



Herd Immunity and You

Brooke Czapkowski (Biology), Jocelyn Pitman (Physics),
 Brenna Pugliese (Biology), Emily Zalewski (Biomedical Engineering)
 Advisors: Professor Jill Rulfs (Biology), Professor Helen Vassallo (Management)

Survey Email

Hello,
 My name is Brenna Pugliese and I am contacting you on behalf of my GPS Heal the World project group. We are investigating the feasibility of running a simulation on the WPI campus to demonstrate the impact of herd immunity on seasonal influenza virus infection rates. To this end, we are gathering data about the WPI student community and the flu. Please help us by taking a **minute to answer 10 quick multiple choice questions**. If you'd like more information about topics discussed in the survey, see the information below the link.

This survey is an integral part of our project and we would greatly appreciate your participation. Feel free to reply to this email with questions, comments, or suggestions. Thank you for your help!

(survey link)

What is Herd Immunity?

•Herd immunity occurs when a large portion of a population is vaccinated against a specific disease. The collective immunity of the vaccinated group provides protection to the unvaccinated individuals in the population.

•In order to achieve herd immunity, about 75% to 80% of the total population must be vaccinated. The population in the scope of our project is the WPI student community.

What are my options for the Seasonal Flu Vaccine?

•The traditional flu shot is an inactivated vaccine which contains killed flu virus. This type of vaccination is appropriate for use among people beyond 6 months of age, including both those who are healthy *and* those with chronic medical conditions.

•The nasal-spray vaccine uses a live, attenuated flu virus. This means that the virus has been weakened to a point where one's body still recognizes the virus as a foreign substance. The body mounts an immune response, but the virus cannot cause illness. The nasal-spray vaccine is approved for use only in healthy people between the ages of 2 and 49 who are not pregnant at the time of vaccination.

Sincerely,
 Brenna Pugliese
 WPI Class of 2013

Survey Questions

- Are you a(n) undergraduate/graduate student?
- Are you male or female?
- Do you live on campus?
- Have you ever had the seasonal flu?
- Did you receive a seasonal flu vaccine this fall?
- Do you usually receive the seasonal flu vaccine annually?
- Have any of the following conditions/reasons inhibited you from receiving a flu vaccination this year?
 (Multiple answers accepted)
 - Religion
 - Medical
 - Availability
 - Possible Vaccine Dangers
 - Other
- Have you received the H1N1 vaccine this year?
- Are you actively trying to get the H1N1 vaccine?
- Would you consider participating in an on-campus simulation of herd immunity to a communicable disease such as the flu?

Possible Simulation Outcomes

Student Name	Day One AM Status	Day One PM Status	Day Two AM Status	Day Two PM Status
Stephen Colbert	Not Vaccinated	Healthy	Not Vaccinated	Healthy
James Bond	Not Vaccinated	Infected	Not Vaccinated	Healthy
Hilary Clinton	Infected	Infected	Infected	Infected
Oprah Winfrey	Vaccinated	Vaccinated	Vaccinated	Vaccinated
Jay Leno	Not Vaccinated	Healthy	Not Vaccinated	Infected
Barack Obama	Not Vaccinated	Infected	Not Vaccinated	Infected

Acknowledgements

Giles Chickering for his help creating our T-shirts.

Need

Need: to educate college students about the importance of herd immunity
 •specifically the seasonal flu

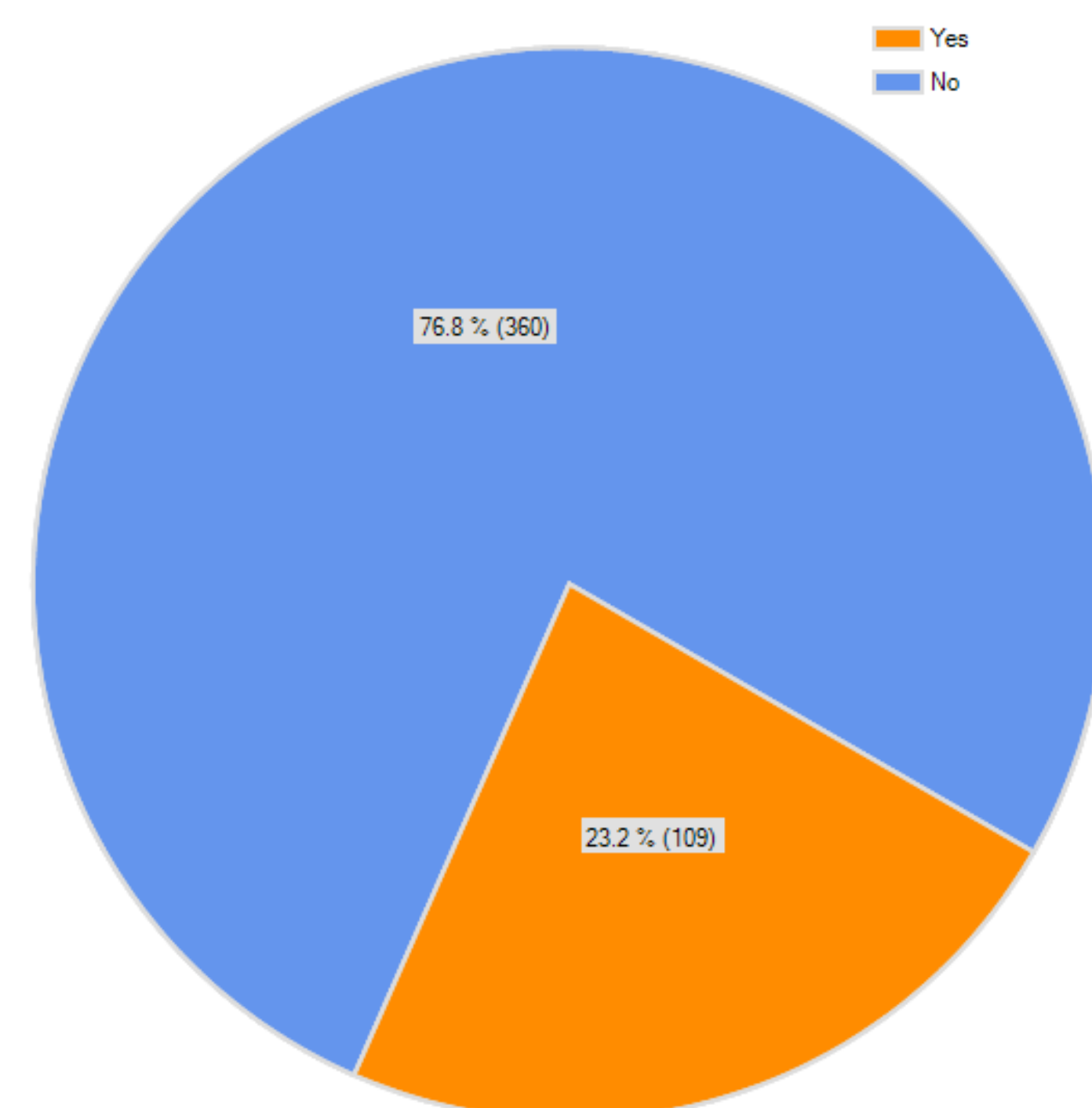
Approach

Approach: investigate whether a flu outbreak simulation would encourage WPI students to receive the seasonal flu vaccine

- Execute online survey
 - Prior vaccination history
 - Received/actively seeking Seasonal Flu/H1N1 vaccine
 - Participation in simulation
- Send email which educates students about the importance of herd immunity
 - Herd immunity and flu vaccine background information
- Plan a simulation which would be run on the WPI campus
 - Complete with proportions for herd immunity success

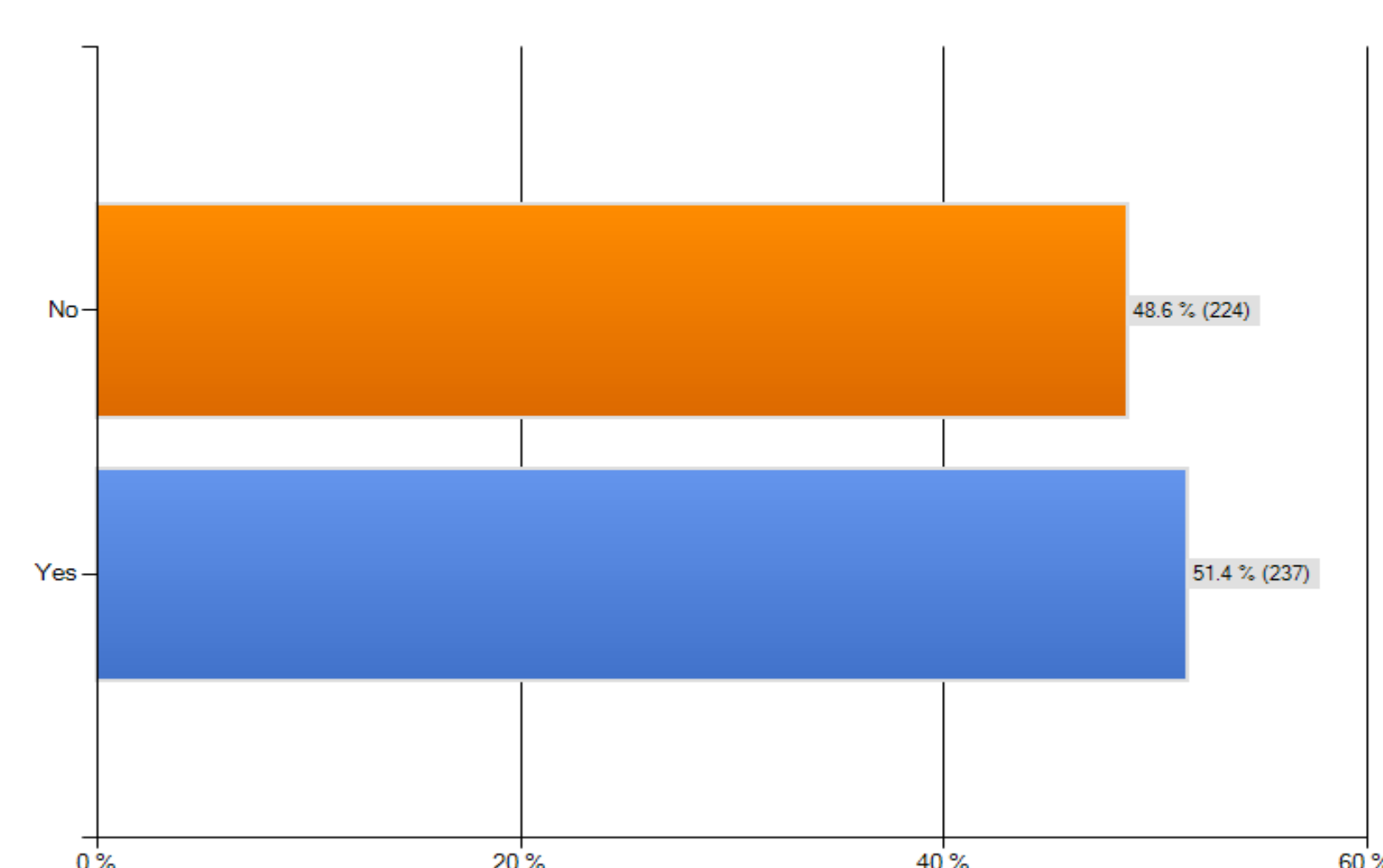
Question 6 Response

Do you usually receive the seasonal flu vaccine annually?



Question 10 Response

Would you consider participating in an on-campus simulation of herd immunity to a communicable disease such as the flu?



Herd Immunity

- Vaccinating a portion of a population to provide additional protection to the unvaccinated
 - 75%-80% must be vaccinated for success
- Only a small percentage of the population can be left unvaccinated
 - Those who cannot safely receive vaccines due to medical conditions
 - Can help reduce the spread of disease to the unimmunized
- Difficult for a contagious disease to maintain a chain of infection if a large percentage of a population has been immunized
- The higher the percentage of immunized people, the lower the likelihood that a susceptible person will come into contact with an infected individual

Simulation

Location:

•Campus-wide

Time span:

•Two days; day one "without herd immunity," day two "with herd immunity"

Day One (without herd immunity) Set Up:

- All participants who are "not vaccinated" (including those "infected") are given sheets of red stickers
- 68% of participants are given blue stickers to wear (indicating they are not vaccinated)
- 22% of participants are given green wristbands (indicating they are vaccinated)
- 10% of participants begin as "infected with the flu," wearing red stickers
- Participants will be given materials the day prior to the start of the simulation

Simulation Procedure (Applicable to Day One and Day Two):

- Simulation begins at 8:00AM, and administrators will record initial status.
- When those who are "infected" see those who are "not vaccinated," they place a red sticker on them and inform them that they are now "infected."
- Once those who were "not vaccinated" become "infected," they are able use their red stickers to infect others who remain "not vaccinated."
- Those who are "vaccinated" are "safe" and cannot become "infected" with the flu by having a red sticker placed on them.
- Simulation ends at midnight.
- Participants must email their status (if they are "infected," "healthy," or "vaccinated") to the simulation administrators.

Materials:

- Each participant is given a t-shirt to wear in order to identify themselves as an active participant in the simulation.
- Red stickers
- Blue stickers
- Green wristbands

Day Two (with herd immunity) Set Up:

- All participants who are "not vaccinated" (including those "infected") are given sheets of red stickers
- 10% of participants are given blue stickers to wear (indicating they are not vaccinated)
- 80% of participants are given green wristbands (indicating they are vaccinated)
- 10% of participants begin as "infected with the flu," wearing red stickers

T-Shirt Design



← Front

Back →

Don't You Want To
Run With The Herd?

Influenza

What is Influenza (Also Called Flu)?

- Infectious respiratory virus
- Mild to severe infection, can lead to death

How Does the Flu Spread?

- Person to person
- Touching a contaminated object and then touching one's nose or mouth

How do Immunizations Work?

- Contain either a dead or attenuated pathogen that causes a particular disease
- The body practices fighting the disease by making antibodies that recognize the pathogen
- The antibodies allow the body to quickly combat the virus
- Lead to immunity

Will the immunization give someone the very disease it's supposed to prevent?

- It is *impossible* to contract the disease from any vaccine made with dead (killed) bacteria or viruses

Who Should Get Vaccinated Against Seasonal Flu?

- Children aged 6 months up to their 19th birthday
- Pregnant women
- People 50 years of age and older
- People of any age with certain chronic medical conditions
- People who live with — or care for — those at high risk for complications from the flu

References

"CDC - Seasonal Influenza (Flu)." *Centers for Disease Control and Prevention*. Web. 15 Nov. 2009. <<http://www.cdc.gov/flu/>>.

"Frequently Asked Questions About Immunizations." *KidsHealth - the Web's most visited site about children's health*. Web. 22 Nov. 2009. <http://kidshealth.org/parent/general/body/fact_myth_immunizations.html>.

Gardner, Sheila. "Herd immunity protects public from flu." *The Record-Courier* [Gardnerville, Nevada] 9 Oct. 2009: n. pag. Web. 16 Nov. 2009. <<http://apps.recordcourier.com/utills/uincludes/privacypolicy.php>>.

"Herd immunity - animation." *Immunisation*. Ed. Joanne Yarwood and Chris Owen. National Health Service, 2008. Web. 16 Nov. 2009. <http://www.immunisation.nhs.uk/about_immunisation/science/herd_immunity_-_animations>.

"Herd immunity." *Wikipedia, The Free Encyclopedia*. 19 Nov 2009, 15:09 UTC. 16 Nov 2009 <https://en.wikipedia.org/w/index.php?title=Herd_immunity&oldid=3_26740885>.

John, T Jacob, and Reuben Samuel. "Herd immunity and herd effect: new insights and definitions." *European Journal of Epidemiology* 16.7 (2000): 601-606. Abstract. *Springerlink*. Web. 16 Nov. 2009. <<http://www.springerlink.com/content/g65222662v6w5h34/>>.