

The Effectiveness of Flu Vaccinations in Relation to Other Determinants of Health



The Effectiveness of Flu Vaccinations in Relation to Other Determinants of Health

J. L. and Group

Communication for Health Professionals - CS 217

Instructor: J. Andersen

Wednesday, March 25, 2015

LETTER OF TRANSMITTAL

Date: Jan 21, 2015

To: J. Andersen

From: J. L. and Group

Subject: Influenza Vaccinations within Ontario

Statement of Problem:

According to medical science, flu vaccinations cannot make a person ill. However, people sometimes report, anecdotally, flu-like symptoms after receiving a flu vaccine. This has led to a controversy as to whether or not the flu vaccine is necessary. Additionally, some people don't believe the flu vaccine is effective at preventing the flu at all.

Statement of Purpose:

This report will explore the frequency of people who report ill effects after receiving a flu vaccination, a description of the side effects, as well as a comparison of the characteristics and demographics of people who report ill effects versus no side effects. Based on this data we hope to gain insight as to whether or not people need to take precautions when getting a flu vaccine. Also we hope to understand reasoning behind people's beliefs pertaining to the effectiveness of flu vaccines.

Sources and Method of Data Collection:

Primary research will be obtained by surveys within various age groups and people.

Secondary research will be collected from college database/website, government websites, peer-reviewed articles, newspapers and journals.

Tentative Outline:

1. Background
 - a. History

- b. Types of shots
- c. Types of strains

2. Biological Process

- a. What the flu is
- b. What the flu does to the body
- c. How the flu shot works within the body

3. Side Effects

- a. Signs and Symptoms related to the flu
- b. Symptoms of flu vaccine
- c. Effectiveness of flu vaccine

List of Assigned Tasks to Do

Work on and complete memo	-All Members
Type Memo	-C/J
Type Questions	-L/M
Research Background	-C
Research Biological Process	-J/M
Research Side Effects	-L
Improvements and Recommendations	-All members
Conduct online surveys	-All members
Monitor and track surveys	-All members
Put report together and edit	-All members
Put power point presentation together	-All members

Tentative Work Schedule

Start memo	Jan 14
Proof read memo	Jan 14
Hand in memo	Jan 21
Hand in survey questions	Jan 21
Progress meeting #2	Jan 28
Conduct Research	Jan 28
Begin Surveys	Jan 28
Compile all information	Feb 4
Start writing report	Feb 11
Finish writing rough draft/revise	Feb 18
Teacher feedback	Feb 18

Progress meeting #2	Feb 25
Prepare power point presentation	March 4
Submit and Present report	March 11

Before we can continue with our research, your approval is essential. Please provide us with feedback on this subject matter on, or before February 11, 2015. Thank you for your time and consideration.

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EXECUTIVE SUMMARY

The purpose of this report was to see what kind of side effects people reported after receiving the influenza vaccination, who get the shot and who don't, and whom take other precautions to fight off infection naturally or with the combination of the shot. This report also shows the comparison between the demographics of those who reported ill side effects versus people who reported no side effects. Raw evidence was gathered through a survey, 82 participants participated. Through the evidence we found that 65% of people reported no side effects, with the remaining 35% reporting side effects. Those who did not receive the vaccination because they don't believe in the influenza vaccination, found it inconvenient, don't like getting needles, were concerned because of side effects, reasons unknown or because they believed they were healthy enough to fight off infection. In this report, it also shows the people who exercised regularly, remained healthier. It also shows, people who had higher socioeconomic status also remained healthier, most likely due to better living conditions and access to healthier foods. Another interesting piece of the evidence shows that people who had a higher feeling of "self worth", seemed to remain free of illness compared to almost half that felt a lower self worth. These are just a few of the examples to show how it takes more than just simply getting the shot to remain as ill-free as possible. The actual effectiveness of the shot varies, because each year they decide based on past years on how they will choose which strain of influenza it will be. Though it may not always be 100% effective it has shown to still help your body fight off influenza infection.

As a result of our data and report, we recommend the following to prevent influenza and maintain a healthy immune system:

- Get the influenza vaccination yearly
- Maintain a healthy diet and exercise regularly
- Take daily vitamin C supplements
- If you have low self-esteem, join support groups or get involved in community activities.

INTRODUCTION

The Influenza Virus and Vaccinations

The Influenza virus is an acute respiratory virus that can affect Canadians of all ages. The common symptoms displayed are: onset of high fever, coryza (inflamed mucous membrane in nose), cough, headache, prostration (extreme fatigue/exhaustion), malaise (discomfort/uneasiness), and inflammation of the upper respiratory tree and trachea. These symptoms can last from 7-10 days and general weakness and fatigue can last for weeks after. The viral replication peaks approximately 48 hours after inoculation into the nasopharynx and declines slowly with little virus shed after about six days after. The virus is replicated in both the upper and lower respiratory tract. Diagnosis can be established by viral culture, demonstration of viral antigens, or demonstration of viral genetic material. (Taubenberger & Morens, 2008, para. 6)

One way to prevent influenza is vaccinations. According to Centers for Disease Control and Prevention the influenza vaccine works by, “causing antibodies to develop in the body about two weeks after vaccination” (Centers for Disease Control and Prevention, 2014). These antibodies provide protection against infection with the viruses that are in the vaccine”. (NHS choice, 2015, para. 2) “If you’re exposed to the flu virus after you’ve had the flu vaccine, your immune system will recognize the virus and immediately produce antibodies to fight it” (NHS choice, 2014, para. 3) Many people complain of flu like symptoms after receiving the vaccination.

Does Flu Vaccine Cause Side-Effects?

The extent of possible side-effects from flu vaccinations can range from a sore arm to extreme, depending on who you ask. Anecdotally, some people claim to feel flu-like effects while some health-professionals may claim that flu-like effects are not possible. The Ontario Influenza Vaccine Fact Sheet (2013) acknowledges that flu vaccine can cause side effects

which can be “occasionally, severe” (p. 3). They claim however, that most people have no, or mild side effects including soreness, redness or swelling at the injection site.

Selecting the Strain

Every year the World Health Organization decides the strain in the vaccine. The WHO, “reviews the world epidemiological situation twice annually and if necessary recommends new vaccine strains in accordance with the available evidence” (WHO, 2014, para. 4). The vaccine “contains a mixture of influenza strains thought most likely to circulate in the coming season” (WHO, 2014 para. 4). “The virus is grown in chick embryos or cell cultures for the production of vaccines” (WHO, 2014 para. 4). “The viruses are then killed (deactivated) and purified before being made into the vaccine” (NHS, 2015, para. 14). The below diagram demonstrates how the strain is chosen in more detail.

A flu virus contains eight gene segments. The goal is to combine the desired HA and NA genes from flu strain 1 with genes from flu strain 2, which grows well in eggs and is harmless in humans.

- 1 Flu strains 1 and 2 are injected into a fertilized chicken egg.

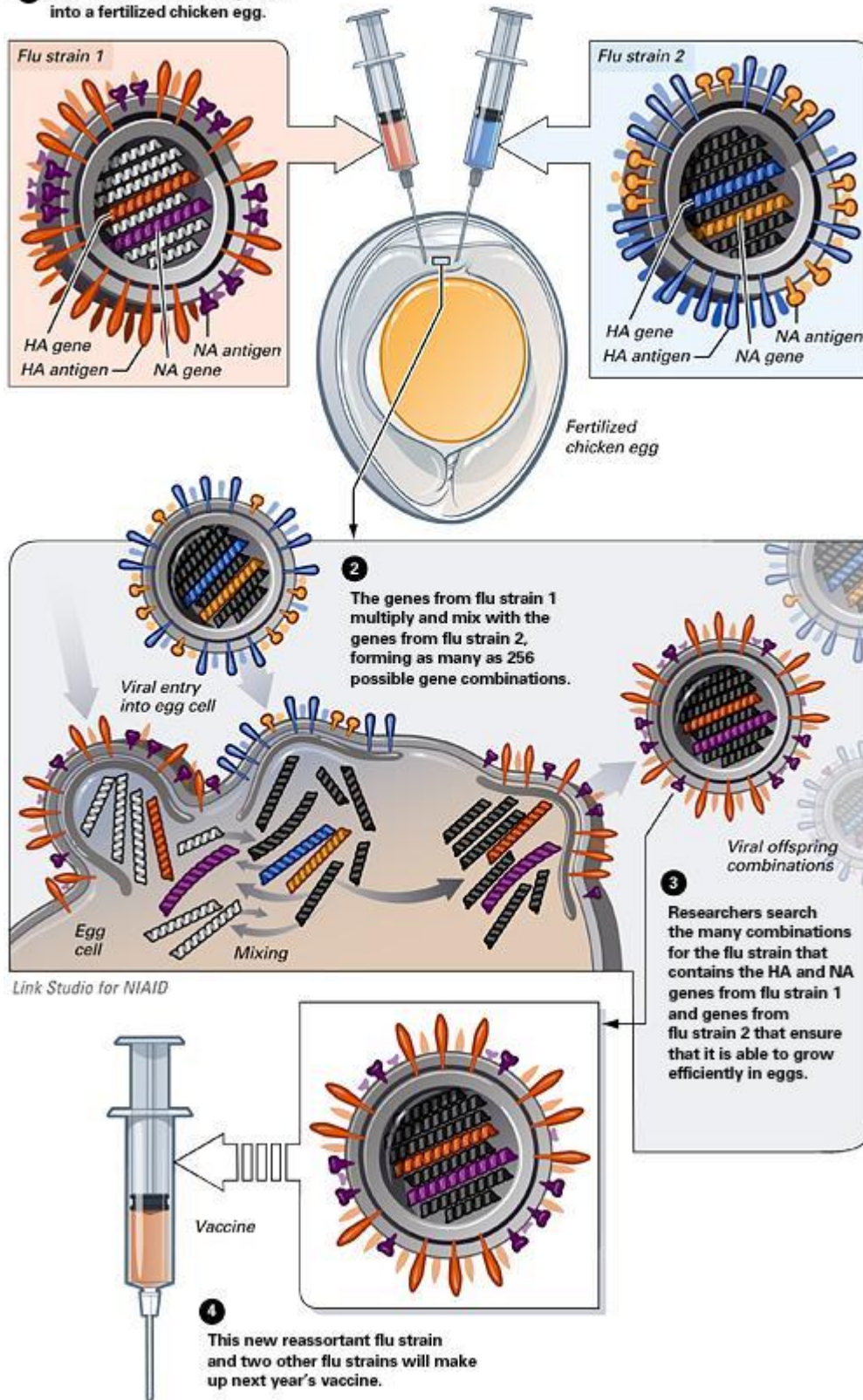


Figure 1. The process of developing a flu vaccine (National Institute of Allergy and Infectious Diseases, 2011).

Influenza Pandemics/History

Unfortunately, with the influenza virus it can mutate and change quite rapidly. The process, called antigenic drift, is when the influenza virus mutates enough over a few years causing a whole new strain of influenza. Depending on the strain, your body may still have some pre-existing immunity and be capable to fight it off or only have mild complications from it. In other cases, it may cause a major change in the strain of virus, therefore, your body will have no pre-existing immunity, causing a serious illness. Influenza pandemic occurs when a new strain develops through this antigenic shift and spreads itself globally. (*The college of physicians of Philadelphia*. (2015) Retrieved March 4, 2015 from <http://www.historyofvaccines.org/content/articles/influenza-pandemics>)

The Determinants of Health

In addition to vaccinations, other determinants of health may contribute to the prevention of flu infection, and may in fact, interact to some degree with vaccinations. Some determinants of health to be investigated are: socioeconomic status, age, gender, stress-level, education, vitamin C supplements, exercise, social support, and feelings self-worth.

Socioeconomic Status

Socioeconomic status is measured by a combination of education, income and occupation. People view this as the social standing or classification of an individual. When viewed through the social lens it emphasizes a person's privileges, power and control. Low socioeconomic status is linked with less education, poverty and poor health that in turn, affects the community as a whole.

What are the Effects on Family Well-Being?

Evidence has shown that the socioeconomic status affects the stability of a family greatly, including parenting practices, which in turn results in some developmental outcomes for children, (Trickett, et al., 1991). Poverty is a reliable predictor of child abuse and neglect. Among low-income families, those with family exposure to substance use exhibit the highest

rates of child abuse and neglect (Ondersma, 2002). Lower SES has been linked to domestic crowding, a condition which has negative consequences for adults and children, including higher psychological stress and poor health outcomes (Melki et al., 2004). All family members living in poverty are more likely to be victims of violence. Racial and ethnic minorities who are also of lower SES are at an increased risk of victimization (Pearlman, Zierler, Gjelsvik, & Verhoek-Oftedahl, 2004).

How Does Low SES Affect Psychological Health?

Evidence has shown support in-between the link of lower SES and negative outcomes psychologically. Perhaps children from lower SES families feel left out of things that they families cannot afford to do, or are made fun of because of the hand-down clothes they wear. This can contribute to perceptions of lower self-worth, especially as a child. Lower SES is also associated with the following:

- Higher rates of attempted suicide, cigarette smoking, and engaging in episodic heavy drinking (Newacheck, Hung, Park, Brindis, & Irwin, 2003)
- Higher levels of emotional and behavioural difficulties, including anxiety, depression, attention-deficit/hyperactivity disorder, and conduct disorders (Weissman et al., 1984; Goodman, 1999; Spencer et al., 2002)
- Higher levels of aggression (Molnar et al., 2008), hostility, perceived threat, and perceived discrimination for youth (Chen and Paterson, 2006)
- Higher incidence of Alzheimer's disease later in life (Fratiglioni, Winblad, & von Strauss, 2007; Karp et al., 2004; Fratiglioni & Rocca, 2001; Evans et al., 1997)

Effects of Low SES on Physical Health.

Due to low SES, people may find it harder to be able to afford or get a hold of fresh products to cook with. In turn it may be cheaper for these people to purchase fast food items regularly. These people may also find it difficult to be able to afford or even find physical-

education classes or gyms near them. In regards to this, here are some of the effects associated with low SES and physical health:

- Higher likelihood of being sedentary (Newacheck et al., 2003) and higher body mass index for adolescents (Chen and Paterson, 2006), possibly because of a lack of neighbourhood resources, such as playgrounds/gyms and accessible healthy food options
- Higher physiological markers of chronic stressful experiences for adolescents (Chen and Paterson, 2006)
- Higher rates of cardiovascular disease for adults (Steptoe & Marmot, 2004; Colhoun Hemingway, & Poulter, 1998; Kaplan and Keil, 1993)

Lower SES is also associated with educational status. Low SES communities may not have the funds or available resources to properly educate children. For instance some American studies show that:

- Children from low-SES families often begin kindergarten with significantly less linguistic knowledge (Purcell-Gates, McIntyre, & Freppon, 1995).
- Children from less-advantaged homes score at least 10% lower than the national average on national achievement scores in mathematics and reading (Hochschild, 2003).
- Children in impoverished settings are much more likely to be absent from school throughout their educational experiences (Zhang, 2003), further increasing the learning gap between them and their wealthier peers.
- While national high school dropout rates have steadily declined (National Center for Education Statistics, 2002), dropout rates for children living in poverty have steadily increased. Between 60 and 70% of students in low-income school districts fail to graduate from high school (Harris, 2005).

Age

The effectiveness of the flu vaccine in elderly has been debated over the years. As we age our bodies become weaker and get sick more often. A small study in the U.S stated, “Our immune systems respond differently to flu vaccines as we age” (CBC News, 2013). As we age our immune systems get weaker. As our immune systems get weaker, the response of our antibodies diminish causing our bodies to not respond to the influenza vaccine as well as a

younger immune system. Flu.gov, a government health site identified that elderly 65 and older are in fact more susceptible to getting the flu. They said, 90% of flu related deaths and over half of flu related hospitalizations occur in people aged 65 and older (Flu.gov).

It is recommended for people aged 65 and older to get the flu vaccine. However, a 2005 study published by the Archives of Internal Medicine, highlights that even though the amount of elderly being vaccinated has increased, there has not been an abundant decline in flu related deaths (Chatelaine, 2013). This study may prevent individuals, particularly 65 and older from getting the flu vaccine.

Centers for Disease Control and Prevention (2015) says that the flu vaccine works best in young children and adults older than 2 years. Therefore, benefits of the flu vaccine reduce in children younger than 2 and adults older than 65. Age does relate to health and flu. The flu vaccine is more beneficial between certain ages.

Gender

Initially, gender may not seem to be a reliable factor in determining health. However, when you consider the implications of typical social roles for gender, and the stresses associated with them, it is easier to understand why gender is a predictor of health. Women generally earn less income in the workplace (Mikkonen & Raphael, 2010). This may result from discrimination in the workplace resulting in a lower hourly wage, or because women spend more time raising children resulting in less hours worked and less opportunity for benefits. Alternatively men experience more extreme instances of social isolation resulting in homelessness, drug abuse and higher suicide rates. (Mikkonen & Raphael, 2010).

In relation to the flu specifically, there are some gender differences as well, but it varies, sometimes in an unreliable manner. Generally, in developed countries, the rate of reported flu incidences are higher for men than for women (WHO, 2010). In Canada, data from April–May 2009 show that differences between males and female in the incidence of

infection vary with age. H1N1 was higher in males than females from 10–19 years of age, higher in females than males 20–39 years of age, and showed no difference after 40 years of age.

Stress

We all know how stress can affect our daily lives. As said by Medline Plus (2015) Stress affects people in different ways. Some people can experience mild stress such as headaches, sleepiness and a depressed mood. Others could even have digestive problems related to the amount of stress they have. Stress is a major detriment to health.

Old or young, stress affects everyone. As said by the American Institute of Stress, “Stress significantly reduces the immune response to influenza and pneumococcal vaccine in the elderly, and to hepatitis B vaccine in younger individuals” (AIS, n.d). Stress can cause the immune system to not respond to vaccines such as influenza. This being the case, in order for a vaccine such as influenza to work properly a lower level of stress is needed. It is important for a vaccine to work properly in order to help prevent a virus from attacking the immune system.

While under a lot of stress at school, work or home people often notice that they get sick more often. Being under a lot of stress, catching a cold or flu is the last thing anyone wants. As said by Dr. Mercola, “Stress has a major influence on the function of your immune system, which is why you've probably noticed you're more likely to catch a cold when you're under a lot of stress” (Mercola, 2012). Researchers from Carnegie Mellon University (2012) infected people with the common cold virus. Those who were under stress were twice as likely to get sick than those who were not under stress at that time. When stressed, the body releases cortisol. If stress levels become chronic however, the immune system is not as sensitive to cortisol which heightened the inflammatory response. The inflammatory response is however what causes a person to cough, sneeze and have other cold symptoms. As the

body reduces its stress level, cortisol becomes more sensitive, lessening the inflammatory response, and therefore helping to fight off infections and viruses.

Level of Education

Can level of education affect your health? A study from the US National Library of Medicine National Institutes of Health conducted a study saying so. Age groups of men and women 25-44, 45-64 and 65 and older were asked their education level, it being; no education, first level, second level and third. They were asked how their physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health were. The results showed that education level does in fact relate to health level, “In general, perceived health status declined with decreasing educational level, so that the lowest scores were found in persons with the least education” (Regidor, E. et al., 1999).

The results of this study show that people who rate themselves as having a higher education level, also say they have less health problems, their health is better than those of a lower education level. Being knowledgeable about health and how to protect yourself from infections and disease is very important and could make you a healthier person overall, as the study recommends.

Exercise

It is well established scientifically, that exercise can help to promote good health and prevent respiratory infection. Kohut, Arntson, Lee, Rozeboom, Yoon, Cunnick & McElhaney (2004) found that older adults who exercised moderately for 30 minutes, 3 times a week for 10 months, had an improved antibody response to influenza vaccination compared to the control group. Barrett et al tested adults over 50 who were prone to acquiring colds and compared the rates of respiratory infection when they exercised compared to when they did not exercise. For 8 weeks, the exercise group did daily 45 minutes of exercise. Out of 47 participants in the exercise group there were 26 illnesses and 241 illness days, compared to 40 illness and 453 illness days for the nonexercise group. Nieman found that upper

respiratory symptoms and incidents were less for participants who participated in 45-minute sessions of brisk walking, five times a week for 15 weeks compared to those who did not.

Despite the benefits of physical activity at preventing illness, vigorous exercise is a stressor, and has also been found to increase illness in some cases. Nieman, Johanssen, Lee, & Arabatzis (1990) found that 12.9% of participants who ran the LA marathon had an infectious episode the week following, compared to other runners who did not participate in the marathon.

Vitamin C

The use of Vitamin C as an effective means to prevent and treat the flu, as well as other diseases such as the common cold, has been debated for many years. At this time, institutions such as schools, hospitals and other workplaces in Canada, do not recognize vitamin C as an effective means to prevent and treat flu for students, patients or workers. There is some evidence, however, that it is indeed effective.

Linus Pauling (1976) was one of the first to advocate the use of high doses of vitamin C to prevent the effects of the flu, common cold and other diseases. More recently, other researchers have begun to support his claims. Mice infected with influenza that were administered vitamin c had a higher survival rate, less weight loss and less lung infection compared to mice administered saline (Cheng, Liu, Li , Li , & Ran, 2014).

Li et al (2006) found that in addition to treating flu, vitamin C was also effective at preventing flu. Mice administered vitamin C prior to influenza-infection had less lung pathology and a greater immune response compared to control mice. Gorton and Jarvis (1999) administered 1000 mg of vitamin C every hour for the first 6 hours for human participants reporting symptoms of flu, and 3 times a day afterwards. They gave a control group who were reporting symptoms, decongestants and pain relievers. The researchers concluded that for the vitamin C group, flu decreased 85%, after the initial megadose. Based

on this research it seems that vitamin C could be a viable supplement or even alternative to influenza vaccines at preventing flu as well as an effective means of treating flu.

Purpose of the Study

This report will explore two avenues of interest regarding influenza. First of all, we will explore the effectiveness of flu vaccine in relation to other determinants of health, and include public opinion regarding vaccines. Secondly, we will explore the validity and frequency of the occurrence of side effects in relation to the flu vaccine.

Although the prevention of flu by use of vaccination is well documented, public opinion is mixed regarding its effectiveness at preventing flu. Some people who get vaccinated still become ill, while others who do not get vaccinated remain free from infection of the virus. It is our goal to explore other determinants of health that may explain these occurrences.

A second goal of this report is to examine the types and frequency of side effects reported by people after flu vaccinations. Although influenza apparently can't give you the flu, many people have reported flu-like symptoms after being vaccinated. In this report, we will explore the extent, as well as the types of side effects that people report after being vaccinated.

Based on this data we hope to gain insight as to whether or not people need to take precautions when getting a flu vaccine. Additionally we will explore what other determinants of health are important for preventing flu. Also we hope to understand reasoning behind people's beliefs pertaining to the effectiveness of flu vaccines.

Scope and Limitations

This study is merely exploratory. Although we will not be repeating the study it would serve well as a pilot study for further research. We took an unscientific approach in the sense that we did use a random sample, and obviously participants could were not randomly

assigned to different treatment groups (e.g., vaccinated or not vaccinated). We also had no way to verify participants' claims regarding the occurrence of vaccinations or flu illness. Additionally, all of our conclusions and recommendations are based on descriptive statistics, rather than inferential statistics. Therefore, hypothetically, all of our results could be explained simply by random variability in data. However, we focussed on reporting data that seem to convey meaningful differences that seemed large enough that we would expect a similar survey to find comparable results.

Participants and Data Collection

Data was collected by means of an internet survey hosted by "Survey Planet".

Participants could access the survey by means of an internet link that was distributed by the members of our group and the instructor for the course. The instructor shared the link on a website exclusive to our course on the Confederation College website (i.e., "Blackboard") and members of our group shared it with friends and family through email, or social media such as "Facebook". The survey was aimed at people who lived in Ontario but it is possible that participants could have accessed the survey from somewhere else.

RESULTS

Are Vaccinations Effective?

The results of our survey are consistent with the idea that vaccinations do in fact prevent illness. As Figure 1 shows, 28% of participants (14 of 50) who were not vaccinated became ill, compared to only 9.7% of vaccinated participants (3 of 31). Our results are comparable to those of Nichol, Lind, Margolis, Murdoch, McFadden, Hauge, Magnan, & Drake (1995), who administered either flu vaccine or placebo to a total of 849 working adults. Participants who received the vaccine reported 25% fewer episodes of respiratory illness compared to the control group, throughout the months of December 1994 through March 1995. Additionally, the vaccine-group reported 43% fewer absent days from work due to illness and 44% fewer visits to a physician. The Ontario Ministry of Health (2014) predicts that “vaccine can prevent influenza illness in about 60% to 80% in healthy children and adults”. This seems like a conservative prediction considering our results, however, our participant base consisted of mostly young adults.

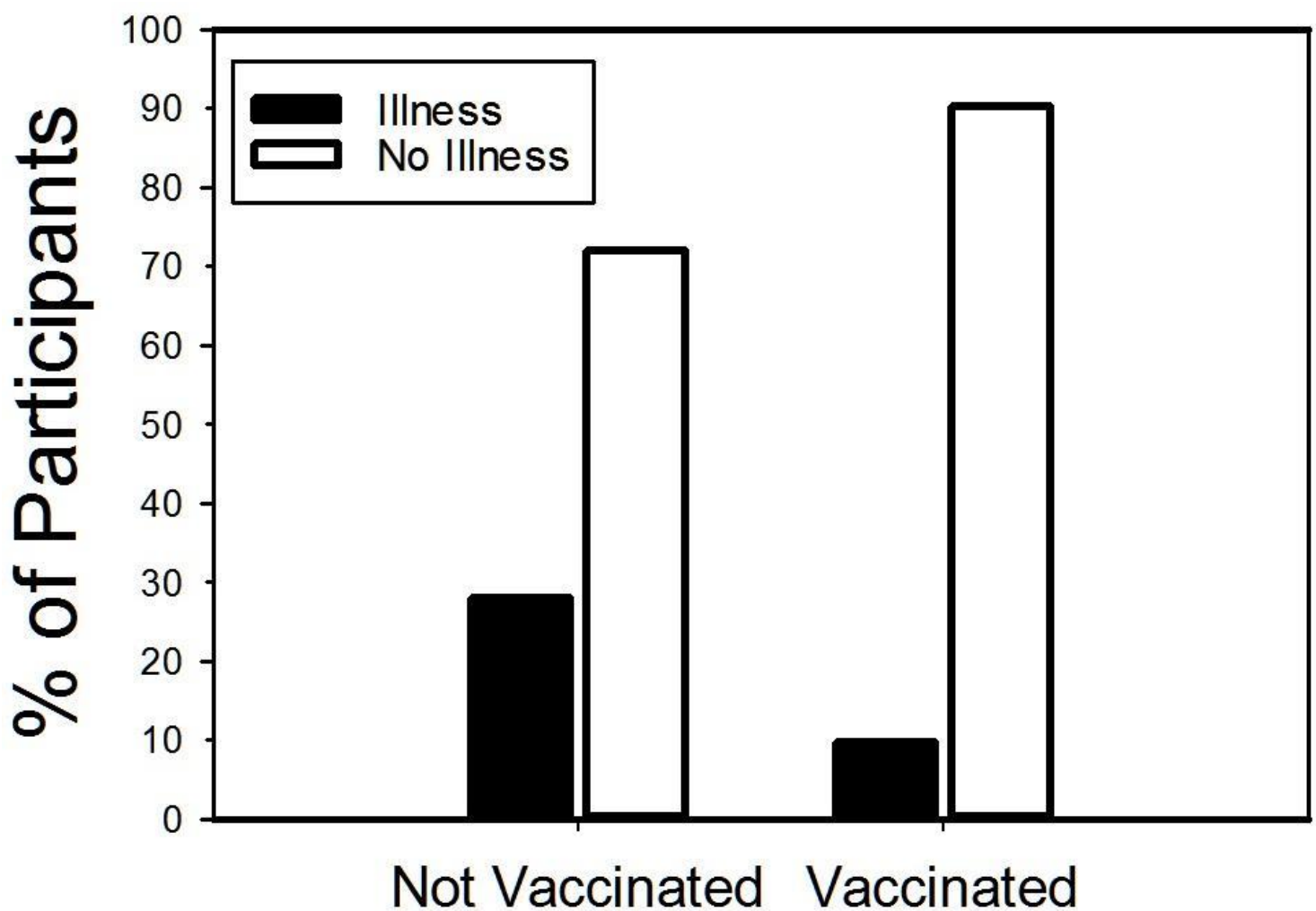


Figure 2. The percentage of participants who became ill vs those did not become ill after receiving a vaccination or not.

It should be noted that our results showed that 11 participants confirmed they had the flu, 75 reported they did not get the flu, and 6 reported that they were ill, but were unsure if it was the flu. We decided to combine the illnesses together (17 of 82) because we had no way to verify why any of the participants were ill. It seemed reasonable to think that one or more participants who reported a flu-illness may in fact have had food poisoning or a cold, and that the unsure group may have just been more conservative with their response. We performed a re-analysis of the data with the “unsure” participants eliminated, and it did not affect any of the conclusions or recommendations we make in this report, although obviously the figures would look slightly different.

It seems as though vaccinations do in fact prevent illness. However, our results could also mean that people who tend to get vaccinated also tend to participate in other activities contributing to the prevention of flu, which may be just as, or even more important than vaccinations. In addition to surveying the effectiveness of vaccinations, we were also interested in other determinants of health in relation to preventing the flu. These determinants include exercise, socioeconomic status, safety of neighbourhood, stress level, age, gender, self-esteem, vitamin C supplements and social-support.

Exercise

Our data revealed that exercise could be an important aspect of health in relation to preventing the flu. We compared people who exercised 60 minutes or less per week (Low) to those who exercised vigorously 90 minutes or more (High).

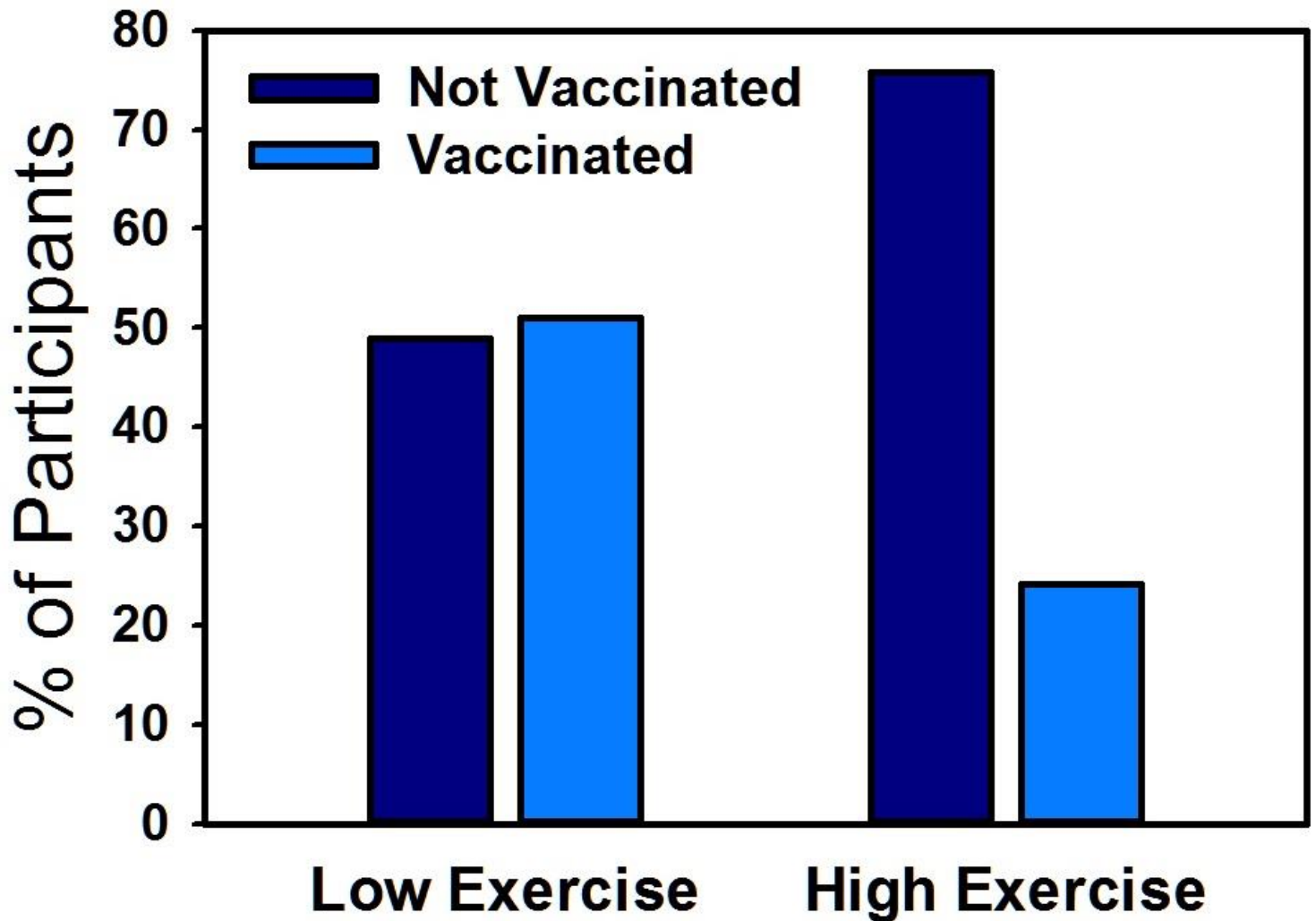


Figure 3. The percentage of low and high exercisers who chose to get vaccinated compared to those who did not get vaccinated.

As Figure 3 shows, the high exercise group chose to get vaccinated substantially less than the low exercise group. After examining our data further, there was no obvious reason why this would be. Continuing from the pattern demonstrated by Figure 2, we would expect the high exercise group to show more illness as a result of their lower number of vaccinations. However, we observed precisely the opposite result. As Figure 4 shows, the high exercise group showed less illness compared to the low exercise group. In fact, not one of the participants from the high-exercise group, who had also received a flu vaccination, became ill.

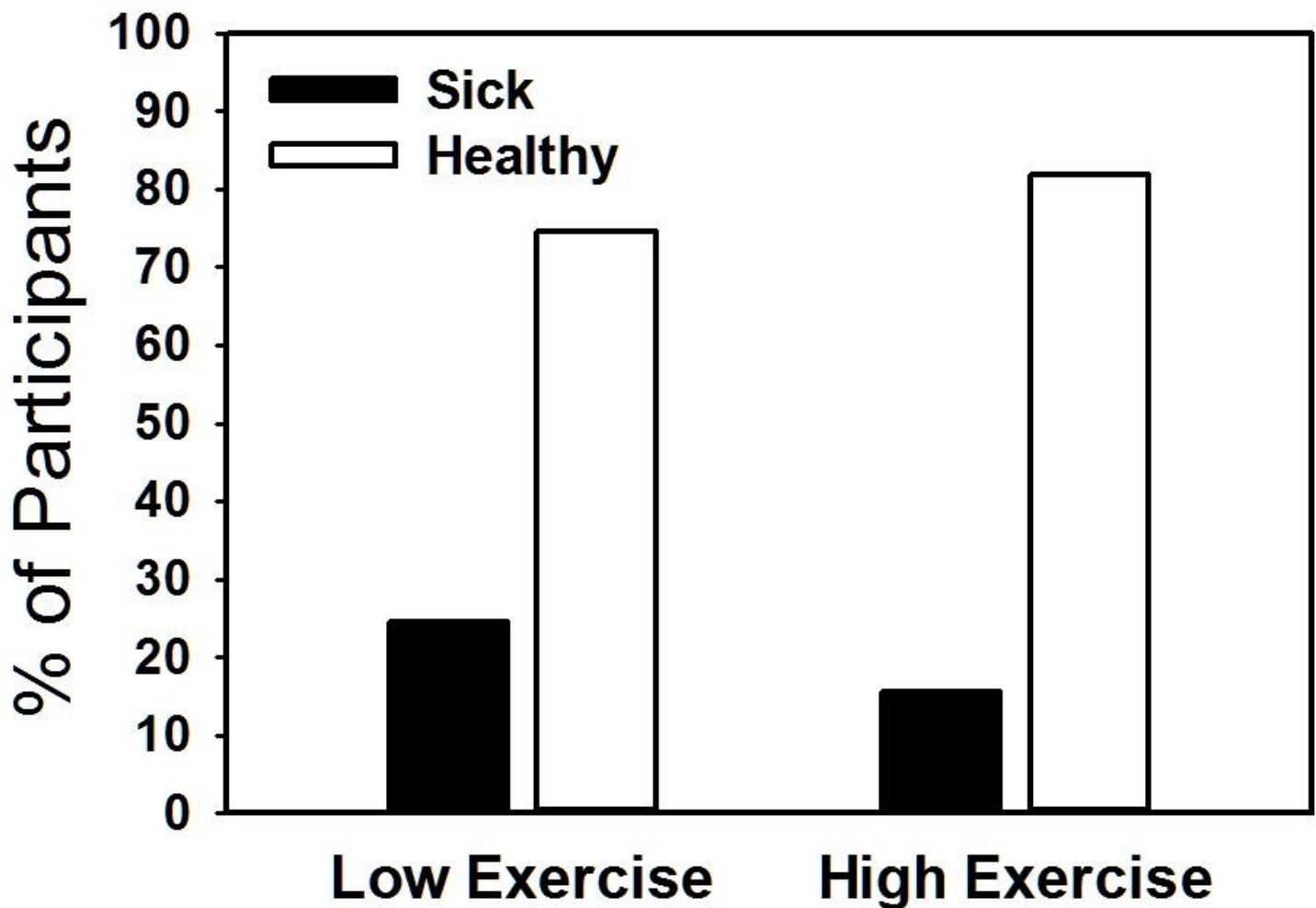


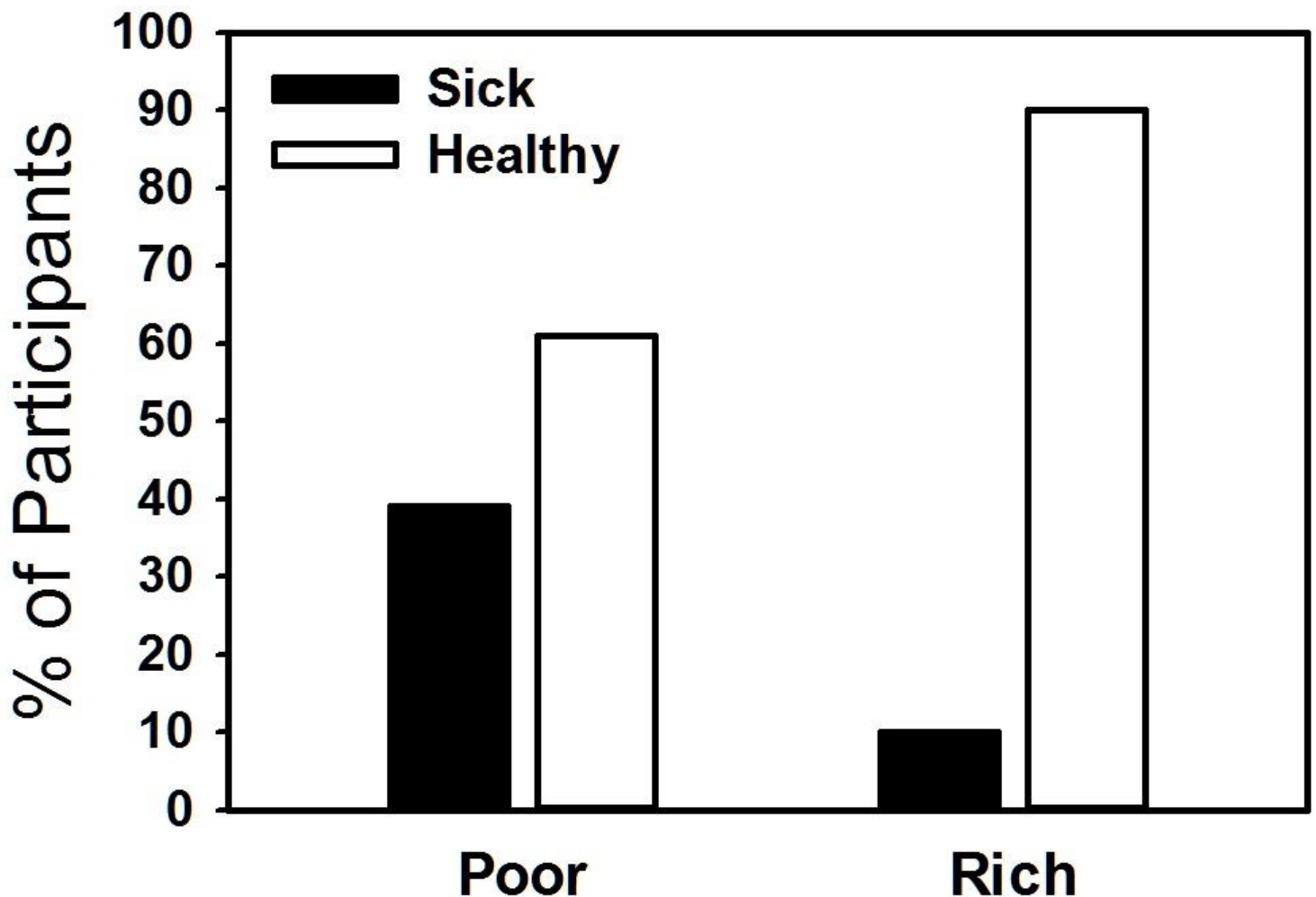
Figure 4. The percentage of low and high exercisers who became ill compared to those who did not become ill regardless of being vaccinated or not.

Our results suggest that exercise could be an important factor, in conjunction with vaccinations in preventing the flu. In fact, the Canadian Society of Exercise Physiology (2011) recommends that adults exercise at least 150 of moderate to vigorous aerobic exercise per week. However, it does seem that the level of exertion and volume of exercise we should adapt in order to prevent illness does have limitations. Brenner, Shek & Sheppard (1994) found, after reviewing past research, that respiratory tract infections were more prevalent in high level athletes especially during times of intense training. They suggest that strenuous exertion as well as the stress of competition are contributing factors.

Socioeconomic Status

Another determinant of health in relation to flu that may have been represented in our data is socioeconomic status. We compared participants who had an estimated household income of over \$55,000 annually ("Rich", 34 of 82) to participants with less than \$55,000 ("Poor", 48 of 82). We realize people in these categories are not necessarily rich or poor, but we will use these terms simply for ease of organization and comprehension.

The number of vaccinations for each group were comparable, with the Poor group showing slightly less vaccinations (35%), compared to the Rich (41%). The slight differences



in vaccinations, however, were not equally represented in the frequency of illness. Only 12% of rich people became ill whereas over 27% of poor people became ill.

Figure 5. The percentage of “poor” and “rich” participants who did not get vaccinated and became ill compared to those who were not ill.

If we examine only the vaccinated participants from each group, only one from the poor group and only 2 from the rich group became ill, reinforcing the idea that vaccinations are effective. However, as Figure 5 shows, when we look at only the unvaccinated participants, we can see that 39% of poor people (12 Of 30) became ill, whereas only 10% (2 of 20) of unvaccinated rich people became ill. It seems as though not getting vaccinated may predict more infections for the socioeconomically disadvantaged.

Socioeconomic status seems to be related to other determinants of health as well. For instance 22% of poor people rated themselves in the lowest category of self-worth, compared to only 3% of rich people. Additionally 57% of rich people strongly agreed that they lived in a safe neighbourhood compared to only 15% of poor people. It is understandable why socioeconomic status could be considered the greatest determinant of health, because it directly affects so many other determinants of health. Our results are consistent with a report that was generated by Federal, Provincial, And Territorial Advisory Committee on Population Health, “Strategies for Population Health: Investing in the Health of Canadians

(1994, 1999). They concluded that income and social status is the single most important determinant of health.

Gender

Our data revealed that proportionately, more females in our survey chose to get vaccinated (22 out of 50, 44%) compared to males (11 of 30, 37.7%). However, although more females were vaccinated, they also became ill more frequently (12 of 50, 24%) compared to males (4 of 30, 13.3%). Most of the illnesses came from the unvaccinated group, 75% for females and 100% for males.

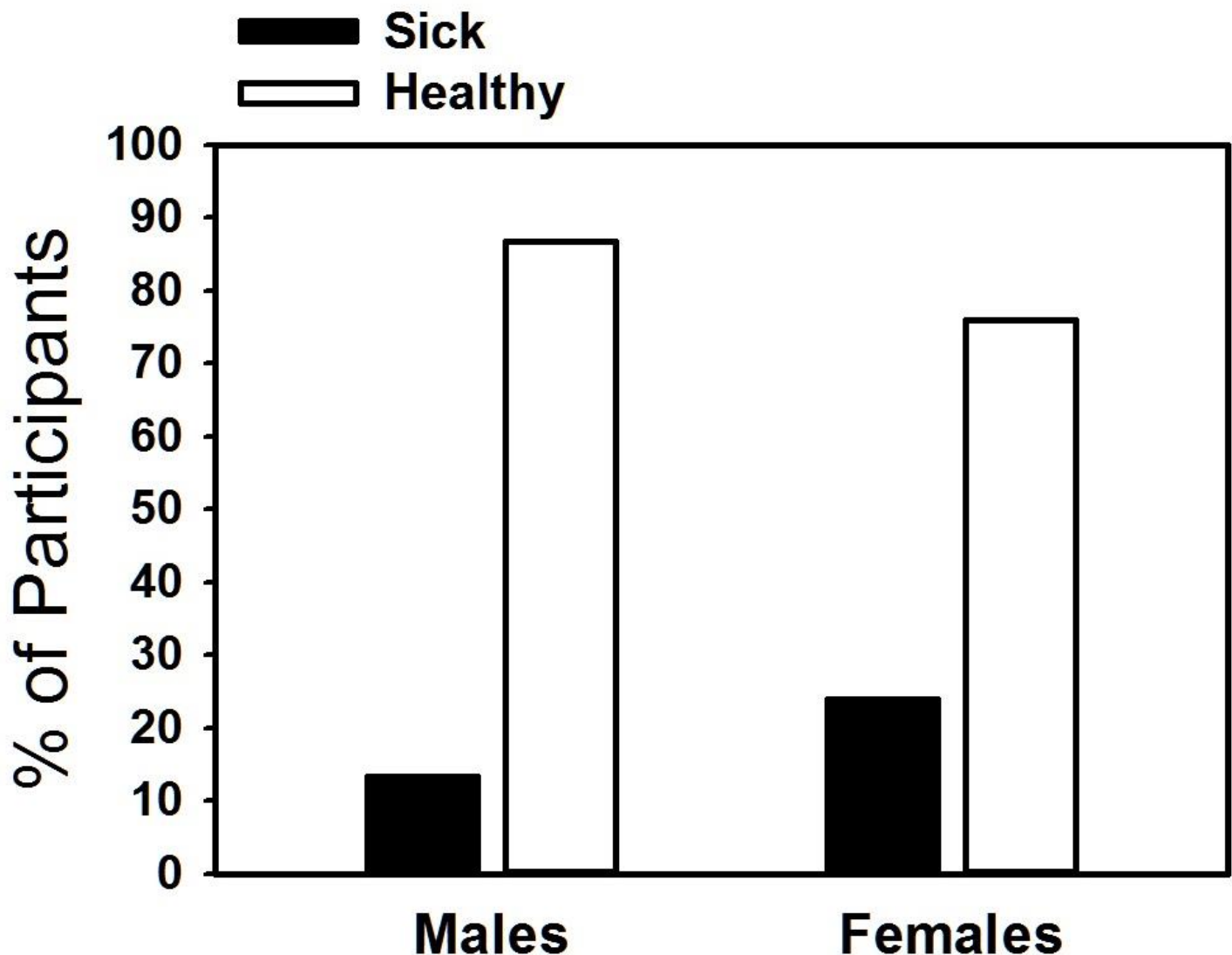


Figure 6. The percentage of males and females who became ill or not.

Our results suggest that females that replied to our survey may have experiences that are different from males, which could then lead to a higher rate of illness. In addition to finishing school and starting a career, females in Canada may feel more stress about starting a

family due to their biological clock, and they may also feel more pressure to fulfil household duties and childrearing activities. Additionally, females may experience the stress of being dependent on others (e.g., the government, a significant other) while pregnant or raising small children. On our survey, 72% of females agreed with the statement, “I generally have a high level of stress”, compared to only 56.7% of males.

Our results are roughly consistent with the findings of The World Health Organization (2010) that found a higher rate of flu infection in females between the age of 20-39, in Canada. Almost all of the illnesses that occurred in our study were associated with people 18-35. However, Crighton, Elliot, Moineddin, Kanaroglou, & Upshur (2007) found that from 1992-2001 in Ontario, flu rates were generally higher for males, but there was a lot of variation depending on age and location. In the Thunder Bay area males and females did not differ significantly in the incidence of flu or hospitalizations resulting from flu, except for a higher rate of hospitalizations resulting from flu for males over the age of 65 compared to the provincial average.

Education

Our respondents were generally well-educated. Over half (47 of 82, 57%) completed at least a college or university degree. Based on results, it seems that education may be a factor in avoiding flu. We divided education into a “lower” group who had not completed a college or university degree (n=35) and compared them with a “higher” group that had completed a college or university degree (n=47). The lower and higher groups had an almost equal proportion of vaccinations (37.1% and 38.3%, respectively), however, the higher group did become ill less often showing a rate of only 17.0% compared to 25.7% of the lower group, as can be seen in Figure 7.

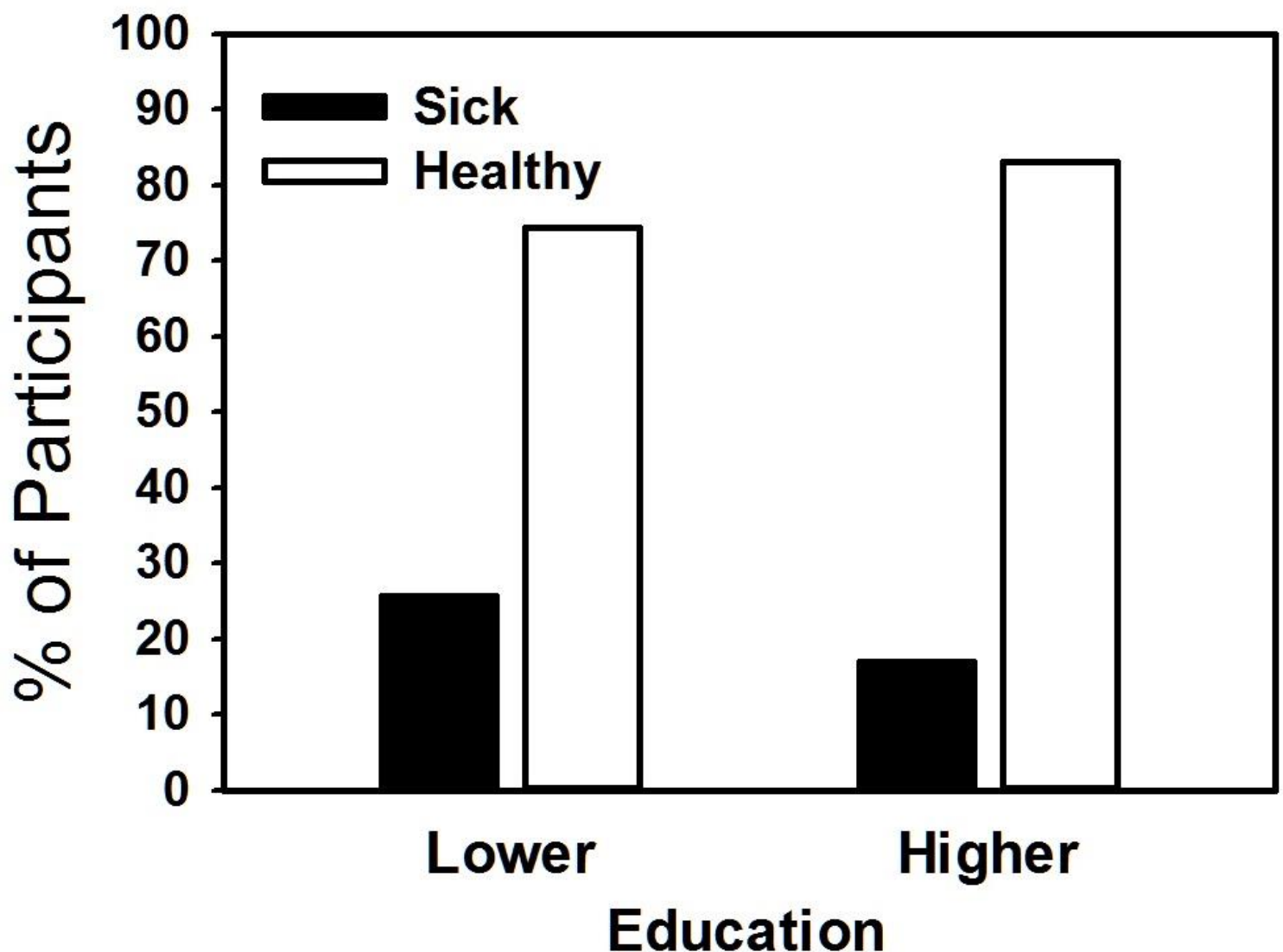


Figure 7. The percentage of participants who became ill or not with a “lower” or “higher” education.

Our results are consistent with the findings of the Federal, Provincial, And Territorial Advisory Committee on Population Health (1994, 1999) that found that health improves with level of education. Of course there are obvious confounding variables that accompany a higher level of education. Generally we would expect people with more education to be older, and have a higher income. A higher level of income and the aspects related to it, would

probably best explain why higher educated people may be able to better fight off illness, even when the rate of vaccination is the same. Also, the Federal, Provincial, And Territorial Advisory Committee on Population Health (1994) suggest that higher education gives people more of a sense of self-control over their lives.

Self-Worth

Participants were asked how agreeable they were with the statement, “I am needed in society”. It was an attempt to measure one’s sense of self-worth, in hopes that we might see a connection in relation to the rate of vaccination or illness. Seventy participants (85%) were agreeable with the statement, compared to twelve who were not (15%). We used this as a criteria to divide participants into “lower” and “higher” self-worth groups.

The “lower” self-worth group showed a similar rate of vaccination (58%, 5 of 12) compared to the “high” (60% 28 of 70). However, as can be seen in Figure 8, 50% (6 of 12) of the “lower” group reported an illness compared to only 16% (11 of 69) of the “high” self-esteem group. These results suggest that feelings of self-worth may be an important factor in preventing flu.



Figure 8. The percentage of participants who became ill or not with a “lower” or “higher” self-worth.

Our results are consistent with those of Antonucci, Peggs, & Marquez (1989) who compared patient's ratings of self-esteem with their health status assessed from their medical charts. They found that higher health esteem predicted higher health status.

Although both groups in our survey had similar rates of vaccination, people with low self-worth may neglect themselves in other ways that could lead to a more vulnerable state of health. Additionally, lower self-worth may be related to lower income, or less social-support. These results would suggest that future studies, with more data, should explore the possibility that self-worth is related to vulnerability to illness.

Safety of Neighbourhood

Only 2 participants were "Somewhat disagreeable" with the statement, "I live in a safe neighbourhood", while 80 participants (98%) were at least "Somewhat agreeable". The most popular response was "Agreeable" with 39 responses (48%).

Generally, people living in safer neighbourhoods were vaccinated more often. At least 45% of participants (30 of 66) who were "Agreeable" or "Very Agreeable" were vaccinated, compared to only 19% (3 of 16) from lower categories. Interestingly though, the proportions were almost the same in relation to illness. The "lower" group showed 20% illness (3 of 15) and the "higher" group reported 21% illness. It is difficult to draw conclusions because we did not collect enough data to see any clear patterns.

Other Determinants of Health

Other than the ways previously mentioned, the pattern of illness and vaccination were generally unremarkable in relation to our questions on vitamin C, self-assessed general health, stress level, and social-support. The pattern of vaccination and illness in relation to these topics either approximated the variability of the demographic represented by the responses on our survey, or they varied in an idiosyncratic manner. We will briefly discuss the results of each of these survey questions.

Vitamin C

Most of our respondents do not take a vitamin C supplement (51 of 82, 62%). The 38% that did take a vitamin C supplement generally were vaccinated and became ill at the same rate as those who did not take a supplement. However, we believe that it is possible that vitamin C has a substantial effect only at higher doses (1000 mg/day or more). Only five of our participants took 1000 mg or more a day, therefore, it is difficult to assess its effect. Out of those five, one reported an illness.

General Health

Only five of our participants disagreed with the statement “I am a healthy individual”. Three of those were not vaccinated and two became ill. Ninety-four percent of respondents agreed with the statement. The most popular response was “Agreeable” (n=40, 49%). There was no clear pattern in relation to vaccinations, or illness.

Stress

Most (54 of 82, 66%) of our participants agreed with the statement “I generally have a high level of stress”. Forty-one percent of “Stressed” participants were vaccinated compared to only 32% of “Non-stressed”. The rate of illness was 19% (10 of 53) for the “Stressed” group, compared to 25% (7 of 28) of the “Non-stressed”. The number of illnesses

seems like it is reasonably proportional to the number of vaccinations for each group. Our survey did not seem to reveal any effects of stress on illness.

Social-Support

Most of our participants (73 of 82, 89%) were “Agreeable” or “Very Agreeable” with the statement, “I have support from loving friends and family”. Only 5 (6%) disagreed, making it difficult to relate to the effects of social-support on illness or the rate of vaccinations.

Age

The majority of our participants were between 18-25 (48 of 82, 58.5%). There were 20 participants between 26-35 (24.4%), 10 between 36-45 (12.2%), 2 between 46-55 (2.4%), 1 between 56-65 (1.2%) and 0 participants that were 66 and older. There were not enough participants in each category to make meaningful comparisons.

Reasons for Not Getting Vaccinated

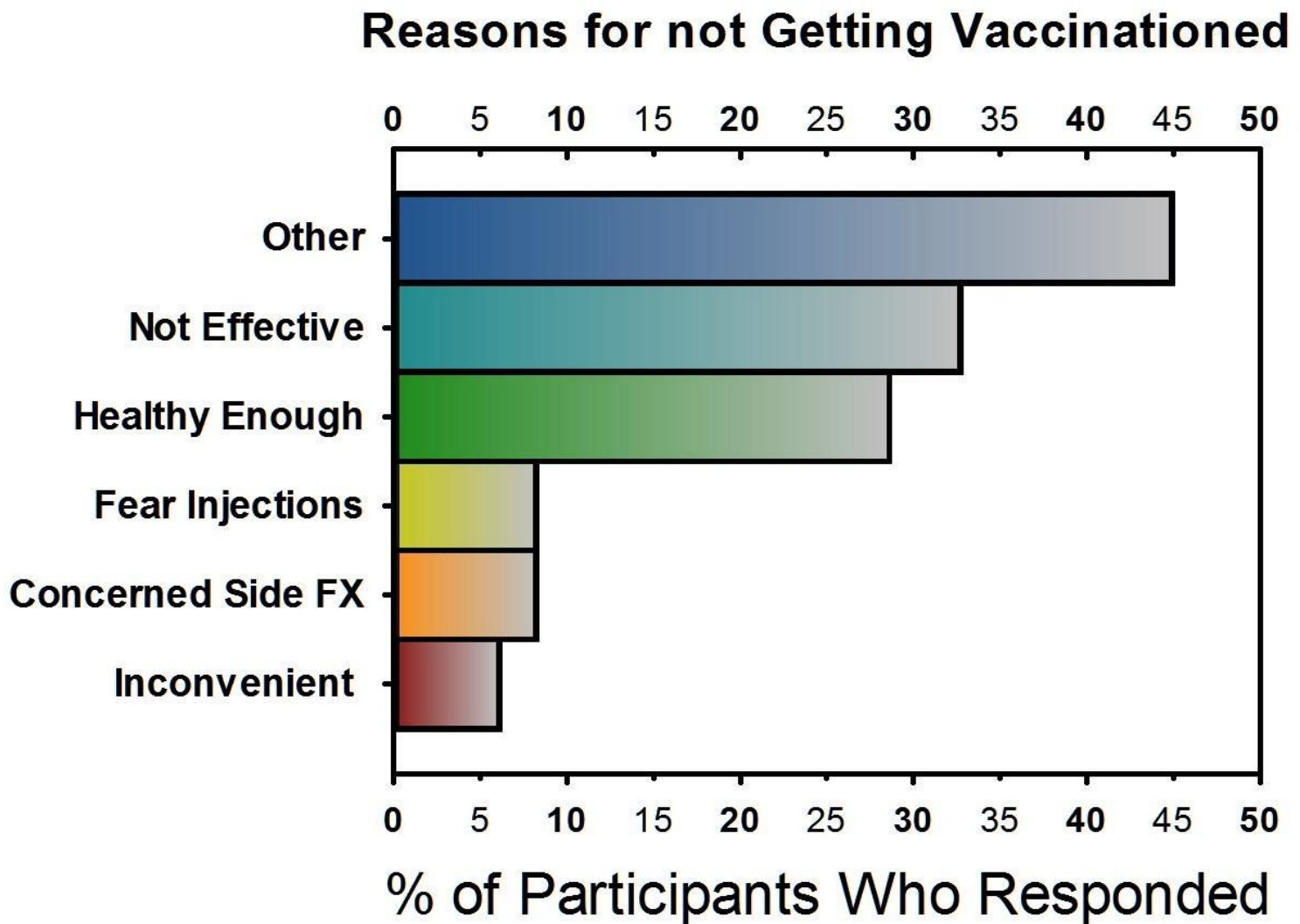
In addition to study the determinants of health in relation to flu and vaccinations, we wanted to explore reasons why people chose to not get vaccinated. We asked participants who did not get a flu vaccine in the prior year, “Why not?” Participants were allowed to choose all the responses that applied to them. Out of the 49 participants who were not vaccinated, the number of responses we received for each choice were as follows:

- “It was too inconvenient” - 3 responses (6.1%);
- “I don’t like injections” - 4 responses (8.2%)
- “I was concerned about side effects” - 4 responses (8.2%)
- “I believe I am healthy enough to fight an infection off” - 14 responses (28.6%)
- “I don’t believe flu shots are effective” - 16 responses (32.7%)
- “Other” - 22 responses or 44%

A substantial number of people who did not get vaccinated, really do seem to believe that flu shots are ineffective. Of course, prior scientific data, as well as our survey data indicate that vaccines are indeed effective.

Out of the 14 who believed they were healthy enough to fight off an infection, 2 (14.2%) did become ill. This result is substantially lower compared to the number of participants in general who were not vaccinated and became ill (28%). It seems reasonable to believe that participants who believed they were healthy enough to fight off an infection, may have in fact been healthier than the average participant that answered our survey that was not vaccinated. This could be due to physical attributes as well as social and psychological factors. For instance, perhaps believing that one is healthy may help to fight off an infection,

compared to someone else in the same physical condition who did not necessarily believe the



same thing.

Figure 9. The percentage of participants' responses pertaining to why they chose not to get vaccinated.

Our most popular choice was "Other", indicating that the reasons we provided did not satisfy all of the reasons that people actually have for not getting vaccinated. One participant said after the survey that he felt somewhat guilty about using government money to get vaccinated. People may have also felt guilty about getting vaccinated if they believed there was limited supply and perhaps they felt someone else needed it more. We can only speculate what the other reasons could be. Religion? Perhaps some people felt "allergic reaction" would not be classified as "Side effects"?

Side Effects

We also explored the phenomenon of side-effects in relation to flu vaccines. There have been anecdotal reports that vaccinations do in fact cause flu-like symptoms, while medical science has made it clear that vaccinations cannot cause the flu.

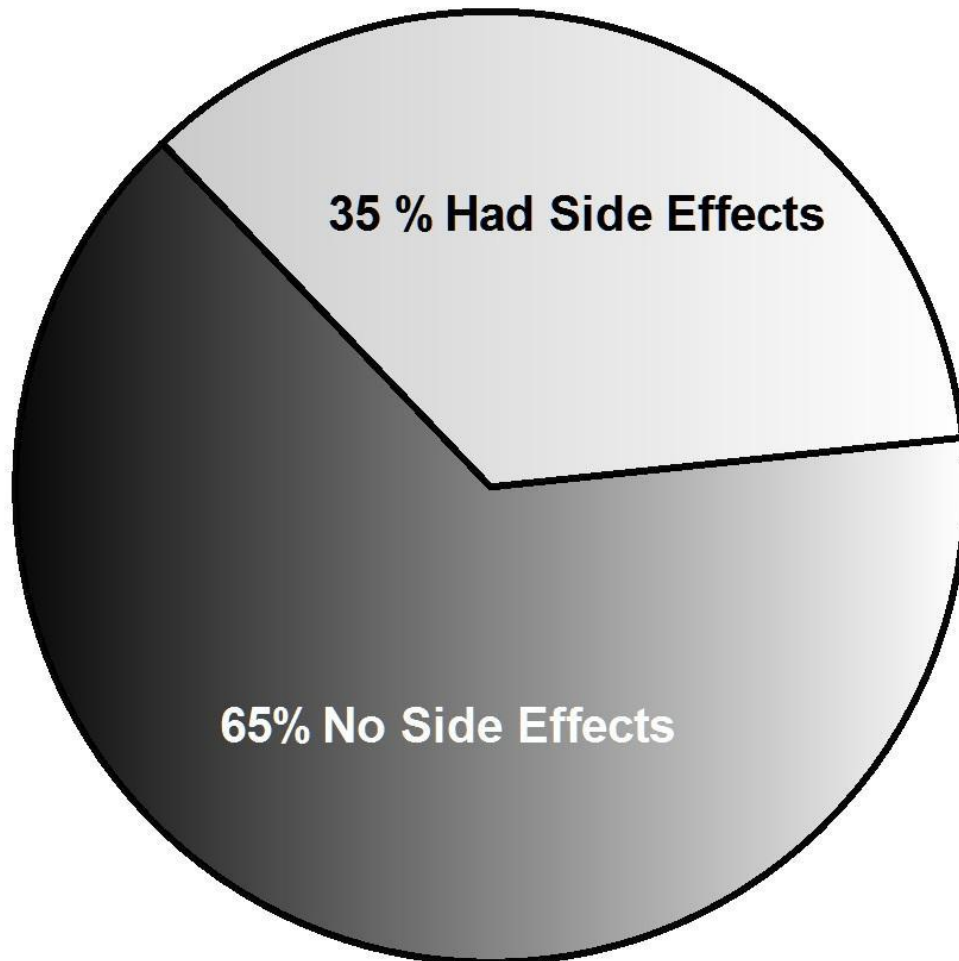


Figure 10. The proportion of participants who were vaccinated that received flu-like symptoms after, compared to those who did not.

We confirmed that people who are vaccinated do experience some side effects. As Figure 10 shows, we found that about one-third of participants reported side-effects, replicated the results of the results of Nichol, Margolis, Lind, Murdoch, McFadden, Hauge, Magnan, & Drake (1996). They administered flu vaccine (424 participants) or saline (425 participants) to randomized groups. They performed baseline tests prior to injections, as well as interviews after the injection. About one-third from each group reported at least one of fever, myalgias, fatigue, malaise or headaches. These results suggest that flu vaccines do in fact cause some flu-like symptoms in some individuals, but that it is not caused by the flu

vaccine itself, but rather a placebo effect, or somehow associated with an inflammatory effect of receiving an injection of any sort.

Side Effects After Vaccination

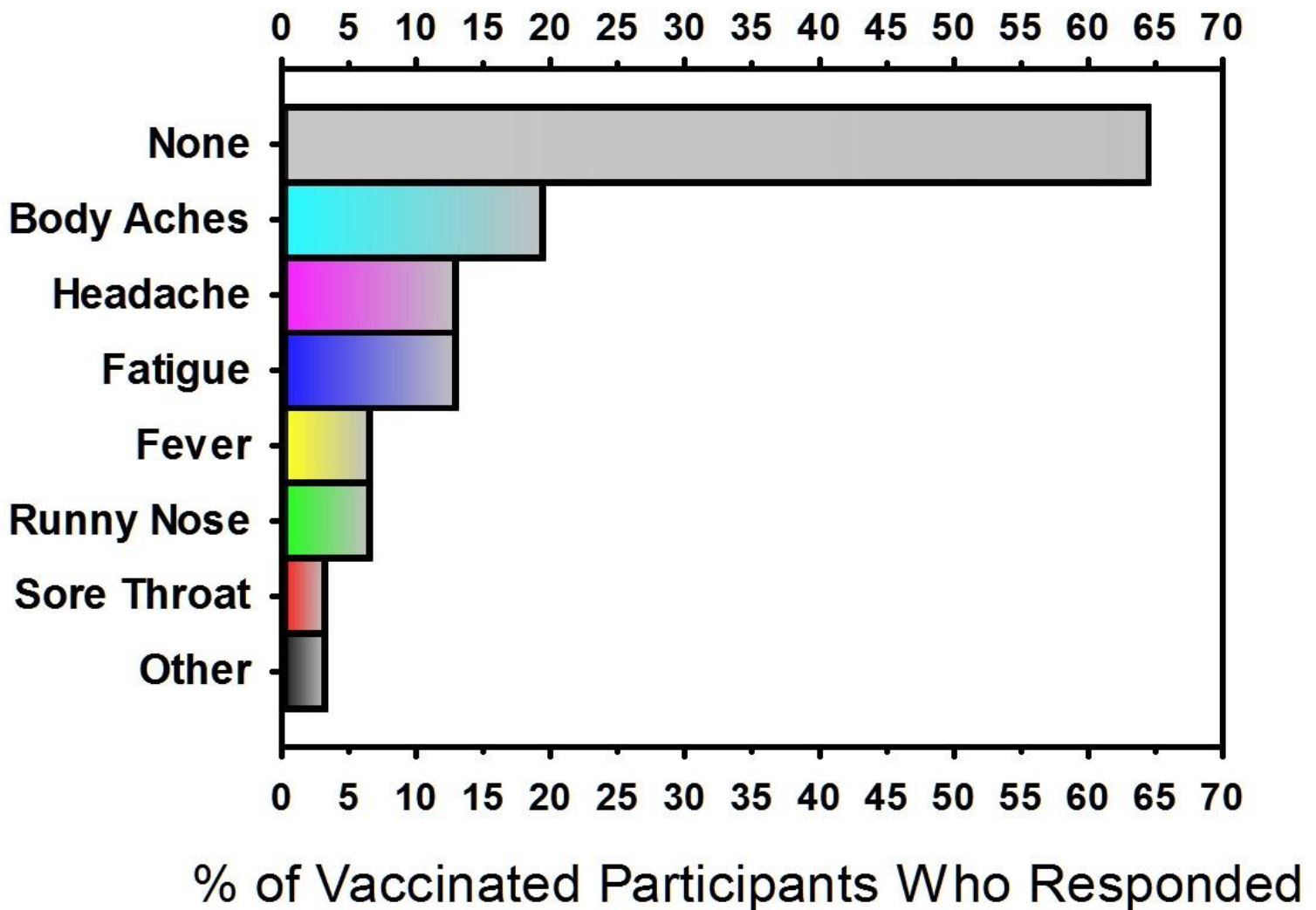


Figure 11. The proportion of different side effects experienced by participants after being vaccinated.

Consistent with results of Nichol et al. (1996) some of our participants reported fatigue, headache, and fever, as can be seen in Figure 11. Additionally some participants reported sore throat, and runny nose. The most popular response was “Body Aches”. One problem with this option on the survey is that it could be interpreted as the pain that comes at the injection site that is common after the vaccination. This is not what we were interested in. A future study could make the options more clear. Additional items that could be added are “General Malaise” and perhaps “Coughing” and “Sneezing”.

Opinions Regarding Flu Vaccines

We asked participants what they thought, regarding the effectiveness of flu vaccines. As Figure 12 shows, the most popular answer, “Sometimes effective at preventing the flu.” was given by 39% (31 of 82) participants. The least number of participants (7% or 6 of 82) believed that vaccines are not effective at preventing flu.

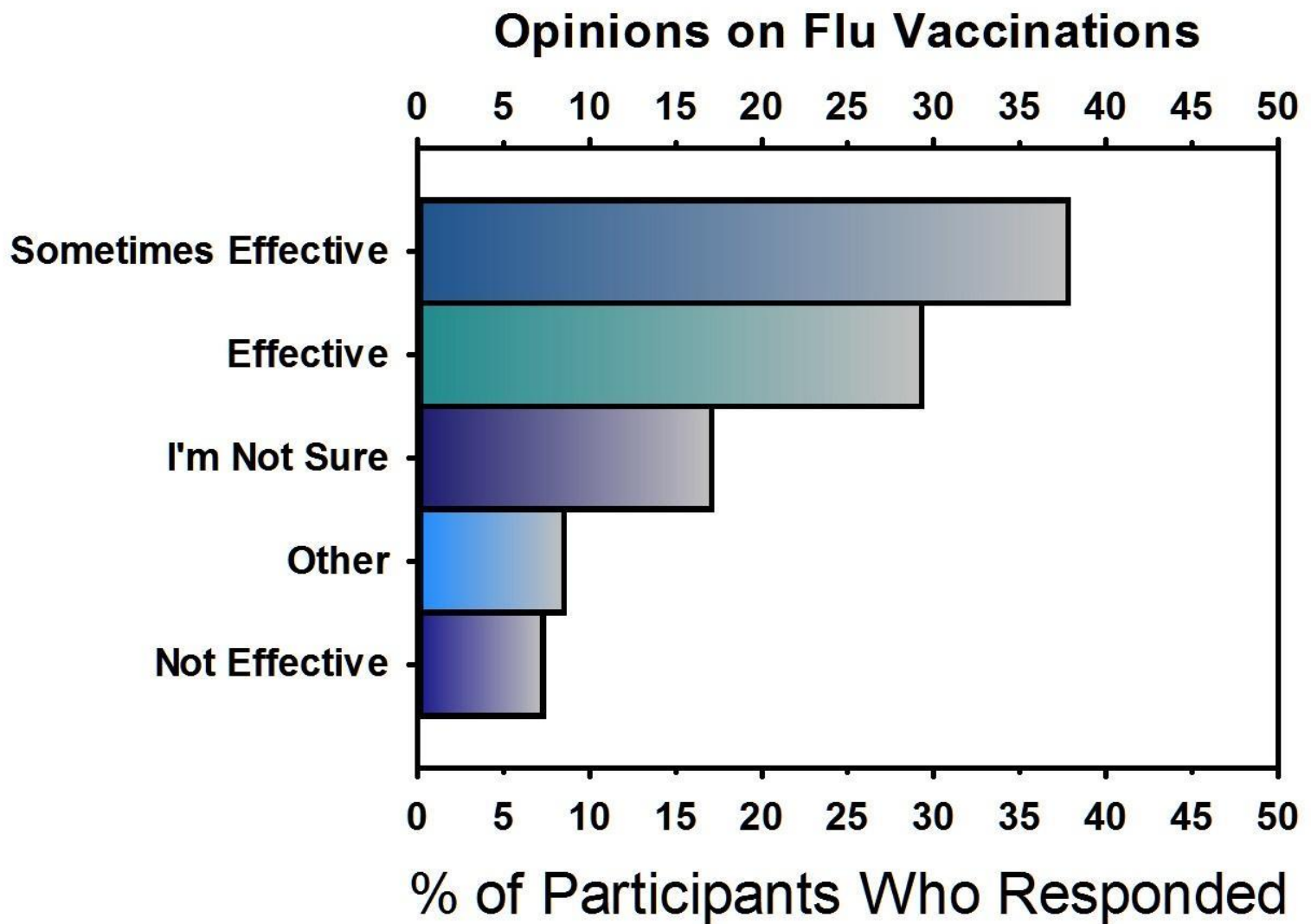


Figure 12. The proportion of different beliefs regarding vaccinations from all participants.

Beliefs about the effectiveness of flu vaccine seemed to have an effect on whether or not people actually chose to get vaccinated, and whether or not they became ill. Participants that either thought vaccines were effective, or sometimes effective, were the majority (55 of 82, 67%), compared to participants that were unsure about vaccines, thought they were ineffective, or “other”. We divided participants into two groups based on their beliefs regarding flu vaccines. Participants that believed vaccines were effective or sometimes effective made up the “Believers” and participants who believed vaccines are ineffective, or are unsure, or “other” made up the “Nonbelievers”. Of the participants that thought vaccines were at least sometimes effective, 53% (29 of 55) became vaccinated, compared to only 15% (4 of 27) of the others groups.

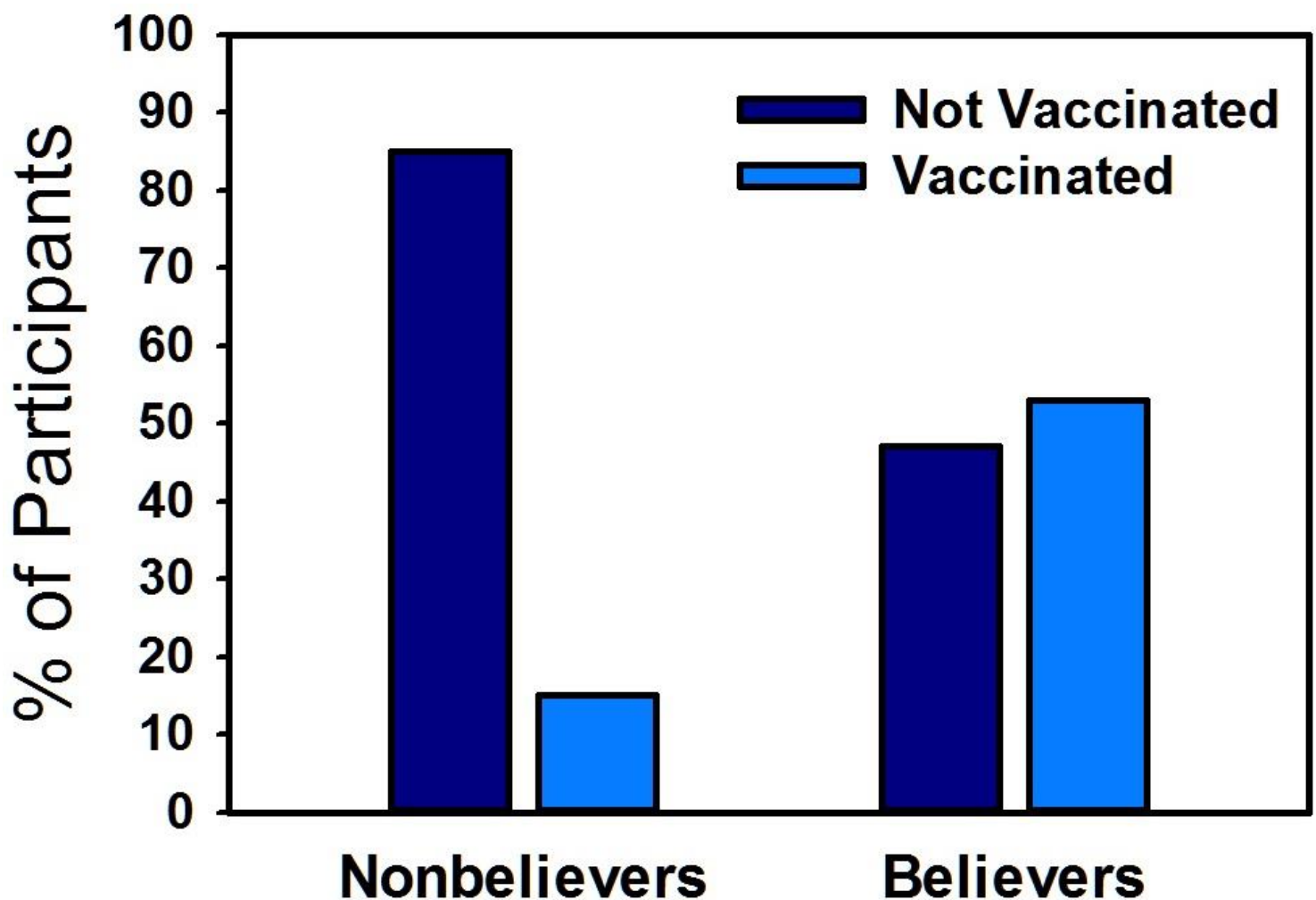


Figure 13. The proportion of participants who received a vaccination or not based on their beliefs regarding vaccinations.

The rate of illness also differed between participants based on their beliefs. Based on the rate of vaccinations, we would expect participants who believed that vaccinations were at least sometimes effective would have a lower rate of illness, because in fact, they were vaccinated more often. Only 16% of participants (9 of 55) that believed vaccinations were at least sometimes effective became ill. In comparison, 69% (9 of 13) of participants who were unsure about flu vaccines or thought they were ineffective, or “other” became ill.

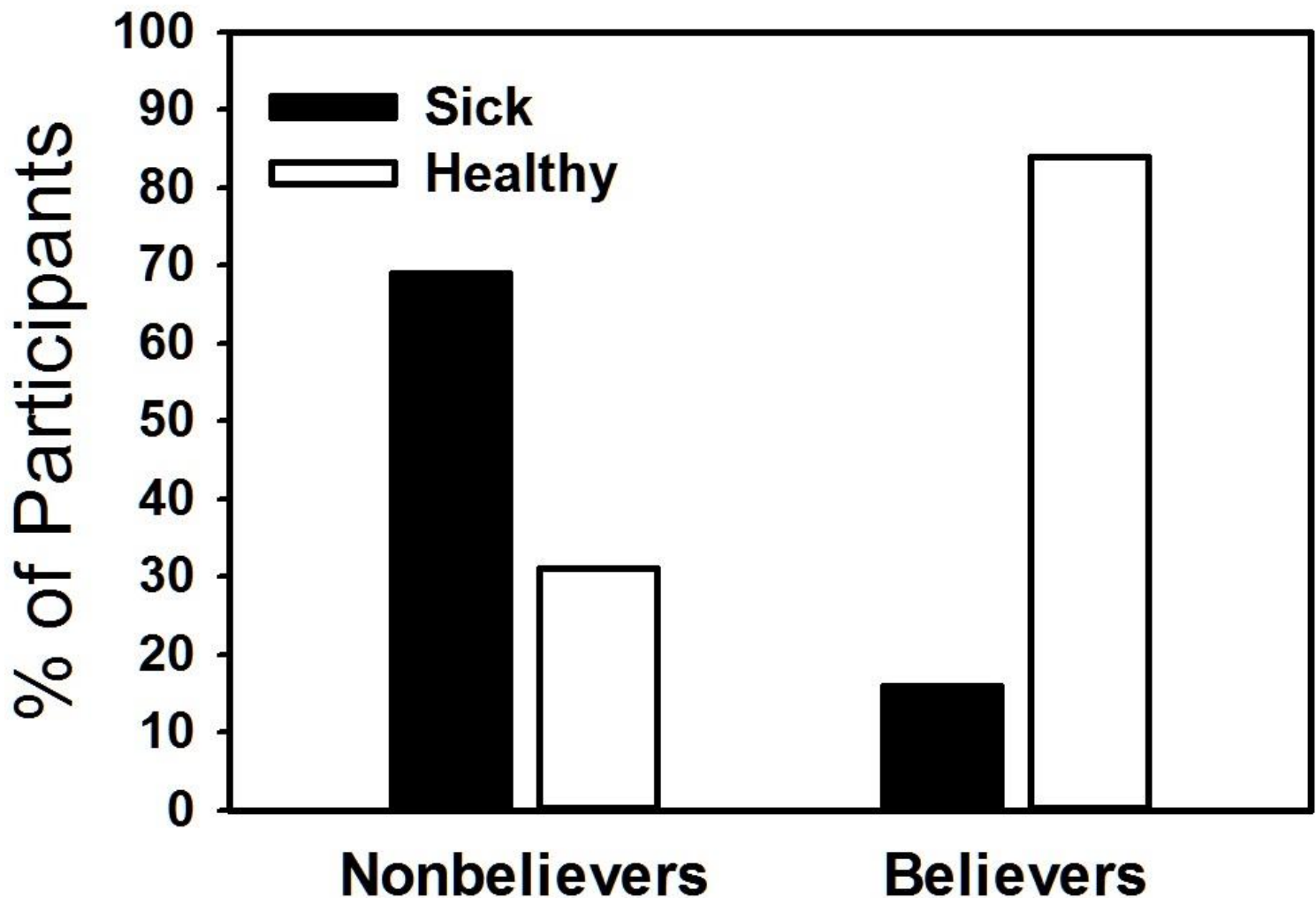


Figure 14. The proportion of different beliefs regarding vaccinations from all participants.

Our results suggest that people’s beliefs on vaccinations have a strong influence on whether or not they get vaccinated. In turn, participants who are unsure about vaccines, believe vaccines are ineffective or “other” are more likely to get the flu. Interpreting why participants chose “other” is somewhat of a mystery because it would seem that the other categories would satisfy all possible beliefs.

An interesting question for a future study would be to examine the rate of illness for believers and nonbelievers who were vaccinated. Even if people don’t believe vaccines work, they may be required to receive one for their profession, or for other reasons. Does simply believing or not believing in the vaccine help to prevent an infection after vaccination? It seems like somewhat of a “Self-fulfilling prophecy” that a study with more data could explore.

Conclusions

From the results of our survey we would conclude several things:

- Out of the determinants of health that we investigated, flu vaccinations are the most effective way to prevent becoming infected with the flu.
- In addition to getting vaccinated, some other factors seem to decrease the chances of becoming ill with the flu.
- People who exercise more, seem to get vaccinated less.
- High levels of vigorous exercise (over 90 minutes a week) may decrease the chance of becoming ill with the flu, especially when paired with a flu vaccination.
- Participants who have an average household income of over \$55,000 are less likely to become infected with the flu.
- Economic status also seemed to be associated with feelings of self-worth and safety of neighbourhood. People with less money had lower self-worth and rated the safety of their neighbourhood lower, compared to those with more money.
- Females in Ontario may have a higher risk of flu infection
- Having a high level of education seems to be associated with a lower rate of illness from flu.
- Feelings of low self-worth seem to increase the chances of flu infection.
- Flu vaccines do cause side effects that could imitate some flu symptoms, in about one-third of participants, but this might just be a placebo effect.
- People's beliefs regarding flu vaccines have a major influence on whether or not they get vaccinated and whether or not they become ill. Participants who believe vaccines prevent illness, get vaccinated more and become ill less.

Recommendations

Based on the results of our survey we would encourage people to get vaccinated. This seems to be the most important and influential factor for preventing flu illness. We would also encourage people to educate themselves about the validity of flu vaccines, and to encourage others to get vaccinated. Additionally, we would encourage people to exercise. Particularly, people should exercise vigorously for over 90 minutes per week. In addition to all of the other health benefits associated with exercise, it seems to make people more resilient to flu infection.

We'd also like to make some additional recommendations, however, we recognize that most people do not have immediate, direct control over certain aspects of their lives, or they are pertain to things most people are already try to acquire. For instance, money and status seem to be good for one's health, and you should try to attain these things. We also recommend you attain a high level of education. People who have higher self-worth may be healthier. Certainly exercising more, as well as attaining more education, status and wealth would contribute to one's self-worth. Additionally, people could increase their self-worth by mastering a skill and joining a group with people who have shared interests.

Although the results of this report did not find vitamin C to be beneficial for preventing flu, there has been enough anecdotal evidence that we would encourage people to try taking a higher dose (2000 mg/day) for a season and seeing if it works for them.

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Appendix A

1. What gender do you most closely identify with?

Male 30
 Female 50
 Other 1
 Total Left Blank 1
 Total Answered 81

2. What is your age?

18-25 48
 26-35 20
 36-45 10
 46-55 2
 56-65 1
 66 and over 0
 Total Left Blank 1
 Total Answered 81

3. What is your approximate annual household income?

\$15,000 or less 21
 \$15,001 - \$25,000 13
 \$25,001 - \$35,000 8
 \$35,000 - \$45,000 5
 \$45,000 - \$55,000 1
 Over \$55,000 34
 Total Left Blank 0
 Total Answered 82

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

Grade 8 or less 1
 Highschool 28
 Trade school or other post-secondary certificate 5
 College or university 39
 Post-graduate degree 8
 Other 1
 Total Left Blank 0
 Total Answered 82

5. Did you receive a flu vaccine in the past year? (Feb. 01, 2014 - Feb. 01, 2015)

Yes	33
No	49
I'm not sure.	0
Total Left Blank	0
Total Answered	82

6. Did you become ill with the flu in the past year?

Yes, after I was vaccinated.	1
Yes and I was not vaccinated.	10
No, and I was vaccinated.	28
No, and I was not vaccinated.	36
I became ill but I'm not confident of the cause of the illness.	6
Other	0
Total Left Blank	1
Total Answered	81

7. If you did not receive a flu vaccine this year, why not? (Select all that apply)

I didn't believe it would be effective at preventing flu.	16
I was concerned about side effects.	6
I didn't believe I would get the flu because I'm healthy enough to fight it off.	14
I don't like getting injections.	6
It was too inconvenient to get one.	10
Other	21
Nonapplicable	25
Total Left Blank	8
Total Answered	74

8. If you received a flu vaccine in the past year (Feb .01, 2014 - Feb. 01, 2015), what side effects did you experience? (Select all that apply).

No side effects.	29
Headache	5
Fatigue	9
Fever or chills	4
Runny nose	2
Sore throat	2
Body aches	6
Other	6
Total Left Blank	36
Total Answered	46

9. What are your beliefs regarding the flu vaccine?

It is effective at preventing the flu.	24
It is sometimes effective at preventing the flu.	31
I'm not sure what to think.	14
Other	7
It is not effective at preventing the flu.	6
Total Left Blank	0
Total Answered	82

10. Research has shown that Vitamin C may help to prevent and treat the flu. How much Vitamin C do you take daily?

I don't take a daily Vitamin C supplement.	51
1-500 mg	16
501-1000 mg	10
1001-1500 mg	4
1501-2000 mg	1
Over 2000 mg	0
Total Left Blank	0
Total Answered	82

11. How agreeable are you with the statement: "I am a healthy individual"?

6 - Very Agreeable	14
5 - Agreeable	40
4 - Somewhat Agreeable	23
3 - Somewhat Disagreeable	4
2 - Disagreeable	1
1 - Very Disagreeable	0
Total Left Blank	0
Total Answered	82

12. How agreeable are you with the statement: "I live in a safe neighbourhood"?

1 - Very Disagreeable	0
2 - Disagreeable	0
3 - Somewhat Disagreeable	2
4 - Somewhat Agreeable	14
5 - Agreeable	39
6 - Very Agreeable	27
Total Left Blank	0
Total Answered	82

13. How agreeable are you with the statement: "I generally have a high level of stress"?

1 - Very Disagreeable	2
2 - Disagreeable	9
3 - Somewhat Disagreeable	17
4 - Somewhat Agreeable	17
5 - Agreeable	27
6 - Very Agreeable	10
Total Left Blank	0
Total Answered	82

14. How agreeable are you with the following statement: "I have support from loving friends and family"?

1 - Very Disagreeable	1
2 - Disagreeable	0
3 - Somewhat Disagreeable	4
4 - Somewhat Agreeable	4
5 - Agreeable	43
6 - Very Agreeable	30
Total Left Blank	0
Total Answered	82

15. How agreeable are you with the following statement: "I am needed in society"?

1 - Very Disagreeable	2
2 - Disagreeable	3
3 - Somewhat Disagreeable	7
4 - Somewhat Agreeable	33
5 - Agreeable	27
6 - Very Agreeable	10
Total Left Blank	0
Total Answered	82

16. How much do you vigorously exercise per week?

1-15 minutes	14
16-30 minutes	11
31-60 minutes	24
91-120 minutes	14
Over 120 minutes	19
Total Left Blank	0
Total Answered	82

Appendix B

**CS 217 Communications for Health Professionals
Formal Report Evaluation**

Process Marks	Marks	Content	Marks
SafeAssign Completion	/1	Introduction:	
		<ul style="list-style-type: none"> • clear purpose, scope, and sources/methods • Historical/Background Information 	/10 /10
Overall design	/4	Body:	
Rough Copy	/10	Structure	
		<ul style="list-style-type: none"> • good audience focus • good flow of ideas • ideas clearly expressed • effective integration of visuals • use/placement of headings • appropriate level of writing 	/15
Prefatory Parts	Marks		
Cover Page	/2		
Title Page	/3		
Memo of Transmittal	/5	Research Integration:	
Table of Contents	/3	<ul style="list-style-type: none"> • thorough research • convincing evidences 	/15 /15
List of Illustrations/Tables/Figures	/2		
Executive Summary	/5	<ul style="list-style-type: none"> • integration of primary and secondary sources 	/15
Appendices	/5	Conclusions/Recommendations:	
		<ul style="list-style-type: none"> • conclusions based on body analysis • recommendations clearly linked with conclusions and logical steps 	/10 /10
APA Documentation	Marks		
<ul style="list-style-type: none"> • appearance and format • proper in-text citation technique • proper reference page format/citation 	/10	TOTAL:	
		_____	/160
Grammar	Marks		
Punctuation, fragments, run-ons/comma splices, awkward sentence structure, subject-verb agreement, verb form/tense, adjective/adverb usage, prepositions, misused words, spelling, pronoun usage/agreement, misplaced/dangling modifiers.	/10		