E. coli resistance patterns from Community Resistance in Athens Project

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The structure below is a possible setup for a data analysis project (including the course project). For a manuscript, adjust as needed.

# 1 Summary/Abstract

*Write a summary of your project.* For this project, I will analyze the data I have collected from my time as a lab technician in the Community Resistance in Athens Project on the antibiotic resistance carriage rates of *E. coli* from Athens residents and see if there is a relationship between resistance and diet of the participants in the study.

# 2 Introduction

## 2.1 General Background Information

*Provide enough background on your topic that others can understand the why and how of your analysis*

As microbes are evolving to resist the drugs we commonly use to treat infections, antibiotic resistance is becoming a rapidly growing health threat worldwide. The Community Resistance in Athens Project seeks to better understand carriage rates of multi-drug resistant *E. coli* such as extended spectrum beta lactamase-producing Enterobacteriaceae and carbapenem resistant Enterobacteriaceae. In addition, the CRAP project is gathering data on the resistance patterns of *E. coli* from individuals in Athens. The data I will be using is a combination of microbiological data that I have collected and the epidemiological data from the survey. The microbiological data quantifies the resistance patterns of *E. coli* from individuals to different antibiotics. The survey queries the study participants on a variety of personal and lifestyle questions, including drinking water sources, diet, economic information, etc.

## 2.2 Description of data and data source

*Describe what the data is, what it contains, where it is from, etc. Eventually this might be part of a methods section.*

The data from this project comes from a collaborative effort between the CDC, UGA’s Genetics, Environmental Health, Microbiology, and Epidemiology departments, the USDA, and the UGA Clinical and Translational Research Unit. From participants, we collect a stool sample, take a small diluted aliquot, and grow its *E. coli* on on selective agar. I further purify these isolates, then test 48 or less from each sample, provided *E. coli* grows, onto different agar plates containing either ampicillin, tetracycline, ceftriaxone, ciprofloxacin, or trimethoprim. As lab technician for the CRAP project, I have recorded the data on the *E. coli* resistance patterns to various antibiotics myself. The data on food consumption, animal contact, and the other epidemiological data comes from a survey each of the participants must take as a part of the study. This survey is IRB approved and survey and sample collection are organized by the Clinical and Translational Research Unit at the University of Georgia. We have data from approximately 300 individuals at this point (with the ultimate goal being 550), and the resistance patterns of approximately 13,000 *E. coli* isolates. We have already made figures for basic questions concerning this data, like what proportions of the study population that show resistance to each antibiotic type and demographics, so I would like to focus on environmental and behavioral factors.

## 2.3 Questions/Hypotheses to be addressed

*State the research questions you plan to answer with this analysis.*  
For this project, we have already observed the general resistance patterns and carriage rates of *E. coli*, so I would like to see if there is a relationship between the resistance patterns and the diet of the individuals. Some researchers presume that commensal gut bacteria act as reservoirs for genes with antibiotic resistance, which could lead to horizontal gene transfer and possibly the development of dangerous multi-drug resistant bacteria (Mathur, et. al). There is abundant research on antibiotic resistance exposure in healthcare settings, and there is a gap in knowledge on everyday exposures, like food. There is evidence that bacteria from fermented dairy and meat commonly carry AR gene (Mathur, et.al). In addition, according to the CDC, raw fruits and vegetables may be contaminated by soil and water (CDC 2020). With respect to this information, I have a few questions.

* Do individuals who eat meat more than half of the days in the last week have higher resistance than do those who do not?
* Do individuals who eat dairy more than half of the days in the last week have higher resistance than do those who do not?
* Do individuals who eat raw fruits or vegetables more than half of the days in the last week have higher resistance than do those who do not?

In addition to these questions, I am interested in the following, if I have time:

* Are resistance patterns influenced temporally?
* Are individuals with exposure to animals (pets, cattle, etc.) have higher resistance patterns than those who do not?
* In there any relationship between resistance of *E. coli* in an individual and the age of the participant?

# 3 Methods and Results

*In most research papers, results and methods are separate. You can combine them here if you find it easier. You are also welcome to structure things such that those are separate sections.*

## 3.1 Data aquisition

*As applicable, explain where and how you got the data. If you directly import the data from an online source, you can combine this section with the next.* This is partly explained in the “Description of data and data source” section. In addition, the resistance patterns will be in a single csv file that I create from an excel sheet. The information on food consumption has been cleaned by another member of the CRAP team and he will share the information with my promptly. It will also be in a csv file.

## 3.2 Data import and cleaning

*Write code that reads in the file and cleans it so it’s ready for analysis. Since this will be fairly long code for most datasets, it might be a good idea to have it in one or several R scripts. If that is the case, explain here briefly what kind of cleaning/processing you do, and provide more details and well documented code somewhere (e.g. as supplement in a paper). All materials, including files that contain code, should be commented well so everyone can follow along.*

#load needed packages. make sure they are installed.  
#library(readxl) #for loading Excel files. My data is a CSV.  
library(dplyr) #for data processing

## Warning: package 'dplyr' was built under R version 4.0.5

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

library(here) #to set paths

## Warning: package 'here' was built under R version 4.0.5

## here() starts at C:/Users/algla/OneDrive/Desktop/MADA/AMANDAGLATTER-MADA-project

library(lubridate) #for dates

## Warning: package 'lubridate' was built under R version 4.0.5

##   
## Attaching package: 'lubridate'

## The following objects are masked from 'package:base':  
##   
## date, intersect, setdiff, union

library(tidyr) #for cleaning

## Warning: package 'tidyr' was built under R version 4.0.5

#path to data  
#note the use of the here() package and not absolute paths  
data\_location <- here::here("data","raw\_data","ARP\_raw.csv")  
  
#load data.   
#note that for functions that come from specific packages (instead of base R)  
# I often specify both package and function like so  
#package::function() that's not required one could just call the function  
#specifying the package makes it clearer where the function "lives",  
#but it adds typing. You can do it either way.  
  
rawdata <- read.csv(data\_location)  
  
#take a look at the data  
dplyr::glimpse(rawdata)

## Rows: 285  
## Columns: 42  
## $ fake\_id <chr> "F-108", "F-125", "F-~  
## $ recorded\_date <chr> "1/18/2021 8:00", "1/~  
## $ numeric\_age <int> 35, 40, 26, 20, 22, 6~  
## $ biological\_sex <chr> "Female", "Male", "Fe~  
## $ race <chr> "White", "White", "Bl~  
## $ multiple\_antibiotics\_past\_year <chr> "No", "No", "No", "No~  
## $ healthcare\_exposure <chr> "Doctorâ\200\231s off~  
## $ additional\_house\_members <chr> "4", "3", "3", "more ~  
## $ regular\_healthcare\_exposure <chr> "No", "Yes", "No", "N~  
## $ regular\_animal\_exposure <chr> "No", "No", "No", "No~  
## $ pets <chr> "Dogs", "Dogs", "Dogs~  
## $ international\_travel\_past\_month <chr> "No", "No", "No", "No~  
## $ treated\_recreational\_water\_exposure\_past\_week <int> 0, 0, 0, 0, 0, 0, 0, ~  
## $ treated\_recreational\_water\_exposure\_past\_month <int> 0, 0, 0, 0, 0, 0, 0, ~  
## $ untreated\_recreational\_water\_exposure\_past\_week <int> 0, 0, 0, 0, 0, 0, 0, ~  
## $ untreated\_recreational\_water\_exposure\_past\_month <int> 0, 0, 0, 1, 0, 0, NA,~  
## $ eat\_poultry\_past\_week <int> 5, 2, 4, 1, 5, 3, 5, ~  
## $ eat\_pork\_or\_beef\_past\_week <int> 2, 2, 2, 3, 1, 2, 2, ~  
## $ eat\_fish\_or\_shellfish\_past\_week <int> 0, 1, 1, 2, 0, 0, 0, ~  
## $ eat\_dairy\_past\_week <int> 7, 1, 1, 7, 7, 5, 3, ~  
## $ eat\_raw\_fruits\_or\_vegetables\_past\_week <int> 5, 0, 1, 3, 0, 2, 0, ~  
## $ esbl <chr> "Negative", "Positive~  
## $ cre <chr> "Negative", "Negative~  
## $ age <chr> "Adult", "Adult", "Ad~  
## $ ecoli\_cultured <chr> "Yes", "Yes", "Yes", ~  
## $ total\_isolates <int> 48, 48, 48, 48, 0, 48~  
## $ amp\_resistant\_isolates <dbl> 0.5, 0.0, 2.0, 0.0, 0~  
## $ ceft\_resistant\_isolates <dbl> 0, 0, 0, 0, 0, 0, 0, ~  
## $ cipro\_resistant\_isolates <dbl> 0, 0, 0, 0, 0, 0, 0, ~  
## $ tetra\_resistant\_isolates <dbl> 0.0, 0.0, 0.0, 0.0, 0~  
## $ trimet\_resistant\_isolates <dbl> 0.0, 0.0, 0.0, 0.0, 0~  
## $ half\_total\_isolates <dbl> 24, 24, 24, 24, 0, 24~  
## $ amp\_high <chr> "No", "No", "No", "No~  
## $ ceft\_high <chr> "No", "No", "No", "No~  
## $ cipro\_high <chr> "No", "No", "No", "No~  
## $ tetra\_high <chr> "No", "No", "No", "No~  
## $ trimet\_high <chr> "No", "No", "No", "No~  
## $ amp\_any <chr> "Yes", "No", "Yes", "~  
## $ ceft\_any <chr> "No", "No", "No", "No~  
## $ cipro\_any <chr> "No", "No", "No", "No~  
## $ tetra\_any <chr> "No", "No", "No", "No~  
## $ trimet\_any <chr> "No", "No", "No", "No~

#Next, I'll clean up the date column. Below, I set each column into the  
#date the stool sample is produced and the time the stool sample was produced.  
#I am also making sure the columns are read as dates and times as opposed  
#to characters.  
#For this, I will use the lubridate package.  
cleandata <- rawdata %>% separate(recorded\_date, into = c(  
 "date\_produced","time\_produced"), sep = " ")  
cleandata$date\_produced <- mdy(cleandata$date\_produced)  
cleandata$time\_produced <- hm(cleandata$time\_produced)  
  
  
#Looking at the column "pets," I can see that there is an excess of words for  
#the "no" category, so I want to simplify that as "No".  
#I'd also like to make an additional column of "Yes" pets and "No".  
  
cleandata <- mutate(cleandata, has\_pets = ifelse(grepl(  
 "I do not live with any companion animals", pets), "No", "Yes"))  
  
#Later, I will move this column to the right of the "pets" column (currently 11).  
  
#I want to see all unique values in the pets column.  
unique(cleandata$pets)

## [1] "Dogs"   
## [2] "Cats,\tDogs"   
## [3] "Reptiles"   
## [4] "Cats,\tDogs,Rodents/Small Mammals"   
## [5] "Cats"   
## [6] "I do not live with any companion animals"   
## [7] "Cats,Rodents/Small Mammals"   
## [8] "Rodents/Small Mammals"   
## [9] "Other"   
## [10] "Cats,Reptiles"   
## [11] "Cats,\tDogs,Other"   
## [12] "Dogs,Reptiles"   
## [13] "Dogs,Other"   
## [14] "Cats,\tDogs,\tBirds"   
## [15] "Cats,\tDogs,Reptiles"   
## [16] "Cats,\tDogs,\tBirds,Reptiles,Rodents/Small Mammals,Other"

#After looking at this, I want to create a column that indicates if a  
#person has a dog or a cat.  
  
cleandata <- mutate(cleandata, cat\_andor\_dog =ifelse(grepl(  
 "Cats|Dogs", pets), "Yes",  
 "No"))  
  
#Similarly to the animal data, I want to make a column for medical exposure that  
#is only the yes and no of exposure to healthcare settings. Then I want to move  
#this column to column 8.  
  
cleandata <- mutate(cleandata, healthcare\_exposure\_yn =ifelse(grepl(  
 "No, I do not have regular exposure to healthcare environments", healthcare\_exposure), "No",  
 "Yes"))  
  
  
#Now I want to do some rearranging.  
#Now I want to rearrange the columns so pets is in the 12th column and   
#cat\_andor\_dog is the 13th.  
#I want to move the y/n exposure to healthcare environment regularly to  
#beside healthcare\_exposure  
  
cleandata <- cleandata[,c(1:8, 46, 9:12, 44,45, 13:43)]  
  
#I'm also removing the column half\_total\_isolates because I see no use for it.  
#Delete time sample produced, age column (because there is already a numeric age column).  
  
cleandata <- cleandata[-c(36, 3, 28)]  
  
  
#Another thing I am considering is removing any columns that have "No" in the   
#ecoli\_cultured column because we cannot study the antibiotic patterns of  
#the samples that do not produce E. coli. I will revisit this idea later because  
#it may be dangerous to delete large chunks of data like that.

## 3.3 Exploratory analysis

###############################  
# analysis script  
#  
#this script loads the processed, cleaned data, does a simple analysis  
#and saves the results to the results folder  
  
#load needed packages. make sure they are installed.  
library(ggplot2) #for plotting

## Warning: package 'ggplot2' was built under R version 4.0.5

library(broom) #for cleaning up output from lm()

## Warning: package 'broom' was built under R version 4.0.5

library(here) #for data loading/saving  
library(dplyr) #for data wrangling  
library(reshape) #for reshaping and melting data

##   
## Attaching package: 'reshape'

## The following objects are masked from 'package:tidyr':  
##   
## expand, smiths

## The following object is masked from 'package:lubridate':  
##   
## stamp

## The following object is masked from 'package:dplyr':  
##   
## rename

library(tidymodels) #for modeling

## Warning: package 'tidymodels' was built under R version 4.0.5

## Registered S3 method overwritten by 'tune':  
## method from   
## required\_pkgs.model\_spec parsnip

## -- Attaching packages -------------------------------------- tidymodels 0.1.4 --

## v dials 0.0.10 v rsample 0.1.0   
## v infer 1.0.0 v tibble 3.1.5   
## v modeldata 0.1.1 v tune 0.1.6   
## v parsnip 0.1.7 v workflows 0.2.4   
## v purrr 0.3.4 v workflowsets 0.1.0   
## v recipes 0.1.17 v yardstick 0.0.8

## Warning: package 'dials' was built under R version 4.0.5

## Warning: package 'scales' was built under R version 4.0.5

## Warning: package 'infer' was built under R version 4.0.5

## Warning: package 'modeldata' was built under R version 4.0.5

## Warning: package 'parsnip' was built under R version 4.0.5

## Warning: package 'recipes' was built under R version 4.0.5

## Warning: package 'rsample' was built under R version 4.0.5

## Warning: package 'tibble' was built under R version 4.0.5

## Warning: package 'tune' was built under R version 4.0.5

## Warning: package 'workflowsets' was built under R version 4.0.5

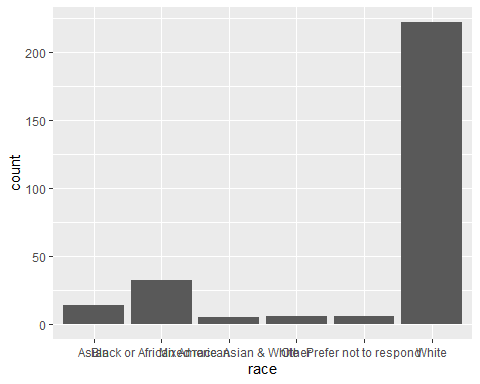
## Warning: package 'yardstick' was built under R version 4.0.5

## -- Conflicts ----------------------------------------- tidymodels\_conflicts() --  
## x purrr::discard() masks scales::discard()  
## x reshape::expand() masks tidyr::expand()  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()  
## x reshape::rename() masks dplyr::rename()  
## x recipes::step() masks stats::step()  
## \* Search for functions across packages at https://www.tidymodels.org/find/

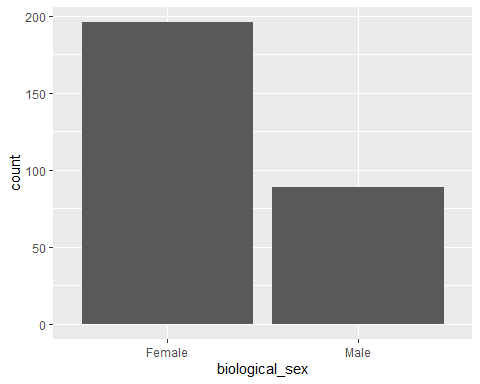
#path to data  
#note the use of the here() package and not absolute paths  
data\_location <- here::here("data","processed\_data","processeddata.rds")  
  
#load data.   
mydata <- readRDS(data\_location)  
  
######################################  
#Data exploration/description  
######################################  
#I'm using basic R commands here.  
#Lots of good packages exist to do more.  
#For instance check out the tableone or skimr packages  
  
#summarize data   
mysummary = summary(mydata)  
  
#look at summary  
print(mysummary)

## fake\_id date\_produced numeric\_age biological\_sex   
## Length:285 Min. :2021-01-18 Min. :18.00 Length:285   
## Class :character 1st Qu.:2021-03-16 1st Qu.:24.50 Class :character   
## Mode :character Median :2021-05-03 Median :35.00 Mode :character   
## Mean :2021-05-04 Mean :39.74   
## 3rd Qu.:2021-06-21 3rd Qu.:52.00   
## Max. :2021-08-03 Max. :86.00   
## NA's :6   
## race multiple\_antibiotics\_past\_year healthcare\_exposure  
## Length:285 Length:285 Length:285   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## healthcare\_exposure\_yn additional\_house\_members regular\_healthcare\_exposure  
## Length:285 Length:285 Length:285   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## regular\_animal\_exposure pets has\_pets   
## Length:285 Length:285 Length:285   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## cat\_andor\_dog international\_travel\_past\_month  
## Length:285 Length:285   
## Class :character Class :character   
## Mode :character Mode :character   
##   
##   
##   
##   
## treated\_recreational\_water\_exposure\_past\_week  
## Min. :0.0000   
## 1st Qu.:0.0000   
## Median :0.0000   
## Mean :0.2359   
## 3rd Qu.:0.0000   
## Max. :7.0000   
## NA's :1   
## treated\_recreational\_water\_exposure\_past\_month  
## Min. : 0.0000   
## 1st Qu.: 0.0000   
## Median : 0.0000   
## Mean : 0.8826   
## 3rd Qu.: 0.0000   
## Max. :20.0000   
## NA's :4   
## untreated\_recreational\_water\_exposure\_past\_week  
## Min. :0.0000   
## 1st Qu.:0.0000   
## Median :0.0000   
## Mean :0.2014   
## 3rd Qu.:0.0000   
## Max. :6.0000   
## NA's :2   
## untreated\_recreational\_water\_exposure\_past\_month eat\_poultry\_past\_week  
## Min. : 0.0000 Min. :0.000   
## 1st Qu.: 0.0000 1st Qu.:2.000   
## Median : 0.0000 Median :3.000   
## Mean : 0.8121 Mean :2.736   
## 3rd Qu.: 0.0000 3rd Qu.:4.000   
## Max. :21.0000 Max. :7.000   
## NA's :3 NA's :1   
## eat\_pork\_or\_beef\_past\_week eat\_fish\_or\_shellfish\_past\_week eat\_dairy\_past\_week  
## Min. :0.000 Min. :0.000 Min. :0.000   
## 1st Qu.:1.000 1st Qu.:0.000 1st Qu.:3.000   
## Median :2.000 Median :1.000 Median :5.000   
## Mean :1.996 Mean :1.021 Mean :4.782   
## 3rd Qu.:3.000 3rd Qu.:2.000 3rd Qu.:7.000   
## Max. :7.000 Max. :7.000 Max. :7.000   
## NA's :1 NA's :2   
## eat\_raw\_fruits\_or\_vegetables\_past\_week esbl cre   
## Min. :0.000 Length:285 Length:285   
## 1st Qu.:2.000 Class :character Class :character   
## Median :4.000 Mode :character Mode :character   
## Mean :4.039   
## 3rd Qu.:7.000   
## Max. :7.000   
## NA's :1   
## ecoli\_cultured total\_isolates amp\_resistant\_isolates  
## Length:285 Min. : 0.00 Min. : 0.00   
## Class :character 1st Qu.:48.00 1st Qu.: 0.00   
## Mode :character Median :48.00 Median : 0.00   
## Mean :40.24 Mean :11.98   
## 3rd Qu.:48.00 3rd Qu.:24.00   
## Max. :48.00 Max. :48.00   
##   
## ceft\_resistant\_isolates cipro\_resistant\_isolates tetra\_resistant\_isolates  
## Min. : 0.0000 Min. : 0.0000 Min. : 0.000   
## 1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 0.000   
## Median : 0.0000 Median : 0.0000 Median : 0.000   
## Mean : 0.6649 Mean : 0.8667 Mean : 7.151   
## 3rd Qu.: 0.0000 3rd Qu.: 0.0000 3rd Qu.: 1.000   
## Max. :48.0000 Max. :48.0000 Max. :48.000   
##   
## trimet\_resistant\_isolates amp\_high ceft\_high   
## Min. : 0.000 Length:285 Length:285   
## 1st Qu.: 0.000 Class :character Class :character   
## Median : 0.000 Mode :character Mode :character   
## Mean : 6.893   
## 3rd Qu.: 0.000   
## Max. :48.000   
##   
## cipro\_high tetra\_high trimet\_high amp\_any   
## Length:285 Length:285 Length:285 Length:285   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## ceft\_any cipro\_any tetra\_any trimet\_any   
## Length:285 Length:285 Length:285 Length:285   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
##

#Let's look at demographics for the study.  
mydata %>% ggplot(aes(x = race)) +  
 geom\_bar()

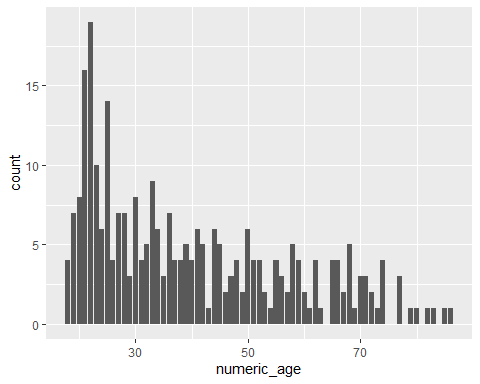


#^The race data shows that a majority of the participants are white.  
mydata %>% ggplot(aes(x = biological\_sex)) +  
 geom\_bar()



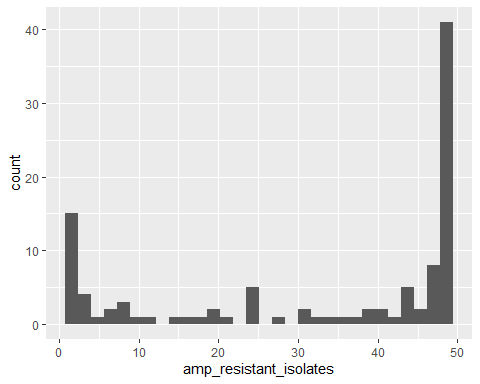
#^This biological sex data shows that, when observing males and females,  
#the participant group is primarily female.  
mydata %>% ggplot(aes(x = numeric\_age)) +  
 geom\_bar()

## Warning: Removed 6 rows containing non-finite values (stat\_count).



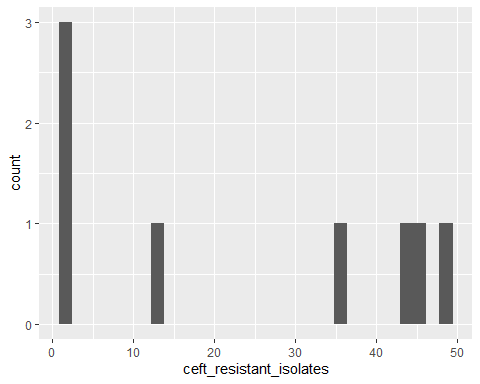
#^This age data shows that the age of the participants skews  
#strongly left/young.  
  
  
#histogram for samples with greater than or equal to one isolate showing resistance   
#to a given antibiotic  
  
  
mydata[c("amp\_resistant\_isolates")] %>% filter(amp\_resistant\_isolates >= 1) %>%   
 ggplot(aes(x=amp\_resistant\_isolates)) + geom\_histogram() #ampicillin

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



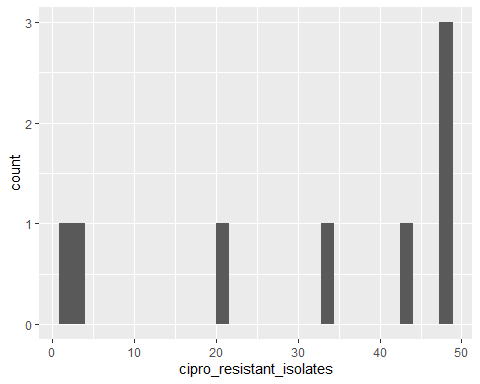
mydata[c("ceft\_resistant\_isolates")] %>% filter(ceft\_resistant\_isolates >= 1) %>%   
 ggplot(aes(x=ceft\_resistant\_isolates)) + geom\_histogram() #ceftriaxone

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



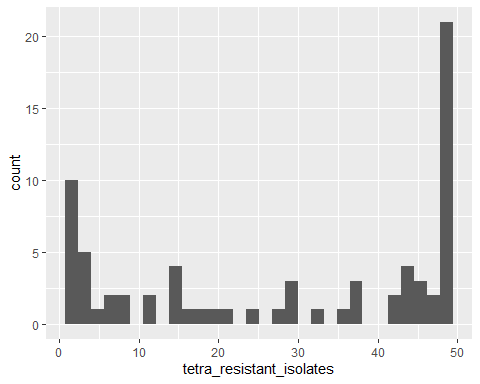
mydata[c("cipro\_resistant\_isolates")] %>% filter(cipro\_resistant\_isolates >= 1) %>%   
 ggplot(aes(x=cipro\_resistant\_isolates)) + geom\_histogram() #ciprofloxacin

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



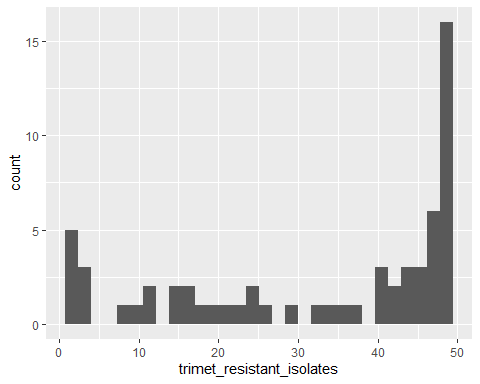
mydata[c("tetra\_resistant\_isolates")] %>% filter(tetra\_resistant\_isolates >= 1) %>%   
 ggplot(aes(x=tetra\_resistant\_isolates)) + geom\_histogram() #tetracycline

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.

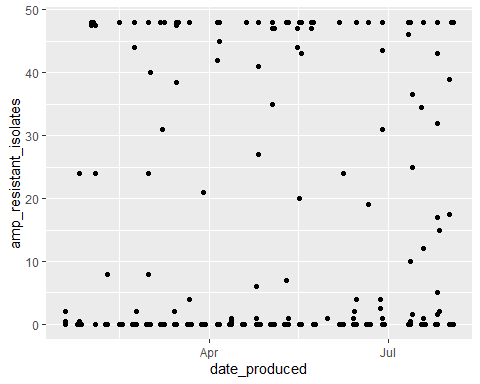


mydata[c("trimet\_resistant\_isolates")] %>% filter(trimet\_resistant\_isolates >= 1) %>%   
 ggplot(aes(x=trimet\_resistant\_isolates)) + geom\_histogram() #trimethoprim

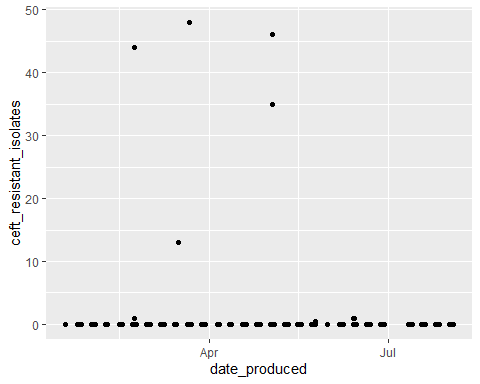
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



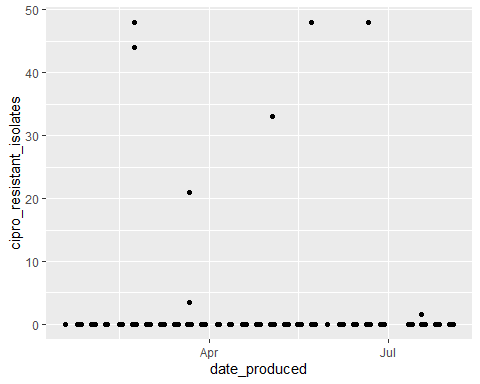
#There is not a strong pattern amongst any of these.On an intitial glance,  
#ciprofloxacin and ceftriaxone are skewed left and the rest are skewed right.  
  
#Examine seasonality of resistance to different antibiotics,  
#starting with ampicillin  
mydata %>% ggplot(aes(y=amp\_resistant\_isolates, x = date\_produced)) + geom\_point()



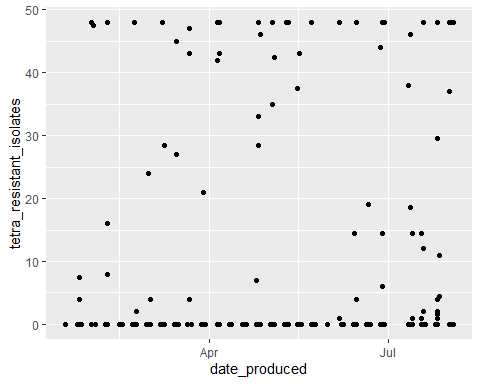
#ceftriaxone  
mydata %>% ggplot(aes(y=ceft\_resistant\_isolates, x = date\_produced)) + geom\_point()



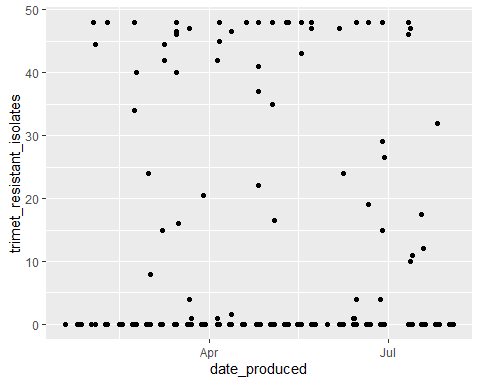
#ciprofloxacin  
mydata %>% ggplot(aes(y=cipro\_resistant\_isolates, x = date\_produced)) + geom\_point()



#tetracycline  
mydata %>% ggplot(aes(y=tetra\_resistant\_isolates, x = date\_produced)) + geom\_point()



#trimethoprim  
mydata %>% ggplot(aes(y=trimet\_resistant\_isolates, x = date\_produced)) + geom\_point()



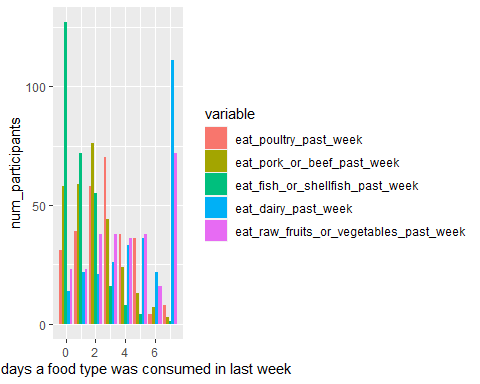
I want to take a look at one of the main outcomes/relationships- that between food and one of the antibiotics.

#Let's look at the food data. I want to make a separate data set of  
#food information so I can make a melted data set.  
  
fooddata <- mydata[,c(1,20:24)] %>%   
 melt(id=c("fake\_id")) %>%  
 subset(select=c("variable", "value"))  
fooddata$value <- as.character(fooddata$value)  
fooddata <- fooddata %>% mutate(value, count = 1) %>%  
 group\_by(variable, value) %>%  
 summarise(num\_participants = sum(count))

## `summarise()` has grouped output by 'variable'. You can override using the `.groups` argument.

fooddata$value <- as.numeric(fooddata$value)  
   
   
fooddata\_plot <- fooddata %>% ggplot(aes(x=value, y = num\_participants  
 , fill = variable)) +  
 geom\_bar(position="dodge", stat="identity") +  
 xlab("Number days a food type was consumed in last week")  
fooddata\_plot

## Warning: Removed 4 rows containing missing values (geom\_bar).



#On another note, let's compare a participant's tetracycline resistance  
#with its ampicillin resistance. This will be the proportion of E.coli  
#isolates.  
  
abs\_pattern <- mydata %>%  
 mutate(amp\_proportion\_resistant = amp\_resistant\_isolates / total\_isolates) %>%  
 mutate(ceft\_proportion\_resistant = ceft\_resistant\_isolates / total\_isolates) %>%  
 mutate(cipro\_proportion\_resistant = cipro\_resistant\_isolates / total\_isolates) %>%  
 mutate(tetra\_proportion\_resistant = tetra\_resistant\_isolates / total\_isolates) %>%  
 mutate(trimet\_proportion\_resistant = trimet\_resistant\_isolates / total\_isolates)  
abs\_pattern

## fake\_id date\_produced numeric\_age biological\_sex race  
## 1 F-108 2021-01-18 35 Female White  
## 2 F-125 2021-01-18 40 Male White  
## 3 F-141 2021-01-18 26 Female Black or African American  
## 4 F-224 2021-01-24 20 Female White  
## 5 F-305 2021-01-24 22 Female White  
## 6 F-378 2021-01-25 68 Female White  
## 7 F-241 2021-01-25 24 Female White  
## 8 F-329 2021-01-25 20 Female White  
## 9 F-293 2021-01-26 20 Female Prefer not to respond  
## 10 F-230 2021-01-26 41 Female White  
## 11 F-254 2021-01-31 33 Female White  
## 12 F-152 2021-01-31 62 Female White  
## 13 F-342 2021-02-01 50 Female White  
## 14 F-215 2021-02-02 25 Male Prefer not to respond  
## 15 F-380 2021-02-02 21 Male White  
## 16 F-256 2021-02-02 49 Male Black or African American  
## 17 F-266 2021-02-02 67 Female White  
## 18 F-307 2021-02-07 46 Female White  
## 19 F-340 2021-02-07 34 Male White  
## 20 F-234 2021-02-08 27 Female White  
## 21 F-275 2021-02-08 20 Female Asian  
## 22 F-384 2021-02-08 24 Male White  
## 23 F-317 2021-02-08 72 Female Other  
## 24 F-263 2021-02-14 41 Female White  
## 25 F-213 2021-02-14 25 Male White  
## 26 F-194 2021-02-15 60 Female Mixed race: Asian & White  
## 27 F-323 2021-02-15 55 Female White  
## 28 F-352 2021-02-15 27 Male White  
## 29 F-272 2021-02-15 74 Male White  
## 30 F-358 2021-02-15 40 Female Black or African American  
## 31 F-120 2021-02-16 28 Female White  
## 32 F-350 2021-02-16 22 Male White  
## 33 F-260 2021-02-21 33 Female White  
## 34 F-221 2021-02-21 25 Female Other  
## 35 F-158 2021-02-22 86 Female White  
## 36 F-174 2021-02-22 18 Male Black or African American  
## 37 F-327 2021-02-22 23 Female White  
## 38 F-368 2021-02-22 25 Female White  
## 39 F-227 2021-02-22 22 Male White  
## 40 F-251 2021-02-23 43 Female White  
## 41 F-143 2021-02-23 23 Female Prefer not to respond  
## 42 F-278 2021-02-23 25 Female White  
## 43 F-190 2021-02-28 50 Male White  
## 44 F-112 2021-03-01 23 Male White  
## 45 F-341 2021-03-01 32 Male White  
## 46 F-115 2021-03-01 21 Female White  
## 47 F-268 2021-03-01 19 Female White  
## 48 F-140 2021-03-01 19 Female Black or African American  
## 49 F-184 2021-03-01 27 Female Black or African American  
## 50 F-299 2021-03-01 32 Female White  
## 51 F-258 2021-03-02 67 Male White  
## 52 F-273 2021-03-02 56 Male Prefer not to respond  
## 53 F-195 2021-03-07 30 Female White  
## 54 F-316 2021-03-07 66 Male White  
## 55 F-330 2021-03-08 73 Male White  
## 56 F-353 2021-03-08 24 Female White  
## 57 F-212 2021-03-08 23 Male Asian  
## 58 F-225 2021-03-08 74 Female White  
## 59 F-279 2021-03-08 20 Female Asian  
## 60 F-287 2021-03-08 57 Female White  
## 61 F-180 2021-03-09 22 Female White  
## 62 F-202 2021-03-09 20 Female White  
## 63 F-269 2021-03-14 30 Female White  
## 64 F-247 2021-03-14 69 Female White  
## 65 F-298 2021-03-14 18 Female White  
## 66 F-276 2021-03-15 34 Female White  
## 67 F-351 2021-03-15 32 Female Mixed race: Asian & White  
## 68 F-291 2021-03-15 19 Female White  
## 69 F-104 2021-03-15 26 Female White  
## 70 F-294 2021-03-15 66 Female White  
## 71 F-337 2021-03-15 66 Male White  
## 72 F-131 2021-03-16 37 Female White  
## 73 F-161 2021-03-21 61 Female White  
## 74 F-303 2021-03-22 59 Female White  
## 75 F-165 2021-03-22 33 Male White  
## 76 F-229 2021-03-22 36 Female White  
## 77 F-166 2021-03-23 42 Male White  
## 78 F-348 2021-03-23 35 Male White  
## 79 F-321 2021-03-23 41 Male White  
## 80 F-347 2021-03-28 74 Male White  
## 81 F-265 2021-03-29 39 Male White  
## 82 F-160 2021-03-29 58 Male White  
## 83 F-103 2021-03-29 22 Female White  
## 84 F-231 2021-03-29 68 Female White  
## 85 F-349 2021-03-29 30 Female White  
## 86 F-255 2021-03-29 52 Female White  
## 87 F-367 2021-03-29 22 Female White  
## 88 F-302 2021-03-29 20 Male Other  
## 89 F-196 2021-03-30 36 Female White  
## 90 F-365 2021-04-05 21 Female White  
## 91 F-220 2021-04-05 47 Male White  
## 92 F-193 2021-04-05 26 Female White  
## 93 F-170 2021-04-05 NA Female Black or African American  
## 94 F-124 2021-04-05 42 Female White  
## 95 F-343 2021-04-05 21 Female White  
## 96 F-105 2021-04-05 21 Female White  
## 97 F-148 2021-04-06 37 Female White  
## 98 F-325 2021-04-06 22 Female White  
## 99 F-175 2021-04-06 21 Female White  
## 100 F-249 2021-04-06 22 Female White  
## 101 F-271 2021-04-11 77 Male White  
## 102 F-176 2021-04-11 35 Female White  
## 103 F-118 2021-04-12 31 Male White  
## 104 F-309 2021-04-12 33 Female White  
## 105 F-283 2021-04-12 79 Female White  
## 106 F-257 2021-04-12 33 Female White  
## 107 F-240 2021-04-12 29 Female White  
## 108 F-142 2021-04-12 47 Male White  
## 109 F-338 2021-04-12 46 Female White  
## 110 F-373 2021-04-12 83 Female White  
## 111 F-149 2021-04-12 23 Female White  
## 112 F-144 2021-04-12 18 Female Black or African American  
## 113 F-346 2021-04-18 30 Female White  
## 114 F-192 2021-04-18 29 Female White  
## 115 F-209 2021-04-18 59 Female Black or African American  
## 116 F-322 2021-04-19 65 Male White  
## 117 F-219 2021-04-19 48 Female White  
## 118 F-155 2021-04-19 72 Female White  
## 119 F-207 2021-04-19 44 Female White  
## 120 F-188 2021-04-19 34 Female White  
## 121 F-246 2021-04-20 22 Female White  
## 122 F-216 2021-04-25 55 Female White  
## 123 F-163 2021-04-25 41 Female White  
## 124 F-107 2021-04-25 30 Male Asian  
## 125 F-136 2021-04-26 77 Male White  
## 126 F-138 2021-04-26 50 Female Black or African American  
## 127 F-361 2021-04-26 27 Female White  
## 128 F-132 2021-04-26 80 Female White  
## 129 F-200 2021-04-26 53 Female White  
## 130 F-371 2021-04-26 25 Female White  
## 131 F-366 2021-04-26 45 Female Black or African American  
## 132 F-274 2021-04-27 51 Female White  
## 133 F-128 2021-04-27 51 Female White  
## 134 F-264 2021-04-27 65 Male Asian  
## 135 F-376 2021-05-02 40 Male White  
## 136 F-137 2021-05-03 19 Female Mixed race: Asian & White  
## 137 F-292 2021-05-03 82 Female White  
## 138 F-300 2021-05-03 66 Female White  
## 139 F-197 2021-05-03 45 Female Black or African American  
## 140 F-162 2021-05-03 45 Female Black or African American  
## 141 F-339 2021-05-03 60 Female White  
## 142 F-375 2021-05-03 21 Female White  
## 143 F-181 2021-05-03 48 Male Black or African American  
## 144 F-296 2021-05-04 71 Female White  
## 145 F-362 2021-05-04 55 Female Black or African American  
## 146 F-113 2021-05-04 NA Male Black or African American  
## 147 F-356 2021-05-09 50 Female White  
## 148 F-168 2021-05-10 37 Male Other  
## 149 F-210 2021-05-10 28 Female White  
## 150 F-218 2021-05-10 51 Male Black or African American  
## 151 F-314 2021-05-10 42 Female White  
## 152 F-151 2021-05-10 26 Male White  
## 153 F-270 2021-05-10 25 Female White  
## 154 F-311 2021-05-11 42 Female White  
## 155 F-243 2021-05-11 38 Female White  
## 156 F-239 2021-05-11 36 Female White  
## 157 F-139 2021-05-11 28 Female Black or African American  
## 158 F-133 2021-05-16 58 Male White  
## 159 F-226 2021-05-16 48 Male White  
## 160 F-187 2021-05-17 62 Female White  
## 161 F-199 2021-05-17 39 Male White  
## 162 F-214 2021-05-17 59 Female White  
## 163 F-211 2021-05-17 37 Female White  
## 164 F-106 2021-05-17 68 Female White  
## 165 F-331 2021-05-17 40 Male Prefer not to respond  
## 166 F-154 2021-05-17 21 Female Black or African American  
## 167 F-304 2021-05-17 44 Female Black or African American  
## 168 F-129 2021-05-18 58 Female White  
## 169 F-206 2021-05-18 52 Male Black or African American  
## 170 F-167 2021-05-18 38 Female White  
## 171 F-382 2021-05-18 27 Male White  
## 172 F-238 2021-05-23 58 Female White  
## 173 F-259 2021-05-23 53 Male White  
## 174 F-262 2021-05-23 52 Female White  
## 175 F-261 2021-05-24 57 Female White  
## 176 F-310 2021-05-24 65 Male White  
## 177 F-237 2021-05-24 NA Female Black or African American  
## 178 F-277 2021-05-24 63 Female White  
## 179 F-355 2021-05-25 39 Female White  
## 180 F-171 2021-05-25 58 Female White  
## 181 F-186 2021-05-25 22 Female White  
## 182 F-248 2021-05-31 18 Female Asian  
## 183 F-285 2021-06-06 22 Male Black or African American  
## 184 F-306 2021-06-06 19 Male White  
## 185 F-244 2021-06-07 70 Female White  
## 186 F-100 2021-06-07 44 Female White  
## 187 F-117 2021-06-07 56 Female White  
## 188 F-328 2021-06-07 30 Male Black or African American  
## 189 F-146 2021-06-08 28 Female White  
## 190 F-114 2021-06-08 44 Female Black or African American  
## 191 F-301 2021-06-13 70 Male White  
## 192 F-222 2021-06-13 33 Male White  
## 193 F-111 2021-06-13 68 Male White  
## 194 F-320 2021-06-13 45 Female White  
## 195 F-242 2021-06-14 25 Female Black or African American  
## 196 F-228 2021-06-14 39 Male White  
## 197 F-370 2021-06-14 27 Female White  
## 198 F-379 2021-06-14 36 Female White  
## 199 F-284 2021-06-14 42 Female White  
## 200 F-189 2021-06-15 34 Female White  
## 201 F-183 2021-06-15 70 Female White  
## 202 F-336 2021-06-15 45 Female White  
## 203 F-383 2021-06-15 23 Female White  
## 204 F-185 2021-06-15 41 Female White  
## 205 F-177 2021-06-20 62 Female White  
## 206 F-110 2021-06-20 NA Male Asian  
## 207 F-282 2021-06-20 56 Male White  
## 208 F-233 2021-06-20 28 Female White  
## 209 F-150 2021-06-21 36 Female White  
## 210 F-360 2021-06-21 31 Female Black or African American  
## 211 F-357 2021-06-21 36 Female White  
## 212 F-157 2021-06-21 33 Female White  
## 213 F-235 2021-06-21 22 Female White  
## 214 F-123 2021-06-21 32 Female White  
## 215 F-178 2021-06-21 71 Male White  
## 216 F-173 2021-06-21 52 Female White  
## 217 F-127 2021-06-22 33 Female White  
## 218 F-344 2021-06-22 24 Female Mixed race: Asian & White  
## 219 F-267 2021-06-22 34 Female White  
## 220 F-126 2021-06-27 41 Female White  
## 221 F-109 2021-06-27 23 Female White  
## 222 F-381 2021-06-28 54 Female White  
## 223 F-153 2021-06-28 59 Female White  
## 224 F-326 2021-06-28 28 Female Other  
## 225 F-253 2021-06-28 22 Female Asian  
## 226 F-122 2021-06-28 31 Female White  
## 227 F-288 2021-06-28 19 Male Asian  
## 228 F-374 2021-06-28 21 Female White  
## 229 F-335 2021-06-28 23 Female White  
## 230 F-172 2021-06-28 38 Male White  
## 231 F-182 2021-06-28 44 Female White  
## 232 F-119 2021-06-28 21 Female White  
## 233 F-252 2021-06-29 NA Female White  
## 234 F-169 2021-06-29 29 Male Asian  
## 235 F-245 2021-07-11 62 Male White  
## 236 F-369 2021-07-11 48 Female White  
## 237 F-359 2021-07-11 24 Female Black or African American  
## 238 F-280 2021-07-11 65 Male Black or African American  
## 239 F-205 2021-07-11 32 Male White  
## 240 F-201 2021-07-12 50 Male White  
## 241 F-135 2021-07-12 22 Male White  
## 242 F-332 2021-07-12 85 Female White  
## 243 F-286 2021-07-12 27 Female Black or African American  
## 244 F-204 2021-07-12 25 Male Other  
## 245 F-334 2021-07-13 50 Male White  
## 246 F-318 2021-07-13 21 Male Asian  
## 247 F-191 2021-07-13 21 Male White  
## 248 F-312 2021-07-18 44 Female White  
## 249 F-333 2021-07-18 77 Male White  
## 250 F-372 2021-07-18 21 Male White  
## 251 F-364 2021-07-18 21 Female Black or African American  
## 252 F-130 2021-07-18 24 Female White  
## 253 F-319 2021-07-18 71 Female White  
## 254 F-179 2021-07-18 28 Female White  
## 255 F-345 2021-07-19 30 Female White  
## 256 F-121 2021-07-19 49 Female White  
## 257 F-198 2021-07-19 21 Female White  
## 258 F-250 2021-07-19 25 Female White  
## 259 F-147 2021-07-19 19 Male White  
## 260 F-289 2021-07-19 22 Male White  
## 261 F-116 2021-07-20 21 Male Asian  
## 262 F-281 2021-07-20 23 Male White  
## 263 F-217 2021-07-25 36 Female White  
## 264 F-295 2021-07-25 39 Female White  
## 265 F-324 2021-07-25 22 Male White  
## 266 F-223 2021-07-26 25 Female White  
## 267 F-290 2021-07-26 47 Male Black or African American  
## 268 F-308 2021-07-26 NA Male White  
## 269 F-315 2021-07-26 20 Male Asian  
## 270 F-377 2021-07-26 31 Male White  
## 271 F-164 2021-07-26 22 Male Asian  
## 272 F-102 2021-07-26 22 Male White  
## 273 F-134 2021-07-26 34 Male Mixed race: Asian & White  
## 274 F-208 2021-07-27 30 Female White  
## 275 F-145 2021-07-27 33 Female Prefer not to respond  
## 276 F-385 2021-08-01 38 Female White  
## 277 F-297 2021-08-01 25 Female White  
## 278 F-313 2021-08-01 74 Female White  
## 279 F-236 2021-08-02 22 Male White  
## 280 F-232 2021-08-02 25 Female White  
## 281 F-159 2021-08-02 25 Female White  
## 282 F-354 2021-08-02 51 Male White  
## 283 F-363 2021-08-02 68 Female White  
## 284 F-203 2021-08-03 23 Female White  
## 285 F-101 2021-08-03 55 Female White  
## multiple\_antibiotics\_past\_year  
## 1 No  
## 2 No  
## 3 No  
## 4 No  
## 5 No  
## 6 No  
## 7 No  
## 8 No  
## 9 Yes  
## 10 No  
## 11 No  
## 12 No  
## 13 No  
## 14 No  
## 15 No  
## 16 No  
## 17 No  
## 18 No  
## 19 No  
## 20 No  
## 21 No  
## 22 No  
## 23 No  
## 24 No  
## 25 No  
## 26 No  
## 27 No  
## 28 No  
## 29 No  
## 30 No  
## 31 Yes  
## 32 No  
## 33 No  
## 34 No  
## 35 No  
## 36 No  
## 37 No  
## 38 No  
## 39 No  
## 40 No  
## 41 No  
## 42 Yes  
## 43 No  
## 44 No  
## 45 No  
## 46 Yes  
## 47 No  
## 48 No  
## 49 No  
## 50 Yes  
## 51 No  
## 52 No  
## 53 No  
## 54 No  
## 55 No  
## 56 No  
## 57 No  
## 58 No  
## 59 No  
## 60 No  
## 61 No  
## 62 No  
## 63 No  
## 64 Yes  
## 65 No  
## 66 No  
## 67 No  
## 68 No  
## 69 No  
## 70 No  
## 71 No  
## 72 No  
## 73 No  
## 74 No  
## 75 No  
## 76 Yes  
## 77 No  
## 78 No  
## 79 No  
## 80 No  
## 81 No  
## 82 No  
## 83 No  
## 84 No  
## 85 No  
## 86 No  
## 87 No  
## 88 No  
## 89 No  
## 90 No  
## 91 No  
## 92 No  
## 93 No  
## 94 No  
## 95 No  
## 96 No  
## 97 No  
## 98 No  
## 99 No  
## 100 No  
## 101 No  
## 102 No  
## 103 No  
## 104 No  
## 105 Yes  
## 106 Yes  
## 107 No  
## 108 No  
## 109 No  
## 110 Yes  
## 111 No  
## 112 No  
## 113 No  
## 114 No  
## 115 No  
## 116 No  
## 117 No  
## 118 Yes  
## 119 No  
## 120 No  
## 121 No  
## 122 No  
## 123 No  
## 124 No  
## 125 No  
## 126 No  
## 127 Yes  
## 128 No  
## 129 No  
## 130 No  
## 131 No  
## 132 No  
## 133 No  
## 134 No  
## 135 No  
## 136 No  
## 137 No  
## 138 No  
## 139 No  
## 140 No  
## 141 No  
## 142 No  
## 143 No  
## 144 No  
## 145 No  
## 146 No  
## 147 No  
## 148 No  
## 149 No  
## 150 No  
## 151 No  
## 152 No  
## 153 No  
## 154 No  
## 155 No  
## 156 No  
## 157 No  
## 158 No  
## 159 No  
## 160 No  
## 161 No  
## 162 No  
## 163 No  
## 164 Yes  
## 165 No  
## 166 No  
## 167 No  
## 168 No  
## 169 No  
## 170 No  
## 171 No  
## 172 No  
## 173 Yes  
## 174 No  
## 175 Yes  
## 176 No  
## 177 No  
## 178 No  
## 179 No  
## 180 No  
## 181 No  
## 182 No  
## 183 No  
## 184 No  
## 185 No  
## 186 No  
## 187 No  
## 188 No  
## 189 No  
## 190 No  
## 191 No  
## 192 No  
## 193 No  
## 194 No  
## 195 Yes  
## 196 No  
## 197 No  
## 198 No  
## 199 No  
## 200 No  
## 201 No  
## 202 No  
## 203 No  
## 204 No  
## 205 Yes  
## 206 No  
## 207 No  
## 208 No  
## 209 No  
## 210 No  
## 211 No  
## 212 No  
## 213 No  
## 214 No  
## 215 No  
## 216 No  
## 217 No  
## 218 Yes  
## 219 No  
## 220 No  
## 221 Yes  
## 222 No  
## 223 No  
## 224 No  
## 225 No  
## 226 No  
## 227 No  
## 228 No  
## 229 No  
## 230 No  
## 231 No  
## 232 No  
## 233 No  
## 234 No  
## 235 No  
## 236 No  
## 237 Yes  
## 238 No  
## 239 No  
## 240 No  
## 241 No  
## 242 No  
## 243 No  
## 244 No  
## 245 No  
## 246 No  
## 247 No  
## 248 No  
## 249 No  
## 250 No  
## 251 Yes  
## 252 No  
## 253 No  
## 254 No  
## 255 No  
## 256 No  
## 257 No  
## 258 No  
## 259 No  
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## 261 No  
## 262 No  
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## 266 No  
## 267 No  
## 268 No  
## 269 No  
## 270 No  
## 271 No  
## 272 No  
## 273 No  
## 274 No  
## 275 No  
## 276 No  
## 277 Yes  
## 278 Yes  
## 279 No  
## 280 No  
## 281 No  
## 282 No  
## 283 No  
## 284 No  
## 285 Yes  
## healthcare\_exposure  
## 1 Doctorâ\200\231s office/outpatient clinic  
## 2 Doctorâ\200\231s office/outpatient clinic,Hospital,Long term care/rehabilitation facility,Nursing home,Assisted living  
## 3 Doctorâ\200\231s office/outpatient clinic  
## 4 Other healthcare environment  
## 5 No, I do not have regular exposure to healthcare environments  
## 6 Doctorâ\200\231s office/outpatient clinic,Long term care/rehabilitation facility,Assisted living  
## 7 No, I do not have regular exposure to healthcare environments  
## 8 No, I do not have regular exposure to healthcare environments  
## 9 No, I do not have regular exposure to healthcare environments  
## 10 Doctorâ\200\231s office/outpatient clinic  
## 11 No, I do not have regular exposure to healthcare environments  
## 12 No, I do not have regular exposure to healthcare environments  
## 13 No, I do not have regular exposure to healthcare environments  
## 14 Other healthcare environment  
## 15 No, I do not have regular exposure to healthcare environments  
## 16 Other healthcare environment  
## 17 <NA>  
## 18 Other healthcare environment  
## 19 No, I do not have regular exposure to healthcare environments  
## 20 Doctorâ\200\231s office/outpatient clinic  
## 21 Other healthcare environment  
## 22 No, I do not have regular exposure to healthcare environments  
## 23 <NA>  
## 24 No, I do not have regular exposure to healthcare environments  
## 25 No, I do not have regular exposure to healthcare environments  
## 26 No, I do not have regular exposure to healthcare environments  
## 27 No, I do not have regular exposure to healthcare environments  
## 28 No, I do not have regular exposure to healthcare environments  
## 29 No, I do not have regular exposure to healthcare environments  
## 30 No, I do not have regular exposure to healthcare environments  
## 31 <NA>  
## 32 No, I do not have regular exposure to healthcare environments  
## 33 No, I do not have regular exposure to healthcare environments  
## 34 No, I do not have regular exposure to healthcare environments  
## 35 No, I do not have regular exposure to healthcare environments  
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## 40 No, I do not have regular exposure to healthcare environments  
## 41 No, I do not have regular exposure to healthcare environments  
## 42 No, I do not have regular exposure to healthcare environments  
## 43 No, I do not have regular exposure to healthcare environments  
## 44 No, I do not have regular exposure to healthcare environments  
## 45 Other healthcare environment  
## 46 No, I do not have regular exposure to healthcare environments  
## 47 No, I do not have regular exposure to healthcare environments  
## 48 No, I do not have regular exposure to healthcare environments  
## 49 No, I do not have regular exposure to healthcare environments  
## 50 No, I do not have regular exposure to healthcare environments  
## 51 Other healthcare environment  
## 52 No, I do not have regular exposure to healthcare environments  
## 53 No, I do not have regular exposure to healthcare environments  
## 54 No, I do not have regular exposure to healthcare environments  
## 55 No, I do not have regular exposure to healthcare environments  
## 56 No, I do not have regular exposure to healthcare environments  
## 57 No, I do not have regular exposure to healthcare environments  
## 58 No, I do not have regular exposure to healthcare environments  
## 59 No, I do not have regular exposure to healthcare environments  
## 60 No, I do not have regular exposure to healthcare environments  
## 61 No, I do not have regular exposure to healthcare environments  
## 62 Doctorâ\200\231s office/outpatient clinic  
## 63 Doctorâ\200\231s office/outpatient clinic  
## 64 No, I do not have regular exposure to healthcare environments  
## 65 No, I do not have regular exposure to healthcare environments  
## 66 No, I do not have regular exposure to healthcare environments  
## 67 No, I do not have regular exposure to healthcare environments  
## 68 <NA>  
## 69 No, I do not have regular exposure to healthcare environments  
## 70 No, I do not have regular exposure to healthcare environments  
## 71 No, I do not have regular exposure to healthcare environments  
## 72 No, I do not have regular exposure to healthcare environments  
## 73 No, I do not have regular exposure to healthcare environments  
## 74 <NA>  
## 75 No, I do not have regular exposure to healthcare environments  
## 76 No, I do not have regular exposure to healthcare environments  
## 77 No, I do not have regular exposure to healthcare environments  
## 78 No, I do not have regular exposure to healthcare environments  
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## 86 No, I do not have regular exposure to healthcare environments  
## 87 No, I do not have regular exposure to healthcare environments  
## 88 No, I do not have regular exposure to healthcare environments  
## 89 No, I do not have regular exposure to healthcare environments  
## 90 No, I do not have regular exposure to healthcare environments  
## 91 No, I do not have regular exposure to healthcare environments  
## 92 No, I do not have regular exposure to healthcare environments  
## 93 Other healthcare environment  
## 94 No, I do not have regular exposure to healthcare environments  
## 95 Hospital  
## 96 No, I do not have regular exposure to healthcare environments  
## 97 No, I do not have regular exposure to healthcare environments  
## 98 No, I do not have regular exposure to healthcare environments  
## 99 No, I do not have regular exposure to healthcare environments  
## 100 No, I do not have regular exposure to healthcare environments  
## 101 No, I do not have regular exposure to healthcare environments  
## 102 No, I do not have regular exposure to healthcare environments  
## 103 No, I do not have regular exposure to healthcare environments  
## 104 Hospital  
## 105 <NA>  
## 106 No, I do not have regular exposure to healthcare environments  
## 107 No, I do not have regular exposure to healthcare environments  
## 108 No, I do not have regular exposure to healthcare environments  
## 109 No, I do not have regular exposure to healthcare environments  
## 110 <NA>  
## 111 No, I do not have regular exposure to healthcare environments  
## 112 No, I do not have regular exposure to healthcare environments  
## 113 No, I do not have regular exposure to healthcare environments  
## 114 No, I do not have regular exposure to healthcare environments  
## 115 Other healthcare environment  
## 116 No, I do not have regular exposure to healthcare environments  
## 117 No, I do not have regular exposure to healthcare environments  
## 118 No, I do not have regular exposure to healthcare environments  
## 119 No, I do not have regular exposure to healthcare environments  
## 120 No, I do not have regular exposure to healthcare environments  
## 121 No, I do not have regular exposure to healthcare environments  
## 122 No, I do not have regular exposure to healthcare environments  
## 123 Hospital  
## 124 Doctorâ\200\231s office/outpatient clinic  
## 125 No, I do not have regular exposure to healthcare environments  
## 126 No, I do not have regular exposure to healthcare environments  
## 127 No, I do not have regular exposure to healthcare environments  
## 128 No, I do not have regular exposure to healthcare environments  
## 129 No, I do not have regular exposure to healthcare environments  
## 130 Hospital  
## 131 No, I do not have regular exposure to healthcare environments  
## 132 No, I do not have regular exposure to healthcare environments  
## 133 No, I do not have regular exposure to healthcare environments  
## 134 No, I do not have regular exposure to healthcare environments  
## 135 Doctorâ\200\231s office/outpatient clinic,Hospital,Long term care/rehabilitation facility,Nursing home,Assisted living  
## 136 No, I do not have regular exposure to healthcare environments  
## 137 No, I do not have regular exposure to healthcare environments  
## 138 No, I do not have regular exposure to healthcare environments  
## 139 Doctorâ\200\231s office/outpatient clinic  
## 140 Hospital  
## 141 No, I do not have regular exposure to healthcare environments  
## 142 No, I do not have regular exposure to healthcare environments  
## 143 No, I do not have regular exposure to healthcare environments  
## 144 No, I do not have regular exposure to healthcare environments  
## 145 No, I do not have regular exposure to healthcare environments  
## 146 No, I do not have regular exposure to healthcare environments  
## 147 Hospital  
## 148 No, I do not have regular exposure to healthcare environments  
## 149 No, I do not have regular exposure to healthcare environments  
## 150 No, I do not have regular exposure to healthcare environments  
## 151 No, I do not have regular exposure to healthcare environments  
## 152 No, I do not have regular exposure to healthcare environments  
## 153 Hospital  
## 154 No, I do not have regular exposure to healthcare environments  
## 155 No, I do not have regular exposure to healthcare environments  
## 156 No, I do not have regular exposure to healthcare environments  
## 157 Hospital  
## 158 No, I do not have regular exposure to healthcare environments  
## 159 No, I do not have regular exposure to healthcare environments  
## 160 No, I do not have regular exposure to healthcare environments  
## 161 No, I do not have regular exposure to healthcare environments  
## 162 Doctorâ\200\231s office/outpatient clinic  
## 163 No, I do not have regular exposure to healthcare environments  
## 164 No, I do not have regular exposure to healthcare environments  
## 165 No, I do not have regular exposure to healthcare environments  
## 166 No, I do not have regular exposure to healthcare environments  
## 167 No, I do not have regular exposure to healthcare environments  
## 168 No, I do not have regular exposure to healthcare environments  
## 169 <NA>  
## 170 No, I do not have regular exposure to healthcare environments  
## 171 No, I do not have regular exposure to healthcare environments  
## 172 No, I do not have regular exposure to healthcare environments  
## 173 No, I do not have regular exposure to healthcare environments  
## 174 No, I do not have regular exposure to healthcare environments  
## 175 No, I do not have regular exposure to healthcare environments  
## 176 Other healthcare environment,No, I do not have regular exposure to healthcare environments  
## 177 Other healthcare environment  
## 178 No, I do not have regular exposure to healthcare environments  
## 179 Hospital  
## 180 No, I do not have regular exposure to healthcare environments  
## 181 No, I do not have regular exposure to healthcare environments  
## 182 No, I do not have regular exposure to healthcare environments  
## 183 No, I do not have regular exposure to healthcare environments  
## 184 No, I do not have regular exposure to healthcare environments  
## 185 No, I do not have regular exposure to healthcare environments  
## 186 No, I do not have regular exposure to healthcare environments  
## 187 No, I do not have regular exposure to healthcare environments  
## 188 No, I do not have regular exposure to healthcare environments  
## 189 No, I do not have regular exposure to healthcare environments  
## 190 Doctorâ\200\231s office/outpatient clinic  
## 191 No, I do not have regular exposure to healthcare environments  
## 192 No, I do not have regular exposure to healthcare environments  
## 193 No, I do not have regular exposure to healthcare environments  
## 194 No, I do not have regular exposure to healthcare environments  
## 195 No, I do not have regular exposure to healthcare environments  
## 196 No, I do not have regular exposure to healthcare environments  
## 197 No, I do not have regular exposure to healthcare environments  
## 198 No, I do not have regular exposure to healthcare environments  
## 199 Hospital  
## 200 Hospital,Other healthcare environment  
## 201 No, I do not have regular exposure to healthcare environments  
## 202 No, I do not have regular exposure to healthcare environments  
## 203 No, I do not have regular exposure to healthcare environments  
## 204 No, I do not have regular exposure to healthcare environments  
## 205 No, I do not have regular exposure to healthcare environments  
## 206 Assisted living,Other healthcare environment  
## 207 No, I do not have regular exposure to healthcare environments  
## 208 No, I do not have regular exposure to healthcare environments  
## 209 No, I do not have regular exposure to healthcare environments  
## 210 No, I do not have regular exposure to healthcare environments  
## 211 No, I do not have regular exposure to healthcare environments  
## 212 No, I do not have regular exposure to healthcare environments  
## 213 No, I do not have regular exposure to healthcare environments  
## 214 No, I do not have regular exposure to healthcare environments  
## 215 Doctorâ\200\231s office/outpatient clinic  
## 216 No, I do not have regular exposure to healthcare environments  
## 217 No, I do not have regular exposure to healthcare environments  
## 218 No, I do not have regular exposure to healthcare environments  
## 219 No, I do not have regular exposure to healthcare environments  
## 220 No, I do not have regular exposure to healthcare environments  
## 221 No, I do not have regular exposure to healthcare environments  
## 222 No, I do not have regular exposure to healthcare environments  
## 223 <NA>  
## 224 No, I do not have regular exposure to healthcare environments  
## 225 No, I do not have regular exposure to healthcare environments  
## 226 No, I do not have regular exposure to healthcare environments  
## 227 No, I do not have regular exposure to healthcare environments  
## 228 Hospital  
## 229 No, I do not have regular exposure to healthcare environments  
## 230 No, I do not have regular exposure to healthcare environments  
## 231 No, I do not have regular exposure to healthcare environments  
## 232 No, I do not have regular exposure to healthcare environments  
## 233 No, I do not have regular exposure to healthcare environments  
## 234 No, I do not have regular exposure to healthcare environments  
## 235 Doctorâ\200\231s office/outpatient clinic  
## 236 No, I do not have regular exposure to healthcare environments  
## 237 No, I do not have regular exposure to healthcare environments  
## 238 No, I do not have regular exposure to healthcare environments  
## 239 No, I do not have regular exposure to healthcare environments  
## 240 No, I do not have regular exposure to healthcare environments  
## 241 <NA>  
## 242 No, I do not have regular exposure to healthcare environments  
## 243 No, I do not have regular exposure to healthcare environments  
## 244 Hospital  
## 245 No, I do not have regular exposure to healthcare environments  
## 246 No, I do not have regular exposure to healthcare environments  
## 247 Doctorâ\200\231s office/outpatient clinic  
## 248 No, I do not have regular exposure to healthcare environments  
## 249 <NA>  
## 250 No, I do not have regular exposure to healthcare environments  
## 251 No, I do not have regular exposure to healthcare environments  
## 252 No, I do not have regular exposure to healthcare environments  
## 253 No, I do not have regular exposure to healthcare environments  
## 254 No, I do not have regular exposure to healthcare environments  
## 255 No, I do not have regular exposure to healthcare environments  
## 256 No, I do not have regular exposure to healthcare environments  
## 257 No, I do not have regular exposure to healthcare environments  
## 258 No, I do not have regular exposure to healthcare environments  
## 259 No, I do not have regular exposure to healthcare environments  
## 260 No, I do not have regular exposure to healthcare environments  
## 261 No, I do not have regular exposure to healthcare environments  
## 262 No, I do not have regular exposure to healthcare environments  
## 263 Doctorâ\200\231s office/outpatient clinic  
## 264 No, I do not have regular exposure to healthcare environments  
## 265 No, I do not have regular exposure to healthcare environments  
## 266 No, I do not have regular exposure to healthcare environments  
## 267 Hospital  
## 268 No, I do not have regular exposure to healthcare environments  
## 269 No, I do not have regular exposure to healthcare environments  
## 270 No, I do not have regular exposure to healthcare environments  
## 271 No, I do not have regular exposure to healthcare environments  
## 272 Doctorâ\200\231s office/outpatient clinic  
## 273 No, I do not have regular exposure to healthcare environments  
## 274 No, I do not have regular exposure to healthcare environments  
## 275 No, I do not have regular exposure to healthcare environments  
## 276 No, I do not have regular exposure to healthcare environments  
## 277 No, I do not have regular exposure to healthcare environments  
## 278 No, I do not have regular exposure to healthcare environments  
## 279 Doctorâ\200\231s office/outpatient clinic,Hospital,Long term care/rehabilitation facility,Nursing home,Assisted living  
## 280 No, I do not have regular exposure to healthcare environments  
## 281 No, I do not have regular exposure to healthcare environments  
## 282 No, I do not have regular exposure to healthcare environments  
## 283 No, I do not have regular exposure to healthcare environments  
## 284 No, I do not have regular exposure to healthcare environments  
## 285 No, I do not have regular exposure to healthcare environments  
## healthcare\_exposure\_yn additional\_house\_members regular\_healthcare\_exposure  
## 1 Yes 4 No  
## 2 Yes 3 Yes  
## 3 Yes 3 No  
## 4 Yes more than 10 No  
## 5 No 1 No  
## 6 Yes 0 Yes  
## 7 No 1 No  
## 8 No 3 No  
## 9 No 4 No  
## 10 Yes 3 No  
## 11 No 4 No  
## 12 No 2 No  
## 13 No 5 No  
## 14 Yes 6 No  
## 15 No 4 No  
## 16 Yes 1 Yes  
## 17 Yes 0 No  
## 18 Yes 5 No  
## 19 No 3 No  
## 20 Yes 2 Yes  
## 21 Yes 3 No  
## 22 No 3 No  
## 23 Yes 0 No  
## 24 No 3 No  
## 25 No 3 Yes  
## 26 No 3 No  
## 27 No 1 No  
## 28 No 0 No  
## 29 No 1 No  
## 30 No 1 No  
## 31 Yes 2 No  
## 32 No 5 No  
## 33 No 0 No  
## 34 No 3 No  
## 35 No 0 No  
## 36 No 1 No  
## 37 No 1 No  
## 38 No 1 No  
## 39 No 3 No  
## 40 No 4 No  
## 41 No 3 No  
## 42 No 3 No  
## 43 No 1 No  
## 44 No 3 No  
## 45 Yes 3 No  
## 46 No 2 No  
## 47 No 3 No  
## 48 No 1 No  
## 49 No 3 No  
## 50 No 3 No  
## 51 Yes 2 No  
## 52 No 0 No  
## 53 No 0 No  
## 54 No 2 No  
## 55 No 1 No  
## 56 No 1 No  
## 57 No 6 Yes  
## 58 No 0 No  
## 59 No 3 No  
## 60 No 2 No  
## 61 No 5 No  
## 62 Yes 2 Yes  
## 63 Yes 2 No  
## 64 No 1 No  
## 65 No 2 No  
## 66 No 1 No  
## 67 No 2 No  
## 68 Yes 0 No  
## 69 No 4 No  
## 70 No 1 No  
## 71 No 0 No  
## 72 No 4 No  
## 73 No 0 No  
## 74 Yes 1 Yes  
## 75 No 1 No  
## 76 No 4 No  
## 77 No 1 No  
## 78 No 3 No  
## 79 No 4 No  
## 80 No 1 No  
## 81 No 1 No  
## 82 No 1 Yes  
## 83 No 2 No  
## 84 No 0 No  
## 85 No 4 No  
## 86 No 0 No  
## 87 No 4 No  
## 88 No 3 No  
## 89 No 4 No  
## 90 No 4 No  
## 91 No 3 No  
## 92 No 1 No  
## 93 Yes 2 No  
## 94 No 3 No  
## 95 Yes 2 Yes  
## 96 No 0 No  
## 97 No 3 No  
## 98 No 2 No  
## 99 No 3 No  
## 100 No 3 No  
## 101 No 2 No  
## 102 No 0 No  
## 103 No 1 No  
## 104 Yes 4 Yes  
## 105 Yes 0 No  
## 106 No 1 No  
## 107 No 0 No  
## 108 No 4 No  
## 109 No 2 No  
## 110 Yes 0 No  
## 111 No 0 No  
## 112 No 3 No  
## 113 No 5 No  
## 114 No 3 No  
## 115 Yes 3 No  
## 116 No 1 No  
## 117 No 2 No  
## 118 No 1 No  
## 119 No 2 No  
## 120 No 2 No  
## 121 No 3 No  
## 122 No 2 No  
## 123 Yes 0 No  
## 124 Yes 3 Yes  
## 125 No 1 No  
## 126 No 3 No  
## 127 No 1 No  
## 128 No 0 No  
## 129 No 0 No  
## 130 Yes 1 Yes  
## 131 No 0 No  
## 132 No 1 No  
## 133 No 1 No  
## 134 No 1 No  
## 135 Yes 3 Yes  
## 136 No 1 No  
## 137 No 1 No  
## 138 No 0 No  
## 139 Yes 1 Yes  
## 140 Yes 4 No  
## 141 No 2 No  
## 142 No 3 No  
## 143 No 3 No  
## 144 No 1 No  
## 145 No 3 No  
## 146 No 1 No  
## 147 Yes 3 Yes  
## 148 No 2 No  
## 149 No 9 No  
## 150 No 4 No  
## 151 No 4 No  
## 152 No 0 No  
## 153 Yes 4 Yes  
## 154 No 2 No  
## 155 No 0 No  
## 156 No 4 No  
## 157 Yes 3 No  
## 158 No 2 No  
## 159 No 3 No  
## 160 No 1 No  
## 161 No 5 No  
## 162 Yes 3 No  
## 163 No 3 No  
## 164 No 1 No  
## 165 No 1 No  
## 166 No 3 No  
## 167 No 3 No  
## 168 No 4 No  
## 169 Yes 1 No  
## 170 No 0 No  
## 171 No 1 No  
## 172 No 0 No  
## 173 No 0 No  
## 174 No 1 No  
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## 176 No 1 No  
## 177 Yes 5 Yes  
## 178 No 2 No  
## 179 Yes 3 No  
## 180 No 2 No  
## 181 No 1 No  
## 182 No 3 No  
## 183 No 3 No  
## 184 No 4 No  
## 185 No 1 No  
## 186 No 2 No  
## 187 No 3 No  
## 188 No 3 No  
## 189 No 1 No  
## 190 Yes 3 No  
## 191 No 1 No  
## 192 No 3 No  
## 193 No 1 No  
## 194 No 3 No  
## 195 No 3 No  
## 196 No 1 No  
## 197 No 0 No  
## 198 No 0 No  
## 199 Yes 3 Yes  
## 200 Yes 1 No  
## 201 No 1 No  
## 202 No 2 No  
## 203 No 1 No  
## 204 No 1 No  
## 205 No 1 Yes  
## 206 Yes 4 Yes  
## 207 No 2 No  
## 208 No 2 No  
## 209 No 2 No  
## 210 No 1 No  
## 211 No 1 No  
## 212 No 3 No  
## 213 No 3 No  
## 214 No 1 No  
## 215 Yes 4 No  
## 216 No 1 No  
## 217 No 0 No  
## 218 No 0 No  
## 219 No 2 No  
## 220 No 3 No  
## 221 No 0 No  
## 222 No 1 No  
## 223 Yes 1 No  
## 224 No 1 No  
## 225 No 3 No  
## 226 No 1 No  
## 227 No 2 No  
## 228 Yes 3 Yes  
## 229 No 6 No  
## 230 No 4 No  
## 231 No 5 No  
## 232 No 3 No  
## 233 No 2 No  
## 234 No 3 No  
## 235 Yes 3 No  
## 236 No 3 No  
## 237 No 0 No  
## 238 No 4 No  
## 239 No 1 No  
## 240 No 2 No  
## 241 Yes 2 No  
## 242 No 0 No  
## 243 No 2 No  
## 244 Yes 1 Yes  
## 245 No 2 No  
## 246 No 3 Yes  
## 247 Yes 1 Yes  
## 248 No 1 No  
## 249 Yes 2 No  
## 250 No 2 No  
## 251 No 1 No  
## 252 No 0 No  
## 253 No 1 No  
## 254 No 1 No  
## 255 No 3 No  
## 256 No 1 No  
## 257 No 1 No  
## 258 No 1 No  
## 259 No 3 No  
## 260 No 2 No  
## 261 No 2 No  
## 262 No 3 No  
## 263 Yes 1 Yes  
## 264 No 1 No  
## 265 No 2 No  
## 266 No 1 No  
## 267 Yes 2 Yes  
## 268 No 2 No  
## 269 No 3 Yes  
## 270 No 1 No  
## 271 No 4 No  
## 272 Yes 2 No  
## 273 No 5 No  
## 274 No 1 No  
## 275 No 3 No  
## 276 No 3 No  
## 277 No 1 No  
## 278 No 1 No  
## 279 Yes 3 No  
## 280 No 0 No  
## 281 No 0 No  
## 282 No 4 No  
## 283 No 0 No  
## 284 No 1 No  
## 285 No 2 No  
## regular\_animal\_exposure  
## 1 No  
## 2 No  
## 3 No  
## 4 No  
## 5 No  
## 6 No  
## 7 No  
## 8 No  
## 9 No  
## 10 No  
## 11 No  
## 12 No  
## 13 No  
## 14 <NA>  
## 15 No  
## 16 No  
## 17 No  
## 18 Yes  
## 19 No  
## 20 No  
## 21 No  
## 22 No  
## 23 No  
## 24 No  
## 25 No  
## 26 No  
## 27 No  
## 28 No  
## 29 No  
## 30 No  
## 31 No  
## 32 No  
## 33 No  
## 34 Yes  
## 35 No  
## 36 No  
## 37 Yes  
## 38 No  
## 39 No  
## 40 No  
## 41 No  
## 42 No  
## 43 No  
## 44 No  
## 45 No  
## 46 No  
## 47 No  
## 48 No  
## 49 No  
## 50 No  
## 51 No  
## 52 No  
## 53 No  
## 54 No  
## 55 No  
## 56 No  
## 57 No  
## 58 No  
## 59 No  
## 60 No  
## 61 No  
## 62 No  
## 63 No  
## 64 No  
## 65 No  
## 66 No  
## 67 No  
## 68 No  
## 69 No  
## 70 No  
## 71 No  
## 72 No  
## 73 No  
## 74 No  
## 75 No  
## 76 No  
## 77 No  
## 78 No  
## 79 No  
## 80 No  
## 81 No  
## 82 No  
## 83 Yes  
## 84 No  
## 85 No  
## 86 No  
## 87 No  
## 88 No  
## 89 No  
## 90 No  
## 91 No  
## 92 No  
## 93 No  
## 94 No  
## 95 No  
## 96 No  
## 97 No  
## 98 No  
## 99 No  
## 100 No  
## 101 No  
## 102 No  
## 103 No  
## 104 No  
## 105 No  
## 106 No  
## 107 No  
## 108 No  
## 109 No  
## 110 No  
## 111 No  
## 112 No  
## 113 No  
## 114 No  
## 115 No  
## 116 No  
## 117 No  
## 118 No  
## 119 No  
## 120 No  
## 121 No  
## 122 No  
## 123 No  
## 124 No  
## 125 No  
## 126 No  
## 127 No  
## 128 No  
## 129 No  
## 130 No  
## 131 No  
## 132 No  
## 133 No  
## 134 No  
## 135 No  
## 136 No  
## 137 No  
## 138 No  
## 139 No  
## 140 No  
## 141 No  
## 142 No  
## 143 No  
## 144 No  
## 145 No  
## 146 No  
## 147 No  
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## 149 No  
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## 156 No  
## 157 No  
## 158 No  
## 159 No  
## 160 No  
## 161 No  
## 162 No  
## 163 No  
## 164 No  
## 165 Yes  
## 166 No  
## 167 No  
## 168 No  
## 169 No  
## 170 No  
## 171 No  
## 172 No  
## 173 No  
## 174 No  
## 175 No  
## 176 No  
## 177 No  
## 178 No  
## 179 No  
## 180 No  
## 181 No  
## 182 No  
## 183 No  
## 184 No  
## 185 No  
## 186 No  
## 187 Yes  
## 188 No  
## 189 No  
## 190 No  
## 191 No  
## 192 No  
## 193 No  
## 194 No  
## 195 No  
## 196 No  
## 197 No  
## 198 No  
## 199 No  
## 200 Yes  
## 201 No  
## 202 No  
## 203 No  
## 204 No  
## 205 No  
## 206 Yes  
## 207 No  
## 208 No  
## 209 No  
## 210 No  
## 211 No  
## 212 No  
## 213 <NA>  
## 214 No  
## 215 No  
## 216 No  
## 217 No  
## 218 Yes  
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## 220 No  
## 221 No  
## 222 No  
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## 224 No  
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## 231 No  
## 232 No  
## 233 No  
## 234 No  
## 235 No  
## 236 No  
## 237 No  
## 238 No  
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## 242 No  
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## 244 No  
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## 246 No  
## 247 No  
## 248 No  
## 249 No  
## 250 No  
## 251 No  
## 252 No  
## 253 No  
## 254 Yes  
## 255 No  
## 256 No  
## 257 Yes  
## 258 No  
## 259 No  
## 260 No  
## 261 No  
## 262 No  
## 263 No  
## 264 No  
## 265 No  
## 266 Yes  
## 267 No  
## 268 No  
## 269 No  
## 270 No  
## 271 No  
## 272 No  
## 273 Yes  
## 274 No  
## 275 No  
## 276 No  
## 277 No  
## 278 No  
## 279 No  
## 280 No  
## 281 Yes  
## 282 No  
## 283 No  
## 284 No  
## 285 No  
## pets has\_pets  
## 1 Dogs Yes  
## 2 Dogs Yes  
## 3 Dogs Yes  
## 4 Cats,\tDogs Yes  
## 5 Reptiles Yes  
## 6 Dogs Yes  
## 7 Dogs Yes  
## 8 Cats,\tDogs,Rodents/Small Mammals Yes  
## 9 Cats Yes  
## 10 Dogs Yes  
## 11 Dogs Yes  
## 12 I do not live with any companion animals No  
## 13 Dogs Yes  
## 14 I do not live with any companion animals No  
## 15 Dogs Yes  
## 16 I do not live with any companion animals No  
## 17 Cats Yes  
## 18 Cats,\tDogs Yes  
## 19 Dogs Yes  
## 20 Dogs Yes  
## 21 I do not live with any companion animals No  
## 22 Cats,\tDogs Yes  
## 23 Dogs Yes  
## 24 I do not live with any companion animals No  
## 25 I do not live with any companion animals No  
## 26 Cats Yes  
## 27 I do not live with any companion animals No  
## 28 Dogs Yes  
## 29 Dogs Yes  
## 30 I do not live with any companion animals No  
## 31 Cats,\tDogs Yes  
## 32 I do not live with any companion animals No  
## 33 I do not live with any companion animals No  
## 34 Dogs Yes  
## 35 I do not live with any companion animals No  
## 36 I do not live with any companion animals No  
## 37 Cats,Rodents/Small Mammals Yes  
## 38 Cats Yes  
## 39 Cats,\tDogs Yes  
## 40 Dogs Yes  
## 41 Cats,\tDogs Yes  
## 42 I do not live with any companion animals No  
## 43 Dogs Yes  
## 44 Dogs Yes  
## 45 Dogs Yes  
## 46 Rodents/Small Mammals Yes  
## 47 I do not live with any companion animals No  
## 48 I do not live with any companion animals No  
## 49 Dogs Yes  
## 50 Cats Yes  
## 51 I do not live with any companion animals No  
## 52 I do not live with any companion animals No  
## 53 Cats Yes  
## 54 Dogs Yes  
## 55 Other Yes  
## 56 Cats,Reptiles Yes  
## 57 I do not live with any companion animals No  
## 58 I do not live with any companion animals No  
## 59 I do not live with any companion animals No  
## 60 Dogs Yes  
## 61 Dogs Yes  
## 62 I do not live with any companion animals No  
## 63 Cats Yes  
## 64 I do not live with any companion animals No  
## 65 Reptiles Yes  
## 66 I do not live with any companion animals No  
## 67 Cats,Reptiles Yes  
## 68 Cats Yes  
## 69 I do not live with any companion animals No  
## 70 Dogs Yes  
## 71 I do not live with any companion animals No  
## 72 I do not live with any companion animals No  
## 73 Cats Yes  
## 74 Dogs Yes  
## 75 Dogs Yes  
## 76 Dogs Yes  
## 77 Dogs Yes  
## 78 I do not live with any companion animals No  
## 79 Cats,\tDogs Yes  
## 80 I do not live with any companion animals No  
## 81 I do not live with any companion animals No  
## 82 Dogs Yes  
## 83 Cats Yes  
## 84 I do not live with any companion animals No  
## 85 Cats Yes  
## 86 Cats,\tDogs Yes  
## 87 I do not live with any companion animals No  
## 88 I do not live with any companion animals No  
## 89 I do not live with any companion animals No  
## 90 Cats,\tDogs Yes  
## 91 Dogs Yes  
## 92 Rodents/Small Mammals Yes  
## 93 I do not live with any companion animals No  
## 94 I do not live with any companion animals No  
## 95 Dogs Yes  
## 96 I do not live with any companion animals No  
## 97 Dogs Yes  
## 98 Cats,\tDogs Yes  
## 99 I do not live with any companion animals No  
## 100 I do not live with any companion animals No  
## 101 I do not live with any companion animals No  
## 102 Cats Yes  
## 103 Dogs Yes  
## 104 Cats Yes  
## 105 I do not live with any companion animals No  
## 106 Cats,\tDogs,Other Yes  
## 107 I do not live with any companion animals No  
## 108 Cats,\tDogs Yes  
## 109 Cats,\tDogs Yes  
## 110 I do not live with any companion animals No  
## 111 Dogs Yes  
## 112 I do not live with any companion animals No  
## 113 Dogs Yes  
## 114 Dogs Yes  
## 115 I do not live with any companion animals No  
## 116 I do not live with any companion animals No  
## 117 I do not live with any companion animals No  
## 118 Cats Yes  
## 119 I do not live with any companion animals No  
## 120 Dogs Yes  
## 121 Dogs,Reptiles Yes  
## 122 I do not live with any companion animals No  
## 123 Dogs Yes  
## 124 I do not live with any companion animals No  
## 125 I do not live with any companion animals No  
## 126 I do not live with any companion animals No  
## 127 I do not live with any companion animals No  
## 128 Dogs Yes  
## 129 I do not live with any companion animals No  
## 130 Dogs Yes  
## 131 Cats Yes  
## 132 I do not live with any companion animals No  
## 133 I do not live with any companion animals No  
## 134 I do not live with any companion animals No  
## 135 Dogs Yes  
## 136 Cats Yes  
## 137 Dogs Yes  
## 138 Dogs Yes  
## 139 I do not live with any companion animals No  
## 140 I do not live with any companion animals No  
## 141 I do not live with any companion animals No  
## 142 Cats,\tDogs,Rodents/Small Mammals Yes  
## 143 I do not live with any companion animals No  
## 144 I do not live with any companion animals No  
## 145 I do not live with any companion animals No  
## 146 I do not live with any companion animals No  
## 147 Cats Yes  
## 148 I do not live with any companion animals No  
## 149 Cats,\tDogs Yes  
## 150 I do not live with any companion animals No  
## 151 Cats,\tDogs Yes  
## 152 I do not live with any companion animals No  
## 153 Dogs Yes  
## 154 Cats,\tDogs Yes  
## 155 Cats Yes  
## 156 Dogs Yes  
## 157 I do not live with any companion animals No  
## 158 I do not live with any companion animals No  
## 159 I do not live with any companion animals No  
## 160 Cats Yes  
## 161 Cats,\tDogs Yes  
## 162 Dogs Yes  
## 163 I do not live with any companion animals No  
## 164 Cats Yes  
## 165 I do not live with any companion animals No  
## 166 I do not live with any companion animals No  
## 167 Rodents/Small Mammals Yes  
## 168 Cats Yes  
## 169 I do not live with any companion animals No  
## 170 Cats,\tDogs Yes  
## 171 Cats Yes  
## 172 Dogs Yes  
## 173 Cats Yes  
## 174 Dogs,Other Yes  
## 175 Dogs Yes  
## 176 Dogs Yes  
## 177 I do not live with any companion animals No  
## 178 I do not live with any companion animals No  
## 179 I do not live with any companion animals No  
## 180 Dogs Yes  
## 181 I do not live with any companion animals No  
## 182 Dogs Yes  
## 183 Dogs Yes  
## 184 Cats,\tDogs,\tBirds Yes  
## 185 Dogs Yes  
## 186 Cats,\tDogs,\tBirds Yes  
## 187 Cats,\tDogs,Reptiles Yes  
## 188 Dogs Yes  
## 189 I do not live with any companion animals No  
## 190 I do not live with any companion animals No  
## 191 Cats,\tDogs Yes  
## 192 Dogs Yes  
## 193 Cats Yes  
## 194 Cats,\tDogs Yes  
## 195 I do not live with any companion animals No  
## 196 Dogs Yes  
## 197 I do not live with any companion animals No  
## 198 Dogs Yes  
## 199 Dogs Yes  
## 200 I do not live with any companion animals No  
## 201 Cats Yes  
## 202 Cats,\tDogs Yes  
## 203 Cats Yes  
## 204 Cats Yes  
## 205 Dogs Yes  
## 206 Cats,\tDogs,\tBirds,Reptiles,Rodents/Small Mammals,Other Yes  
## 207 Dogs Yes  
## 208 Cats Yes  
## 209 I do not live with any companion animals No  
## 210 Dogs Yes  
## 211 Cats Yes  
## 212 Dogs Yes  
## 213 Cats Yes  
## 214 Cats,\tDogs Yes  
## 215 Cats,\tDogs Yes  
## 216 Cats Yes  
## 217 I do not live with any companion animals No  
## 218 Dogs Yes  
## 219 I do not live with any companion animals No  
## 220 Cats,\tDogs Yes  
## 221 Rodents/Small Mammals Yes  
## 222 I do not live with any companion animals No  
## 223 Dogs Yes  
## 224 I do not live with any companion animals No  
## 225 I do not live with any companion animals No  
## 226 Cats Yes  
## 227 I do not live with any companion animals No  
## 228 Dogs Yes  
## 229 Dogs Yes  
## 230 I do not live with any companion animals No  
## 231 Cats,\tDogs Yes  
## 232 I do not live with any companion animals No  
## 233 I do not live with any companion animals No  
## 234 I do not live with any companion animals No  
## 235 Dogs Yes  
## 236 Dogs Yes  
## 237 I do not live with any companion animals No  
## 238 Cats,\tDogs Yes  
## 239 Cats,\tDogs Yes  
## 240 Cats,\tDogs,\tBirds Yes  
## 241 I do not live with any companion animals No  
## 242 Cats Yes  
## 243 I do not live with any companion animals No  
## 244 I do not live with any companion animals No  
## 245 Cats,\tDogs Yes  
## 246 I do not live with any companion animals No  
## 247 I do not live with any companion animals No  
## 248 Dogs Yes  
## 249 I do not live with any companion animals No  
## 250 Dogs,Reptiles Yes  
## 251 I do not live with any companion animals No  
## 252 Cats Yes  
## 253 Cats Yes  
## 254 Dogs Yes  
## 255 Cats Yes  
## 256 Cats Yes  
## 257 Cats,\tDogs Yes  
## 258 Cats,\tDogs Yes  
## 259 I do not live with any companion animals No  
## 260 I do not live with any companion animals No  
## 261 I do not live with any companion animals No  
## 262 Cats,\tDogs Yes  
## 263 I do not live with any companion animals No  
## 264 Dogs Yes  
## 265 Cats,\tDogs Yes  
## 266 Cats,\tDogs Yes  
## 267 I do not live with any companion animals No  
## 268 Cats Yes  
## 269 I do not live with any companion animals No  
## 270 Dogs Yes  
## 271 Dogs Yes  
## 272 Dogs Yes  
## 273 Cats,\tDogs Yes  
## 274 I do not live with any companion animals No  
## 275 Dogs Yes  
## 276 Cats Yes  
## 277 Dogs Yes  
## 278 Dogs Yes  
## 279 I do not live with any companion animals No  
## 280 I do not live with any companion animals No  
## 281 Cats,\tDogs,Other Yes  
## 282 Cats Yes  
## 283 I do not live with any companion animals No  
## 284 I do not live with any companion animals No  
## 285 Cats,\tDogs Yes  
## cat\_andor\_dog international\_travel\_past\_month  
## 1 Yes No  
## 2 Yes No  
## 3 Yes No  
## 4 Yes No  
## 5 No No  
## 6 Yes No  
## 7 Yes No  
## 8 Yes No  
## 9 Yes No  
## 10 Yes No  
## 11 Yes No  
## 12 No No  
## 13 Yes No  
## 14 No No  
## 15 Yes No  
## 16 No No  
## 17 Yes No  
## 18 Yes No  
## 19 Yes No  
## 20 Yes No  
## 21 No No  
## 22 Yes No  
## 23 Yes No  
## 24 No No  
## 25 No No  
## 26 Yes No  
## 27 No No  
## 28 Yes No  
## 29 Yes No  
## 30 No No  
## 31 Yes No  
## 32 No No  
## 33 No No  
## 34 Yes No  
## 35 No No  
## 36 No No  
## 37 Yes No  
## 38 Yes No  
## 39 Yes No  
## 40 Yes No  
## 41 Yes No  
## 42 No No  
## 43 Yes No  
## 44 Yes No  
## 45 Yes No  
## 46 No No  
## 47 No No  
## 48 No No  
## 49 Yes No  
## 50 Yes No  
## 51 No No  
## 52 No No  
## 53 Yes No  
## 54 Yes No  
## 55 No No  
## 56 Yes No  
## 57 No No  
## 58 No No  
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## 61 Yes No  
## 62 No No  
## 63 Yes No  
## 64 No No  
## 65 No No  
## 66 No No  
## 67 Yes No  
## 68 Yes No  
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## 75 Yes No  
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## 77 Yes No  
## 78 No No  
## 79 Yes No  
## 80 No No  
## 81 No No  
## 82 Yes No  
## 83 Yes No  
## 84 No No  
## 85 Yes No  
## 86 Yes No  
## 87 No No  
## 88 No No  
## 89 No No  
## 90 Yes No  
## 91 Yes No  
## 92 No No  
## 93 No No  
## 94 No No  
## 95 Yes No  
## 96 No No  
## 97 Yes No  
## 98 Yes No  
## 99 No No  
## 100 No No  
## 101 No No  
## 102 Yes No  
## 103 Yes No  
## 104 Yes No  
## 105 No No  
## 106 Yes No  
## 107 No No  
## 108 Yes No  
## 109 Yes No  
## 110 No No  
## 111 Yes No  
## 112 No No  
## 113 Yes No  
## 114 Yes No  
## 115 No No  
## 116 No No  
## 117 No No  
## 118 Yes No  
## 119 No No  
## 120 Yes No  
## 121 Yes No  
## 122 No No  
## 123 Yes No  
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## 125 No No  
## 126 No No  
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## 129 No No  
## 130 Yes No  
## 131 Yes No  
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## 133 No No  
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## 137 Yes No  
## 138 Yes No  
## 139 No No  
## 140 No No  
## 141 No No  
## 142 Yes No  
## 143 No No  
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## 146 No No  
## 147 Yes No  
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## 149 Yes No  
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## 154 Yes No  
## 155 Yes No  
## 156 Yes No  
## 157 No No  
## 158 No No  
## 159 No No  
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## 162 Yes No  
## 163 No No  
## 164 Yes No  
## 165 No No  
## 166 No No  
## 167 No No  
## 168 Yes Yes  
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## 174 Yes No  
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## 176 Yes No  
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## 178 No No  
## 179 No No  
## 180 Yes No  
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## 187 Yes No  
## 188 Yes No  
## 189 No No  
## 190 No No  
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## 197 No No  
## 198 Yes No  
## 199 Yes No  
## 200 No No  
## 201 Yes No  
## 202 Yes No  
## 203 Yes No  
## 204 Yes No  
## 205 Yes No  
## 206 Yes No  
## 207 Yes No  
## 208 Yes No  
## 209 No No  
## 210 Yes No  
## 211 Yes No  
## 212 Yes No  
## 213 Yes No  
## 214 Yes No  
## 215 Yes No  
## 216 Yes No  
## 217 No Yes  
## 218 Yes No  
## 219 No No  
## 220 Yes No  
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## 222 No No  
## 223 Yes No  
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## 226 Yes No  
## 227 No No  
## 228 Yes No  
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## 230 No No  
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## 238 Yes No  
## 239 Yes <NA>  
## 240 Yes No  
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## 243 No No  
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## 249 No No  
## 250 Yes No  
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## 263 No No  
## 264 Yes No  
## 265 Yes No  
## 266 Yes No  
## 267 No Yes  
## 268 Yes No  
## 269 No No  
## 270 Yes No  
## 271 Yes No  
## 272 Yes No  
## 273 Yes No  
## 274 No No  
## 275 Yes No  
## 276 Yes No  
## 277 Yes No  
## 278 Yes No  
## 279 No No  
## 280 No No  
## 281 Yes No  
## 282 Yes No  
## 283 No No  
## 284 No No  
## 285 Yes No  
## treated\_recreational\_water\_exposure\_past\_week  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0  
## 7 0  
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## eat\_pork\_or\_beef\_past\_week eat\_fish\_or\_shellfish\_past\_week  
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## 61 2 0  
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## 86 2 1  
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## eat\_dairy\_past\_week eat\_raw\_fruits\_or\_vegetables\_past\_week esbl  
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## 6 5 2 Negative  
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## 8 7 3 Negative  
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## 264 7 7 Negative  
## 265 5 7 Negative  
## 266 7 3 Negative  
## 267 2 3 Negative  
## 268 7 7 Negative  
## 269 4 5 Negative  
## 270 2 2 Negative  
## 271 3 3 Negative  
## 272 7 4 Negative  
## 273 5 7 Negative  
## 274 5 7 Negative  
## 275 3 4 Negative  
## 276 7 7 Negative  
## 277 1 3 Negative  
## 278 7 7 Negative  
## 279 5 1 Negative  
## 280 7 6 Negative  
## 281 7 3 Negative  
## 282 6 6 Negative  
## 283 2 2 Negative  
## 284 7 7 Negative  
## 285 2 5 Negative  
## cre ecoli\_cultured total\_isolates amp\_resistant\_isolates  
## 1 Negative Yes 48 0.5  
## 2 Negative Yes 48 0.0  
## 3 Negative Yes 48 2.0  
## 4 Negative Yes 48 0.0  
## 5 Negative No 0 0.0  
## 6 Negative Yes 48 24.0  
## 7 Negative No 0 0.0  
## 8 Negative Yes 48 0.5  
## 9 Negative No 0 0.0  
## 10 Negative Yes 48 0.0  
## 11 Negative Yes 48 48.0  
## 12 Negative Yes 48 47.5  
## 13 Negative Yes 48 48.0  
## 14 Negative Yes 48 0.0  
## 15 Negative Yes 48 47.5  
## 16 Negative Yes 48 24.0  
## 17 Negative Yes 4 0.0  
## 18 Negative Yes 48 0.0  
## 19 Negative Yes 48 0.0  
## 20 Negative Yes 48 0.0  
## 21 Negative Yes 48 8.0  
## 22 Negative Yes 48 0.0  
## 23 Negative Yes 48 0.0  
## 24 Negative Yes 48 48.0  
## 25 Negative Yes 48 0.0  
## 26 Negative No 0 0.0  
## 27 Negative Yes 48 0.0  
## 28 Negative No 0 0.0  
## 29 Negative Yes 48 0.0  
## 30 Negative Yes 48 0.0  
## 31 Negative No 0 0.0  
## 32 Negative No 0 0.0  
## 33 Negative Yes 48 0.0  
## 34 Negative Yes 48 0.0  
## 35 Negative Yes 48 48.0  
## 36 Negative Yes 48 48.0  
## 37 Negative Yes 48 0.0  
## 38 Negative No 0 0.0  
## 39 Negative Yes 48 44.0  
## 40 Negative No 0 0.0  
## 41 Negative Yes 48 2.0  
## 42 Negative Yes 48 0.0  
## 43 Negative Yes 48 0.0  
## 44 Negative No 0 0.0  
## 45 Negative Yes 48 0.0  
## 46 Negative Yes 48 0.0  
## 47 Negative Yes 48 8.0  
## 48 Negative Yes 48 8.0  
## 49 Negative Yes 48 48.0  
## 50 Negative Yes 24 24.0  
## 51 Negative Yes 48 0.0  
## 52 Negative Yes 48 40.0  
## 53 Negative Yes 48 0.0  
## 54 Negative Yes 48 48.0  
## 55 Negative Yes 48 31.0  
## 56 Negative Yes 48 0.0  
## 57 Negative Yes 48 0.0  
## 58 Negative No 0 0.0  
## 59 Negative Yes 48 0.0  
## 60 Negative Yes 48 0.0  
## 61 Negative Yes 48 0.0  
## 62 Negative Yes 48 48.0  
## 63 Negative Yes 48 2.0  
## 64 Negative No 0 0.0  
## 65 Negative Yes 48 0.0  
## 66 Negative Yes 48 0.0  
## 67 Negative Yes 48 0.0  
## 68 Negative Yes 48 48.0  
## 69 Negative Yes 48 38.5  
## 70 Negative Yes 48 0.0  
## 71 Negative Yes 48 47.5  
## 72 Negative Yes 48 48.0  
## 73 Negative Yes 48 0.0  
## 74 Negative Yes 48 48.0  
## 75 Negative Yes 48 4.0  
## 76 Negative Yes 48 0.0  
## 77 Negative Yes 48 0.0  
## 78 Negative Yes 48 0.0  
## 79 Negative Yes 48 0.0  
## 80 Negative Yes 48 0.0  
## 81 Negative Yes 48 0.0  
## 82 Negative No 0 0.0  
## 83 Negative Yes 48 0.0  
## 84 Negative Yes 48 0.0  
## 85 Negative Yes 48 0.0  
## 86 Negative No 0 0.0  
## 87 Negative No 0 0.0  
## 88 Negative Yes 48 21.0  
## 89 Negative No 0 0.0  
## 90 Negative Yes 48 48.0  
## 91 Negative Yes 48 48.0  
## 92 Negative Yes 48 0.0  
## 93 Negative Yes 48 48.0  
## 94 Negative Yes 48 42.0  
## 95 Negative Yes 48 0.0  
## 96 Negative Yes 48 0.0  
## 97 Negative Yes 48 0.0  
## 98 Negative Yes 48 45.0  
## 99 Negative Yes 48 48.0  
## 100 Negative Yes 48 0.0  
## 101 Negative Yes 16 0.0  
## 102 Negative Yes 48 0.0  
## 103 Negative Yes 48 0.0  
## 104 Negative Yes 48 1.0  
## 105 Negative Yes 48 0.0  
## 106 Negative Yes 31 0.0  
## 107 Negative Yes 48 0.0  
## 108 Negative Yes 40 0.0  
## 109 Negative Yes 48 0.5  
## 110 Negative Yes 43 0.0  
## 111 Negative Yes 48 0.0  
## 112 Negative Yes 48 0.0  
## 113 Negative No 0 0.0  
## 114 Negative No 0 0.0  
## 115 Negative No 0 0.0  
## 116 Negative Yes 48 0.0  
## 117 Negative Yes 48 0.0  
## 118 Negative Yes 48 0.0  
## 119 Negative No 0 0.0  
## 120 Negative No 0 0.0  
## 121 Negative Yes 48 48.0  
## 122 Negative Yes 48 0.0  
## 123 Negative Yes 45 1.0  
## 124 Negative Yes 48 6.0  
## 125 Negative Yes 41 0.0  
## 126 Negative Yes 48 0.0  
## 127 Negative Yes 48 0.0  
## 128 Negative Yes 45 41.0  
## 129 Negative Yes 40 27.0  
## 130 Negative Yes 48 48.0  
## 131 Negative Yes 48 48.0  
## 132 Negative No 0 0.0  
## 133 Negative Yes 48 0.0  
## 134 Negative Yes 48 0.0  
## 135 Negative Yes 48 0.0  
## 136 Negative Yes 48 0.0  
## 137 Negative Yes 48 0.0  
## 138 Negative Yes 48 47.0  
## 139 Negative Yes 48 0.0  
## 140 Negative Yes 48 48.0  
## 141 Negative Yes 48 47.0  
## 142 Negative Yes 48 35.0  
## 143 Negative Yes 48 0.0  
## 144 Negative Yes 48 0.0  
## 145 Negative Yes 48 0.0  
## 146 Negative Yes 48 47.0  
## 147 Negative Yes 48 0.0  
## 148 Negative Yes 48 48.0  
## 149 Negative Yes 48 0.0  
## 150 Negative No 0 0.0  
## 151 Negative No 0 0.0  
## 152 Negative Yes 48 0.0  
## 153 Negative Yes 48 7.0  
## 154 Negative Yes 48 48.0  
## 155 Negative No 0 0.0  
## 156 Negative Yes 48 1.0  
## 157 Negative Yes 48 0.0  
## 158 Negative Yes 48 47.0  
## 159 Negative Yes 48 44.0  
## 160 Negative Yes 48 0.0  
## 161 Negative No 0 0.0  
## 162 Negative Yes 48 48.0  
## 163 Negative No 0 0.0  
## 164 Negative Yes 48 48.0  
## 165 Negative Yes 48 0.0  
## 166 Negative Yes 45 0.0  
## 167 Negative Yes 37 20.0  
## 168 Negative Yes 42 0.0  
## 169 Negative Yes 48 48.0  
## 170 Negative Yes 48 0.0  
## 171 Negative Yes 43 43.0  
## 172 Negative Yes 48 48.0  
## 173 Negative Yes 48 48.0  
## 174 Negative Yes 48 47.0  
## 175 Negative No 0 0.0  
## 176 Negative Yes 48 0.0  
## 177 Negative Yes 48 48.0  
## 178 Negative Yes 48 0.0  
## 179 Negative Yes 48 0.0  
## 180 Negative Yes 20 0.0  
## 181 Negative Yes 48 0.0  
## 182 Negative Yes 48 1.0  
## 183 Negative Yes 48 48.0  
## 184 Negative Yes 48 0.0  
## 185 Negative Yes 48 0.0  
## 186 Negative Yes 48 0.0  
## 187 Negative No 0 0.0  
## 188 Negative Yes 48 0.0  
## 189 Negative Yes 48 24.0  
## 190 Negative Yes 48 0.0  
## 191 Negative No 0 0.0  
## 192 Negative No 0 0.0  
## 193 Negative Yes 48 0.0  
## 194 Negative Yes 48 1.0  
## 195 Negative Yes 48 0.0  
## 196 Negative Yes 48 2.0  
## 197 Negative Yes 45 0.0  
## 198 Negative No 0 0.0  
## 199 Negative Yes 40 0.0  
## 200 Negative Yes 48 0.0  
## 201 Negative Yes 48 0.0  
## 202 Negative Yes 48 0.0  
## 203 Negative Yes 48 4.0  
## 204 Negative Yes 48 48.0  
## 205 Negative No 0 0.0  
## 206 Negative Yes 48 0.0  
## 207 Negative Yes 48 0.0  
## 208 Negative Yes 48 0.0  
## 209 Negative Yes 48 48.0  
## 210 Negative Yes 48 0.0  
## 211 Negative Yes 32 0.0  
## 212 Negative No 0 0.0  
## 213 Negative Yes 48 48.0  
## 214 Negative Yes 48 0.0  
## 215 Negative Yes 48 19.0  
## 216 Negative Yes 48 0.0  
## 217 Negative Yes 48 0.0  
## 218 Negative Yes 48 0.0  
## 219 Negative Yes 48 0.0  
## 220 Negative Yes 48 2.5  
## 221 Negative Yes 48 4.0  
## 222 Negative Yes 48 43.5  
## 223 Negative Yes 48 0.0  
## 224 Negative Yes 48 1.0  
## 225 Negative Yes 48 48.0  
## 226 Negative Yes 48 0.0  
## 227 Negative Yes 48 0.0  
## 228 Negative No 0 0.0  
## 229 Negative Yes 48 0.0  
## 230 Negative Yes 48 31.0  
## 231 Negative No 0 0.0  
## 232 Negative Yes 48 48.0  
## 233 Negative Yes 48 0.0  
## 234 Negative Yes 48 0.0  
## 235 Negative Yes 24 0.0  
## 236 Negative Yes 48 48.0  
## 237 Negative Yes 48 46.0  
## 238 Negative Yes 48 0.0  
## 239 Negative Yes 48 48.0  
## 240 Negative Yes 24 0.5  
## 241 Negative Yes 48 10.0  
## 242 Negative No 0 0.0  
## 243 Negative Yes 48 48.0  
## 244 Negative Yes 42 0.0  
## 245 Negative Yes 48 25.0  
## 246 Negative Yes 48 1.5  
## 247 Negative Yes 48 36.5  
## 248 Negative Yes 48 34.5  
## 249 Negative Yes 48 0.0  
## 250 Negative Yes 48 0.0  
## 251 Negative Yes 48 0.0  
## 252 Negative Yes 48 0.0  
## 253 Negative Yes 48 0.0  
## 254 Negative Yes 48 0.0  
## 255 Negative Yes 48 1.0  
## 256 Negative Yes 48 48.0  
## 257 Negative Yes 48 12.0  
## 258 Negative Yes 48 1.0  
## 259 Negative Yes 48 48.0  
## 260 Negative Yes 48 0.0  
## 261 Negative No 0 0.0  
## 262 Negative Yes 48 0.0  
## 263 Negative Yes 48 0.0  
## 264 Negative Yes 48 0.0  
## 265 Negative Yes 48 0.0  
## 266 Negative Yes 48 0.0  
## 267 Negative Yes 48 43.0  
## 268 Negative Yes 48 17.0  
## 269 Negative Yes 48 0.0  
## 270 Negative Yes 48 48.0  
## 271 Negative Yes 48 32.0  
## 272 Negative Yes 48 1.5  
## 273 Negative Yes 40 5.0  
## 274 Negative Yes 48 2.0  
## 275 Negative Yes 48 15.0  
## 276 Negative Yes 48 17.5  
## 277 Negative Yes 48 0.0  
## 278 Negative Yes 48 39.0  
## 279 Negative Yes 48 0.0  
## 280 Negative Yes 48 0.0  
## 281 Negative Yes 48 0.0  
## 282 Negative No 0 0.0  
## 283 Negative Yes 48 48.0  
## 284 Negative No 0 0.0  
## 285 Negative Yes 48 48.0  
## ceft\_resistant\_isolates cipro\_resistant\_isolates tetra\_resistant\_isolates  
## 1 0.0 0.0 0.0  
## 2 0.0 0.0 0.0  
## 3 0.0 0.0 0.0  
## 4 0.0 0.0 0.0  
## 5 0.0 0.0 0.0  
## 6 0.0 0.0 4.0  
## 7 0.0 0.0 0.0  
## 8 0.0 0.0 7.5  
## 9 0.0 0.0 0.0  
## 10 0.0 0.0 0.0  
## 11 0.0 0.0 48.0  
## 12 0.0 0.0 0.0  
## 13 0.0 0.0 47.5  
## 14 0.0 0.0 0.0  
## 15 0.0 0.0 0.0  
## 16 0.0 0.0 0.0  
## 17 0.0 0.0 0.0  
## 18 0.0 0.0 0.0  
## 19 0.0 0.0 0.0  
## 20 0.0 0.0 16.0  
## 21 0.0 0.0 8.0  
## 22 0.0 0.0 48.0  
## 23 0.0 0.0 0.0  
## 24 0.0 0.0 0.0  
## 25 0.0 0.0 0.0  
## 26 0.0 0.0 0.0  
## 27 0.0 0.0 0.0  
## 28 0.0 0.0 0.0  
## 29 0.0 0.0 0.0  
## 30 0.0 0.0 0.0  
## 31 0.0 0.0 0.0  
## 32 0.0 0.0 0.0  
## 33 0.0 0.0 0.0  
## 34 0.0 0.0 0.0  
## 35 0.0 48.0 48.0  
## 36 1.0 0.0 48.0  
## 37 0.0 0.0 0.0  
## 38 0.0 0.0 0.0  
## 39 44.0 44.0 0.0  
## 40 0.0 0.0 0.0  
## 41 0.0 0.0 2.0  
## 42 0.0 0.0 0.0  
## 43 0.0 0.0 0.0  
## 44 0.0 0.0 0.0  
## 45 0.0 0.0 0.0  
## 46 0.0 0.0 0.0  
## 47 0.0 0.0 0.0  
## 48 0.0 0.0 0.0  
## 49 0.0 0.0 0.0  
## 50 0.0 0.0 24.0  
## 51 0.0 0.0 0.0  
## 52 0.0 0.0 4.0  
## 53 0.0 0.0 0.0  
## 54 0.0 0.0 0.0  
## 55 0.0 0.0 0.0  
## 56 0.0 0.0 0.0  
## 57 0.0 0.0 0.0  
## 58 0.0 0.0 0.0  
## 59 0.0 0.0 48.0  
## 60 0.0 0.0 0.0  
## 61 0.0 0.0 28.5  
## 62 0.0 0.0 0.0  
## 63 0.0 0.0 0.0  
## 64 0.0 0.0 0.0  
## 65 0.0 0.0 0.0  
## 66 0.0 0.0 0.0  
## 67 0.0 0.0 0.0  
## 68 0.0 0.0 27.0  
## 69 0.0 0.0 45.0  
## 70 0.0 0.0 0.0  
## 71 0.0 0.0 0.0  
## 72 13.0 0.0 0.0  
## 73 0.0 0.0 0.0  
## 74 48.0 21.0 47.0  
## 75 0.0 3.5 4.0  
## 76 0.0 0.0 43.0  
## 77 0.0 0.0 0.0  
## 78 0.0 0.0 0.0  
## 79 0.0 0.0 0.0  
## 80 0.0 0.0 0.0  
## 81 0.0 0.0 0.0  
## 82 0.0 0.0 0.0  
## 83 0.0 0.0 0.0  
## 84 0.0 0.0 0.0  
## 85 0.0 0.0 0.0  
## 86 0.0 0.0 0.0  
## 87 0.0 0.0 0.0  
## 88 0.0 0.0 21.0  
## 89 0.0 0.0 0.0  
## 90 0.0 0.0 0.0  
## 91 0.0 0.0 0.0  
## 92 0.0 0.0 0.0  
## 93 0.0 0.0 48.0  
## 94 0.0 0.0 42.0  
## 95 0.0 0.0 0.0  
## 96 0.0 0.0 0.0  
## 97 0.0 0.0 0.0  
## 98 0.0 0.0 43.0  
## 99 0.0 0.0 48.0  
## 100 0.0 0.0 0.0  
## 101 0.0 0.0 0.0  
## 102 0.0 0.0 0.0  
## 103 0.0 0.0 0.0  
## 104 0.0 0.0 0.0  
## 105 0.0 0.0 0.0  
## 106 0.0 0.0 0.0  
## 107 0.0 0.0 0.0  
## 108 0.0 0.0 0.0  
## 109 0.0 0.0 0.0  
## 110 0.0 0.0 0.0  
## 111 0.0 0.0 0.0  
## 112 0.0 0.0 0.0  
## 113 0.0 0.0 0.0  
## 114 0.0 0.0 0.0  
## 115 0.0 0.0 0.0  
## 116 0.0 0.0 0.0  
## 117 0.0 0.0 0.0  
## 118 0.0 0.0 0.0  
## 119 0.0 0.0 0.0  
## 120 0.0 0.0 0.0  
## 121 0.0 0.0 0.0  
## 122 0.0 0.0 0.0  
## 123 0.0 0.0 0.0  
## 124 0.0 0.0 7.0  
## 125 0.0 0.0 28.5  
## 126 0.0 0.0 0.0  
## 127 0.0 0.0 0.0  
## 128 0.0 0.0 33.0  
## 129 0.0 0.0 0.0  
## 130 0.0 0.0 48.0  
## 131 0.0 0.0 0.0  
## 132 0.0 0.0 0.0  
## 133 0.0 0.0 46.0  
## 134 0.0 0.0 0.0  
## 135 0.0 0.0 0.0  
## 136 0.0 0.0 0.0  
## 137 0.0 0.0 0.0  
## 138 46.0 0.0 0.0  
## 139 0.0 0.0 0.0  
## 140 0.0 0.0 48.0  
## 141 0.0 0.0 0.0  
## 142 35.0 33.0 35.0  
## 143 0.0 0.0 0.0  
## 144 0.0 0.0 0.0  
## 145 0.0 0.0 0.0  
## 146 0.0 0.0 42.5  
## 147 0.0 0.0 0.0  
## 148 0.0 0.0 48.0  
## 149 0.0 0.0 0.0  
## 150 0.0 0.0 0.0  
## 151 0.0 0.0 0.0  
## 152 0.0 0.0 0.0  
## 153 0.0 0.0 0.0  
## 154 0.0 0.0 0.0  
## 155 0.0 0.0 0.0  
## 156 0.0 0.0 48.0  
## 157 0.0 0.0 0.0  
## 158 0.0 0.0 0.0  
## 159 0.0 0.0 37.5  
## 160 0.0 0.0 0.0  
## 161 0.0 0.0 0.0  
## 162 0.0 0.0 0.0  
## 163 0.0 0.0 0.0  
## 164 0.0 0.0 0.0  
## 165 0.0 0.0 43.0  
## 166 0.0 0.0 0.0  
## 167 0.0 0.0 0.0  
## 168 0.0 0.0 0.0  
## 169 0.0 0.0 0.0  
## 170 0.0 0.0 0.0  
## 171 0.0 0.0 0.0  
## 172 0.0 0.0 48.0  
## 173 0.0 0.0 0.0  
## 174 0.0 48.0 0.0  
## 175 0.0 0.0 0.0  
## 176 0.0 0.0 0.0  
## 177 0.0 0.0 0.0  
## 178 0.0 0.0 0.0  
## 179 0.0 0.0 0.0  
## 180 0.0 0.0 0.0  
## 181 0.5 0.0 0.0  
## 182 0.0 0.0 0.0  
## 183 0.0 0.0 48.0  
## 184 0.0 0.0 1.0  
## 185 0.0 0.0 0.0  
## 186 0.0 0.0 0.0  
## 187 0.0 0.0 0.0  
## 188 0.0 0.0 0.0  
## 189 0.0 0.0 0.0  
## 190 0.0 0.0 0.0  
## 191 0.0 0.0 0.0  
## 192 0.0 0.0 0.0  
## 193 0.0 0.0 0.0  
## 194 1.0 0.0 0.0  
## 195 1.0 0.0 0.0  
## 196 0.0 0.0 0.0  
## 197 0.0 0.0 14.5  
## 198 0.0 0.0 0.0  
## 199 0.0 0.0 0.0  
## 200 0.0 0.0 0.0  
## 201 0.0 0.0 0.0  
## 202 0.0 0.0 0.0  
## 203 0.0 0.0 4.0  
## 204 0.0 0.0 48.0  
## 205 0.0 0.0 0.0  
## 206 0.0 0.0 0.0  
## 207 0.0 0.0 0.0  
## 208 0.0 0.0 0.0  
## 209 0.0 48.0 0.0  
## 210 0.0 0.0 0.0  
## 211 0.0 0.0 0.0  
## 212 0.0 0.0 0.0  
## 213 0.0 0.0 0.0  
## 214 0.0 0.0 0.0  
## 215 0.0 0.0 19.0  
## 216 0.0 0.0 0.0  
## 217 0.0 0.0 0.0  
## 218 0.0 0.0 0.0  
## 219 0.0 0.0 0.0  
## 220 0.0 0.0 0.0  
## 221 0.0 0.0 44.0  
## 222 0.0 0.0 6.0  
## 223 0.0 0.0 0.0  
## 224 0.0 0.0 0.0  
## 225 0.0 0.0 48.0  
## 226 0.0 0.0 0.0  
## 227 0.0 0.0 0.0  
## 228 0.0 0.0 0.0  
## 229 0.0 0.0 0.0  
## 230 0.0 0.0 0.0  
## 231 0.0 0.0 0.0  
## 232 0.0 0.0 14.5  
## 233 0.0 0.0 48.0  
## 234 0.0 0.0 0.0  
## 235 0.0 0.0 0.0  
## 236 0.0 0.0 0.0  
## 237 0.0 0.0 38.0  
## 238 0.0 0.0 0.0  
## 239 0.0 0.0 0.0  
## 240 0.0 0.0 0.0  
## 241 0.0 0.0 18.5  
## 242 0.0 0.0 0.0  
## 243 0.0 0.0 46.0  
## 244 0.0 0.0 0.0  
## 245 0.0 0.0 0.0  
## 246 0.0 0.0 1.0  
## 247 0.0 0.0 14.5  
## 248 0.0 0.0 1.0  
## 249 0.0 0.0 1.0  
## 250 0.0 0.0 0.0  
## 251 0.0 0.0 0.0  
## 252 0.0 0.0 0.0  
## 253 0.0 0.0 0.0  
## 254 0.0 1.5 14.5  
## 255 0.0 0.0 0.0  
## 256 0.0 0.0 48.0  
## 257 0.0 0.0 12.0  
## 258 0.0 0.0 2.0  
## 259 0.0 0.0 2.0  
## 260 0.0 0.0 0.0  
## 261 0.0 0.0 0.0  
## 262 0.0 0.0 0.0  
## 263 0.0 0.0 0.0  
## 264 0.0 0.0 0.0  
## 265 0.0 0.0 0.0  
## 266 0.0 0.0 29.5  
## 267 0.0 0.0 1.0  
## 268 0.0 0.0 2.0  
## 269 0.0 0.0 0.0  
## 270 0.0 0.0 48.0  
## 271 0.0 0.0 1.5  
## 272 0.0 0.0 4.0  
## 273 0.0 0.0 0.0  
## 274 0.0 0.0 11.0  
## 275 0.0 0.0 4.5  
## 276 0.0 0.0 48.0  
## 277 0.0 0.0 0.0  
## 278 0.0 0.0 37.0  
## 279 0.0 0.0 0.0  
## 280 0.0 0.0 48.0  
## 281 0.0 0.0 0.0  
## 282 0.0 0.0 0.0  
## 283 0.0 0.0 0.0  
## 284 0.0 0.0 0.0  
## 285 0.0 0.0 48.0  
## trimet\_resistant\_isolates amp\_high ceft\_high cipro\_high tetra\_high  
## 1 0.0 No No No No  
## 2 0.0 No No No No  
## 3 0.0 No No No No  
## 4 0.0 No No No No  
## 5 0.0 No No No No  
## 6 0.0 No No No No  
## 7 0.0 No No No No  
## 8 0.0 No No No No  
## 9 0.0 No No No No  
## 10 0.0 No No No No  
## 11 0.0 Yes No No Yes  
## 12 0.0 Yes No No No  
## 13 48.0 Yes No No Yes  
## 14 0.0 No No No No  
## 15 44.5 Yes No No No  
## 16 0.0 No No No No  
## 17 0.0 No No No No  
## 18 0.0 No No No No  
## 19 0.0 No No No No  
## 20 0.0 No No No No  
## 21 0.0 No No No No  
## 22 48.0 No No No Yes  
## 23 0.0 No No No No  
## 24 0.0 Yes No No No  
## 25 0.0 No No No No  
## 26 0.0 No No No No  
## 27 0.0 No No No No  
## 28 0.0 No No No No  
## 29 0.0 No No No No  
## 30 0.0 No No No No  
## 31 0.0 No No No No  
## 32 0.0 No No No No  
## 33 0.0 No No No No  
## 34 0.0 No No No No  
## 35 0.0 Yes No Yes Yes  
## 36 48.0 Yes No No Yes  
## 37 0.0 No No No No  
## 38 0.0 No No No No  
## 39 34.0 Yes Yes Yes No  
## 40 0.0 No No No No  
## 41 40.0 No No No No  
## 42 0.0 No No No No  
## 43 0.0 No No No No  
## 44 0.0 No No No No  
## 45 0.0 No No No No  
## 46 0.0 No No No No  
## 47 0.0 No No No No  
## 48 0.0 No No No No  
## 49 0.0 Yes No No No  
## 50 24.0 Yes No No Yes  
## 51 0.0 No No No No  
## 52 8.0 Yes No No No  
## 53 0.0 No No No No  
## 54 0.0 Yes No No No  
## 55 15.0 Yes No No No  
## 56 0.0 No No No No  
## 57 0.0 No No No No  
## 58 0.0 No No No No  
## 59 0.0 No No No Yes  
## 60 0.0 No No No No  
## 61 42.0 No No No Yes  
## 62 44.5 Yes No No No  
## 63 0.0 No No No No  
## 64 0.0 No No No No  
## 65 0.0 No No No No  
## 66 0.0 No No No No  
## 67 0.0 No No No No  
## 68 48.0 Yes No No Yes  
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## 219 0.00000000 0.00000000  
## 220 0.05208333 0.00000000  
## 221 0.08333333 0.00000000  
## 222 0.90625000 0.00000000  
## 223 0.00000000 0.00000000  
## 224 0.02083333 0.00000000  
## 225 1.00000000 0.00000000  
## 226 0.00000000 0.00000000  
## 227 0.00000000 0.00000000  
## 228 NaN NaN  
## 229 0.00000000 0.00000000  
## 230 0.64583333 0.00000000  
## 231 NaN NaN  
## 232 1.00000000 0.00000000  
## 233 0.00000000 0.00000000  
## 234 0.00000000 0.00000000  
## 235 0.00000000 0.00000000  
## 236 1.00000000 0.00000000  
## 237 0.95833333 0.00000000  
## 238 0.00000000 0.00000000  
## 239 1.00000000 0.00000000  
## 240 0.02083333 0.00000000  
## 241 0.20833333 0.00000000  
## 242 NaN NaN  
## 243 1.00000000 0.00000000  
## 244 0.00000000 0.00000000  
## 245 0.52083333 0.00000000  
## 246 0.03125000 0.00000000  
## 247 0.76041667 0.00000000  
## 248 0.71875000 0.00000000  
## 249 0.00000000 0.00000000  
## 250 0.00000000 0.00000000  
## 251 0.00000000 0.00000000  
## 252 0.00000000 0.00000000  
## 253 0.00000000 0.00000000  
## 254 0.00000000 0.00000000  
## 255 0.02083333 0.00000000  
## 256 1.00000000 0.00000000  
## 257 0.25000000 0.00000000  
## 258 0.02083333 0.00000000  
## 259 1.00000000 0.00000000  
## 260 0.00000000 0.00000000  
## 261 NaN NaN  
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## 263 0.00000000 0.00000000  
## 264 0.00000000 0.00000000  
## 265 0.00000000 0.00000000  
## 266 0.00000000 0.00000000  
## 267 0.89583333 0.00000000  
## 268 0.35416667 0.00000000  
## 269 0.00000000 0.00000000  
## 270 1.00000000 0.00000000  
## 271 0.66666667 0.00000000  
## 272 0.03125000 0.00000000  
## 273 0.12500000 0.00000000  
## 274 0.04166667 0.00000000  
## 275 0.31250000 0.00000000  
## 276 0.36458333 0.00000000  
## 277 0.00000000 0.00000000  
## 278 0.81250000 0.00000000  
## 279 0.00000000 0.00000000  
## 280 0.00000000 0.00000000  
## 281 0.00000000 0.00000000  
## 282 NaN NaN  
## 283 1.00000000 0.00000000  
## 284 NaN NaN  
## 285 1.00000000 0.00000000  
## cipro\_proportion\_resistant tetra\_proportion\_resistant  
## 1 0.00000000 0.00000000  
## 2 0.00000000 0.00000000  
## 3 0.00000000 0.00000000  
## 4 0.00000000 0.00000000  
## 5 NaN NaN  
## 6 0.00000000 0.08333333  
## 7 NaN NaN  
## 8 0.00000000 0.15625000  
## 9 NaN NaN  
## 10 0.00000000 0.00000000  
## 11 0.00000000 1.00000000  
## 12 0.00000000 0.00000000  
## 13 0.00000000 0.98958333  
## 14 0.00000000 0.00000000  
## 15 0.00000000 0.00000000  
## 16 0.00000000 0.00000000  
## 17 0.00000000 0.00000000  
## 18 0.00000000 0.00000000  
## 19 0.00000000 0.00000000  
## 20 0.00000000 0.33333333  
## 21 0.00000000 0.16666667  
## 22 0.00000000 1.00000000  
## 23 0.00000000 0.00000000  
## 24 0.00000000 0.00000000  
## 25 0.00000000 0.00000000  
## 26 NaN NaN  
## 27 0.00000000 0.00000000  
## 28 NaN NaN  
## 29 0.00000000 0.00000000  
## 30 0.00000000 0.00000000  
## 31 NaN NaN  
## 32 NaN NaN  
## 33 0.00000000 0.00000000  
## 34 0.00000000 0.00000000  
## 35 1.00000000 1.00000000  
## 36 0.00000000 1.00000000  
## 37 0.00000000 0.00000000  
## 38 NaN NaN  
## 39 0.91666667 0.00000000  
## 40 NaN NaN  
## 41 0.00000000 0.04166667  
## 42 0.00000000 0.00000000  
## 43 0.00000000 0.00000000  
## 44 NaN NaN  
## 45 0.00000000 0.00000000  
## 46 0.00000000 0.00000000  
## 47 0.00000000 0.00000000  
## 48 0.00000000 0.00000000  
## 49 0.00000000 0.00000000  
## 50 0.00000000 1.00000000  
## 51 0.00000000 0.00000000  
## 52 0.00000000 0.08333333  
## 53 0.00000000 0.00000000  
## 54 0.00000000 0.00000000  
## 55 0.00000000 0.00000000  
## 56 0.00000000 0.00000000  
## 57 0.00000000 0.00000000  
## 58 NaN NaN  
## 59 0.00000000 1.00000000  
## 60 0.00000000 0.00000000  
## 61 0.00000000 0.59375000  
## 62 0.00000000 0.00000000  
## 63 0.00000000 0.00000000  
## 64 NaN NaN  
## 65 0.00000000 0.00000000  
## 66 0.00000000 0.00000000  
## 67 0.00000000 0.00000000  
## 68 0.00000000 0.56250000  
## 69 0.00000000 0.93750000  
## 70 0.00000000 0.00000000  
## 71 0.00000000 0.00000000  
## 72 0.00000000 0.00000000  
## 73 0.00000000 0.00000000  
## 74 0.43750000 0.97916667  
## 75 0.07291667 0.08333333  
## 76 0.00000000 0.89583333  
## 77 0.00000000 0.00000000  
## 78 0.00000000 0.00000000  
## 79 0.00000000 0.00000000  
## 80 0.00000000 0.00000000  
## 81 0.00000000 0.00000000  
## 82 NaN NaN  
## 83 0.00000000 0.00000000  
## 84 0.00000000 0.00000000  
## 85 0.00000000 0.00000000  
## 86 NaN NaN  
## 87 NaN NaN  
## 88 0.00000000 0.43750000  
## 89 NaN NaN  
## 90 0.00000000 0.00000000  
## 91 0.00000000 0.00000000  
## 92 0.00000000 0.00000000  
## 93 0.00000000 1.00000000  
## 94 0.00000000 0.87500000  
## 95 0.00000000 0.00000000  
## 96 0.00000000 0.00000000  
## 97 0.00000000 0.00000000  
## 98 0.00000000 0.89583333  
## 99 0.00000000 1.00000000  
## 100 0.00000000 0.00000000  
## 101 0.00000000 0.00000000  
## 102 0.00000000 0.00000000  
## 103 0.00000000 0.00000000  
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## 108 0.00000000 0.00000000  
## 109 0.00000000 0.00000000  
## 110 0.00000000 0.00000000  
## 111 0.00000000 0.00000000  
## 112 0.00000000 0.00000000  
## 113 NaN NaN  
## 114 NaN NaN  
## 115 NaN NaN  
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## 117 0.00000000 0.00000000  
## 118 0.00000000 0.00000000  
## 119 NaN NaN  
## 120 NaN NaN  
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## 122 0.00000000 0.00000000  
## 123 0.00000000 0.00000000  
## 124 0.00000000 0.14583333  
## 125 0.00000000 0.69512195  
## 126 0.00000000 0.00000000  
## 127 0.00000000 0.00000000  
## 128 0.00000000 0.73333333  
## 129 0.00000000 0.00000000  
## 130 0.00000000 1.00000000  
## 131 0.00000000 0.00000000  
## 132 NaN NaN  
## 133 0.00000000 0.95833333  
## 134 0.00000000 0.00000000  
## 135 0.00000000 0.00000000  
## 136 0.00000000 0.00000000  
## 137 0.00000000 0.00000000  
## 138 0.00000000 0.00000000  
## 139 0.00000000 0.00000000  
## 140 0.00000000 1.00000000  
## 141 0.00000000 0.00000000  
## 142 0.68750000 0.72916667  
## 143 0.00000000 0.00000000  
## 144 0.00000000 0.00000000  
## 145 0.00000000 0.00000000  
## 146 0.00000000 0.88541667  
## 147 0.00000000 0.00000000  
## 148 0.00000000 1.00000000  
## 149 0.00000000 0.00000000  
## 150 NaN NaN  
## 151 NaN NaN  
## 152 0.00000000 0.00000000  
## 153 0.00000000 0.00000000  
## 154 0.00000000 0.00000000  
## 155 NaN NaN  
## 156 0.00000000 1.00000000  
## 157 0.00000000 0.00000000  
## 158 0.00000000 0.00000000  
## 159 0.00000000 0.78125000  
## 160 0.00000000 0.00000000  
## 161 NaN NaN  
## 162 0.00000000 0.00000000  
## 163 NaN NaN  
## 164 0.00000000 0.00000000  
## 165 0.00000000 0.89583333  
## 166 0.00000000 0.00000000  
## 167 0.00000000 0.00000000  
## 168 0.00000000 0.00000000  
## 169 0.00000000 0.00000000  
## 170 0.00000000 0.00000000  
## 171 0.00000000 0.00000000  
## 172 0.00000000 1.00000000  
## 173 0.00000000 0.00000000  
## 174 1.00000000 0.00000000  
## 175 NaN NaN  
## 176 0.00000000 0.00000000  
## 177 0.00000000 0.00000000  
## 178 0.00000000 0.00000000  
## 179 0.00000000 0.00000000  
## 180 0.00000000 0.00000000  
## 181 0.00000000 0.00000000  
## 182 0.00000000 0.00000000  
## 183 0.00000000 1.00000000  
## 184 0.00000000 0.02083333  
## 185 0.00000000 0.00000000  
## 186 0.00000000 0.00000000  
## 187 NaN NaN  
## 188 0.00000000 0.00000000  
## 189 0.00000000 0.00000000  
## 190 0.00000000 0.00000000  
## 191 NaN NaN  
## 192 NaN NaN  
## 193 0.00000000 0.00000000  
## 194 0.00000000 0.00000000  
## 195 0.00000000 0.00000000  
## 196 0.00000000 0.00000000  
## 197 0.00000000 0.32222222  
## 198 NaN NaN  
## 199 0.00000000 0.00000000  
## 200 0.00000000 0.00000000  
## 201 0.00000000 0.00000000  
## 202 0.00000000 0.00000000  
## 203 0.00000000 0.08333333  
## 204 0.00000000 1.00000000  
## 205 NaN NaN  
## 206 0.00000000 0.00000000  
## 207 0.00000000 0.00000000  
## 208 0.00000000 0.00000000  
## 209 1.00000000 0.00000000  
## 210 0.00000000 0.00000000  
## 211 0.00000000 0.00000000  
## 212 NaN NaN  
## 213 0.00000000 0.00000000  
## 214 0.00000000 0.00000000  
## 215 0.00000000 0.39583333  
## 216 0.00000000 0.00000000  
## 217 0.00000000 0.00000000  
## 218 0.00000000 0.00000000  
## 219 0.00000000 0.00000000  
## 220 0.00000000 0.00000000  
## 221 0.00000000 0.91666667  
## 222 0.00000000 0.12500000  
## 223 0.00000000 0.00000000  
## 224 0.00000000 0.00000000  
## 225 0.00000000 1.00000000  
## 226 0.00000000 0.00000000  
## 227 0.00000000 0.00000000  
## 228 NaN NaN  
## 229 0.00000000 0.00000000  
## 230 0.00000000 0.00000000  
## 231 NaN NaN  
## 232 0.00000000 0.30208333  
## 233 0.00000000 1.00000000  
## 234 0.00000000 0.00000000  
## 235 0.00000000 0.00000000  
## 236 0.00000000 0.00000000  
## 237 0.00000000 0.79166667  
## 238 0.00000000 0.00000000  
## 239 0.00000000 0.00000000  
## 240 0.00000000 0.00000000  
## 241 0.00000000 0.38541667  
## 242 NaN NaN  
## 243 0.00000000 0.95833333  
## 244 0.00000000 0.00000000  
## 245 0.00000000 0.00000000  
## 246 0.00000000 0.02083333  
## 247 0.00000000 0.30208333  
## 248 0.00000000 0.02083333  
## 249 0.00000000 0.02083333  
## 250 0.00000000 0.00000000  
## 251 0.00000000 0.00000000  
## 252 0.00000000 0.00000000  
## 253 0.00000000 0.00000000  
## 254 0.03125000 0.30208333  
## 255 0.00000000 0.00000000  
## 256 0.00000000 1.00000000  
## 257 0.00000000 0.25000000  
## 258 0.00000000 0.04166667  
## 259 0.00000000 0.04166667  
## 260 0.00000000 0.00000000  
## 261 NaN NaN  
## 262 0.00000000 0.00000000  
## 263 0.00000000 0.00000000  
## 264 0.00000000 0.00000000  
## 265 0.00000000 0.00000000  
## 266 0.00000000 0.61458333  
## 267 0.00000000 0.02083333  
## 268 0.00000000 0.04166667  
## 269 0.00000000 0.00000000  
## 270 0.00000000 1.00000000  
## 271 0.00000000 0.03125000  
## 272 0.00000000 0.08333333  
## 273 0.00000000 0.00000000  
## 274 0.00000000 0.22916667  
## 275 0.00000000 0.09375000  
## 276 0.00000000 1.00000000  
## 277 0.00000000 0.00000000  
## 278 0.00000000 0.77083333  
## 279 0.00000000 0.00000000  
## 280 0.00000000 1.00000000  
## 281 0.00000000 0.00000000  
## 282 NaN NaN  
## 283 0.00000000 0.00000000  
## 284 NaN NaN  
## 285 0.00000000 1.00000000  
## trimet\_proportion\_resistant  
## 1 0.00000000  
## 2 0.00000000  
## 3 0.00000000  
## 4 0.00000000  
## 5 NaN  
## 6 0.00000000  
## 7 NaN  
## 8 0.00000000  
## 9 NaN  
## 10 0.00000000  
## 11 0.00000000  
## 12 0.00000000  
## 13 1.00000000  
## 14 0.00000000  
## 15 0.92708333  
## 16 0.00000000  
## 17 0.00000000  
## 18 0.00000000  
## 19 0.00000000  
## 20 0.00000000  
## 21 0.00000000  
## 22 1.00000000  
## 23 0.00000000  
## 24 0.00000000  
## 25 0.00000000  
## 26 NaN  
## 27 0.00000000  
## 28 NaN  
## 29 0.00000000  
## 30 0.00000000  
## 31 NaN  
## 32 NaN  
## 33 0.00000000  
## 34 0.00000000  
## 35 0.00000000  
## 36 1.00000000  
## 37 0.00000000  
## 38 NaN  
## 39 0.70833333  
## 40 NaN  
## 41 0.83333333  
## 42 0.00000000  
## 43 0.00000000  
## 44 NaN  
## 45 0.00000000  
## 46 0.00000000  
## 47 0.00000000  
## 48 0.00000000  
## 49 0.00000000  
## 50 1.00000000  
## 51 0.00000000  
## 52 0.16666667  
## 53 0.00000000  
## 54 0.00000000  
## 55 0.31250000  
## 56 0.00000000  
## 57 0.00000000  
## 58 NaN  
## 59 0.00000000  
## 60 0.00000000  
## 61 0.87500000  
## 62 0.92708333  
## 63 0.00000000  
## 64 NaN  
## 65 0.00000000  
## 66 0.00000000  
## 67 0.00000000  
## 68 1.00000000  
## 69 0.95833333  
## 70 0.83333333  
## 71 0.96875000  
## 72 0.33333333  
## 73 0.00000000  
## 74 0.97916667  
## 75 0.08333333  
## 76 0.00000000  
## 77 0.00000000  
## 78 0.00000000  
## 79 0.02083333  
## 80 0.00000000  
## 81 0.00000000  
## 82 NaN  
## 83 0.00000000  
## 84 0.00000000  
## 85 0.00000000  
## 86 NaN  
## 87 NaN  
## 88 0.42708333  
## 89 NaN  
## 90 0.00000000  
## 91 0.00000000  
## 92 0.02083333  
## 93 0.00000000  
## 94 0.87500000  
## 95 0.00000000  
## 96 0.00000000  
## 97 0.00000000  
## 98 0.93750000  
## 99 1.00000000  
## 100 0.00000000  
## 101 0.00000000  
## 102 0.00000000  
## 103 0.96875000  
## 104 0.00000000  
## 105 0.00000000  
## 106 0.00000000  
## 107 0.00000000  
## 108 0.00000000  
## 109 0.00000000  
## 110 0.03488372  
## 111 0.00000000  
## 112 0.00000000  
## 113 NaN  
## 114 NaN  
## 115 NaN  
## 116 0.00000000  
## 117 0.00000000  
## 118 0.00000000  
## 119 NaN  
## 120 NaN  
## 121 1.00000000  
## 122 0.00000000  
## 123 0.00000000  
## 124 0.00000000  
## 125 0.90243902  
## 126 0.00000000  
## 127 0.00000000  
## 128 0.91111111  
## 129 0.55000000  
## 130 1.00000000  
## 131 0.00000000  
## 132 NaN  
## 133 0.00000000  
## 134 0.00000000  
## 135 0.00000000  
## 136 0.00000000  
## 137 0.00000000  
## 138 0.00000000  
## 139 0.00000000  
## 140 1.00000000  
## 141 0.00000000  
## 142 0.72916667  
## 143 0.00000000  
## 144 0.00000000  
## 145 0.00000000  
## 146 0.34375000  
## 147 0.00000000  
## 148 1.00000000  
## 149 0.00000000  
## 150 NaN  
## 151 NaN  
## 152 0.00000000  
## 153 0.00000000  
## 154 0.00000000  
## 155 NaN  
## 156 1.00000000  
## 157 0.00000000  
## 158 0.00000000  
## 159 0.00000000  
## 160 0.00000000  
## 161 NaN  
## 162 0.00000000  
## 163 NaN  
## 164 0.00000000  
## 165 0.00000000  
## 166 0.00000000  
## 167 0.00000000  
## 168 0.00000000  
## 169 1.00000000  
## 170 0.00000000  
## 171 1.00000000  
## 172 1.00000000  
## 173 0.97916667  
## 174 0.00000000  
## 175 NaN  
## 176 0.00000000  
## 177 0.00000000  
## 178 0.00000000  
## 179 0.00000000  
## 180 0.00000000  
## 181 0.00000000  
## 182 0.00000000  
## 183 0.97916667  
## 184 0.00000000  
## 185 0.00000000  
## 186 0.00000000  
## 187 NaN  
## 188 0.00000000  
## 189 0.50000000  
## 190 0.00000000  
## 191 NaN  
## 192 NaN  
## 193 0.00000000  
## 194 0.02083333  
## 195 0.02083333  
## 196 0.00000000  
## 197 0.00000000  
## 198 NaN  
## 199 0.00000000  
## 200 0.00000000  
## 201 0.00000000  
## 202 0.00000000  
## 203 0.08333333  
## 204 1.00000000  
## 205 NaN  
## 206 0.00000000  
## 207 0.00000000  
## 208 0.00000000  
## 209 0.00000000  
## 210 0.00000000  
## 211 0.00000000  
## 212 NaN  
## 213 0.00000000  
## 214 0.00000000  
## 215 0.39583333  
## 216 1.00000000  
## 217 0.00000000  
## 218 0.00000000  
## 219 0.00000000  
## 220 0.00000000  
## 221 0.08333333  
## 222 0.60416667  
## 223 0.00000000  
## 224 0.00000000  
## 225 1.00000000  
## 226 0.00000000  
## 227 0.00000000  
## 228 NaN  
## 229 0.00000000  
## 230 0.00000000  
## 231 NaN  
## 232 0.31250000  
## 233 0.00000000  
## 234 0.55208333  
## 235 0.00000000  
## 236 1.00000000  
## 237 0.95833333  
## 238 0.00000000  
## 239 0.00000000  
## 240 0.00000000  
## 241 0.20833333  
## 242 NaN  
## 243 0.97916667  
## 244 0.00000000  
## 245 0.00000000  
## 246 0.00000000  
## 247 0.22916667  
## 248 0.00000000  
## 249 0.00000000  
## 250 0.00000000  
## 251 0.00000000  
## 252 0.00000000  
## 253 0.00000000  
## 254 0.36458333  
## 255 0.00000000  
## 256 0.00000000  
## 257 0.25000000  
## 258 0.00000000  
## 259 0.00000000  
## 260 0.00000000  
## 261 NaN  
## 262 0.00000000  
## 263 0.00000000  
## 264 0.00000000  
## 265 0.00000000  
## 266 0.00000000  
## 267 0.00000000  
## 268 0.66666667  
## 269 0.00000000  
## 270 0.00000000  
## 271 0.00000000  
## 272 0.00000000  
## 273 0.00000000  
## 274 0.00000000  
## 275 0.00000000  
## 276 0.00000000  
## 277 0.00000000  
## 278 0.00000000  
## 279 0.00000000  
## 280 0.00000000  
## 281 0.00000000  
## 282 NaN  
## 283 0.00000000  
## 284 NaN  
## 285 0.00000000

amp\_tet\_plot <- abs\_pattern %>% ggplot(  
 aes(x=amp\_proportion\_resistant, y = tetra\_proportion\_resistant)) +  
 geom\_point()  
  
#Wow, there kind of seem to be patterns here, but also in other ways thereis no correlation. I had a thought that we could remove any zero values, but that is a really bad idea because it is straight up removing data to make a pattern, so I will not do that. You can kind of see a diagonal line, but I do not think we can say anything because of the excessive outliers.  
  
  
#I want to see if ampicillin resistance and number of days an individual ate fruit that week are correlated  
  
amp\_rawproduce <- mydata %>% subset(select = c(1,24,28, 29)) %>%  
 mutate(amp\_prop\_res = amp\_resistant\_isolates / total\_isolates)  
amp\_rawproduce$eat\_raw\_fruits\_or\_vegetables\_past\_week <- as.character(amp\_rawproduce$eat\_raw\_fruits\_or\_vegetables\_past\_week)  
  
amp\_produce\_plot <- amp\_rawproduce %>% ggplot(aes(eat\_raw\_fruits\_or\_vegetables\_past\_week, amp\_prop\_res)) +   
 geom\_point()  
#I know that number of days fruit was eaten is categorical and not numeric,  
#but at this time I do not have a better way to approach this.  
  
  
#None of this data is ready to put in the manuscript.  
#save data frame table to file for later use in manuscript  
#summarytable\_file = here("results", "summarytable.rds")  
#saveRDS(summary\_df, file = summarytable\_file)

## 3.4 Full analysis

*Use one or several suitable statistical/machine learning methods to analyze your data and to produce meaningful figures, tables, etc. This might again be code that is best placed in one or several separate R scripts that need to be well documented. You want the code to produce figures and data ready for display as tables, and save those. Then you load them here.*

######################################  
#Data fitting/statistical analysis  
######################################  
  
# fit linear model  
amptetfit <- lm(amp\_proportion\_resistant ~ tetra\_proportion\_resistant, abs\_pattern)   
  
# place results from fit into a data frame with the tidy function  
amptettable <- broom::tidy(amptetfit)  
  
#look at fit results  
print(amptettable)

## # A tibble: 2 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.203 0.0276 7.37 2.74e-12  
## 2 tetra\_proportion\_resistant 0.517 0.0708 7.29 4.25e-12

# save ampicillin tetracycline fit results table   
amptettable\_file = here("results", "amptettable.rds")  
saveRDS(amptettable, file = amptettable\_file)  
  
#save ampicillin tetracycline figure results  
amp\_tet\_plot\_figure = here("results", "amp\_tet\_plot")  
saveRDS(amp\_tet\_plot, file = amp\_tet\_plot\_figure)  
  
  
#save ampicillin-raw produce figure   
amp\_produce\_plot\_figure = here("results", "amp\_produce\_plot")  
saveRDS(amp\_produce\_plot, file = amp\_produce\_plot\_figure)  
  
lm\_mod <- linear\_reg() %>% set\_engine("lm")  
  
#Fits another linear model to the continuous outcome  
#(ampicillin resistance proportion) using all (important) predictors of interest.  
ampprop\_and\_predictors <- abs\_pattern %>%  
 subset(select = c(amp\_proportion\_resistant,  
 regular\_healthcare\_exposure,  
 healthcare\_exposure\_yn,  
 regular\_animal\_exposure,  
 has\_pets,  
 cat\_andor\_dog,  
 untreated\_recreational\_water\_exposure\_past\_week,  
 untreated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_week,  
 eat\_poultry\_past\_week,  
 eat\_pork\_or\_beef\_past\_week,  
 eat\_fish\_or\_shellfish\_past\_week,  
 eat\_dairy\_past\_week,  
 eat\_raw\_fruits\_or\_vegetables\_past\_week))  
ampprop\_and\_predictors

## amp\_proportion\_resistant regular\_healthcare\_exposure healthcare\_exposure\_yn  
## 1 0.01041667 No Yes  
## 2 0.00000000 Yes Yes  
## 3 0.04166667 No Yes  
## 4 0.00000000 No Yes  
## 5 NaN No No  
## 6 0.50000000 Yes Yes  
## 7 NaN No No  
## 8 0.01041667 No No  
## 9 NaN No No  
## 10 0.00000000 No Yes  
## 11 1.00000000 No No  
## 12 0.98958333 No No  
## 13 1.00000000 No No  
## 14 0.00000000 No Yes  
## 15 0.98958333 No No  
## 16 0.50000000 Yes Yes  
## 17 0.00000000 No Yes  
## 18 0.00000000 No Yes  
## 19 0.00000000 No No  
## 20 0.00000000 Yes Yes  
## 21 0.16666667 No Yes  
## 22 0.00000000 No No  
## 23 0.00000000 No Yes  
## 24 1.00000000 No No  
## 25 0.00000000 Yes No  
## 26 NaN No No  
## 27 0.00000000 No No  
## 28 NaN No No  
## 29 0.00000000 No No  
## 30 0.00000000 No No  
## 31 NaN No Yes  
## 32 NaN No No  
## 33 0.00000000 No No  
## 34 0.00000000 No No  
## 35 1.00000000 No No  
## 36 1.00000000 No No  
## 37 0.00000000 No No  
## 38 NaN No No  
## 39 0.91666667 No No  
## 40 NaN No No  
## 41 0.04166667 No No  
## 42 0.00000000 No No  
## 43 0.00000000 No No  
## 44 NaN No No  
## 45 0.00000000 No Yes  
## 46 0.00000000 No No  
## 47 0.16666667 No No  
## 48 0.16666667 No No  
## 49 1.00000000 No No  
## 50 1.00000000 No No  
## 51 0.00000000 No Yes  
## 52 0.83333333 No No  
## 53 0.00000000 No No  
## 54 1.00000000 No No  
## 55 0.64583333 No No  
## 56 0.00000000 No No  
## 57 0.00000000 Yes No  
## 58 NaN No No  
## 59 0.00000000 No No  
## 60 0.00000000 No No  
## 61 0.00000000 No No  
## 62 1.00000000 Yes Yes  
## 63 0.04166667 No Yes  
## 64 NaN No No  
## 65 0.00000000 No No  
## 66 0.00000000 No No  
## 67 0.00000000 No No  
## 68 1.00000000 No Yes  
## 69 0.80208333 No No  
## 70 0.00000000 No No  
## 71 0.98958333 No No  
## 72 1.00000000 No No  
## 73 0.00000000 No No  
## 74 1.00000000 Yes Yes  
## 75 0.08333333 No No  
## 76 0.00000000 No No  
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lm\_ampall\_model <- lm\_mod %>% fit(amp\_proportion\_resistant ~ ., data = ampprop\_and\_predictors)  
ampallpredictors\_lm <- tidy(lm\_ampall\_model)  
ampallpredictors\_lm

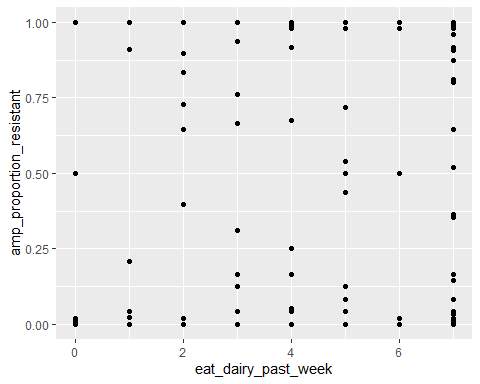
## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.407 0.0978 4.16 4.61e-5  
## 2 regular\_healthcare\_exposureYes 0.0325 0.108 0.301 7.63e-1  
## 3 healthcare\_exposure\_ynYes -0.106 0.0813 -1.30 1.93e-1  
## 4 regular\_animal\_exposureYes -0.169 0.137 -1.23 2.19e-1  
## 5 has\_petsYes -0.122 0.180 -0.675 5.00e-1  
## 6 cat\_andor\_dogYes 0.0912 0.178 0.512 6.09e-1  
## 7 untreated\_recreational\_water\_exposure~ 0.0531 0.0776 0.684 4.95e-1  
## 8 untreated\_recreational\_water\_exposure~ -0.0176 0.0224 -0.785 4.33e-1  
## 9 treated\_recreational\_water\_exposure\_p~ -0.000116 0.0190 -0.00611 9.95e-1  
## 10 treated\_recreational\_water\_exposure\_p~ 0.0435 0.0550 0.791 4.30e-1  
## 11 eat\_poultry\_past\_week 0.00578 0.0165 0.351 7.26e-1  
## 12 eat\_pork\_or\_beef\_past\_week 0.00394 0.0176 0.224 8.23e-1  
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0249 0.0219 -1.14 2.56e-1  
## 14 eat\_dairy\_past\_week -0.0261 0.0130 -2.01 4.57e-2  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0131 0.0125 1.05 2.95e-1

ampallpredictors\_table <- broom::tidy(lm\_ampall\_model)  
ampallpredictors\_table

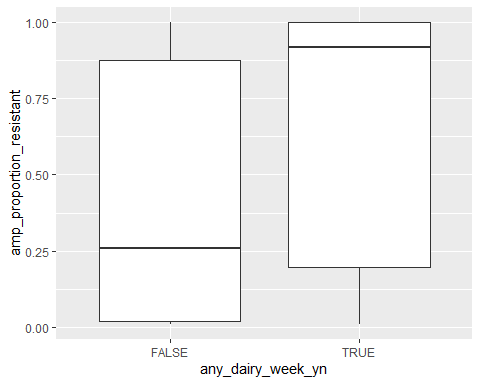
## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.407 0.0978 4.16 4.61e-5  
## 2 regular\_healthcare\_exposureYes 0.0325 0.108 0.301 7.63e-1  
## 3 healthcare\_exposure\_ynYes -0.106 0.0813 -1.30 1.93e-1  
## 4 regular\_animal\_exposureYes -0.169 0.137 -1.23 2.19e-1  
## 5 has\_petsYes -0.122 0.180 -0.675 5.00e-1  
## 6 cat\_andor\_dogYes 0.0912 0.178 0.512 6.09e-1  
## 7 untreated\_recreational\_water\_exposure~ 0.0531 0.0776 0.684 4.95e-1  
## 8 untreated\_recreational\_water\_exposure~ -0.0176 0.0224 -0.785 4.33e-1  
## 9 treated\_recreational\_water\_exposure\_p~ -0.000116 0.0190 -0.00611 9.95e-1  
## 10 treated\_recreational\_water\_exposure\_p~ 0.0435 0.0550 0.791 4.30e-1  
## 11 eat\_poultry\_past\_week 0.00578 0.0165 0.351 7.26e-1  
## 12 eat\_pork\_or\_beef\_past\_week 0.00394 0.0176 0.224 8.23e-1  
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0249 0.0219 -1.14 2.56e-1  
## 14 eat\_dairy\_past\_week -0.0261 0.0130 -2.01 4.57e-2  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0131 0.0125 1.05 2.95e-1

#Looking at this, only dairy seems to have statistical significance.   
#Again, these are p-values, so approach with some skepticism.   
  
abs\_pattern %>% ggplot(aes(x = eat\_dairy\_past\_week, y = amp\_proportion\_resistant)) +  
 geom\_point()

## Warning: Removed 40 rows containing missing values (geom\_point).



amp\_dairy\_yn\_plot <- abs\_pattern %>% mutate(any\_dairy\_week\_yn = eat\_dairy\_past\_week > 0) %>%   
 ggplot(aes(x = any\_dairy\_week\_yn, y = amp\_proportion\_resistant)) +  
 geom\_boxplot()  
  
#plotting but only for isolates that show SOME ampicillin resistance.  
#I'm just doing this for exploration's sake.  
abs\_pattern %>% mutate(any\_dairy\_week\_yn = eat\_dairy\_past\_week > 0) %>%   
 filter(amp\_proportion\_resistant > 0) %>%  
 ggplot(aes(x = any\_dairy\_week\_yn, y = amp\_proportion\_resistant)) +  
 geom\_boxplot() #the mean is a lot higher



#Tetracycline  
tetprop\_and\_predictors <- abs\_pattern %>%  
 subset(select = c(tetra\_proportion\_resistant,  
 regular\_healthcare\_exposure,  
 healthcare\_exposure\_yn,  
 regular\_animal\_exposure,  
 has\_pets,  
 cat\_andor\_dog,  
 untreated\_recreational\_water\_exposure\_past\_week,  
 untreated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_week,  
 eat\_poultry\_past\_week,  
 eat\_pork\_or\_beef\_past\_week,  
 eat\_fish\_or\_shellfish\_past\_week,  
 eat\_dairy\_past\_week,  
 eat\_raw\_fruits\_or\_vegetables\_past\_week))  
tetprop\_and\_predictors

## tetra\_proportion\_resistant regular\_healthcare\_exposure  
## 1 0.00000000 No  
## 2 0.00000000 Yes  
## 3 0.00000000 No  
## 4 0.00000000 No  
## 5 NaN No  
## 6 0.08333333 Yes  
## 7 NaN No  
## 8 0.15625000 No  
## 9 NaN No  
## 10 0.00000000 No  
## 11 1.00000000 No  
## 12 0.00000000 No  
## 13 0.98958333 No  
## 14 0.00000000 No  
## 15 0.00000000 No  
## 16 0.00000000 Yes  
## 17 0.00000000 No  
## 18 0.00000000 No  
## 19 0.00000000 No  
## 20 0.33333333 Yes  
## 21 0.16666667 No  
## 22 1.00000000 No  
## 23 0.00000000 No  
## 24 0.00000000 No  
## 25 0.00000000 Yes  
## 26 NaN No  
## 27 0.00000000 No  
## 28 NaN No  
## 29 0.00000000 No  
## 30 0.00000000 No  
## 31 NaN No  
## 32 NaN No  
## 33 0.00000000 No  
## 34 0.00000000 No  
## 35 1.00000000 No  
## 36 1.00000000 No  
## 37 0.00000000 No  
## 38 NaN No  
## 39 0.00000000 No  
## 40 NaN No  
## 41 0.04166667 No  
## 42 0.00000000 No  
## 43 0.00000000 No  
## 44 NaN No  
## 45 0.00000000 No  
## 46 0.00000000 No  
## 47 0.00000000 No  
## 48 0.00000000 No  
## 49 0.00000000 No  
## 50 1.00000000 No  
## 51 0.00000000 No  
## 52 0.08333333 No  
## 53 0.00000000 No  
## 54 0.00000000 No  
## 55 0.00000000 No  
## 56 0.00000000 No  
## 57 0.00000000 Yes  
## 58 NaN No  
## 59 1.00000000 No  
## 60 0.00000000 No  
## 61 0.59375000 No  
## 62 0.00000000 Yes  
## 63 0.00000000 No  
## 64 NaN No  
## 65 0.00000000 No  
## 66 0.00000000 No  
## 67 0.00000000 No  
## 68 0.56250000 No  
## 69 0.93750000 No  
## 70 0.00000000 No  
## 71 0.00000000 No  
## 72 0.00000000 No  
## 73 0.00000000 No  
## 74 0.97916667 Yes  
## 75 0.08333333 No  
## 76 0.89583333 No  
## 77 0.00000000 No  
## 78 0.00000000 No  
## 79 0.00000000 No  
## 80 0.00000000 No  
## 81 0.00000000 No  
## 82 NaN Yes  
## 83 0.00000000 No  
## 84 0.00000000 No  
## 85 0.00000000 No  
## 86 NaN No  
## 87 NaN No  
## 88 0.43750000 No  
## 89 NaN No  
## 90 0.00000000 No  
## 91 0.00000000 No  
## 92 0.00000000 No  
## 93 1.00000000 No  
## 94 0.87500000 No  
## 95 0.00000000 Yes  
## 96 0.00000000 No  
## 97 0.00000000 No  
## 98 0.89583333 No  
## 99 1.00000000 No  
## 100 0.00000000 No  
## 101 0.00000000 No  
## 102 0.00000000 No  
## 103 0.00000000 No  
## 104 0.00000000 Yes  
## 105 0.00000000 No  
## 106 0.00000000 No  
## 107 0.00000000 No  
## 108 0.00000000 No  
## 109 0.00000000 No  
## 110 0.00000000 No  
## 111 0.00000000 No  
## 112 0.00000000 No  
## 113 NaN No  
## 114 NaN No  
## 115 NaN No  
## 116 0.00000000 No  
## 117 0.00000000 No  
## 118 0.00000000 No  
## 119 NaN No  
## 120 NaN No  
## 121 0.00000000 No  
## 122 0.00000000 No  
## 123 0.00000000 No  
## 124 0.14583333 Yes  
## 125 0.69512195 No  
## 126 0.00000000 No  
## 127 0.00000000 No  
## 128 0.73333333 No  
## 129 0.00000000 No  
## 130 1.00000000 Yes  
## 131 0.00000000 No  
## 132 NaN No  
## 133 0.95833333 No  
## 134 0.00000000 No  
## 135 0.00000000 Yes  
## 136 0.00000000 No  
## 137 0.00000000 No  
## 138 0.00000000 No  
## 139 0.00000000 Yes  
## 140 1.00000000 No  
## 141 0.00000000 No  
## 142 0.72916667 No  
## 143 0.00000000 No  
## 144 0.00000000 No  
## 145 0.00000000 No  
## 146 0.88541667 No  
## 147 0.00000000 Yes  
## 148 1.00000000 No  
## 149 0.00000000 No  
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## 151 NaN No  
## 152 0.00000000 No  
## 153 0.00000000 Yes  
## 154 0.00000000 No  
## 155 NaN No  
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## 157 0.00000000 No  
## 158 0.00000000 No  
## 159 0.78125000 No  
## 160 0.00000000 No  
## 161 NaN No  
## 162 0.00000000 No  
## 163 NaN No  
## 164 0.00000000 No  
## 165 0.89583333 No  
## 166 0.00000000 No  
## 167 0.00000000 No  
## 168 0.00000000 No  
## 169 0.00000000 No  
## 170 0.00000000 No  
## 171 0.00000000 No  
## 172 1.00000000 No  
## 173 0.00000000 No  
## 174 0.00000000 No  
## 175 NaN No  
## 176 0.00000000 No  
## 177 0.00000000 Yes  
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## 179 0.00000000 No  
## 180 0.00000000 No  
## 181 0.00000000 No  
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## 183 1.00000000 No  
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## 185 0.00000000 No  
## 186 0.00000000 No  
## 187 NaN No  
## 188 0.00000000 No  
## 189 0.00000000 No  
## 190 0.00000000 No  
## 191 NaN No  
## 192 NaN No  
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## 197 0.32222222 No  
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## 200 0.00000000 No  
## 201 0.00000000 No  
## 202 0.00000000 No  
## 203 0.08333333 No  
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## 205 NaN Yes  
## 206 0.00000000 Yes  
## 207 0.00000000 No  
## 208 0.00000000 No  
## 209 0.00000000 No  
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## 212 NaN No  
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## 214 0.00000000 No  
## 215 0.39583333 No  
## 216 0.00000000 No  
## 217 0.00000000 No  
## 218 0.00000000 No  
## 219 0.00000000 No  
## 220 0.00000000 No  
## 221 0.91666667 No  
## 222 0.12500000 No  
## 223 0.00000000 No  
## 224 0.00000000 No  
## 225 1.00000000 No  
## 226 0.00000000 No  
## 227 0.00000000 No  
## 228 NaN Yes  
## 229 0.00000000 No  
## 230 0.00000000 No  
## 231 NaN No  
## 232 0.30208333 No  
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## 234 0.00000000 No  
## 235 0.00000000 No  
## 236 0.00000000 No  
## 237 0.79166667 No  
## 238 0.00000000 No  
## 239 0.00000000 No  
## 240 0.00000000 No  
## 241 0.38541667 No  
## 242 NaN No  
## 243 0.95833333 No  
## 244 0.00000000 Yes  
## 245 0.00000000 No  
## 246 0.02083333 Yes  
## 247 0.30208333 Yes  
## 248 0.02083333 No  
## 249 0.02083333 No  
## 250 0.00000000 No  
## 251 0.00000000 No  
## 252 0.00000000 No  
## 253 0.00000000 No  
## 254 0.30208333 No  
## 255 0.00000000 No  
## 256 1.00000000 No  
## 257 0.25000000 No  
## 258 0.04166667 No  
## 259 0.04166667 No  
## 260 0.00000000 No  
## 261 NaN No  
## 262 0.00000000 No  
## 263 0.00000000 Yes  
## 264 0.00000000 No  
## 265 0.00000000 No  
## 266 0.61458333 No  
## 267 0.02083333 Yes  
## 268 0.04166667 No  
## 269 0.00000000 Yes  
## 270 1.00000000 No  
## 271 0.03125000 No  
## 272 0.08333333 No  
## 273 0.00000000 No  
## 274 0.22916667 No  
## 275 0.09375000 No  
## 276 1.00000000 No  
## 277 0.00000000 No  
## 278 0.77083333 No  
## 279 0.00000000 No  
## 280 1.00000000 No  
## 281 0.00000000 No  
## 282 NaN No  
## 283 0.00000000 No  
## 284 NaN No  
## 285 1.00000000 No  
## healthcare\_exposure\_yn regular\_animal\_exposure has\_pets cat\_andor\_dog  
## 1 Yes No Yes Yes  
## 2 Yes No Yes Yes  
## 3 Yes No Yes Yes  
## 4 Yes No Yes Yes  
## 5 No No Yes No  
## 6 Yes No Yes Yes  
## 7 No No Yes Yes  
## 8 No No Yes Yes  
## 9 No No Yes Yes  
## 10 Yes No Yes Yes  
## 11 No No Yes Yes  
## 12 No No No No  
## 13 No No Yes Yes  
## 14 Yes <NA> No No  
## 15 No No Yes Yes  
## 16 Yes No No No  
## 17 Yes No Yes Yes  
## 18 Yes Yes Yes Yes  
## 19 No No Yes Yes  
## 20 Yes No Yes Yes  
## 21 Yes No No No  
## 22 No No Yes Yes  
## 23 Yes No Yes Yes  
## 24 No No No No  
## 25 No No No No  
## 26 No No Yes Yes  
## 27 No No No No  
## 28 No No Yes Yes  
## 29 No No Yes Yes  
## 30 No No No No  
## 31 Yes No Yes Yes  
## 32 No No No No  
## 33 No No No No  
## 34 No Yes Yes Yes  
## 35 No No No No  
## 36 No No No No  
## 37 No Yes Yes Yes  
## 38 No No Yes Yes  
## 39 No No Yes Yes  
## 40 No No Yes Yes  
## 41 No No Yes Yes  
## 42 No No No No  
## 43 No No Yes Yes  
## 44 No No Yes Yes  
## 45 Yes No Yes Yes  
## 46 No No Yes No  
## 47 No No No No  
## 48 No No No No  
## 49 No No Yes Yes  
## 50 No No Yes Yes  
## 51 Yes No No No  
## 52 No No No No  
## 53 No No Yes Yes  
## 54 No No Yes Yes  
## 55 No No Yes No  
## 56 No No Yes Yes  
## 57 No No No No  
## 58 No No No No  
## 59 No No No No  
## 60 No No Yes Yes  
## 61 No No Yes Yes  
## 62 Yes No No No  
## 63 Yes No Yes Yes  
## 64 No No No No  
## 65 No No Yes No  
## 66 No No No No  
## 67 No No Yes Yes  
## 68 Yes No Yes Yes  
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## 85 No No Yes Yes  
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## 89 No No No No  
## 90 No No Yes Yes  
## 91 No No Yes Yes  
## 92 No No Yes No  
## 93 Yes No No No  
## 94 No No No No  
## 95 Yes No Yes Yes  
## 96 No No No No  
## 97 No No Yes Yes  
## 98 No No Yes Yes  
## 99 No No No No  
## 100 No No No No  
## 101 No No No No  
## 102 No No Yes Yes  
## 103 No No Yes Yes  
## 104 Yes No Yes Yes  
## 105 Yes No No No  
## 106 No No Yes Yes  
## 107 No No No No  
## 108 No No Yes Yes  
## 109 No No Yes Yes  
## 110 Yes No No No  
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## 114 No No Yes Yes  
## 115 Yes No No No  
## 116 No No No No  
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## 122 No No No No  
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## 124 Yes No No No  
## 125 No No No No  
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## 134 No No No No  
## 135 Yes No Yes Yes  
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## 137 No No Yes Yes  
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## 168 No No Yes Yes  
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## 171 No No Yes Yes  
## 172 No No Yes Yes  
## 173 No No Yes Yes  
## 174 No No Yes Yes  
## 175 No No Yes Yes  
## 176 No No Yes Yes  
## 177 Yes No No No  
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## 184 No No Yes Yes  
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## 192 No No Yes Yes  
## 193 No No Yes Yes  
## 194 No No Yes Yes  
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## 197 No No No No  
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## 200 Yes Yes No No  
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## 202 No No Yes Yes  
## 203 No No Yes Yes  
## 204 No No Yes Yes  
## 205 No No Yes Yes  
## 206 Yes Yes Yes Yes  
## 207 No No Yes Yes  
## 208 No No Yes Yes  
## 209 No No No No  
## 210 No No Yes Yes  
## 211 No No Yes Yes  
## 212 No No Yes Yes  
## 213 No <NA> Yes Yes  
## 214 No No Yes Yes  
## 215 Yes No Yes Yes  
## 216 No No Yes Yes  
## 217 No No No No  
## 218 No Yes Yes Yes  
## 219 No No No No  
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## 221 No No Yes No  
## 222 No No No No  
## 223 Yes No Yes Yes  
## 224 No No No No  
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## 226 No No Yes Yes  
## 227 No No No No  
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## 279 Yes No No No  
## 280 No No No No  
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## 284 No No No No  
## 285 No No Yes Yes  
## untreated\_recreational\_water\_exposure\_past\_week  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0  
## 7 0  
## 8 0  
## 9 0  
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## 145 0  
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## 147 0  
## 148 0  
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## 158 0  
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## 271 1  
## 272 0  
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## 89 7 2  
## 90 4 2  
## 91 6 7  
## 92 5 1  
## 93 1 5  
## 94 7 7  
## 95 7 4  
## 96 4 7  
## 97 7 5  
## 98 3 1  
## 99 7 2  
## 100 7 6  
## 101 5 1  
## 102 6 4  
## 103 1 6  
## 104 7 0  
## 105 0 0  
## 106 7 5  
## 107 2 5  
## 108 0 0  
## 109 0 7  
## 110 7 5  
## 111 0 3  
## 112 7 4  
## 113 7 5  
## 114 7 6  
## 115 4 3  
## 116 7 0  
## 117 7 4  
## 118 7 7  
## 119 7 7  
## 120 7 2  
## 121 5 5  
## 122 7 7  
## 123 1 4  
## 124 3 3  
## 125 6 4  
## 126 7 3  
## 127 3 7  
## 128 1 7  
## 129 4 2  
## 130 4 7  
## 131 4 6  
## 132 3 2  
## 133 5 2  
## 134 7 7  
## 135 1 1  
## 136 3 4  
## 137 7 7  
## 138 6 4  
## 139 1 1  
## 140 5 3  
## 141 5 7  
## 142 2 5  
## 143 1 2  
## 144 7 7  
## 145 1 7  
## 146 4 2  
## 147 3 5  
## 148 4 7  
## 149 3 6  
## 150 0 0  
## 151 5 7  
## 152 7 6  
## 153 7 2  
## 154 7 7  
## 155 2 4  
## 156 0 3  
## 157 1 0  
## 158 7 0  
## 159 7 6  
## 160 5 6  
## 161 2 5  
## 162 1 4  
## 163 7 4  
## 164 7 4  
## 165 7 3  
## 166 3 1  
## 167 5 0  
## 168 3 6  
## 169 2 2  
## 170 6 3  
## 171 7 2  
## 172 7 5  
## 173 2 3  
## 174 4 3  
## 175 7 0  
## 176 7 7  
## 177 2 0  
## 178 3 1  
## 179 3 4  
## 180 1 6  
## 181 6 1  
## 182 7 3  
## 183 0 2  
## 184 7 2  
## 185 7 5  
## 186 7 7  
## 187 5 3  
## 188 2 1  
## 189 0 7  
## 190 4 4  
## 191 6 7  
## 192 5 1  
## 193 4 2  
## 194 7 5  
## 195 0 0  
## 196 7 4  
## 197 6 7  
## 198 2 3  
## 199 4 1  
## 200 5 4  
## 201 4 3  
## 202 3 2  
## 203 5 5  
## 204 0 7  
## 205 3 4  
## 206 7 7  
## 207 6 0  
## 208 7 3  
## 209 4 2  
## 210 7 7  
## 211 7 6  
## 212 4 7  
## 213 5 7  
## 214 7 7  
## 215 2 5  
## 216 5 7  
## 217 6 2  
## 218 6 4  
## 219 7 7  
## 220 4 1  
## 221 7 7  
## 222 7 0  
## 223 3 6  
## 224 0 7  
## 225 3 3  
## 226 6 5  
## 227 2 2  
## 228 0 4  
## 229 5 5  
## 230 2 5  
## 231 7 4  
## 232 5 7  
## 233 1 1  
## 234 3 7  
## 235 0 0  
## 236 7 5  
## 237 7 7  
## 238 1 6  
## 239 4 3  
## 240 6 5  
## 241 1 1  
## 242 7 3  
## 243 2 2  
## 244 7 7  
## 245 7 2  
## 246 7 3  
## 247 3 3  
## 248 5 7  
## 249 4 2  
## 250 4 5  
## 251 4 4  
## 252 7 7  
## 253 6 2  
## 254 7 4  
## 255 7 7  
## 256 5 5  
## 257 4 7  
## 258 2 3  
## 259 5 4  
## 260 7 1  
## 261 4 2  
## 262 5 4  
## 263 7 7  
## 264 7 7  
## 265 5 7  
## 266 7 3  
## 267 2 3  
## 268 7 7  
## 269 4 5  
## 270 2 2  
## 271 3 3  
## 272 7 4  
## 273 5 7  
## 274 5 7  
## 275 3 4  
## 276 7 7  
## 277 1 3  
## 278 7 7  
## 279 5 1  
## 280 7 6  
## 281 7 3  
## 282 6 6  
## 283 2 2  
## 284 7 7  
## 285 2 5

lm\_tetall\_model <- lm\_mod %>% fit(tetra\_proportion\_resistant ~ ., data = tetprop\_and\_predictors)  
tetallpredictors\_lm <- tidy(lm\_tetall\_model)  
tetallpredictors\_lm

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.246 0.0831 2.97 0.00334  
## 2 regular\_healthcare\_exposureYes -0.0314 0.0917 -0.342 0.732   
## 3 healthcare\_exposure\_ynYes -0.0558 0.0691 -0.808 0.420   
## 4 regular\_animal\_exposureYes 0.0641 0.116 0.553 0.581   
## 5 has\_petsYes -0.0816 0.153 -0.533 0.594   
## 6 cat\_andor\_dogYes 0.0259 0.151 0.171 0.864   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0490 0.0659 0.744 0.458   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.0136 0.0190 -0.713 0.477   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00811 0.0162 -0.502 0.616   
## 10 treated\_recreational\_water\_exposure\_pas~ 0.0472 0.0467 1.01 0.313   
## 11 eat\_poultry\_past\_week 0.00817 0.0140 0.585 0.559   
## 12 eat\_pork\_or\_beef\_past\_week -0.00458 0.0150 -0.305 0.760   
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0177 0.0186 -0.954 0.341   
## 14 eat\_dairy\_past\_week -0.0136 0.0110 -1.23 0.219   
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0118 0.0106 1.10 0.271

#no significance for tetracycline  
  
tetallpredictors\_table <- broom::tidy(lm\_tetall\_model)  
tetallpredictors\_table

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.246 0.0831 2.97 0.00334  
## 2 regular\_healthcare\_exposureYes -0.0314 0.0917 -0.342 0.732   
## 3 healthcare\_exposure\_ynYes -0.0558 0.0691 -0.808 0.420   
## 4 regular\_animal\_exposureYes 0.0641 0.116 0.553 0.581   
## 5 has\_petsYes -0.0816 0.153 -0.533 0.594   
## 6 cat\_andor\_dogYes 0.0259 0.151 0.171 0.864   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0490 0.0659 0.744 0.458   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.0136 0.0190 -0.713 0.477   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00811 0.0162 -0.502 0.616   
## 10 treated\_recreational\_water\_exposure\_pas~ 0.0472 0.0467 1.01 0.313   
## 11 eat\_poultry\_past\_week 0.00817 0.0140 0.585 0.559   
## 12 eat\_pork\_or\_beef\_past\_week -0.00458 0.0150 -0.305 0.760   
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0177 0.0186 -0.954 0.341   
## 14 eat\_dairy\_past\_week -0.0136 0.0110 -1.23 0.219   
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0118 0.0106 1.10 0.271

#Trimethoprim  
triprop\_and\_predictors <- abs\_pattern %>%  
 subset(select = c(trimet\_proportion\_resistant,  
 regular\_healthcare\_exposure,  
 healthcare\_exposure\_yn,  
 regular\_animal\_exposure,  
 has\_pets,  
 cat\_andor\_dog,  
 untreated\_recreational\_water\_exposure\_past\_week,  
 untreated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_month,  
 treated\_recreational\_water\_exposure\_past\_week,  
 eat\_poultry\_past\_week,  
 eat\_pork\_or\_beef\_past\_week,  
 eat\_fish\_or\_shellfish\_past\_week,  
 eat\_dairy\_past\_week,  
 eat\_raw\_fruits\_or\_vegetables\_past\_week))  
triprop\_and\_predictors

## trimet\_proportion\_resistant regular\_healthcare\_exposure  
## 1 0.00000000 No  
## 2 0.00000000 Yes  
## 3 0.00000000 No  
## 4 0.00000000 No  
## 5 NaN No  
## 6 0.00000000 Yes  
## 7 NaN No  
## 8 0.00000000 No  
## 9 NaN No  
## 10 0.00000000 No  
## 11 0.00000000 No  
## 12 0.00000000 No  
## 13 1.00000000 No  
## 14 0.00000000 No  
## 15 0.92708333 No  
## 16 0.00000000 Yes  
## 17 0.00000000 No  
## 18 0.00000000 No  
## 19 0.00000000 No  
## 20 0.00000000 Yes  
## 21 0.00000000 No  
## 22 1.00000000 No  
## 23 0.00000000 No  
## 24 0.00000000 No  
## 25 0.00000000 Yes  
## 26 NaN No  
## 27 0.00000000 No  
## 28 NaN No  
## 29 0.00000000 No  
## 30 0.00000000 No  
## 31 NaN No  
## 32 NaN No  
## 33 0.00000000 No  
## 34 0.00000000 No  
## 35 0.00000000 No  
## 36 1.00000000 No  
## 37 0.00000000 No  
## 38 NaN No  
## 39 0.70833333 No  
## 40 NaN No  
## 41 0.83333333 No  
## 42 0.00000000 No  
## 43 0.00000000 No  
## 44 NaN No  
## 45 0.00000000 No  
## 46 0.00000000 No  
## 47 0.00000000 No  
## 48 0.00000000 No  
## 49 0.00000000 No  
## 50 1.00000000 No  
## 51 0.00000000 No  
## 52 0.16666667 No  
## 53 0.00000000 No  
## 54 0.00000000 No  
## 55 0.31250000 No  
## 56 0.00000000 No  
## 57 0.00000000 Yes  
## 58 NaN No  
## 59 0.00000000 No  
## 60 0.00000000 No  
## 61 0.87500000 No  
## 62 0.92708333 Yes  
## 63 0.00000000 No  
## 64 NaN No  
## 65 0.00000000 No  
## 66 0.00000000 No  
## 67 0.00000000 No  
## 68 1.00000000 No  
## 69 0.95833333 No  
## 70 0.83333333 No  
## 71 0.96875000 No  
## 72 0.33333333 No  
## 73 0.00000000 No  
## 74 0.97916667 Yes  
## 75 0.08333333 No  
## 76 0.00000000 No  
## 77 0.00000000 No  
## 78 0.00000000 No  
## 79 0.02083333 No  
## 80 0.00000000 No  
## 81 0.00000000 No  
## 82 NaN Yes  
## 83 0.00000000 No  
## 84 0.00000000 No  
## 85 0.00000000 No  
## 86 NaN No  
## 87 NaN No  
## 88 0.42708333 No  
## 89 NaN No  
## 90 0.00000000 No  
## 91 0.00000000 No  
## 92 0.02083333 No  
## 93 0.00000000 No  
## 94 0.87500000 No  
## 95 0.00000000 Yes  
## 96 0.00000000 No  
## 97 0.00000000 No  
## 98 0.93750000 No  
## 99 1.00000000 No  
## 100 0.00000000 No  
## 101 0.00000000 No  
## 102 0.00000000 No  
## 103 0.96875000 No  
## 104 0.00000000 Yes  
## 105 0.00000000 No  
## 106 0.00000000 No  
## 107 0.00000000 No  
## 108 0.00000000 No  
## 109 0.00000000 No  
## 110 0.03488372 No  
## 111 0.00000000 No  
## 112 0.00000000 No  
## 113 NaN No  
## 114 NaN No  
## 115 NaN No  
## 116 0.00000000 No  
## 117 0.00000000 No  
## 118 0.00000000 No  
## 119 NaN No  
## 120 NaN No  
## 121 1.00000000 No  
## 122 0.00000000 No  
## 123 0.00000000 No  
## 124 0.00000000 Yes  
## 125 0.90243902 No  
## 126 0.00000000 No  
## 127 0.00000000 No  
## 128 0.91111111 No  
## 129 0.55000000 No  
## 130 1.00000000 Yes  
## 131 0.00000000 No  
## 132 NaN No  
## 133 0.00000000 No  
## 134 0.00000000 No  
## 135 0.00000000 Yes  
## 136 0.00000000 No  
## 137 0.00000000 No  
## 138 0.00000000 No  
## 139 0.00000000 Yes  
## 140 1.00000000 No  
## 141 0.00000000 No  
## 142 0.72916667 No  
## 143 0.00000000 No  
## 144 0.00000000 No  
## 145 0.00000000 No  
## 146 0.34375000 No  
## 147 0.00000000 Yes  
## 148 1.00000000 No  
## 149 0.00000000 No  
## 150 NaN No  
## 151 NaN No  
## 152 0.00000000 No  
## 153 0.00000000 Yes  
## 154 0.00000000 No  
## 155 NaN No  
## 156 1.00000000 No  
## 157 0.00000000 No  
## 158 0.00000000 No  
## 159 0.00000000 No  
## 160 0.00000000 No  
## 161 NaN No  
## 162 0.00000000 No  
## 163 NaN No  
## 164 0.00000000 No  
## 165 0.00000000 No  
## 166 0.00000000 No  
## 167 0.00000000 No  
## 168 0.00000000 No  
## 169 1.00000000 No  
## 170 0.00000000 No  
## 171 1.00000000 No  
## 172 1.00000000 No  
## 173 0.97916667 No  
## 174 0.00000000 No  
## 175 NaN No  
## 176 0.00000000 No  
## 177 0.00000000 Yes  
## 178 0.00000000 No  
## 179 0.00000000 No  
## 180 0.00000000 No  
## 181 0.00000000 No  
## 182 0.00000000 No  
## 183 0.97916667 No  
## 184 0.00000000 No  
## 185 0.00000000 No  
## 186 0.00000000 No  
## 187 NaN No  
## 188 0.00000000 No  
## 189 0.50000000 No  
## 190 0.00000000 No  
## 191 NaN No  
## 192 NaN No  
## 193 0.00000000 No  
## 194 0.02083333 No  
## 195 0.02083333 No  
## 196 0.00000000 No  
## 197 0.00000000 No  
## 198 NaN No  
## 199 0.00000000 Yes  
## 200 0.00000000 No  
## 201 0.00000000 No  
## 202 0.00000000 No  
## 203 0.08333333 No  
## 204 1.00000000 No  
## 205 NaN Yes  
## 206 0.00000000 Yes  
## 207 0.00000000 No  
## 208 0.00000000 No  
## 209 0.00000000 No  
## 210 0.00000000 No  
## 211 0.00000000 No  
## 212 NaN No  
## 213 0.00000000 No  
## 214 0.00000000 No  
## 215 0.39583333 No  
## 216 1.00000000 No  
## 217 0.00000000 No  
## 218 0.00000000 No  
## 219 0.00000000 No  
## 220 0.00000000 No  
## 221 0.08333333 No  
## 222 0.60416667 No  
## 223 0.00000000 No  
## 224 0.00000000 No  
## 225 1.00000000 No  
## 226 0.00000000 No  
## 227 0.00000000 No  
## 228 NaN Yes  
## 229 0.00000000 No  
## 230 0.00000000 No  
## 231 NaN No  
## 232 0.31250000 No  
## 233 0.00000000 No  
## 234 0.55208333 No  
## 235 0.00000000 No  
## 236 1.00000000 No  
## 237 0.95833333 No  
## 238 0.00000000 No  
## 239 0.00000000 No  
## 240 0.00000000 No  
## 241 0.20833333 No  
## 242 NaN No  
## 243 0.97916667 No  
## 244 0.00000000 Yes  
## 245 0.00000000 No  
## 246 0.00000000 Yes  
## 247 0.22916667 Yes  
## 248 0.00000000 No  
## 249 0.00000000 No  
## 250 0.00000000 No  
## 251 0.00000000 No  
## 252 0.00000000 No  
## 253 0.00000000 No  
## 254 0.36458333 No  
## 255 0.00000000 No  
## 256 0.00000000 No  
## 257 0.25000000 No  
## 258 0.00000000 No  
## 259 0.00000000 No  
## 260 0.00000000 No  
## 261 NaN No  
## 262 0.00000000 No  
## 263 0.00000000 Yes  
## 264 0.00000000 No  
## 265 0.00000000 No  
## 266 0.00000000 No  
## 267 0.00000000 Yes  
## 268 0.66666667 No  
## 269 0.00000000 Yes  
## 270 0.00000000 No  
## 271 0.00000000 No  
## 272 0.00000000 No  
## 273 0.00000000 No  
## 274 0.00000000 No  
## 275 0.00000000 No  
## 276 0.00000000 No  
## 277 0.00000000 No  
## 278 0.00000000 No  
## 279 0.00000000 No  
## 280 0.00000000 No  
## 281 0.00000000 No  
## 282 NaN No  
## 283 0.00000000 No  
## 284 NaN No  
## 285 0.00000000 No  
## healthcare\_exposure\_yn regular\_animal\_exposure has\_pets cat\_andor\_dog  
## 1 Yes No Yes Yes  
## 2 Yes No Yes Yes  
## 3 Yes No Yes Yes  
## 4 Yes No Yes Yes  
## 5 No No Yes No  
## 6 Yes No Yes Yes  
## 7 No No Yes Yes  
## 8 No No Yes Yes  
## 9 No No Yes Yes  
## 10 Yes No Yes Yes  
## 11 No No Yes Yes  
## 12 No No No No  
## 13 No No Yes Yes  
## 14 Yes <NA> No No  
## 15 No No Yes Yes  
## 16 Yes No No No  
## 17 Yes No Yes Yes  
## 18 Yes Yes Yes Yes  
## 19 No No Yes Yes  
## 20 Yes No Yes Yes  
## 21 Yes No No No  
## 22 No No Yes Yes  
## 23 Yes No Yes Yes  
## 24 No No No No  
## 25 No No No No  
## 26 No No Yes Yes  
## 27 No No No No  
## 28 No No Yes Yes  
## 29 No No Yes Yes  
## 30 No No No No  
## 31 Yes No Yes Yes  
## 32 No No No No  
## 33 No No No No  
## 34 No Yes Yes Yes  
## 35 No No No No  
## 36 No No No No  
## 37 No Yes Yes Yes  
## 38 No No Yes Yes  
## 39 No No Yes Yes  
## 40 No No Yes Yes  
## 41 No No Yes Yes  
## 42 No No No No  
## 43 No No Yes Yes  
## 44 No No Yes Yes  
## 45 Yes No Yes Yes  
## 46 No No Yes No  
## 47 No No No No  
## 48 No No No No  
## 49 No No Yes Yes  
## 50 No No Yes Yes  
## 51 Yes No No No  
## 52 No No No No  
## 53 No No Yes Yes  
## 54 No No Yes Yes  
## 55 No No Yes No  
## 56 No No Yes Yes  
## 57 No No No No  
## 58 No No No No  
## 59 No No No No  
## 60 No No Yes Yes  
## 61 No No Yes Yes  
## 62 Yes No No No  
## 63 Yes No Yes Yes  
## 64 No No No No  
## 65 No No Yes No  
## 66 No No No No  
## 67 No No Yes Yes  
## 68 Yes No Yes Yes  
## 69 No No No No  
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## 71 No No No No  
## 72 No No No No  
## 73 No No Yes Yes  
## 74 Yes No Yes Yes  
## 75 No No Yes Yes  
## 76 No No Yes Yes  
## 77 No No Yes Yes  
## 78 No No No No  
## 79 No No Yes Yes  
## 80 No No No No  
## 81 No No No No  
## 82 No No Yes Yes  
## 83 No Yes Yes Yes  
## 84 No No No No  
## 85 No No Yes Yes  
## 86 No No Yes Yes  
## 87 No No No No  
## 88 No No No No  
## 89 No No No No  
## 90 No No Yes Yes  
## 91 No No Yes Yes  
## 92 No No Yes No  
## 93 Yes No No No  
## 94 No No No No  
## 95 Yes No Yes Yes  
## 96 No No No No  
## 97 No No Yes Yes  
## 98 No No Yes Yes  
## 99 No No No No  
## 100 No No No No  
## 101 No No No No  
## 102 No No Yes Yes  
## 103 No No Yes Yes  
## 104 Yes No Yes Yes  
## 105 Yes No No No  
## 106 No No Yes Yes  
## 107 No No No No  
## 108 No No Yes Yes  
## 109 No No Yes Yes  
## 110 Yes No No No  
## 111 No No Yes Yes  
## 112 No No No No  
## 113 No No Yes Yes  
## 114 No No Yes Yes  
## 115 Yes No No No  
## 116 No No No No  
## 117 No No No No  
## 118 No No Yes Yes  
## 119 No No No No  
## 120 No No Yes Yes  
## 121 No No Yes Yes  
## 122 No No No No  
## 123 Yes No Yes Yes  
## 124 Yes No No No  
## 125 No No No No  
## 126 No No No No  
## 127 No No No No  
## 128 No No Yes Yes  
## 129 No No No No  
## 130 Yes No Yes Yes  
## 131 No No Yes Yes  
## 132 No No No No  
## 133 No No No No  
## 134 No No No No  
## 135 Yes No Yes Yes  
## 136 No No Yes Yes  
## 137 No No Yes Yes  
## 138 No No Yes Yes  
## 139 Yes No No No  
## 140 Yes No No No  
## 141 No No No No  
## 142 No No Yes Yes  
## 143 No No No No  
## 144 No No No No  
## 145 No No No No  
## 146 No No No No  
## 147 Yes No Yes Yes  
## 148 No No No No  
## 149 No No Yes Yes  
## 150 No No No No  
## 151 No No Yes Yes  
## 152 No No No No  
## 153 Yes No Yes Yes  
## 154 No No Yes Yes  
## 155 No No Yes Yes  
## 156 No No Yes Yes  
## 157 Yes No No No  
## 158 No No No No  
## 159 No No No No  
## 160 No No Yes Yes  
## 161 No No Yes Yes  
## 162 Yes No Yes Yes  
## 163 No No No No  
## 164 No No Yes Yes  
## 165 No Yes No No  
## 166 No No No No  
## 167 No No Yes No  
## 168 No No Yes Yes  
## 169 Yes No No No  
## 170 No No Yes Yes  
## 171 No No Yes Yes  
## 172 No No Yes Yes  
## 173 No No Yes Yes  
## 174 No No Yes Yes  
## 175 No No Yes Yes  
## 176 No No Yes Yes  
## 177 Yes No No No  
## 178 No No No No  
## 179 Yes No No No  
## 180 No No Yes Yes  
## 181 No No No No  
## 182 No No Yes Yes  
## 183 No No Yes Yes  
## 184 No No Yes Yes  
## 185 No No Yes Yes  
## 186 No No Yes Yes  
## 187 No Yes Yes Yes  
## 188 No No Yes Yes  
## 189 No No No No  
## 190 Yes No No No  
## 191 No No Yes Yes  
## 192 No No Yes Yes  
## 193 No No Yes Yes  
## 194 No No Yes Yes  
## 195 No No No No  
## 196 No No Yes Yes  
## 197 No No No No  
## 198 No No Yes Yes  
## 199 Yes No Yes Yes  
## 200 Yes Yes No No  
## 201 No No Yes Yes  
## 202 No No Yes Yes  
## 203 No No Yes Yes  
## 204 No No Yes Yes  
## 205 No No Yes Yes  
## 206 Yes Yes Yes Yes  
## 207 No No Yes Yes  
## 208 No No Yes Yes  
## 209 No No No No  
## 210 No No Yes Yes  
## 211 No No Yes Yes  
## 212 No No Yes Yes  
## 213 No <NA> Yes Yes  
## 214 No No Yes Yes  
## 215 Yes No Yes Yes  
## 216 No No Yes Yes  
## 217 No No No No  
## 218 No Yes Yes Yes  
## 219 No No No No  
## 220 No No Yes Yes  
## 221 No No Yes No  
## 222 No No No No  
## 223 Yes No Yes Yes  
## 224 No No No No  
## 225 No No No No  
## 226 No No Yes Yes  
## 227 No No No No  
## 228 Yes No Yes Yes  
## 229 No No Yes Yes  
## 230 No No No No  
## 231 No No Yes Yes  
## 232 No No No No  
## 233 No No No No  
## 234 No No No No  
## 235 Yes No Yes Yes  
## 236 No No Yes Yes  
## 237 No No No No  
## 238 No No Yes Yes  
## 239 No No Yes Yes  
## 240 No No Yes Yes  
## 241 Yes No No No  
## 242 No No Yes Yes  
## 243 No No No No  
## 244 Yes No No No  
## 245 No No Yes Yes  
## 246 No No No No  
## 247 Yes No No No  
## 248 No No Yes Yes  
## 249 Yes No No No  
## 250 No No Yes Yes  
## 251 No No No No  
## 252 No No Yes Yes  
## 253 No No Yes Yes  
## 254 No Yes Yes Yes  
## 255 No No Yes Yes  
## 256 No No Yes Yes  
## 257 No Yes Yes Yes  
## 258 No No Yes Yes  
## 259 No No No No  
## 260 No No No No  
## 261 No No No No  
## 262 No No Yes Yes  
## 263 Yes No No No  
## 264 No No Yes Yes  
## 265 No No Yes Yes  
## 266 No Yes Yes Yes  
## 267 Yes No No No  
## 268 No No Yes Yes  
## 269 No No No No  
## 270 No No Yes Yes  
## 271 No No Yes Yes  
## 272 Yes No Yes Yes  
## 273 No Yes Yes Yes  
## 274 No No No No  
## 275 No No Yes Yes  
## 276 No No Yes Yes  
## 277 No No Yes Yes  
## 278 No No Yes Yes  
## 279 Yes No No No  
## 280 No No No No  
## 281 No Yes Yes Yes  
## 282 No No Yes Yes  
## 283 No No No No  
## 284 No No No No  
## 285 No No Yes Yes  
## untreated\_recreational\_water\_exposure\_past\_week  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0  
## 7 0  
## 8 0  
## 9 0  
## 10 0  
## 11 0  
## 12 0  
## 13 0  
## 14 0  
## 15 0  
## 16 0  
## 17 0  
## 18 0  
## 19 0  
## 20 2  
## 21 0  
## 22 0  
## 23 0  
## 24 0  
## 25 1  
## 26 0  
## 27 0  
## 28 0  
## 29 6  
## 30 0  
## 31 0  
## 32 0  
## 33 0  
## 34 0  
## 35 0  
## 36 0  
## 37 1  
## 38 0  
## 39 0  
## 40 0  
## 41 0  
## 42 0  
## 43 0  
## 44 0  
## 45 0  
## 46 0  
## 47 0  
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## 180 3 2  
## 181 0 2  
## 182 2 1  
## 183 3 1  
## 184 2 2  
## 185 3 2  
## 186 3 1  
## 187 2 2  
## 188 4 0  
## 189 0 0  
## 190 2 1  
## 191 2 2  
## 192 3 0  
## 193 3 1  
## 194 5 0  
## 195 0 0  
## 196 4 1  
## 197 1 3  
## 198 1 0  
## 199 2 0  
## 200 4 0  
## 201 2 0  
## 202 2 1  
## 203 1 4  
## 204 0 0  
## 205 0 1  
## 206 0 4  
## 207 3 0  
## 208 1 1  
## 209 1 0  
## 210 3 1  
## 211 3 2  
## 212 2 0  
## 213 0 0  
## 214 3 0  
## 215 4 1  
## 216 2 0  
## 217 3 0  
## 218 0 1  
## 219 5 1  
## 220 0 0  
## 221 2 1  
## 222 5 0  
## 223 0 0  
## 224 0 0  
## 225 0 3  
## 226 5 2  
## 227 0 3  
## 228 0 1  
## 229 4 1  
## 230 2 1  
## 231 3 0  
## 232 2 0  
## 233 2 2  
## 234 7 2  
## 235 1 2  
## 236 2 5  
## 237 1 0  
## 238 5 1  
## 239 1 1  
## 240 4 2  
## 241 1 3  
## 242 3 1  
## 243 2 0  
## 244 0 0  
## 245 4 0  
## 246 7 2  
## 247 1 0  
## 248 2 3  
## 249 2 0  
## 250 1 0  
## 251 3 1  
## 252 0 1  
## 253 4 0  
## 254 1 1  
## 255 0 2  
## 256 1 1  
## 257 6 1  
## 258 1 1  
## 259 3 0  
## 260 2 0  
## 261 0 0  
## 262 1 0  
## 263 2 3  
## 264 4 3  
## 265 2 0  
## 266 4 0  
## 267 5 3  
## 268 1 2  
## 269 2 2  
## 270 2 0  
## 271 1 0  
## 272 6 0  
## 273 2 2  
## 274 0 7  
## 275 1 0  
## 276 0 0  
## 277 2 1  
## 278 5 2  
## 279 1 2  
## 280 1 0  
## 281 3 4  
## 282 2 0  
## 283 0 0  
## 284 2 1  
## 285 4 1  
## eat\_dairy\_past\_week eat\_raw\_fruits\_or\_vegetables\_past\_week  
## 1 7 5  
## 2 1 0  
## 3 1 1  
## 4 7 3  
## 5 7 0  
## 6 5 2  
## 7 3 0  
## 8 7 3  
## 9 5 7  
## 10 1 7  
## 11 7 1  
## 12 4 7  
## 13 5 5  
## 14 1 2  
## 15 4 5  
## 16 6 4  
## 17 6 5  
## 18 7 3  
## 19 7 4  
## 20 7 7  
## 21 3 2  
## 22 7 3  
## 23 2 2  
## 24 1 4  
## 25 7 4  
## 26 3 NA  
## 27 7 1  
## 28 7 3  
## 29 7 7  
## 30 7 3  
## 31 7 0  
## 32 7 5  
## 33 7 2  
## 34 5 0  
## 35 7 7  
## 36 3 4  
## 37 7 2  
## 38 4 3  
## 39 4 5  
## 40 7 5  
## 41 3 4  
## 42 1 1  
## 43 7 5  
## 44 5 4  
## 45 7 7  
## 46 0 7  
## 47 4 7  
## 48 7 5  
## 49 5 3  
## 50 5 7  
## 51 7 7  
## 52 2 7  
## 53 6 2  
## 54 3 4  
## 55 7 7  
## 56 6 3  
## 57 2 0  
## 58 4 0  
## 59 4 4  
## 60 5 5  
## 61 7 7  
## 62 6 1  
## 63 4 2  
## 64 7 7  
## 65 7 6  
## 66 6 5  
## 67 7 5  
## 68 4 2  
## 69 7 2  
## 70 7 2  
## 71 7 7  
## 72 1 5  
## 73 7 7  
## 74 5 7  
## 75 7 1  
## 76 3 4  
## 77 5 3  
## 78 7 1  
## 79 7 7  
## 80 7 7  
## 81 7 0  
## 82 7 0  
## 83 4 3  
## 84 7 7  
## 85 7 7  
## 86 7 5  
## 87 6 3  
## 88 5 2  
## 89 7 2  
## 90 4 2  
## 91 6 7  
## 92 5 1  
## 93 1 5  
## 94 7 7  
## 95 7 4  
## 96 4 7  
## 97 7 5  
## 98 3 1  
## 99 7 2  
## 100 7 6  
## 101 5 1  
## 102 6 4  
## 103 1 6  
## 104 7 0  
## 105 0 0  
## 106 7 5  
## 107 2 5  
## 108 0 0  
## 109 0 7  
## 110 7 5  
## 111 0 3  
## 112 7 4  
## 113 7 5  
## 114 7 6  
## 115 4 3  
## 116 7 0  
## 117 7 4  
## 118 7 7  
## 119 7 7  
## 120 7 2  
## 121 5 5  
## 122 7 7  
## 123 1 4  
## 124 3 3  
## 125 6 4  
## 126 7 3  
## 127 3 7  
## 128 1 7  
## 129 4 2  
## 130 4 7  
## 131 4 6  
## 132 3 2  
## 133 5 2  
## 134 7 7  
## 135 1 1  
## 136 3 4  
## 137 7 7  
## 138 6 4  
## 139 1 1  
## 140 5 3  
## 141 5 7  
## 142 2 5  
## 143 1 2  
## 144 7 7  
## 145 1 7  
## 146 4 2  
## 147 3 5  
## 148 4 7  
## 149 3 6  
## 150 0 0  
## 151 5 7  
## 152 7 6  
## 153 7 2  
## 154 7 7  
## 155 2 4  
## 156 0 3  
## 157 1 0  
## 158 7 0  
## 159 7 6  
## 160 5 6  
## 161 2 5  
## 162 1 4  
## 163 7 4  
## 164 7 4  
## 165 7 3  
## 166 3 1  
## 167 5 0  
## 168 3 6  
## 169 2 2  
## 170 6 3  
## 171 7 2  
## 172 7 5  
## 173 2 3  
## 174 4 3  
## 175 7 0  
## 176 7 7  
## 177 2 0  
## 178 3 1  
## 179 3 4  
## 180 1 6  
## 181 6 1  
## 182 7 3  
## 183 0 2  
## 184 7 2  
## 185 7 5  
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## 187 5 3  
## 188 2 1  
## 189 0 7  
## 190 4 4  
## 191 6 7  
## 192 5 1  
## 193 4 2  
## 194 7 5  
## 195 0 0  
## 196 7 4  
## 197 6 7  
## 198 2 3  
## 199 4 1  
## 200 5 4  
## 201 4 3  
## 202 3 2  
## 203 5 5  
## 204 0 7  
## 205 3 4  
## 206 7 7  
## 207 6 0  
## 208 7 3  
## 209 4 2  
## 210 7 7  
## 211 7 6  
## 212 4 7  
## 213 5 7  
## 214 7 7  
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## 216 5 7  
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## 225 3 3  
## 226 6 5  
## 227 2 2  
## 228 0 4  
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## 230 2 5  
## 231 7 4  
## 232 5 7  
## 233 1 1  
## 234 3 7  
## 235 0 0  
## 236 7 5  
## 237 7 7  
## 238 1 6  
## 239 4 3  
## 240 6 5  
## 241 1 1  
## 242 7 3  
## 243 2 2  
## 244 7 7  
## 245 7 2  
## 246 7 3  
## 247 3 3  
## 248 5 7  
## 249 4 2  
## 250 4 5  
## 251 4 4  
## 252 7 7  
## 253 6 2  
## 254 7 4  
## 255 7 7  
## 256 5 5  
## 257 4 7  
## 258 2 3  
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## 260 7 1  
## 261 4 2  
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## 266 7 3  
## 267 2 3  
## 268 7 7  
## 269 4 5  
## 270 2 2  
## 271 3 3  
## 272 7 4  
## 273 5 7  
## 274 5 7  
## 275 3 4  
## 276 7 7  
## 277 1 3  
## 278 7 7  
## 279 5 1  
## 280 7 6  
## 281 7 3  
## 282 6 6  
## 283 2 2  
## 284 7 7  
## 285 2 5

lm\_triall\_model <- lm\_mod %>% fit(trimet\_proportion\_resistant ~ ., data = triprop\_and\_predictors)  
triallpredictors\_lm <- tidy(lm\_triall\_model)  
triallpredictors\_lm

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.177 0.0811 2.18 0.0302  
## 2 regular\_healthcare\_exposureYes 0.0126 0.0895 0.141 0.888   
## 3 healthcare\_exposure\_ynYes -0.0798 0.0675 -1.18 0.238   
## 4 regular\_animal\_exposureYes -0.0973 0.113 -0.858 0.392   
## 5 has\_petsYes -0.108 0.149 -0.721 0.472   
## 6 cat\_andor\_dogYes 0.132 0.148 0.895 0.372   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0244 0.0644 0.379 0.705   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.00632 0.0186 -0.340 0.734   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00476 0.0158 -0.302 0.763   
## 10 treated\_recreational\_water\_exposure\_pas~ -0.00631 0.0456 -0.138 0.890   
## 11 eat\_poultry\_past\_week 0.0168 0.0137 1.23 0.221   
## 12 eat\_pork\_or\_beef\_past\_week -0.00446 0.0146 -0.305 0.761   
## 13 eat\_fish\_or\_shellfish\_past\_week 0.00137 0.0182 0.0754 0.940   
## 14 eat\_dairy\_past\_week -0.0190 0.0108 -1.76 0.0793  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0144 0.0104 1.38 0.169

#no significance for trimethoprim  
  
triallpredictors\_table <- broom::tidy(lm\_triall\_model)  
triallpredictors\_table

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.177 0.0811 2.18 0.0302  
## 2 regular\_healthcare\_exposureYes 0.0126 0.0895 0.141 0.888   
## 3 healthcare\_exposure\_ynYes -0.0798 0.0675 -1.18 0.238   
## 4 regular\_animal\_exposureYes -0.0973 0.113 -0.858 0.392   
## 5 has\_petsYes -0.108 0.149 -0.721 0.472   
## 6 cat\_andor\_dogYes 0.132 0.148 0.895 0.372   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0244 0.0644 0.379 0.705   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.00632 0.0186 -0.340 0.734   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00476 0.0158 -0.302 0.763   
## 10 treated\_recreational\_water\_exposure\_pas~ -0.00631 0.0456 -0.138 0.890   
## 11 eat\_poultry\_past\_week 0.0168 0.0137 1.23 0.221   
## 12 eat\_pork\_or\_beef\_past\_week -0.00446 0.0146 -0.305 0.761   
## 13 eat\_fish\_or\_shellfish\_past\_week 0.00137 0.0182 0.0754 0.940   
## 14 eat\_dairy\_past\_week -0.0190 0.0108 -1.76 0.0793  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0144 0.0104 1.38 0.169

#Fits another linear model to the   
#categorical outcome using all (important) predictors of interest.  
log\_model <- logistic\_reg() %>%  
 set\_engine("glm") %>%  
 set\_mode("classification")  
  
abs\_pattern\_yndairy <- abs\_pattern %>% mutate(any\_dairy\_week\_yn = eat\_dairy\_past\_week > 0)  
  
#linear regression between ampicillin and dairy (as y/n)  
ampdairy\_lm\_fit <-lm\_mod %>%  
 fit(amp\_proportion\_resistant ~ any\_dairy\_week\_yn, data = abs\_pattern\_yndairy)  
ampdairy\_lm <- tidy(ampdairy\_lm\_fit)  
ampdairy\_lm

## # A tibble: 2 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.213 0.123 1.73 0.0840  
## 2 any\_dairy\_week\_ynTRUE 0.0856 0.126 0.681 0.497

ampallpredictors\_table

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.407 0.0978 4.16 4.61e-5  
## 2 regular\_healthcare\_exposureYes 0.0325 0.108 0.301 7.63e-1  
## 3 healthcare\_exposure\_ynYes -0.106 0.0813 -1.30 1.93e-1  
## 4 regular\_animal\_exposureYes -0.169 0.137 -1.23 2.19e-1  
## 5 has\_petsYes -0.122 0.180 -0.675 5.00e-1  
## 6 cat\_andor\_dogYes 0.0912 0.178 0.512 6.09e-1  
## 7 untreated\_recreational\_water\_exposure~ 0.0531 0.0776 0.684 4.95e-1  
## 8 untreated\_recreational\_water\_exposure~ -0.0176 0.0224 -0.785 4.33e-1  
## 9 treated\_recreational\_water\_exposure\_p~ -0.000116 0.0190 -0.00611 9.95e-1  
## 10 treated\_recreational\_water\_exposure\_p~ 0.0435 0.0550 0.791 4.30e-1  
## 11 eat\_poultry\_past\_week 0.00578 0.0165 0.351 7.26e-1  
## 12 eat\_pork\_or\_beef\_past\_week 0.00394 0.0176 0.224 8.23e-1  
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0249 0.0219 -1.14 2.56e-1  
## 14 eat\_dairy\_past\_week -0.0261 0.0130 -2.01 4.57e-2  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0131 0.0125 1.05 2.95e-1

tetallpredictors\_table

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.246 0.0831 2.97 0.00334  
## 2 regular\_healthcare\_exposureYes -0.0314 0.0917 -0.342 0.732   
## 3 healthcare\_exposure\_ynYes -0.0558 0.0691 -0.808 0.420   
## 4 regular\_animal\_exposureYes 0.0641 0.116 0.553 0.581   
## 5 has\_petsYes -0.0816 0.153 -0.533 0.594   
## 6 cat\_andor\_dogYes 0.0259 0.151 0.171 0.864   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0490 0.0659 0.744 0.458   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.0136 0.0190 -0.713 0.477   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00811 0.0162 -0.502 0.616   
## 10 treated\_recreational\_water\_exposure\_pas~ 0.0472 0.0467 1.01 0.313   
## 11 eat\_poultry\_past\_week 0.00817 0.0140 0.585 0.559   
## 12 eat\_pork\_or\_beef\_past\_week -0.00458 0.0150 -0.305 0.760   
## 13 eat\_fish\_or\_shellfish\_past\_week -0.0177 0.0186 -0.954 0.341   
## 14 eat\_dairy\_past\_week -0.0136 0.0110 -1.23 0.219   
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0118 0.0106 1.10 0.271

triallpredictors\_table

## # A tibble: 15 x 5  
## term estimate std.error statistic p.value  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 (Intercept) 0.177 0.0811 2.18 0.0302  
## 2 regular\_healthcare\_exposureYes 0.0126 0.0895 0.141 0.888   
## 3 healthcare\_exposure\_ynYes -0.0798 0.0675 -1.18 0.238   
## 4 regular\_animal\_exposureYes -0.0973 0.113 -0.858 0.392   
## 5 has\_petsYes -0.108 0.149 -0.721 0.472   
## 6 cat\_andor\_dogYes 0.132 0.148 0.895 0.372   
## 7 untreated\_recreational\_water\_exposure\_p~ 0.0244 0.0644 0.379 0.705   
## 8 untreated\_recreational\_water\_exposure\_p~ -0.00632 0.0186 -0.340 0.734   
## 9 treated\_recreational\_water\_exposure\_pas~ -0.00476 0.0158 -0.302 0.763   
## 10 treated\_recreational\_water\_exposure\_pas~ -0.00631 0.0456 -0.138 0.890   
## 11 eat\_poultry\_past\_week 0.0168 0.0137 1.23 0.221   
## 12 eat\_pork\_or\_beef\_past\_week -0.00446 0.0146 -0.305 0.761   
## 13 eat\_fish\_or\_shellfish\_past\_week 0.00137 0.0182 0.0754 0.940   
## 14 eat\_dairy\_past\_week -0.0190 0.0108 -1.76 0.0793  
## 15 eat\_raw\_fruits\_or\_vegetables\_past\_week 0.0144 0.0104 1.38 0.169

ampallpredictors\_figure = here("results", "ampallpredictors\_table")  
saveRDS(ampallpredictors\_table, file = ampallpredictors\_figure)  
  
tetallpredictors\_figure = here("results", "tetallpredictors\_table")  
saveRDS(tetallpredictors\_table, file = tetallpredictors\_figure)  
  
triallpredictors\_figure = here("results", "triallpredictors\_table")  
saveRDS(triallpredictors\_table, file = triallpredictors\_figure)

# 4 Discussion

## 4.1 Summary and Interpretation

*Summarize what you did, what you found and what it means.*

## 4.2 Strengths and Limitations

*Discuss what you perceive as strengths and limitations of your analysis.*

## 4.3 Conclusions

*What are the main take-home messages?*

*Include citations in your Rmd file using bibtex, the list of references will automatically be placed at the end*

This paper (Leek & Peng, 2015) discusses types of analyses.

Note that this cited reference will show up at the end of the document, the reference formatting is determined by the CSL file specified in the YAML header. Many more style files for almost any journal [are available](https://www.zotero.org/styles). You also specify the location of your bibtex reference file in the YAML. You can call your reference file anything you like, I just used the generic word references.bib but giving it a more descriptive name is probably better.

# 5 References

(I will put these links in proper format soon.)

* <https://www.cambridge.org/core/journals/epidemiology-and-infection/article/risk-factors-for-antibioticresistant-e-coli-in-children-in-a-rural-area/D3A8BA423024A18D592BAA70719608A0>
* <https://www.sciencedirect.com/science/article/pii/S1473309918302962?casa_token=j_ZSlMulgkcAAAAA:dUmvDkbjCNWA2ELFH1tBujfCqNQVtCEWm9aGJOaYCzZ8aQDgWEOie1US-SLNsw3AqNA9xbW2nQ>
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* <https://www.nature.com/articles/39767>
* <https://www.sciencedirect.com/science/article/pii/S0168160505002618>
* <https://www.cdc.gov/foodsafety/challenges/antibiotic-resistance.html>

Leek, J. T., & Peng, R. D. (2015). Statistics. What is the question? *Science (New York, N.Y.)*, *347*, 1314–1315. <https://doi.org/10.1126/science.aaa6146>