

```
#load package
library(dplyr)
library(tidyr)
library(gtsummary)
library(labelled)
library(MASS)
library(stats)
library(ggplot2)
```

```
#Load preprocessed data
data_filter <- readRDS(file = "../output/data_preprocessed.rds")
```

```
## define custom test
fisher.test.simulate.p.values <- function(data, variable, by, ...) {
  result <- list()
  test_results <- stats::fisher.test(data[[variable]], data[[by]], simulate.p.value = TRUE)
  result$p <- test_results$p.value
  result$test <- test_results$method
  result
}
```

```
##table 1 and table 2
```

```
#temporary convert Phq9_1-9 to factor
data_filter_phq9asfactor <- data_filter
data_filter_phq9asfactor$phq9_1 <- factor(data_filter_phq9asfactor$phq9_1, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_2 <- factor(data_filter_phq9asfactor$phq9_2, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_3 <- factor(data_filter_phq9asfactor$phq9_3, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_4 <- factor(data_filter_phq9asfactor$phq9_4, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_5 <- factor(data_filter_phq9asfactor$phq9_5, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_6 <- factor(data_filter_phq9asfactor$phq9_6, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_7 <- factor(data_filter_phq9asfactor$phq9_7, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_8 <- factor(data_filter_phq9asfactor$phq9_8, levels = c("0", "1", "2", "3"))
data_filter_phq9asfactor$phq9_9 <- factor(data_filter_phq9asfactor$phq9_9, levels = c("0", "1", "2", "3"))
```

```
table1 <-
  data_filter_phq9asfactor %>%
  tbl_summary()

table2 <-
  data_filter_phq9asfactor %>%
  tbl_summary(by = phq_9_cat) %>%
  add_p(
    test = list(all_categorical() ~ "fisher.test.simulate.p.values") # this applies the custom test to a
  ) %>%
  add_overall()
```

```
table1
```

```
## Table printed with 'knitr::kable()', not {gt}. Learn why at
## https://www.danielsjoberg.com/gtsummary/articles/rmarkdown.html
## To suppress this message, include 'message = FALSE' in code chunk header.
```

Characteristic	N = 272
Age	73 (67, 78)
Sex	
male	78 (29%)
female	194 (71%)
Weight of Patient (kgs)	58 (51, 66)
Height of Patient (cms)	156 (151, 162)
BMI	23.5 (21.3, 25.7)
Ethnic	
Thai	262 (96%)
Chinese	9 (3.3%)
others	1 (0.4%)
Marital status	
single	50 (18%)
married	172 (63%)
divorced	10 (3.7%)
widow	40 (15%)
Address	
Bangkok	182 (67%)
others	90 (33%)
Education	
not educate	3 (1.1%)
elementary	36 (13%)
high school	42 (15%)
college degree	191 (70%)
above college degree	0 (0%)
Employment	
unemployed	93 (34%)
part-time job	23 (8.5%)
full-time job	24 (8.8%)
retired	132 (49%)
income	
10,000 or less	52 (19%)
10,001 - 20,000	50 (18%)
20,001 - 30,000	44 (16%)
30,001 or more	66 (24%)
unknown	60 (22%)
Income Loss from COVID-19	
Same	221 (87%)
Less than 50%	0 (0%)
Over 50% loss	20 (7.9%)
No income	13 (5.1%)
Unknown	18
Ambulation	
Normal	260 (96%)
Gait aid	12 (4.4%)
Bedbound	0 (0%)
Hearing	
Normal	255 (94%)
Hearing aid	2 (0.7%)
Hearing impairment	15 (5.5%)
Visual	
Normal	172 (63%)

Characteristic	N = 272
Glasses	100 (37%)
Vision loss	0 (0%)
Smoking	
Never smoking	234 (86%)
Current smoking	6 (2.2%)
Past smoking	32 (12%)
Alcohol Drinking	
Never drinking	247 (91%)
Social drinking	22 (8.1%)
Regular drinking	3 (1.1%)
Dementia diagnosis	
No	255 (94%)
Yes	10 (3.7%)
Not sure	7 (2.6%)
Self Percept Cognition	
Normal	115 (42%)
Minor cognitive problem	155 (57%)
Major cognitive problem	2 (0.7%)
Number of Hospitalization	
0	230 (85%)
1	35 (13%)
2	5 (1.8%)
3	2 (0.7%)
Self Percept Health	
Worst	1 (0.4%)
Bad	6 (2.2%)
Average	111 (41%)
Good	131 (48%)
Best	23 (8.5%)
neuro	
None	238 (88%)
Neurological disease	34 (13%)
cvs	
None	53 (19%)
Cardiovascular disease	219 (81%)
respi	
None	251 (92%)
Respiratory disease	21 (7.7%)
gi	
None	216 (79%)
Gastrointestinal disease	56 (21%)
renal	
None	250 (92%)
Renal disease	22 (8.1%)
endo	
None	211 (78%)
Endocrine disease	61 (22%)
msk	
None	172 (63%)
MSK disease	100 (37%)
cancer	
None	249 (92%)

Characteristic	N = 272
Cancer	23 (8.5%)
allergy	
None	197 (72%)
Allergy	75 (28%)
psychi	
None	257 (94%)
Psych disease	15 (5.5%)
phq9_1	
0	186 (68%)
1	78 (29%)
2	6 (2.2%)
3	2 (0.7%)
phq9_2	
0	212 (78%)
1	56 (21%)
2	4 (1.5%)
3	0 (0%)
phq9_3	
0	171 (63%)
1	65 (24%)
2	23 (8.5%)
3	13 (4.8%)
phq9_4	
0	208 (76%)
1	47 (17%)
2	13 (4.8%)
3	4 (1.5%)
phq9_5	
0	222 (82%)
1	37 (14%)
2	8 (2.9%)
3	5 (1.8%)
phq9_6	
0	254 (93%)
1	15 (5.5%)
2	3 (1.1%)
3	0 (0%)
phq9_7	
0	250 (92%)
1	20 (7.4%)
2	1 (0.4%)
3	1 (0.4%)
phq9_8	
0	254 (93%)
1	15 (5.5%)
2	2 (0.7%)
3	1 (0.4%)
phq9_9	
0	268 (99%)
1	4 (1.5%)
2	0 (0%)
3	0 (0%)

Characteristic	N = 272
PHQ-9 score	1 (0, 3)
PHQ-9 Interpretation	
normal	233 (86%)
mild depression	33 (12%)
moderate depression	6 (2.2%)

table2

Table printed with 'knitr::kable()', not {gt}. Learn why at
<https://www.danielsjoberg.com/gtsummary/articles/rmarkdown.html>
To suppress this message, include 'message = FALSE' in code chunk header.

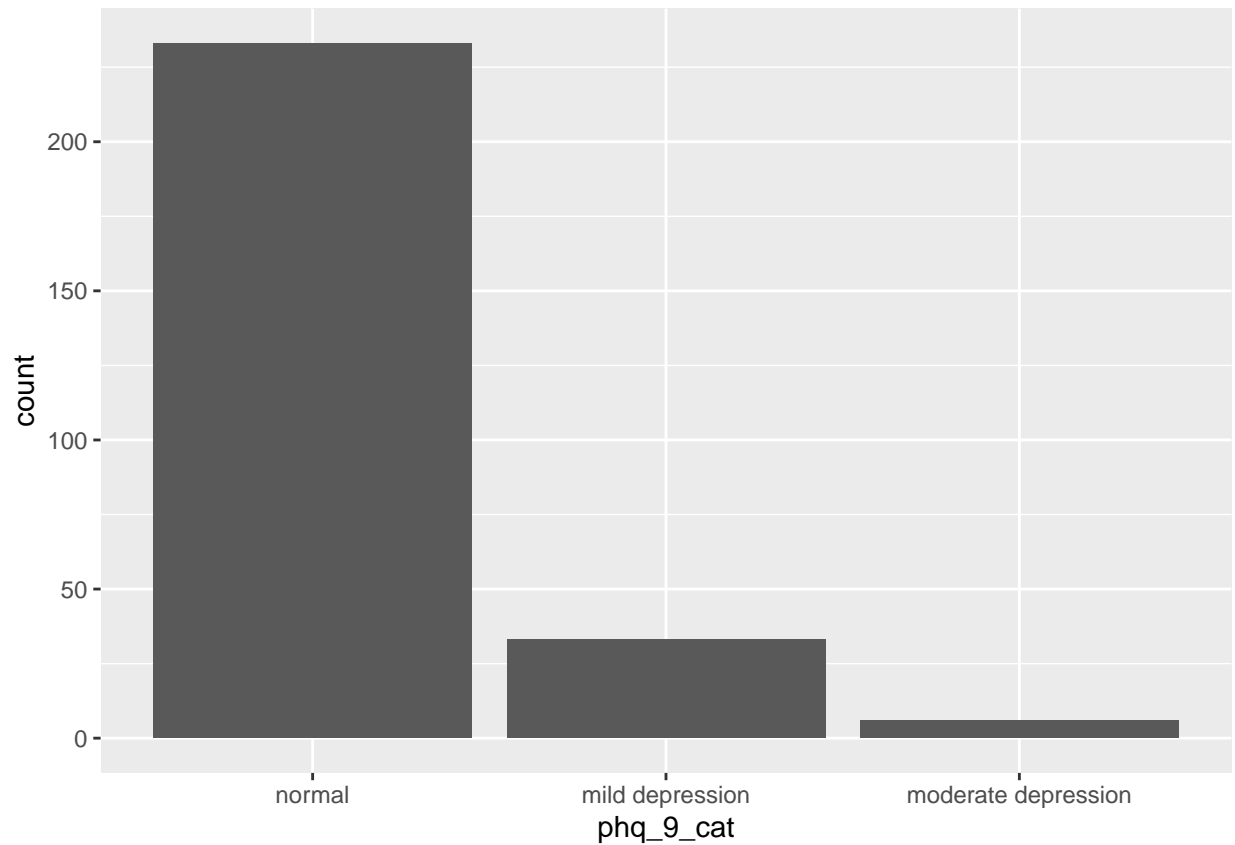
Characteristic	Overall, N = 272	normal, N = 233	mild depression, N = 33	moderate depression, N = 6	p-value
Age	73 (67, 78)	72 (67, 77)	74 (67, 80)	80 (76, 85)	0.020
Sex					>0.9
male	78 (29%)	67 (29%)	9 (27%)	2 (33%)	
female	194 (71%)	166 (71%)	24 (73%)	4 (67%)	
Weight of Patient (kgs)	58 (51, 66)	58 (51, 66)	60 (52, 70)	50 (48, 58)	0.3
Height of Patient (cms)	156 (151, 162)	156 (151, 163)	155 (150, 160)	159 (152, 164)	0.3
BMI	23.5 (21.3, 25.7)	23.4 (21.2, 25.7)	24.6 (22.9, 27.3)	20.9 (19.9, 22.0)	0.019
Ethnic					0.011
Thai	262 (96%)	226 (97%)	32 (97%)	4 (67%)	
Chinese	9 (3.3%)	7 (3.0%)	1 (3.0%)	1 (17%)	
others	1 (0.4%)	0 (0%)	0 (0%)	1 (17%)	
Marital status					0.5
single	50 (18%)	45 (19%)	5 (15%)	0 (0%)	
married	172 (63%)	149 (64%)	19 (58%)	4 (67%)	
divorced	10 (3.7%)	8 (3.4%)	2 (6.1%)	0 (0%)	
widow	40 (15%)	31 (13%)	7 (21%)	2 (33%)	
Address					0.2
Bangkok	182 (67%)	152 (65%)	24 (73%)	6 (100%)	
others	90 (33%)	81 (35%)	9 (27%)	0 (0%)	
Education					0.11
not educate	3 (1.1%)	2 (0.9%)	1 (3.0%)	0 (0%)	
elementary	36 (13%)	29 (12%)	6 (18%)	1 (17%)	
high school	42 (15%)	32 (14%)	9 (27%)	1 (17%)	
college degree	191 (70%)	170 (73%)	17 (52%)	4 (67%)	
above college degree	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Employment					0.3
unemployed	93 (34%)	75 (32%)	17 (52%)	1 (17%)	
part-time job	23 (8.5%)	19 (8.2%)	3 (9.1%)	1 (17%)	
full-time job	24 (8.8%)	22 (9.4%)	2 (6.1%)	0 (0%)	
retired	132 (49%)	117 (50%)	11 (33%)	4 (67%)	
income					0.075
10,000 or less	52 (19%)	40 (17%)	11 (33%)	1 (17%)	

Characteristic	Overall, N = 272	normal, N = 233	mild depression, N = 33	moderate depression, N = 6	p-value
10,001 - 20,000	50 (18%)	43 (18%)	4 (12%)	3 (50%)	0.2
20,001 - 30,000	44 (16%)	39 (17%)	5 (15%)	0 (0%)	
30,001 or more	66 (24%)	62 (27%)	4 (12%)	0 (0%)	
unknown	60 (22%)	49 (21%)	9 (27%)	2 (33%)	
Income Loss from COVID-19					
Same	221 (87%)	194 (89%)	22 (76%)	5 (83%)	0.3
Less than 50%	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Over 50% loss	20 (7.9%)	15 (6.8%)	4 (14%)	1 (17%)	
No income	13 (5.1%)	10 (4.6%)	3 (10%)	0 (0%)	
Unknown	18	14	4	0	
Ambulation					0.2
Normal	260 (96%)	224 (96%)	30 (91%)	6 (100%)	
Gait aid	12 (4.4%)	9 (3.9%)	3 (9.1%)	0 (0%)	
Bedbound	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Hearing					
Normal	255 (94%)	221 (95%)	29 (88%)	5 (83%)	0.5
Hearing aid	2 (0.7%)	2 (0.9%)	0 (0%)	0 (0%)	
Hearing impairment	15 (5.5%)	10 (4.3%)	4 (12%)	1 (17%)	
Visual					
Normal	172 (63%)	144 (62%)	24 (73%)	4 (67%)	
Glasses	100 (37%)	89 (38%)	9 (27%)	2 (33%)	0.5
Vision loss	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Smoking					
Never smoking	234 (86%)	202 (87%)	26 (79%)	6 (100%)	
Current smoking	6 (2.2%)	5 (2.1%)	1 (3.0%)	0 (0%)	
Past smoking	32 (12%)	26 (11%)	6 (18%)	0 (0%)	0.5
Alcohol					
Drinking					
Never drinking	247 (91%)	212 (91%)	29 (88%)	6 (100%)	
Social drinking	22 (8.1%)	19 (8.2%)	3 (9.1%)	0 (0%)	
Regular drinking	3 (1.1%)	2 (0.9%)	1 (3.0%)	0 (0%)	0.043
Dementia diagnosis					
No	255 (94%)	222 (95%)	28 (85%)	5 (83%)	
Yes	10 (3.7%)	7 (3.0%)	2 (6.1%)	1 (17%)	
Not sure	7 (2.6%)	4 (1.7%)	3 (9.1%)	0 (0%)	
Self Percept Cognition					0.003
Normal	115 (42%)	107 (46%)	7 (21%)	1 (17%)	
Minor cognitive problem	155 (57%)	125 (54%)	26 (79%)	4 (67%)	
Major cognitive problem	2 (0.7%)	1 (0.4%)	0 (0%)	1 (17%)	
Number of Hospitalization					
0	230 (85%)	204 (88%)	22 (67%)	4 (67%)	0.003
1	35 (13%)	24 (10%)	9 (27%)	2 (33%)	
2	5 (1.8%)	5 (2.1%)	0 (0%)	0 (0%)	
3	2 (0.7%)	0 (0%)	2 (6.1%)	0 (0%)	

Characteristic	Overall, N = 272	normal, N = 233	mild depression, N = 33	moderate depression, N = 6	p-value
Self Percept					<0.001
Health					
Worst	1 (0.4%)	0 (0%)	1 (3.0%)	0 (0%)	
Bad	6 (2.2%)	2 (0.9%)	1 (3.0%)	3 (50%)	
Average	111 (41%)	88 (38%)	22 (67%)	1 (17%)	
Good	131 (48%)	121 (52%)	9 (27%)	1 (17%)	
Best	23 (8.5%)	22 (9.4%)	0 (0%)	1 (17%)	
neuro					0.055
None	238 (88%)	208 (89%)	26 (79%)	4 (67%)	
Neurological	34 (13%)	25 (11%)	7 (21%)	2 (33%)	
disease					
cvs					0.6
None	53 (19%)	48 (21%)	4 (12%)	1 (17%)	
Cardiovascular	219 (81%)	185 (79%)	29 (88%)	5 (83%)	
disease					
respi					0.007
None	251 (92%)	218 (94%)	30 (91%)	3 (50%)	
Respiratory	21 (7.7%)	15 (6.4%)	3 (9.1%)	3 (50%)	
disease					
gi					0.002
None	216 (79%)	189 (81%)	26 (79%)	1 (17%)	
Gastrointestinal	56 (21%)	44 (19%)	7 (21%)	5 (83%)	
disease					
renal					0.017
None	250 (92%)	218 (94%)	28 (85%)	4 (67%)	
Renal disease	22 (8.1%)	15 (6.4%)	5 (15%)	2 (33%)	
endo					0.3
None	211 (78%)	184 (79%)	22 (67%)	5 (83%)	
Endocrine	61 (22%)	49 (21%)	11 (33%)	1 (17%)	
disease					
msk					0.020
None	172 (63%)	155 (67%)	15 (45%)	2 (33%)	
MSK disease	100 (37%)	78 (33%)	18 (55%)	4 (67%)	
cancer					0.7
None	249 (92%)	214 (92%)	29 (88%)	6 (100%)	
Cancer	23 (8.5%)	19 (8.2%)	4 (12%)	0 (0%)	
allergy					0.12
None	197 (72%)	171 (73%)	24 (73%)	2 (33%)	
Allergy	75 (28%)	62 (27%)	9 (27%)	4 (67%)	
psychi					0.005
None	257 (94%)	224 (96%)	29 (88%)	4 (67%)	
Psych disease	15 (5.5%)	9 (3.9%)	4 (12%)	2 (33%)	
phq9_1					<0.001
0	186 (68%)	178 (76%)	6 (18%)	2 (33%)	
1	78 (29%)	52 (22%)	25 (76%)	1 (17%)	
2	6 (2.2%)	3 (1.3%)	1 (3.0%)	2 (33%)	
3	2 (0.7%)	0 (0%)	1 (3.0%)	1 (17%)	
phq9_2					<0.001
0	212 (78%)	194 (83%)	15 (45%)	3 (50%)	
1	56 (21%)	38 (16%)	17 (52%)	1 (17%)	
2	4 (1.5%)	1 (0.4%)	1 (3.0%)	2 (33%)	

Characteristic	Overall, N = 272	normal, N = 233	mild depression, N = 33	moderate depression, N = 6	p-value
3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
phq9_3					
0	171 (63%)	165 (71%)	6 (18%)	0 (0%)	
1	65 (24%)	50 (21%)	15 (45%)	0 (0%)	
2	23 (8.5%)	15 (6.4%)	6 (18%)	2 (33%)	
3	13 (4.8%)	3 (1.3%)	6 (18%)	4 (67%)	<0.001
phq9_4					
0	208 (76%)	198 (85%)	9 (27%)	1 (17%)	
1	47 (17%)	32 (14%)	14 (42%)	1 (17%)	
2	13 (4.8%)	1 (0.4%)	9 (27%)	3 (50%)	
3	4 (1.5%)	2 (0.9%)	1 (3.0%)	1 (17%)	<0.001
phq9_5					
0	222 (82%)	209 (90%)	11 (33%)	2 (33%)	
1	37 (14%)	21 (9.0%)	14 (42%)	2 (33%)	
2	8 (2.9%)	2 (0.9%)	5 (15%)	1 (17%)	
3	5 (1.8%)	1 (0.4%)	3 (9.1%)	1 (17%)	<0.001
phq9_6					
0	254 (93%)	226 (97%)	25 (76%)	3 (50%)	
1	15 (5.5%)	7 (3.0%)	6 (18%)	2 (33%)	
2	3 (1.1%)	0 (0%)	2 (6.1%)	1 (17%)	
3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
phq9_7					
0	250 (92%)	226 (97%)	22 (67%)	2 (33%)	
1	20 (7.4%)	7 (3.0%)	11 (33%)	2 (33%)	
2	1 (0.4%)	0 (0%)	0 (0%)	1 (17%)	
3	1 (0.4%)	0 (0%)	0 (0%)	1 (17%)	<0.001
phq9_8					
0	254 (93%)	228 (98%)	24 (73%)	2 (33%)	
1	15 (5.5%)	5 (2.1%)	9 (27%)	1 (17%)	
2	2 (0.7%)	0 (0%)	0 (0%)	2 (33%)	
3	1 (0.4%)	0 (0%)	0 (0%)	1 (17%)	0.004
phq9_9					
0	268 (99%)	232 (100%)	31 (94%)	5 (83%)	
1	4 (1.5%)	1 (0.4%)	2 (6.1%)	1 (17%)	
2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
PHQ-9 score	1 (0, 3)	1 (0, 2)	6 (5, 7)	11 (9, 13)	

```
data_filter %>% ggplot(aes(x = phq_9_cat)) + geom_bar()
```

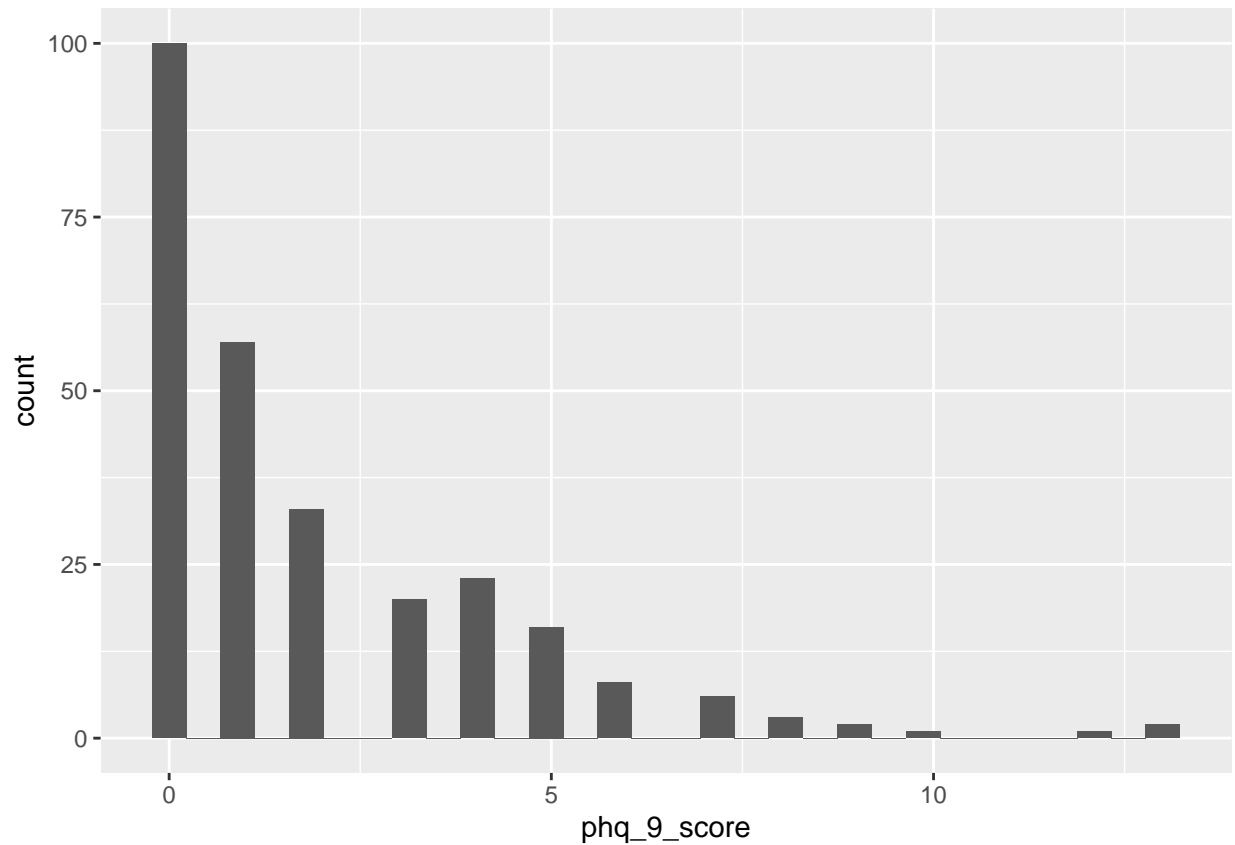



```
data_filter %>% group_by(phq_9_cat) %>%
  summarise(frequency = n())
```

```
## # A tibble: 3 x 2
##   phq_9_cat      frequency
##   <fct>         <int>
## 1 normal           233
## 2 mild depression    33
## 3 moderate depression  6
```

```
data_filter %>% ggplot(aes(x = phq_9_score)) + geom_histogram()
```

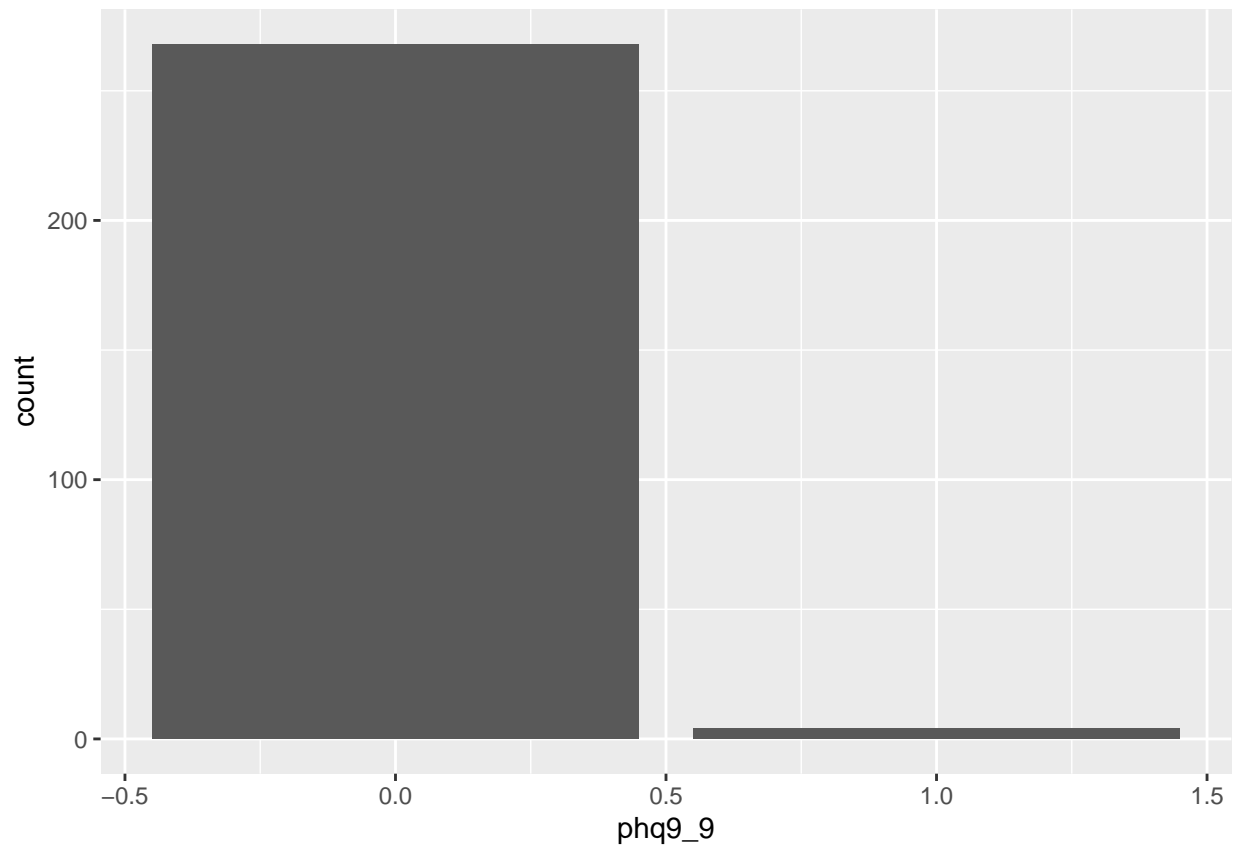
```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```



```
data_filter %>% group_by(phq_9_score) %>%
  summarise(frequency = n())
```

```
## # A tibble: 13 x 2
##   phq_9_score frequency
##   <int>      <int>
## 1         0       100
## 2         1        57
## 3         2        33
## 4         3        20
## 5         4        23
## 6         5        16
## 7         6         8
## 8         7         6
## 9         8         3
## 10        9         2
## 11       10         1
## 12       12         1
## 13       13         2
```

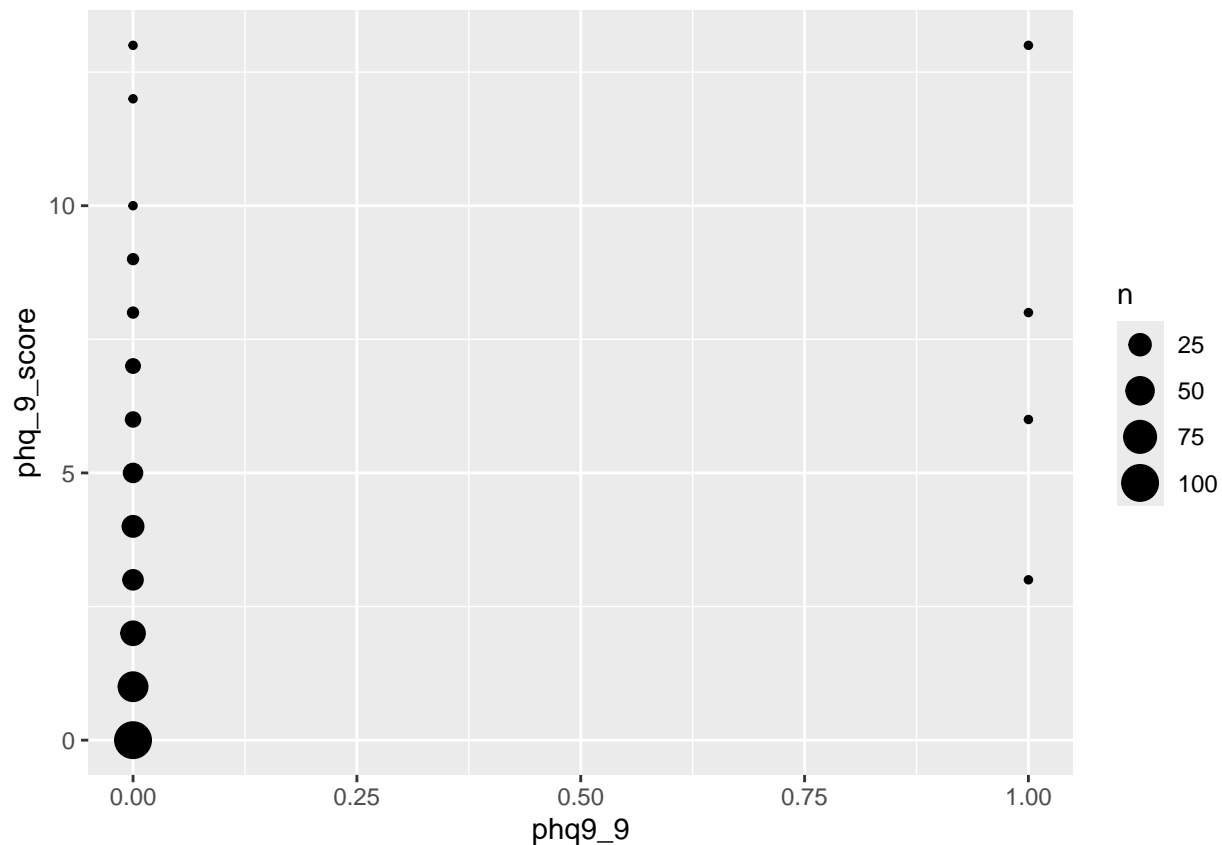
```
data_filter %>% ggplot(aes(x = phq9_9)) + geom_bar()
```



```
data_filter %>% group_by(phq9_9) %>%  
  summarise(frequency = n())
```

```
## # A tibble: 2 x 2  
##   phq9_9 frequency  
##   <int>     <int>  
## 1     0       268  
## 2     1         4
```

```
data_filter %>% ggplot(aes(x = phq9_9, y = phq9_score)) + geom_count()
```



```
#test whether phq9_9 is related to ph9_9_score using t-test
```

```
t.test(data_filter[data_filter$phq9_9 == 1,]$phq_9_score,data_filter[data_filter$phq9_9 == 0,]$phq_9_score)
```

```
##
```

```
## Welch Two Sample t-test
```

```
##
```

```
## data: data_filter[data_filter$phq9_9 == 1,]$phq_9_score and data_filter[data_filter$phq9_9 == 0,]$phq_9_score
```

```
## t = 2.6661, df = 3.0271, p-value = 0.07522
```

```
## alternative hypothesis: true difference in means is not equal to 0
```

```
## 95 percent confidence interval:
```

```
## -1.053732 12.285076
```

```
## sample estimates:
```

```
## mean of x mean of y
```

```
## 7.500000 1.884328
```

```
## Explore each question of PHQ9
```

```
for (i in 1:9) {
  print(paste0("PHQ9_",i,": ",
              attributes((data_filter[,32:40])[i,drop = TRUE])$label))
}
```

```
## [1] "PHQ9_1: Little interest or pleasure in doing things"
```

```
## [1] "PHQ9_2: Feeling down, depressed, or hopeless"
```

```
## [1] "PHQ9_3: Trouble falling or staying asleep, or sleeping too much"
## [1] "PHQ9_4: Feeling tired or having little energy"
## [1] "PHQ9_5: Poor appetite or overeating"
## [1] "PHQ9_6: Feeling bad about yourself - or that you are a failure or have let yourself or your fam
## [1] "PHQ9_7: Trouble concentrating on things, such as reading the newspaper or watching television"
## [1] "PHQ9_8: Moving or speaking so slowly that other people could have noticed? Or so fidgety or res
## [1] "PHQ9_9: Thoughts that you would be better off dead, or thoughts of hurting yourself in some way"
```

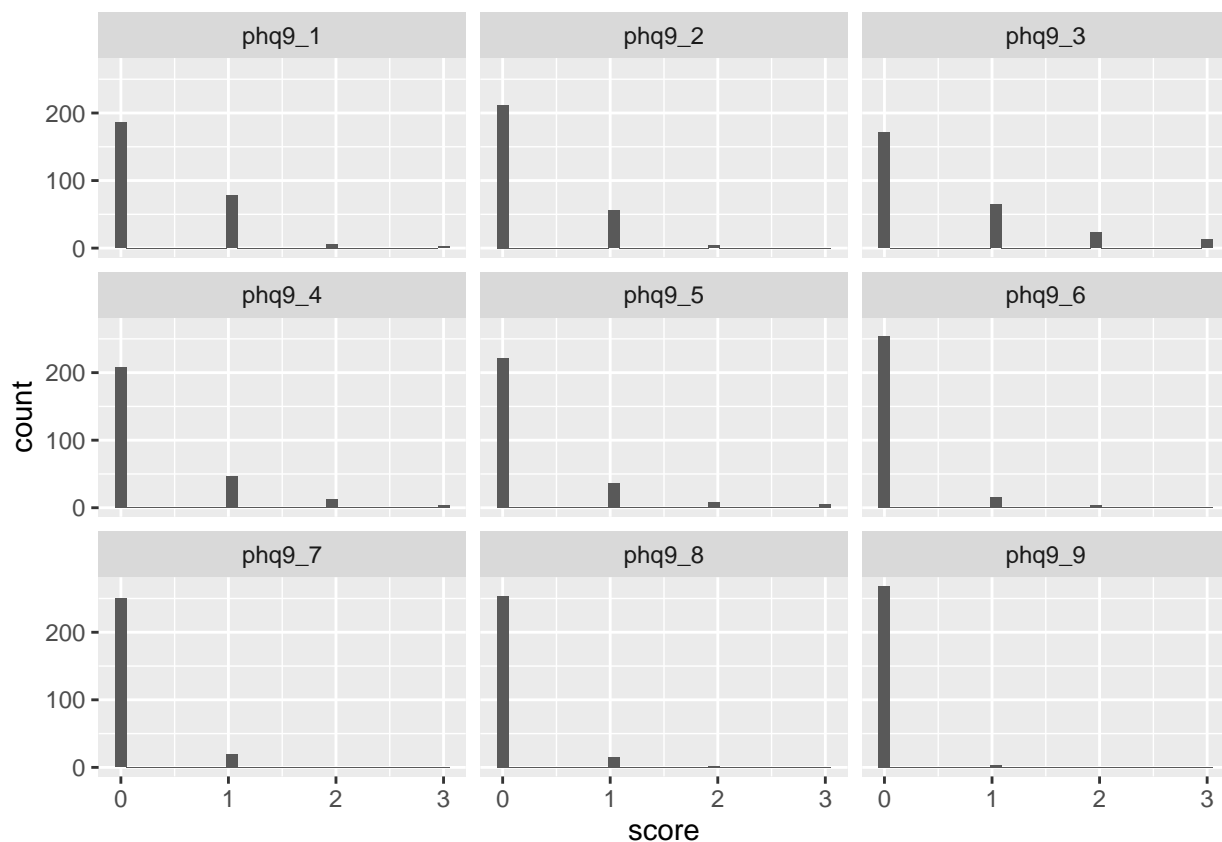
```
#convert wide to long to be used in ggplot
```

```
data_long <- gather(data_filter, phq, score, phq9_1:phq9_9, factor_key=TRUE)
```

```
## Warning: attributes are not identical across measure variables; they will be
## dropped
```

```
data_long %>% ggplot(aes(x=score)) + geom_histogram() + facet_wrap(~phq)
```

```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```



```
##Multiple linear regression
```

```
# Multiple linear regression
```

```
column_to_excludes <- c("WeightofPatient", "HeightofPatient",  
                        "phq9_1", "phq9_2", "phq9_3", "phq9_4", "phq9_5", "phq9_6", "phq9_7", "phq9_8", "phq9_9")
```

```
lm_model <- lm(phq_9_score ~ ., data = data_filter[, !colnames(data_filter) %in% column_to_excludes])

# Print the summary of the model
summary(lm_model)
```

```
##
## Call:
## lm(formula = phq_9_score ~ ., data = data_filter[, !colnames(data_filter) %in%
##     column_to_excludes])
##
## Residuals:
```

	Min	1Q	Median	3Q	Max
	-6.0827	-1.1173	-0.2511	0.9026	5.8626

```
##
## Coefficients:
```

	Estimate	Std. Error	t value
(Intercept)	-0.06888	3.16127	-0.022
Ageofpatient	0.01676	0.02043	0.820
Sexfemale	0.55485	0.42932	1.292
BMI	0.01467	0.03730	0.393
EthnicChinese	-0.29037	0.76808	-0.378
Ethnicothers	10.06719	2.20605	4.563
Maritalstatusmarried	0.08743	0.36858	0.237
Maritalstatusdivorced	1.08392	0.72862	1.488
Maritalstatuswidow	0.48851	0.48451	1.008
Addressothers	-0.35253	0.28338	-1.244
Educationelementary	0.66890	1.28096	0.522
Educationhigh school	0.91309	1.27759	0.715
Educationcollege degree	0.89720	1.27710	0.703
Employmentpart-time job	-0.30170	0.64375	-0.469
Employmentfull-time job	-0.11077	0.57179	-0.194
Employmentretired	0.08139	0.31901	0.255
income10,001 - 20,000	-0.02821	0.48376	-0.058
income20,001 - 30,000	-0.42460	0.52167	-0.814
income30,001 or more	-0.32841	0.49982	-0.657
incomeunknown	-0.65028	0.46309	-1.404
IncomeLossfromCOVIDOver 50% loss	0.58674	0.58470	1.003
IncomeLossfromCOVIDNo income	0.37448	0.64591	0.580
PatientAmbulationGait aid	-0.23045	0.67397	-0.342
PatientHearingHearing aid	-0.88631	1.67219	-0.530
PatientHearingHearing impairment	0.88433	0.60309	1.466
PatientVisualGlasses	-0.08463	0.28611	-0.296
SmokingCurrent smoking	-0.01823	1.00267	-0.018
SmokingPast smoking	0.67579	0.53289	1.268
AlcoholDrinkingSocial drinking	0.43045	0.54499	0.790
AlcoholDrinkingRegular drinking	1.70923	1.26523	1.351
DementiaDxYes	0.41206	0.77238	0.533
DementiaDxNot sure	0.99438	0.88013	1.130
SelfPerceptCognitionMinor cognitive problem	0.19286	0.28173	0.685
SelfPerceptCognitionMajor cognitive problem	2.42538	1.67714	1.446
NumberofHospitalization	0.82960	0.29593	2.803
SelfPerceptHealthBad	2.18523	2.35349	0.929
SelfPerceptHealthAverage	-1.48141	2.08216	-0.711

## SelfPerceptHealthGood	-2.09306	2.07367	-1.009
## SelfPerceptHealthBest	-2.43670	2.11902	-1.150
## neuroNeurological disease	0.63923	0.45127	1.416
## cvsCardiovascular disease	-0.33366	0.34937	-0.955
## respiRespiratory disease	0.33353	0.54665	0.610
## giGastrointestinal disease	0.74104	0.34062	2.176
## renalRenal disease	0.18821	0.51346	0.367
## endoEndocrine disease	0.20233	0.32222	0.628
## mskMSK disease	0.82280	0.29493	2.790
## cancerCancer	0.48249	0.49725	0.970
## allergyAllergy	0.66779	0.31182	2.142
## psychiPsych disease	0.93785	0.61869	1.516
##	Pr(> t)		
## (Intercept)	0.98264		
## Ageofpatient	0.41293		
## Sexfemale	0.19768		
## BMI	0.69450		
## EthnicChinese	0.70579		
## Ethnicothers	8.66e-06	***	
## Maritalstatusmarried	0.81273		
## Maritalstatusdivorced	0.13839		
## Maritalstatuswidow	0.31451		
## Addressothers	0.21492		
## Educationelementary	0.60210		
## Educationhigh school	0.47561		
## Educationcollege degree	0.48315		
## Employmentpart-time job	0.63981		
## Employmentfull-time job	0.84659		
## Employmentretired	0.79887		
## income10,001 - 20,000	0.95355		
## income20,001 - 30,000	0.41664		
## income30,001 or more	0.51187		
## incomeunknown	0.16177		
## IncomeLossfromCOVIDOver 50% loss	0.31681		
## IncomeLossfromCOVIDNo income	0.56271		
## PatientAmbulationGait aid	0.73275		
## PatientHearingHearing aid	0.59667		
## PatientHearingHearing impairment	0.14409		
## PatientVisualGlasses	0.76770		
## SmokingCurrent smoking	0.98551		
## SmokingPast smoking	0.20618		
## AlcoholDrinkingSocial drinking	0.43054		
## AlcoholDrinkingRegular drinking	0.17821		
## DementiaDxYes	0.59427		
## DementiaDxNot sure	0.25988		
## SelfPerceptCognitionMinor cognitive problem	0.49439		
## SelfPerceptCognitionMajor cognitive problem	0.14967		
## NumberofHospitalization	0.00554	**	
## SelfPerceptHealthBad	0.35424		
## SelfPerceptHealthAverage	0.47760		
## SelfPerceptHealthGood	0.31400		
## SelfPerceptHealthBest	0.25152		
## neuroNeurological disease	0.15815		
## cvsCardiovascular disease	0.34069		

```
## respiRespiratory disease          0.54245
## giGastrointestinal disease         0.03073 *
## renalRenal disease                 0.71434
## endoEndocrine disease              0.53076
## mskMSK disease                     0.00577 **
## cancerCancer                       0.33303
## allergyAllergy                     0.03340 *
## psychiPsych disease                0.13109
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.923 on 205 degrees of freedom
## (18 observations deleted due to missingness)
## Multiple R-squared:  0.4891, Adjusted R-squared:  0.3694
## F-statistic: 4.088 on 48 and 205 DF,  p-value: 9.969e-13
```

```
lm_model %>% tbl_regression()
```

Characteristic	Beta	95% CI	p-value
Age	0.02	-0.02, 0.06	0.4
Sex			
male	—	—	
female	0.55	-0.29, 1.4	0.2
BMI	0.01	-0.06, 0.09	0.7
Ethnic			
Thai	—	—	
Chinese	-0.29	-1.8, 1.2	0.7
others	10	5.7, 14	<0.001
Marital status			
single	—	—	
married	0.09	-0.64, 0.81	0.8
divorced	1.1	-0.35, 2.5	0.14
widow	0.49	-0.47, 1.4	0.3
Address			
Bangkok	—	—	
others	-0.35	-0.91, 0.21	0.2
Education			
not educate	—	—	
elementary	0.67	-1.9, 3.2	0.6
high school	0.91	-1.6, 3.4	0.5
college degree	0.90	-1.6, 3.4	0.5
Employment			
unemployed	—	—	
part-time job	-0.30	-1.6, 0.97	0.6
full-time job	-0.11	-1.2, 1.0	0.8
retired	0.08	-0.55, 0.71	0.8
income			
10,000 or less	—	—	
10,001 - 20,000	-0.03	-0.98, 0.93	>0.9
20,001 - 30,000	-0.42	-1.5, 0.60	0.4
30,001 or more	-0.33	-1.3, 0.66	0.5
unknown	-0.65	-1.6, 0.26	0.2

Characteristic	Beta	95% CI	p-value
IncomeLossfromCOVID			
Same	—	—	
Over 50% loss	0.59	-0.57, 1.7	0.3
No income	0.37	-0.90, 1.6	0.6
PatientAmbulation			
Normal	—	—	
Gait aid	-0.23	-1.6, 1.1	0.7
Hearing			
Normal	—	—	
Hearing aid	-0.89	-4.2, 2.4	0.6
Hearing impairment	0.88	-0.30, 2.1	0.14
PatientVisual			
Normal	—	—	
Glasses	-0.08	-0.65, 0.48	0.8
Smoking			
Never smoking	—	—	
Current smoking	-0.02	-2.0, 2.0	>0.9
Past smoking	0.68	-0.37, 1.7	0.2
Alcohol Drinking			
Never drinking	—	—	
Social drinking	0.43	-0.64, 1.5	0.4
Regular drinking	1.7	-0.79, 4.2	0.2
Dementia diagnosis			
No	—	—	
Yes	0.41	-1.1, 1.9	0.6
Not sure	0.99	-0.74, 2.7	0.3
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	0.19	-0.36, 0.75	0.5
Major cognitive problem	2.4	-0.88, 5.7	0.15
Number of Hospitalization	0.83	0.25, 1.4	0.006
Self Percept Health			
Worst	—	—	
Bad	2.2	-2.5, 6.8	0.4
Average	-1.5	-5.6, 2.6	0.5
Good	-2.1	-6.2, 2.0	0.3
Best	-2.4	-6.6, 1.7	0.3
neuro			
None	—	—	
Neurological disease	0.64	-0.25, 1.5	0.2
cvs			
None	—	—	
Cardiovascular disease	-0.33	-1.0, 0.36	0.3
respi			
None	—	—	
Respiratory disease	0.33	-0.74, 1.4	0.5
gi			
None	—	—	
Gastrointestinal disease	0.74	0.07, 1.4	0.031
renal			
None	—	—	
Renal disease	0.19	-0.82, 1.2	0.7

Characteristic	Beta	95% CI	p-value
endo			
None	—	—	
Endocrine disease	0.20	-0.43, 0.84	0.5
msk			
None	—	—	
MSK disease	0.82	0.24, 1.4	0.006
cancer			
None	—	—	
Cancer	0.48	-0.50, 1.5	0.3
allergy			
None	—	—	
Allergy	0.67	0.05, 1.3	0.033
psychi			
None	—	—	
Psych disease	0.94	-0.28, 2.2	0.13

Ordered logistic regression

```
# Ordered logistic regression
column_to_excludes <- c("WeightofPatient", "HeightofPatient",
                        "phq9_1", "phq9_2", "phq9_3", "phq9_4", "phq9_5", "phq9_6", "phq9_7", "phq9_8", "phq9_9")

data_filter[,!colnames(data_filter) %in% column_to_excludes]

## # A tibble: 272 x 30
##   Ageofpatient Sex      BMI Ethnic Maritalstatus Address Education Employment
##   <dbl> <fct> <dbl> <fct> <fct> <fct> <fct> <fct>
## 1      77 male   32.8 Thai married others high school full-time~
## 2      87 female 23.6 Thai single Bangkok college de~ unemployed
## 3      81 female 20.6 Thai single Bangkok college de~ retired
## 4      64 male  456. Thai married Bangkok college de~ part-time~
## 5      65 male   25.6 Thai married others college de~ retired
## 6      70 male   24.7 Thai married Bangkok college de~ retired
## 7      84 male   22.0 Thai married others college de~ unemployed
## 8      75 male   24.8 Thai married Bangkok high school part-time~
## 9      80 male   31.2 Thai married Bangkok college de~ retired
## 10     62 male   23.1 Thai married Bangkok college de~ full-time~
## # i 262 more rows
## # i 22 more variables: income <fct>, IncomeLossfromCOVID <fct>,
## # PatientAmbulation <fct>, PatientHearing <fct>, PatientVisual <fct>,
## # Smoking <fct>, AlcoholDrinking <fct>, DementiaDx <fct>,
## # SelfPerceptCognition <fct>, NumberofHospitalization <dbl>,
## # SelfPerceptHealth <fct>, neuro <fct>, cvs <fct>, respi <fct>, gi <fct>,
## # renal <fct>, endo <fct>, msk <fct>, cancer <fct>, allergy <fct>, ...

ordered_logistic_model <- polr(phq_9_cat ~ ., data = data_filter[,!colnames(data_filter) %in% column_to_excludes])

# Print the summary of the model
summary(ordered_logistic_model)
```

```
## Call:
## polr(formula = phq_9_cat ~ ., data = data_filter[, !colnames(data_filter) %in%
##     column_to_excludes], Hess = TRUE)
##
## Coefficients:
##
## Value Std. Error t value
## Ageofpatient 0.07000 4.569e-02 1.532e+00
## Sexfemale 0.95969 1.165e+00 8.236e-01
## BMI 0.01988 7.513e-02 2.647e-01
## EthnicChinese -1.55203 1.452e+00 -1.069e+00
## Ethnicothers 19.28971 9.439e-06 2.044e+06
## Maritalstatusmarried 0.05975 7.984e-01 7.484e-02
## Maritalstatusdivorced 1.36708 1.309e+00 1.045e+00
## Maritalstatuswidow 0.94499 9.232e-01 1.024e+00
## Addressothers -1.01181 6.999e-01 -1.446e+00
## Educationelementary -0.12460 1.787e+00 -6.971e-02
## Educationhigh school -0.18452 1.637e+00 -1.127e-01
## Educationcollege degree -0.07552 1.651e+00 -4.574e-02
## Employmentpart-time job -1.58204 1.425e+00 -1.110e+00
## Employmentfull-time job 0.69432 1.242e+00 5.590e-01
## Employmentretired -0.25929 6.197e-01 -4.184e-01
## income10,001 - 20,000 -0.26331 8.806e-01 -2.990e-01
## income20,001 - 30,000 -0.66246 1.119e+00 -5.922e-01
## income30,001 or more -0.97594 1.041e+00 -9.376e-01
## incomeunknown -0.05156 7.964e-01 -6.474e-02
## IncomeLossfromCOVIDOver 50% loss 0.43446 1.012e+00 4.291e-01
## IncomeLossfromCOVIDNo income 0.74461 1.174e+00 6.341e-01
## PatientAmbulationGait aid -0.98311 1.085e+00 -9.058e-01
## PatientHearingHearing aid -15.52766 1.089e-06 -1.426e+07
## PatientHearingHearing impairment 1.42546 1.034e+00 1.378e+00
## PatientVisualGlasses -0.47822 5.964e-01 -8.019e-01
## SmokingCurrent smoking 0.95573 1.979e+00 4.829e-01
## SmokingPast smoking 1.81814 1.193e+00 1.523e+00
## AlcoholDrinkingSocial drinking 0.69644 1.034e+00 6.733e-01
## AlcoholDrinkingRegular drinking 2.64342 1.828e+00 1.446e+00
## DementiaDxYes 0.19579 1.092e+00 1.793e-01
## DementiaDxNot sure 1.88023 1.166e+00 1.613e+00
## SelfPerceptCognitionMinor cognitive problem 0.63924 6.465e-01 9.888e-01
## SelfPerceptCognitionMajor cognitive problem 2.77557 2.389e+00 1.162e+00
## NumberofHospitalization 0.93728 4.213e-01 2.224e+00
## SelfPerceptHealthBad -1.72935 2.979e+00 -5.805e-01
## SelfPerceptHealthAverage -3.84066 2.416e+00 -1.590e+00
## SelfPerceptHealthGood -4.83233 2.402e+00 -2.012e+00
## SelfPerceptHealthBest -4.48217 2.652e+00 -1.690e+00
## neuroNeurological disease 0.92220 7.576e-01 1.217e+00
## cvsCardiovascular disease 0.33530 7.794e-01 4.302e-01
## respiRespiratory disease 0.48956 9.935e-01 4.928e-01
## giGastrointestinal disease 0.29800 6.540e-01 4.557e-01
## renalRenal disease -0.21343 8.529e-01 -2.503e-01
## endoEndocrine disease -0.14494 6.242e-01 -2.322e-01
## mskMSK disease 1.29265 5.902e-01 2.190e+00
## cancerCancer 0.67292 8.953e-01 7.516e-01
## allergyAllergy 0.08248 6.357e-01 1.297e-01
## psychiPsych disease 1.60087 9.675e-01 1.655e+00
```

```
##
## Intercepts:
##
## Value Std. Error t value
## normal|mild depression 6.062000e+00 5.144200e+00 1.178400e+00
## mild depression|moderate depression 8.936400e+00 5.173800e+00 1.727300e+00
##
## Residual Deviance: 153.2966
## AIC: 253.2966
## (18 observations deleted due to missingness)
```

```
ordered_logistic_tbl <- ordered_logistic_model %>% tbl_regression(exponentiate = TRUE)
ordered_logistic_tbl
```

Characteristic	OR	95% CI	p-value
Age	1.07	0.98, 1.17	0.13
Sex			
male	—	—	
female	2.61	0.26, 26.0	0.4
BMI	1.02	0.88, 1.18	0.8
Ethnic			
Thai	—	—	
Chinese	0.21	0.01, 3.71	0.3
others	238,460,136	238,455,698, 238,464,574	<0.001
Marital status			
single	—	—	
married	1.06	0.22, 5.12	>0.9
divorced	3.92	0.30, 51.8	0.3
widow	2.57	0.42, 15.9	0.3
Address			
Bangkok	—	—	
others	0.36	0.09, 1.45	0.15
Education			
not educate	—	—	
elementary	0.88	0.03, 30.0	>0.9
high school	0.83	0.03, 21.0	>0.9
college degree	0.93	0.04, 24.0	>0.9
Employment			
unemployed	—	—	
part-time job	0.21	0.01, 3.41	0.3
full-time job	2.00	0.17, 23.2	0.6
retired	0.77	0.23, 2.62	0.7
income			
10,000 or less	—	—	
10,001 - 20,000	0.77	0.14, 4.36	0.8
20,001 - 30,000	0.52	0.06, 4.68	0.6
30,001 or more	0.38	0.05, 2.93	0.3
unknown	0.95	0.20, 4.57	>0.9
Income Loss from COVID-19			
Same	—	—	
Over 50% loss	1.54	0.21, 11.4	0.7
No income	2.11	0.21, 21.3	0.5
Ambulation			

Characteristic	OR	95% CI	p-value
Normal	—	—	
Gait aid	0.37	0.04, 3.18	0.4
Hearing			
Normal	—	—	
Hearing aid	0.00	0.00, 0.00	<0.001
Hearing impairment	4.16	0.54, 32.0	0.2
Visual			
Normal	—	—	
Glasses	0.62	0.19, 2.01	0.4
Smoking			
Never smoking	—	—	
Current smoking	2.60	0.05, 129	0.6
Past smoking	6.16	0.59, 64.8	0.13
Alcohol Drinking			
Never drinking	—	—	
Social drinking	2.01	0.26, 15.4	0.5
Regular drinking	14.1	0.38, 517	0.15
Dementia diagnosis			
No	—	—	
Yes	1.22	0.14, 10.5	0.9
Not sure	6.56	0.66, 65.3	0.11
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	1.90	0.53, 6.78	0.3
Major cognitive problem	16.0	0.14, 1,784	0.2
Number of Hospitalization	2.55	1.11, 5.86	0.027
Self Percept Health			
Worst	—	—	
Bad	0.18	0.00, 63.0	0.6
Average	0.02	0.00, 2.52	0.11
Good	0.01	0.00, 0.91	0.046
Best	0.01	0.00, 2.11	0.092
neuro			
None	—	—	
Neurological disease	2.51	0.56, 11.2	0.2
cvs			
None	—	—	
Cardiovascular disease	1.40	0.30, 6.50	0.7
respi			
None	—	—	
Respiratory disease	1.63	0.23, 11.6	0.6
gi			
None	—	—	
Gastrointestinal disease	1.35	0.37, 4.89	0.6
renal			
None	—	—	
Renal disease	0.81	0.15, 4.34	0.8
endo			
None	—	—	
Endocrine disease	0.87	0.25, 2.96	0.8
msk			
None	—	—	

Characteristic	OR	95% CI	p-value
MSK disease	3.64	1.14, 11.7	0.030
cancer	—	—	
None	—	—	
Cancer	1.96	0.34, 11.5	0.5
allergy	—	—	
None	—	—	
Allergy	1.09	0.31, 3.80	0.9
psychi	—	—	
None	—	—	
Psych disease	4.96	0.74, 33.4	0.10

#Binary logistic regression

```
#Binary logistic regression only for the phq9-9 question
column_to_excludes <- c("WeightofPatient", "HeightofPatient",
                        "phq9_1", "phq9_2", "phq9_3", "phq9_4", "phq9_5", "phq9_6", "phq9_7", "phq9_8", "phq9_9")

column_to_excludes <- c("WeightofPatient", "HeightofPatient", "phq_9_score", "phq_9_cat")

binary_logistic_model <- glm(phq9_9 ~ ., family = binomial(), data = data_filter[, !colnames(data_filter) %in% column_to_excludes])

summary(binary_logistic_model)
```

```
##
## Call:
## glm(formula = phq9_9 ~ ., family = binomial(), data = data_filter[,
##      !colnames(data_filter) %in% column_to_excludes])
##
## Coefficients:
##
##              Estimate Std. Error z value
## (Intercept)    -8.019e+01  1.143e+06      0
## Ageofpatient     1.588e-01  8.398e+03      0
## Sexfemale       -5.368e+00  1.445e+05      0
## BMI              1.872e-01  1.137e+04      0
## EthnicChinese    6.194e+00  2.369e+05      0
## Ethnicothers    -1.194e+01  8.154e+05      0
## Maritalstatusmarried -5.158e+00  1.403e+05      0
## Maritalstatusdivorced  7.413e+00  1.768e+05      0
## Maritalstatuswidow  -2.401e+00  1.880e+05      0
## Addressothers     3.079e-01  1.342e+05      0
## Educationelementary  8.809e+00  4.934e+05      0
## Educationhigh school  3.429e-01  4.141e+05      0
## Educationcollege degree  9.911e+00  5.268e+05      0
## Employmentpart-time job -3.415e+00  5.383e+05      0
## Employmentfull-time job  1.055e+01  1.954e+05      0
## Employmentretired    1.657e+00  1.768e+05      0
## income10,001 - 20,000 -2.953e+00  1.602e+05      0
## income20,001 - 30,000  3.984e+00  1.503e+05      0
## income30,001 or more  -4.073e+00  2.104e+05      0
## incomeunknown       -2.254e+00  1.674e+05      0
## IncomeLossfromCOVIDOver 50% loss -1.673e+00  1.869e+05      0
```

## IncomeLossfromCOVIDNo income	-1.089e+01	4.531e+05	0
## PatientAmbulationGait aid	1.882e-01	2.899e+05	0
## PatientHearingHearing aid	-8.819e+00	5.161e+05	0
## PatientHearingHearing impairment	-2.729e+00	3.723e+05	0
## PatientVisualGlasses	1.491e+00	1.336e+05	0
## SmokingCurrent smoking	9.711e+00	3.232e+05	0
## SmokingPast smoking	-1.086e+00	1.671e+05	0
## AlcoholDrinkingSocial drinking	3.833e+00	1.417e+05	0
## AlcoholDrinkingRegular drinking	2.525e+01	3.954e+05	0
## DementiaDxYes	-2.899e+00	2.298e+05	0
## DementiaDxNot sure	-4.928e+00	6.394e+05	0
## SelfPerceptCognitionMinor cognitive problem	3.194e+00	1.235e+05	0
## SelfPerceptCognitionMajor cognitive problem	9.801e+00	5.743e+05	0
## NumberofHospitalization	4.629e+00	1.147e+05	0
## SelfPerceptHealthBad	2.315e+01	9.114e+05	0
## SelfPerceptHealthAverage	2.218e+01	6.475e+05	0
## SelfPerceptHealthGood	2.243e+01	6.598e+05	0
## SelfPerceptHealthBest	2.263e+01	6.651e+05	0
## neuroNeurological disease	-1.233e+00	1.778e+05	0
## cvsCardiovascular disease	2.754e+00	1.611e+05	0
## respiRespiratory disease	-2.173e+00	2.442e+05	0
## giGastrointestinal disease	-2.491e+00	1.244e+05	0
## renalRenal disease	-6.745e+00	2.267e+05	0
## endoEndocrine disease	3.124e+00	1.114e+05	0
## mskMSK disease	1.997e-01	1.174e+05	0
## cancerCancer	-2.348e-01	2.186e+05	0
## allergyAllergy	3.666e+00	1.649e+05	0
## psychiPsych disease	-1.228e+01	2.627e+05	0
## phq9_1	-1.381e+00	1.440e+05	0
## phq9_2	8.619e-01	1.430e+05	0
## phq9_3	-6.059e-01	8.054e+04	0
## phq9_4	5.132e+00	9.953e+04	0
## phq9_5	4.579e+00	7.074e+04	0
## phq9_6	5.099e+00	2.033e+05	0
## phq9_7	-1.109e+01	3.103e+05	0
## phq9_8	4.484e+00	1.894e+05	0
##	Pr(> z)		
## (Intercept)	1		
## Ageofpatient	1		
## Sexfemale	1		
## BMI	1		
## EthnicChinese	1		
## Ethnicothers	1		
## Maritalstatusmarried	1		
## Maritalstatusdivorced	1		
## Maritalstatuswidow	1		
## Addressothers	1		
## Educationelementary	1		
## Educationhigh school	1		
## Educationcollege degree	1		
## Employmentpart-time job	1		
## Employmentfull-time job	1		
## Employmentretired	1		
## income10,001 - 20,000	1		

```

## income20,001 - 30,000 1
## income30,001 or more 1
## incomeunknown 1
## IncomeLossfromCOVIDOver 50% loss 1
## IncomeLossfromCOVIDNo income 1
## PatientAmbulationGait aid 1
## PatientHearingHearing aid 1
## PatientHearingHearing impairment 1
## PatientVisualGlasses 1
## SmokingCurrent smoking 1
## SmokingPast smoking 1
## AlcoholDrinkingSocial drinking 1
## AlcoholDrinkingRegular drinking 1
## DementiaDxYes 1
## DementiaDxNot sure 1
## SelfPerceptCognitionMinor cognitive problem 1
## SelfPerceptCognitionMajor cognitive problem 1
## NumberofHospitalization 1
## SelfPerceptHealthBad 1
## SelfPerceptHealthAverage 1
## SelfPerceptHealthGood 1
## SelfPerceptHealthBest 1
## neuroNeurological disease 1
## cvsCardiovascular disease 1
## respiRespiratory disease 1
## giGastrointestinal disease 1
## renalRenal disease 1
## endoEndocrine disease 1
## mskMSK disease 1
## cancerCancer 1
## allergyAllergy 1
## psychiPsych disease 1
## phq9_1 1
## phq9_2 1
## phq9_3 1
## phq9_4 1
## phq9_5 1
## phq9_6 1
## phq9_7 1
## phq9_8 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 3.2597e+01 on 253 degrees of freedom
## Residual deviance: 2.5699e-09 on 197 degrees of freedom
## (18 observations deleted due to missingness)
## AIC: 114
##
## Number of Fisher Scoring iterations: 25

```

```
binary_logistic_model %>% tbl_regression(exponentiate = TRUE)
```


Characteristic	OR	95% CI	p-value
Age	1.17	0.00, Inf	>0.9
Sex			
male	—	—	
female	0.00	0.00, Inf	>0.9
BMI	1.21	0.00, Inf	>0.9
Ethnic			
Thai	—	—	
Chinese	490	0.00, Inf	>0.9
others	0.00	0.00, Inf	>0.9
Marital status			
single	—	—	
married	0.01	0.00, Inf	>0.9
divorced	1,658	0.00, Inf	>0.9
widow	0.09	0.00, Inf	>0.9
Address			
Bangkok	—	—	
others	1.36	0.00, Inf	>0.9
Education			
not educate	—	—	
elementary	6,694	0.00, Inf	>0.9
high school	1.41	0.00, Inf	>0.9
college degree	20,144	0.00, Inf	>0.9
Employment			
unemployed	—	—	
part-time job	0.03	0.00, Inf	>0.9
full-time job	38,167	0.00, Inf	>0.9
retired	5.25	0.00, Inf	>0.9
income			
10,000 or less	—	—	
10,001 - 20,000	0.05	0.00, Inf	>0.9
20,001 - 30,000	53.7	0.00, Inf	>0.9
30,001 or more	0.02	0.00, Inf	>0.9

Characteristic	OR	95% CI	p- value
unknown	0.11	0.00, Inf	>0.9
IncomeLossfromCOVID			
Same	—	—	
Over 50% loss	0.19	0.00, Inf	>0.9
No income	0.00	0.00, Inf	>0.9
PatientAmbulation			
Normal	—	—	
Gait aid	1.21	0.00, Inf	>0.9
Hearing			
Normal	—	—	
Hearing aid	0.00	0.00, Inf	>0.9
Hearing impairment	0.07	0.00, Inf	>0.9
PatientVisual			
Normal	—	—	
Glasses	4.44	0.00, Inf	>0.9
Smoking			
Never smoking	—	—	
Current smoking	16,493	0.00, Inf	>0.9
Past smoking	0.34	0.00, Inf	>0.9
Alcohol Drinking			
Never drinking	—	—	
Social drinking	46.2	0.00, Inf	>0.9
Regular drinking	92,175,450,468	0.00, Inf	>0.9
Dementia diagnosis			
No	—	—	
Yes	0.06	0.00, Inf	>0.9
Not sure	0.01	0.00, Inf	>0.9
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	24.4	0.00, Inf	>0.9
Major cognitive problem	18,055	0.00, Inf	>0.9
Number of Hospitalization	102	0.00, Inf	>0.9
Self Percept Health			
Worst	—	—	

Characteristic	OR	95% CI	p- value
Bad	11,282,397,728.00,	Inf	>0.9
Average	4,271,495,704.00,	Inf	>0.9
Good	5,518,524,356.00,	Inf	>0.9
Best	6,758,986,551.00,	Inf	>0.9
neuro			
None	—	—	
Neurological disease	0.29	0.00, Inf	>0.9
cvs			
None	—	—	
Cardiovascular disease	15.7	0.00, Inf	>0.9
respi			
None	—	—	
Respiratory disease	0.11	0.00, Inf	>0.9
gi			
None	—	—	
Gastrointestinal disease	0.08	0.00, Inf	>0.9
renal			
None	—	—	
Renal disease	0.00	0.00, Inf	>0.9
endo			
None	—	—	
Endocrine disease	22.7	0.00, Inf	>0.9
msk			
None	—	—	
MSK disease	1.22	0.00, Inf	>0.9
cancer			
None	—	—	
Cancer	0.79	0.00, Inf	>0.9
allergy			
None	—	—	
Allergy	39.1	0.00, Inf	>0.9
psychi			
None	—	—	
Psych disease	0.00	0.00, Inf	>0.9
Little interest or pleasure in doing things	0.25	0.00, Inf	>0.9

Characteristic	OR	95% CI	p- value
Feeling down, depressed, or hopeless	2.37	0.00, Inf	>0.9
Trouble falling or staying asleep, or sleeping too much	0.55	0.00, Inf	>0.9
Feeling tired or having little energy	169	0.00, Inf	>0.9
Poor appetite or overeating	97.4	0.00, Inf	>0.9
Feeling bad about yourself — or that you are a failure or have let yourself or your family down	164	0.00, Inf	>0.9
Trouble concentrating on things, such as reading the newspaper or watching television	0.00	0.00, Inf	>0.9
Moving or speaking so slowly that other people could have noticed? Or so fidgety or restless that you have been moving a lot more than usual	88.6	0.00, Inf	>0.9