- Davis
- Summit
- Southwest
- Tooele
- Salt Lake
- Wasatch
- Southeast
- Central
- Bear River
- TriCounty
- Utah County
Demographics of participants were compared to opt-in/opt-out response using Spearman correlations or chi-squared tests, where appropriate, and logistic regression in Stata 12. Interestingly, the demographic that was the most significantly associated was that of employment status: someone who was employed was 6.72 times as likely to opt in to cHIE as someone who was unemployed, with a p-value of 0.001 (using Fisher’s exact test). It was considered that this result could be confounded by age, because many of the unemployed participants were of retirement age; however, logistic regression demonstrated that adding the variable age to the model did not significantly improve the predictive power (very minimal increase in Pseudo R²). Logistic regression was also used to consider confounding of this result by insurance status. The addition of insurance status to the model of employment status and opt-in/opt-out response showed a small influence on this association (slight increase in Pseudo R²). Because the group participants included sixteen individuals over age sixty-five, who were primarily unemployed and insured, analysis was re-run exclusively on participants under age sixty-five: the odds ratio decreased slightly to 6.0 from 6.72, and again the addition of insurance status to the model of employment status and opt-in/opt-out response showed a similar small improvement, suggesting some minor influence of insurance status on the association. See Appendix 4 for analysis details and Stata output.

Residence on the Wasatch Front was also significantly associated with opt-in/opt-out response. Participants in Wasatch Front groups were 4.89 times as likely to opt in as compared to participants who resided elsewhere, with a p-value of 0.02. For this analysis, groups considered Wasatch Front were Davis, Weber-Morgan, Salt Lake, Utah County, and Summit. The Summit group was included because all participants were from Park City; moving Summit to the non-Wasatch Front group decreased the odds ratio to 4.01 and retained significance.

Gender, age, number of visits to a doctor in the past year, level of education, insurance status, and ethnicity were not found to be independently associated with opt-in/opt-out response.
Results – Perceived Benefits and Concerns

The salience of each theme is represented here by the relative size of the circles:

The top “benefits” comment categories across all groups were:

1. Better Coordination Across Doctors or Episodes of Care – “I love it. Now, I am not necessarily for it if it is going from one state to another. But I have a rare disease and so I have like six different specialists down at the U of U. When I have an appointment with one, they can bring up my recent blood work, my recent tests and everybody's on the same page, or they e-mail each other.”

1. Better Care When Unconscious or in Another Emergency Situation – “Or even if you are unconscious and you cannot tell them even if you know everything, you can’t give it to them, so for traveling and emergency situations.”

2. Easier, More Convenient Transfer of Records – “More shareable, a lot more convenient, and not so much time has to be spent on the patient to actually fill it out, and a lot easier for the doctor too. It's just all their in the database.”

3. Want a National or International Network – “I would like to see better communication between systems in different states. I moved here from Colorado and my daughter had a complicated condition that is really hard to align her ten doctors in Colorado. Then not only replace those ten doctors here but get all the records transferred and all of her information set up instead of having all her tests from her first five years of life completely over again. It has been five years and I still do not have everything back from Colorado so I still have doctors that are completely in the dark and it is very frustrating.”

3. Valuable for People with Allergies – “Every time I go, I can't remember what I'm allergic to, which antibiotic I am allergic to so I have to call my mom, and so that if that was there, it would probably be easier.”
3. Appreciate Opt-In System, as Opposed to an Opt-Out One – “I would be in favor of the opt-in all the way. Opt-out to me like I said that is taking away my choice. Many people are busy, they do not pay attention, and it really depends on who they were informed about opting in/opting out. If it is an opt-in system then you have to make the choice to be on it. If it is an opt-out system and you are busy and you forget, you do not have a choice.”

The top “concerns” categories across all groups were:

1. Want to See Own Record – “That if the patient is not able to get involved in your records to make sure they are correct and make sure that they are up to speed, to make sure they are being coordinated properly then you are having to entrust somebody else dumping it into the black hole, hoping that it is being entered in accurately. And so if I cannot access it, that is a problem for me. Not necessarily to change, but to view and bring it up to somebody.”

1. Systemic, Societal Loss of Privacy and Control – “You know what the problem is in this era and in this, in this life? That what you hope to, and you hope, assume will happen and what, what you think is very normal to do actually steals away your privacy, it steals away things that -- when I was young -- were just taken for granted that you had as a person. And all these little things, they just eat away little by little. I mean, this doesn’t seem like a really big deal today maybe and it seems so logical that you’d do this. I mean, you know...say, well, God, you know, well, it’s so easy for the records to be transferred and I have different doctors and I do this. Sounds so logical, but in fact, in fact, it changes our whole society.”

2. Want to Choose What Information to Share and With Whom – “One thing that would change my feelings about it would be if they were to get my permission for each transmittal of information, so I would know that it was happening and to whom it was going. It’s the carte blanche – hey, here’s my signature, move my medical records around – that makes me uncomfortable.”

2. Insurance Companies Will Gain Access and Deny Coverage or Raise Costs – “My concern, I do not care if the world knows about my issues, if the medical world does know all my issues, but there are a lot of other stories of insurances getting a hold of records and therefore dropping you. I mean that, I hear those stories a lot from a variety of people. Oh, the insurance got a hold of my records and found out that I had one high blood sugar therefore they want to drop me because...and I have not had an experience with that but I certainly had experiences hearing those kinds of scary stories. And people worry about being dropped from insurance companies.”

3. Spread of Sensitive Information, Usually in Regards to Personal Embarrassment – “There are laws where doctors are not supposed to violate people’s personal information like that. But being a small town and, you know, the way that they are. You know, they’re like, ‘Oh, my God, she’s in here for pain medication again.’” Or, you know. That’s the only reason I wouldn’t give them anything.”

3. External Hackers (People Outside the System) Would Gain Access – “I worked for several years in military intelligence and I was amazed at how easy it is to hack the most secure defense systems ever. And there is nothing that is out there that cannot be hacked. And so that is one of those, it is one of those is the risk worth it kind of things. And that is what goes through my mind when I think of this is I would love to be able to be on vacation, get hit by a -- I do not want to get hit by a truck on vacation, but if it happened, hauled into the emergency room unconscious. They pull up my name and they know what medications I am on, what problems I have and how to work
around that and it improves my chances of survival. But then again, like we have been talking about, peoples' information is going to get stolen, and it is going to get hacked. It is an inevitability and so my stuff might not get hacked but you throw that gamble out and so it is..."

3. Want Notification of Who Has Viewed or Made Changes to Record – “I would just like to make a comment about which doctor gets which information. I mean whether it could be set up something like we do at the credit bureaus, that we can get a free report you know, every year from each bureau. In this case, it would be our initiative to ask but then we can see who had made an inquiry like we do with our credit report. We can see who is asking for information and who has tried to get into our accounts.”

*The full list of comment categories is available in Appendix 2 and the full list of comments is available in Appendix 3.*

**Discussion**

Across all groups, we found that participants had limited knowledge of the concept of health information technology. Only a few participants had heard specifically of cHIE. However, the vast majority of participants were actively engaged in the discussion, passionate about the topic of healthcare, and thought creatively about the topics presented. Interestingly, the coding of nearly every group required the addition of new comment categories, suggesting that even with twelve groups participants continued to share novel ideas, including many ideas that had not previously occurred to the researchers. Nearly everyone saw both significant benefits and important concerns. From one participant who said he would opt out: "I’m against centralization. Even though I know it’s beneficial, definitely this could be a lifesaver.” When it came to the show of hands, most participants decided that the benefits outweighed the risks; often even participants that had expressed serious reservations said that they would opt in.

The aspect of choice, of an opt-in rather than an opt-out system, was embraced with only a handful of exceptions. Even strong advocates of cHIE considered opt-in to be more respectful of their individual rights and said it made them more enthusiastic about joining. The Limited Option, for emergency or single visits only, was well-received: this option was appealing to both participants who had raised their hands for opt-in and those who had chosen opt-out, as well as to those who had abstained from choosing.
Many participants expressed the desire for more information. They suggested putting information on a website, creating a hotline for people to call with questions, and having providers encourage participation. They also underscored the need to reach people, with suggestions including using television advertisements, connections with local Parent Teacher Associations, senior centers, parents’ groups, women’s groups, through Facebook, and offering consent forms in conjunction with activities like voter registration, blood donation, or driver’s license renewal. One participant suggested that allowing people access to their own records could be a strong incentive for people to opt in. Many participants thought that online sign-up capability would increase enrollment.

The desire for ownership of and access to the cHIE Virtual Health Record (VHR) was a clear presence in the groups. Many advocated for control at a level that would be impossible from a practical standpoint, but nearly all participants felt strongly that they should be able to view their record and petition any errors, usually through their doctor’s office. Another interesting concern that had a high frequency of comments—but lesser extensiveness across groups—related to the ability to get a fresh second opinion. Some participants expressed concern about how an accessible medical history could bias future care in other ways, such as having struggled with substance abuse early in life and then having difficulty obtaining needed medications later on. Many participants were worried about inappropriate access by employers, insurance companies, and advertisers.

Though not statistically significant, observationally there appeared to be a difference in perception of cHIE by age. Many younger participants expressed little to no concern over privacy issues. Many recognized that they willingly share large amounts of personal information via the internet already. Although they considered potential security issues, such concerns generally did not outweigh their desire to join and the perception that cHIE would allow for more holistic and better treatment. Older people appeared more likely to comment on the broad loss of privacy in our society and other more ideological concerns. However, we hypothesize that ultimately older people may have experience with managing co-morbid conditions, taking multiple medications, and having difficulty remembering their complete medical history, and thus see immediate benefit in cHIE for themselves and their caregivers. They do not
have to fear loss of employment or a lifetime of stigma based on, for example, a diagnosis of an autism spectrum disorder. As Medicare beneficiaries, they do not have to fear loss of insurance coverage or increased premiums.

Also speaking observationally, there appeared to be some difference in the types of comments based on urban versus rural areas. The Summit group, completed in Park City, was the most strikingly progressive and focused on the potential for cHIE in public health reporting and research; the largely university-student Salt Lake group expressed limited concerns about privacy. The Wasatch and Southwest groups seemed the most concerned about the role of government in the lives of individuals. Some participants expressed extreme concerns about “Big Brother,” “population control,” and “implanting...chips.” There was wide discussion of too much government spending and inefficiency, but it should be noted that the private, non-profit administration of cHIE put a number of participants at greater ease. Interestingly, the groups held in smaller towns such as the Central and Southeast groups seemed less concerned with security than urban areas, but were quite concerned with potential loss of privacy due to office staff gossip, despite recognizing such actions as HIPAA violations. Data analysis showed that residence on the Wasatch Front was associated with choosing the opt-in response. This may reflect an association between urban areas and more progressive ideology, which fits our observations; however, practical concerns should also be considered. Residents of rural areas have more limited options when making healthcare decisions and they may see little value in the sharing of information when the network of providers that they visit is quite small, for example.

The significant association between employment status and opt-in or opt-out selection was surprising. As discussed earlier, age was expected to be a significant factor in opt-in/opt-out response but was found not to be the underlying influence in this association. Among the unemployed participants were retirees, students, and stay-at-home mothers, as well as other unemployed persons, all of whom were less likely to opt in than employed persons. In general, those who are unemployed are more likely to be uninsured, but insurance status had only a minor influence on this association. This may be because, although unemployed, retirees, students, and stay-at-home mothers may have access to
insurance through Medicare, parents’ health plans, or spouses’ health plans. One explanation for the correlation between employment status and opt-in/opt-out response may be that those who are unemployed, for any reason but especially those of working age, are in a sense “outside the system.” Perhaps this leads them to be less trusting of the government, technology, or new “advancements.”

Conclusion

The evidence from these consumer focus groups suggests that there is broad support for the cHIE, even in the early stages of implementation and publication. Despite limited prior knowledge, participants offered sophisticated and varied ideas about the potential benefits and concerns. Their ability to identify many important issues underscores the need for easily accessible, clear but also detailed information to be available to consumers to help them make an educated choice. Direction toward the website and a simple way to contact a live person with questions are important steps toward that end. Especially in light of the recent Medicaid data breach, consumers will likely want to see a significant level of detail about cHIE, and about security in particular, before joining. Because cHIE is an opt-in system, there is an inherent barrier-to-action problem that must be overcome. Advocacy by providers, creative means of advertising—while carefully maintaining credibility—and making the consent process as convenient as possible will help shift the interested population into the population of those who have consented.

Participants, and consumers more generally, have little current knowledge of health information technology. Yet they have a broad understanding of the ways in which other kinds of technology have improved their lives and can easily see the potential in health information technology, with only some basic background explanation. There is potential for improved care and reduced costs in the healthcare system through health information technology, and despite the operational and logistic challenges, the consumer is beginning to come on board.
Appendices

Please see separate attached Excel file for Appendix 1 – Participant Demographics, Appendix 2 – Comment Coding, Appendix 3 – Comment List

Appendix 4

Selected Data Analyses Notes and Stata 12 Outputs

Age was expected to correlate with opt-in/opt-out response, but was found not to be associated.

by optin: ci age, level (95)

> optin = 0 (Opt Out)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>20</td>
<td>42.175</td>
<td>3.404578</td>
<td>35.04914  49.30086</td>
</tr>
</tbody>
</table>

> optin = 1 (Opt In)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>82</td>
<td>40.92073</td>
<td>1.914903</td>
<td>37.11068  44.73079</td>
</tr>
</tbody>
</table>

spearman optin age

Number of obs = 102
Spearman's rho = -0.0709

Test of Ho: optin and age are independent
Prob > |t| = 0.4788

spearman optin education

Number of obs = 101
Spearman's rho = 0.1072
Test of Ho: **optin and education are independent**
Prob > |t| = 0.2858

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
<th>Proportion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Exposed</td>
<td>Unexposed</td>
<td></td>
<td>Total Exposed</td>
</tr>
<tr>
<td>Opt In Cases</td>
<td>51</td>
<td>31</td>
<td>82</td>
<td>0.6220</td>
</tr>
<tr>
<td>Opt Out Controls</td>
<td>13</td>
<td>7</td>
<td>20</td>
<td>0.6500</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>38</td>
<td>102</td>
<td>0.6275</td>
</tr>
</tbody>
</table>

Odds ratio | .8858561 | .2688691 | 2.713075 (exact)
Prev. frac. ex. | .1141439 | -1.713075 | .7311309 (exact)
Prev. frac. pop | .0741935 |

No association between opting in and gender.

<table>
<thead>
<tr>
<th></th>
<th>Insured</th>
<th>Uninsured</th>
<th>Total</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exposed</td>
<td>Unexposed</td>
<td></td>
<td>Total Exposed</td>
</tr>
<tr>
<td>Opt In Cases</td>
<td>68</td>
<td>13</td>
<td>81</td>
<td>0.8395</td>
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<tr>
<td>Opt Out Controls</td>
<td>13</td>
<td>6</td>
<td>19</td>
<td>0.6842</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>19</td>
<td>100</td>
<td>0.8100</td>
</tr>
</tbody>
</table>

Odds ratio | 2.414201 | .6278604 | 8.399647 (exact)
Attr. frac. ex. | .5857843 | -.5927108 | .8809474 (exact)
Attr. frac. pop | .4917695 |

No association between opting in and insurance status.

spearman optin ethnicity

Number of obs = 102
Spearman's rho = 0.1219

Test of Ho: **optin and ethnicity are independent**
Prob > |t| = 0.2221

<table>
<thead>
<tr>
<th></th>
<th>Employed</th>
<th>Unemployed</th>
<th>Total</th>
<th>Proportion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Exposed</td>
<td>Unexposed</td>
<td></td>
<td>Total Exposed</td>
</tr>
<tr>
<td>Opt In Cases</td>
<td>52</td>
<td>29</td>
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<td>0.6420</td>
</tr>
<tr>
<td>Opt Out Controls</td>
<td>4</td>
<td>15</td>
<td>19</td>
<td>0.2105</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>44</td>
<td>100</td>
<td>0.5600</td>
</tr>
</tbody>
</table>
Significant association between opting in and being employed; possibly confounded by age or insurance status as many unemployed participants were of retirement age.

The addition of the variable age to the logistic regression model increases Pseudo R2 but only slightly, suggesting that age is not a confounder in the association between opt-in/opt-out response and employment status.
Iteration 2: log likelihood = -42.063205
Iteration 3: log likelihood = -42.060867
Iteration 4: log likelihood = -42.060867

Logistic regression                               Number of obs   =       100
LR chi2(2)      =      13.12
Prob > chi2     =     0.0014
Log likelihood = -42.060867                       Pseudo R2       = 0.1349

--------------------------------------------
----------------------------------

| optin | Coef. | Std. Err. | z    | P>|z| | [95% Conf. Interval] |
|-------|-------|-----------|------|------|----------------------|
| employed | 1.847916 | .6125766 | 3.02 | 0.003 | .6472878 - 3.048544   |
| insured | .678569  | .6194174 | 1.10 | 0.273 | -.5354669 - 1.892605 |
| _cons  | .1622237 | .5486111 | 0.30 | 0.767 | -.9130343 1.237482   |

The addition of the variable insured to the logistic regression model increases Pseudo R2 slightly, suggesting that insurance status has a small influence on the association between opt-in/opt-out response and employment status.

To determine if retirees (generally unemployed but insured) impacted these results, all 16 entries over age 65 were dropped. Analysis on only the younger participants demonstrated that there was only a slight decrease in the association between opt-in/opt-out response and employment status:

```
cc optin employed, exact
```

```
Employed Unemployed
Exposed Unexposed Total Exposed

Opt In Cases | 48 24 | 72 | 0.6667
Opt Out Controls | 12 12 | 24 | 0.2500

Total | 52 36 | 88 | 0.5909

<table>
<thead>
<tr>
<th>Point estimate</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds ratio</td>
<td>6</td>
</tr>
<tr>
<td>Attr. frac. ex.</td>
<td>.8333333</td>
</tr>
<tr>
<td>Attr. frac. pop</td>
<td>.5555556</td>
</tr>
</tbody>
</table>
```

```
1-sided Fisher's exact P = 0.0027
2-sided Fisher's exact P = 0.0039
```

logit optin employed

```
Iteration 0: log likelihood = -41.72426
Iteration 1: log likelihood = -37.34424
Iteration 2: log likelihood = -37.017886
Iteration 3: log likelihood = -37.016357
Iteration 4: log likelihood = -37.016357

Logistic regression                               Number of obs   =         88
LR chi2(1)      =       9.42
Prob > chi2     =     0.0022
Log likelihood = -37.016357                       Pseudo R2       = 0.1128

--------------------------------------------
----------------------------------

| optin | Coef. | Std. Err. | z    | P>|z| | [95% Conf. Interval] |
|-------|-------|-----------|------|------|----------------------|
| employed | 1.791759 | .6291529 | 2.85 | 0.004 | .5586425 3.024876   |
logit optin employed insured

Iteration 0:  log likelihood =  -41.72426  
Iteration 1:  log likelihood =  -36.780559  
Iteration 2:  log likelihood =  -36.373397  
Iteration 3:  log likelihood =  -36.371259  
Iteration 4:  log likelihood =  -36.371259  

Logistic regression                               Number of obs   =         88  
LR chi2(2)      =      10.71  
Prob > chi2     =     0.0047  
Log likelihood =  -36.371259                       Pseudo R2       =     0.1283  

------------------------------------------------------------------------------  
   optin |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]  
-------------  -------------  --------  --------  -----------------------------  
employed |   1.695893   .6368437     2.66   0.008     .4477026    2.944084  
insured |   .7364405   .6383865     1.15   0.249  -.5147741    1.987655  
    _cons |   .1990135   .5484011     0.36   0.717  -.8758329    1.27386  
------------------------------------------------------------------------------  

The addition of the variable insured to the logistic regression model for participants younger than 65 increases Pseudo R2 slightly, suggesting that insurance status has a small influence on the association between opt-in/opt-out response and employment status.

| optin | Coef.   Std. Err. | z    P>|z|     | [95% Conf. Interval] |
|-------|-------------------|------|--------|----------------------|
| employed | 1.695893   .6368437 | 2.66 | 0.008  | .4477026    2.944084 |
| insured | .7364405   .6383865 | 1.15 | 0.249  | -.5147741    1.987655 |
| _cons  | .1990135   .5484011 | 0.36 | 0.717  | -.8758329    1.27386  |

cc optin wasatchfront, exact

<table>
<thead>
<tr>
<th>WF</th>
<th>Non-WF</th>
<th>Total</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed</td>
<td>Unexposed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opt In</td>
<td>38</td>
<td>44</td>
<td>82</td>
</tr>
<tr>
<td>Opt Out Controls</td>
<td>3</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>61</td>
<td>102</td>
</tr>
</tbody>
</table>

| Odds ratio | 4.893939 | 1.256273 27.66376 (exact) |
| Attr. frac. ex. | .7956656 | .2039946 .9638516 (exact) |
| Attr. frac. pop | .3687231 | |

1-sided Fisher's exact P = 0.0083  
2-sided Fisher's exact P = 0.0112

There is a significant association between opting in and living on the Wasatch Front. Here, Summit was considered Wasatch Front. Moving it to non-Wasatch Front causes a small decrease in the odds ratio but the association remains significant.
| Odds ratio  | 4.013889 | 1.028877 | 22.7706 (exact) |
| Attr. frac. ex. | .7508651 | .0280661 | .9560837 (exact) |
| Attr. frac. pop | .3113343 | | |

1-sided Fisher's exact P = 0.0220
2-sided Fisher's exact P = 0.0370