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

```r
#Load preprocessed data
#data_filter <- readRDS(file = "../output/data_preprocessed.rds")
data_filter <- readRDS(file = "../output/data_preprocessed_edited.rds") # merge the myanmar and the hea
```

```r
## 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
}
```

```r
##table 1 and table 2

#temporary convert Phq91-9 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"))
```

```r
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()
```

```r
table1
```

```
## Table printed with `knitr::kable()`, not {gt}. Learn why at
## https://www.danieldsjoberg.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	263 (97%)
Chinese	9 (3.3%)
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%)
PatientHearing	
Normal	257 (94%)
Hearing impairment	15 (5.5%)
Visual	
Normal	172 (63%)
Glasses	100 (37%)
Vision loss	0 (0%)

Characteristic	**N = 272**
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%)
Cancer	23 (8.5%)
allergy	

Characteristic	**N = 272**
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%)
PHQ-9 score	1 (0, 3)
PHQ-9 Interpretation	

Characteristic	N = 272
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.danieldsjoberg.com/gtsummary/articles/rmarkdown.html
## To suppress this message, include `message = FALSE` in code chunk header.
```

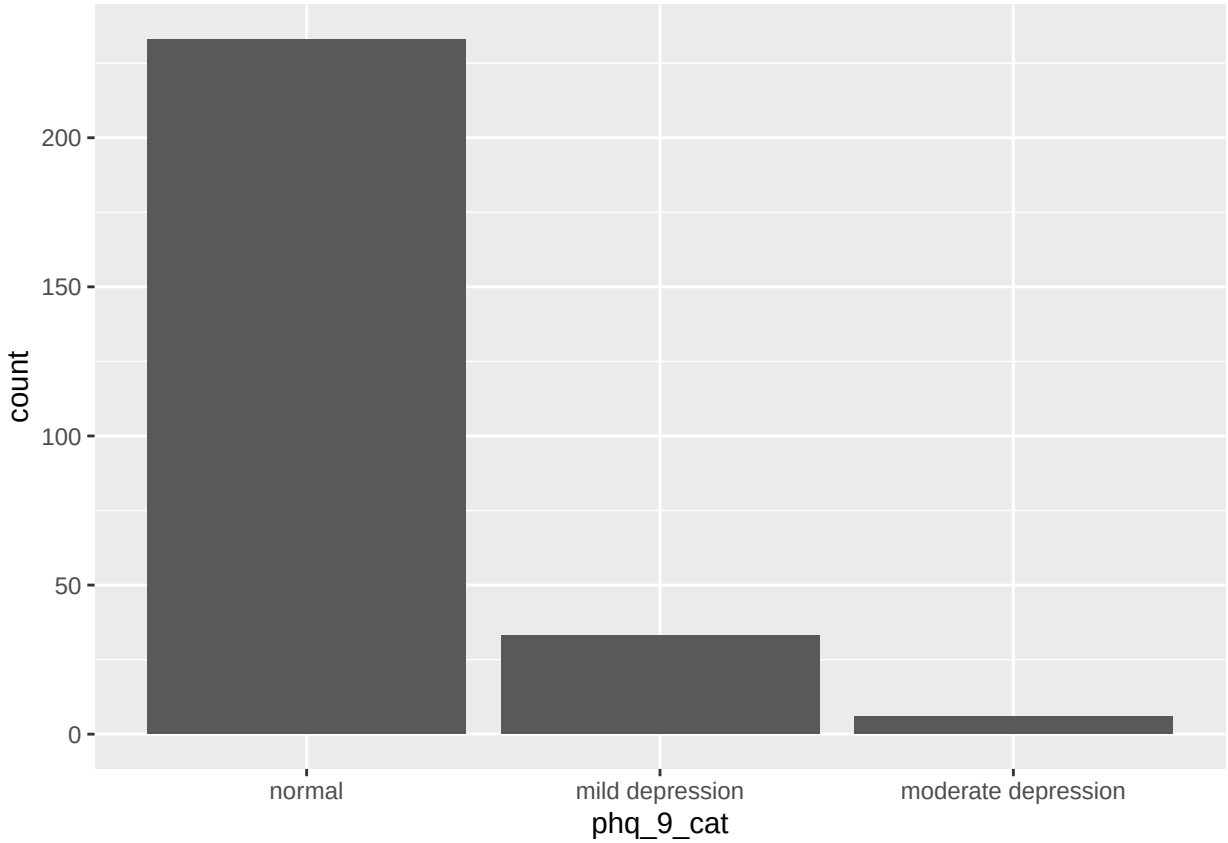
Characteristic	**Overall**, N = 272	**normal**, N = 233	**mild depression**, N = 33	**moderate depression**, N = 6	**p-value**
Age	73 (67, 78)	72 (67, 77)	74 (67, 80)	80 (76, 85)	0.020
Sex					>0.9
male	78 (29%)	67 (29%)	9 (27%)	2 (33%)	
female	194 (71%)	166 (71%)	24 (73%)	4 (67%)	
Weight of Patient (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, 25.6)	24.6 (22.9, 27.3)	20.9 (19.9, 22.0)	0.017
Ethnic					0.3
Thai	263 (97%)	226 (97%)	32 (97%)	5 (83%)	
Chinese	9 (3.3%)	7 (3.0%)	1 (3.0%)	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					0.12
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					0.074
10,000 or less	52 (19%)	40 (17%)	11 (33%)	1 (17%)	
10,001 - 20,000	50 (18%)	43 (18%)	4 (12%)	3 (50%)	
20,001 - 30,000	44 (16%)	39 (17%)	5 (15%)	0 (0%)	
30,001 or more	66 (24%)	62 (27%)	4 (12%)	0 (0%)	

Characteristic	**Overall**, N = 272	**normal**, N = 233	**mild depression**, N = 33	**moderate depression**, N = 6	**p-value**
unknown	60 (22%)	49 (21%)	9 (27%)	2 (33%)	
Income Loss from COVID-19					0.2
Same	221 (87%)	194 (89%)	22 (76%)	5 (83%)	
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					0.4
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%)	
PatientHearing					0.082
Normal	257 (94%)	223 (96%)	29 (88%)	5 (83%)	
Hearing impairment	15 (5.5%)	10 (4.3%)	4 (12%)	1 (17%)	
Visual					0.4
Normal	172 (63%)	144 (62%)	24 (73%)	4 (67%)	
Glasses	100 (37%)	89 (38%)	9 (27%)	2 (33%)	
Vision loss	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Smoking					0.5
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%)	
Alcohol Drinking					0.5
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%)	
Dementia diagnosis					0.043
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					0.002
0	230 (85%)	204 (88%)	22 (67%)	4 (67%)	
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%)	
Self Percept Health					<0.001
Worst	1 (0.4%)	0 (0%)	1 (3.0%)	0 (0%)	
Bad	6 (2.2%)	2 (0.9%)	1 (3.0%)	3 (50%)	

Characteristic	**Overall**, N = 272	**normal**, N = 233	**mild depression**, N = 33	**moderate depression**, N = 6	**p-value**
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					0.059
None	238 (88%)	208 (89%)	26 (79%)	4 (67%)	
Neurological disease	34 (13%)	25 (11%)	7 (21%)	2 (33%)	
cvs					0.6
None	53 (19%)	48 (21%)	4 (12%)	1 (17%)	
Cardiovascular disease	219 (81%)	185 (79%)	29 (88%)	5 (83%)	
respi					0.007
None	251 (92%)	218 (94%)	30 (91%)	3 (50%)	
Respiratory disease	21 (7.7%)	15 (6.4%)	3 (9.1%)	3 (50%)	
gi					0.003
None	216 (79%)	189 (81%)	26 (79%)	1 (17%)	
Gastrointestinal disease	56 (21%)	44 (19%)	7 (21%)	5 (83%)	
renal					0.021
None	250 (92%)	218 (94%)	28 (85%)	4 (67%)	
Renal disease	22 (8.1%)	15 (6.4%)	5 (15%)	2 (33%)	
endo					0.2
None	211 (78%)	184 (79%)	22 (67%)	5 (83%)	
Endocrine disease	61 (22%)	49 (21%)	11 (33%)	1 (17%)	
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					0.006
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%)	
3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
phq9_3					<0.001
0	171 (63%)	165 (71%)	6 (18%)	0 (0%)	
1	65 (24%)	50 (21%)	15 (45%)	0 (0%)	

Characteristic	Overall, N = 272	normal, N = 233	mild depression, N = 33	moderate depression, N = 6	p-value
2	23 (8.5%)	15 (6.4%)	6 (18%)	2 (33%)	
3	13 (4.8%)	3 (1.3%)	6 (18%)	4 (67%)	
phq9_4					<0.001
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%)	
phq9_5					<0.001
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%)	
phq9_6					<0.001
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%)	
phq9_7					<0.001
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%)	
phq9_8					<0.001
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%)	
phq9_9					0.008
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%)	
PHQ-9 score	1 (0, 3)	1 (0, 2)	6 (5, 7)	11 (9, 13)	<0.001

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

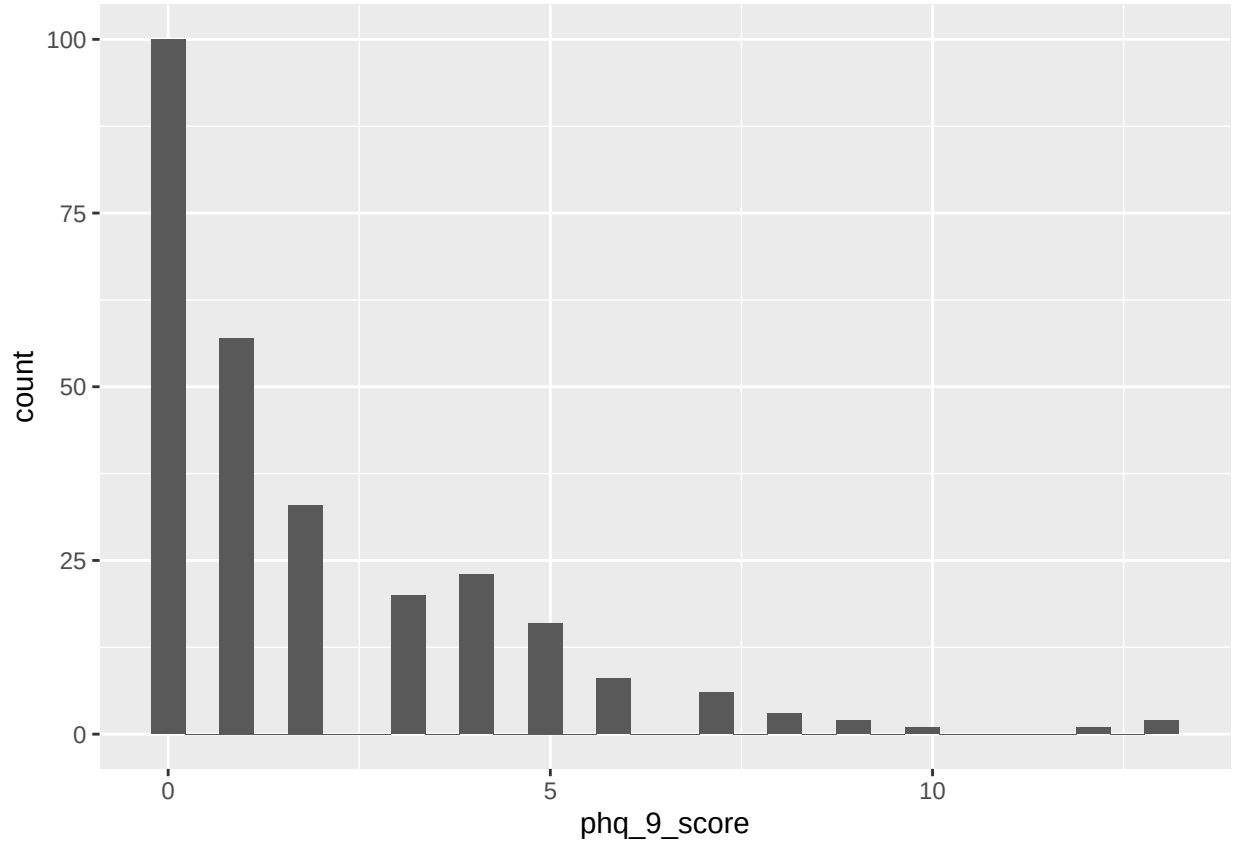



```
data_filter %>% group_by(phq_9_cat) %>%
  summarise(frequency = n())
```

```
## # 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()
```

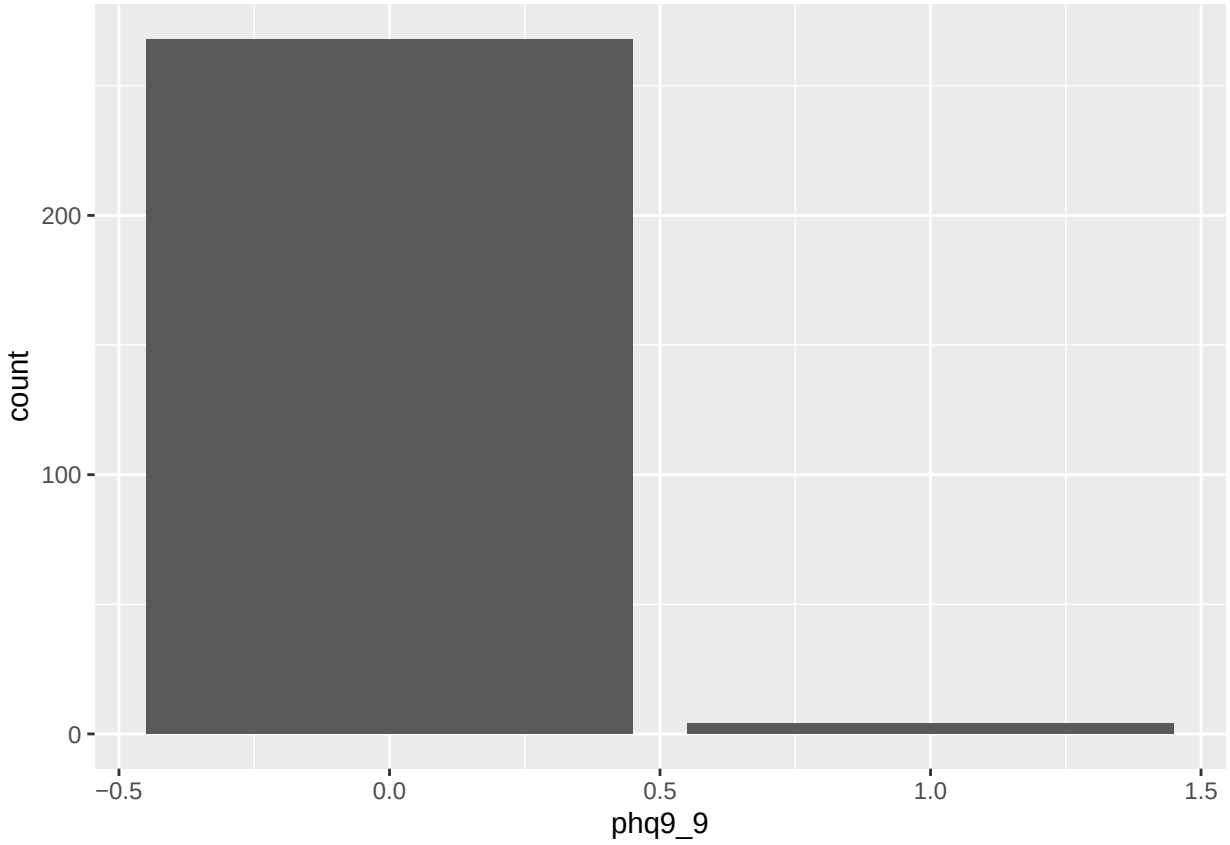
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```
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
```

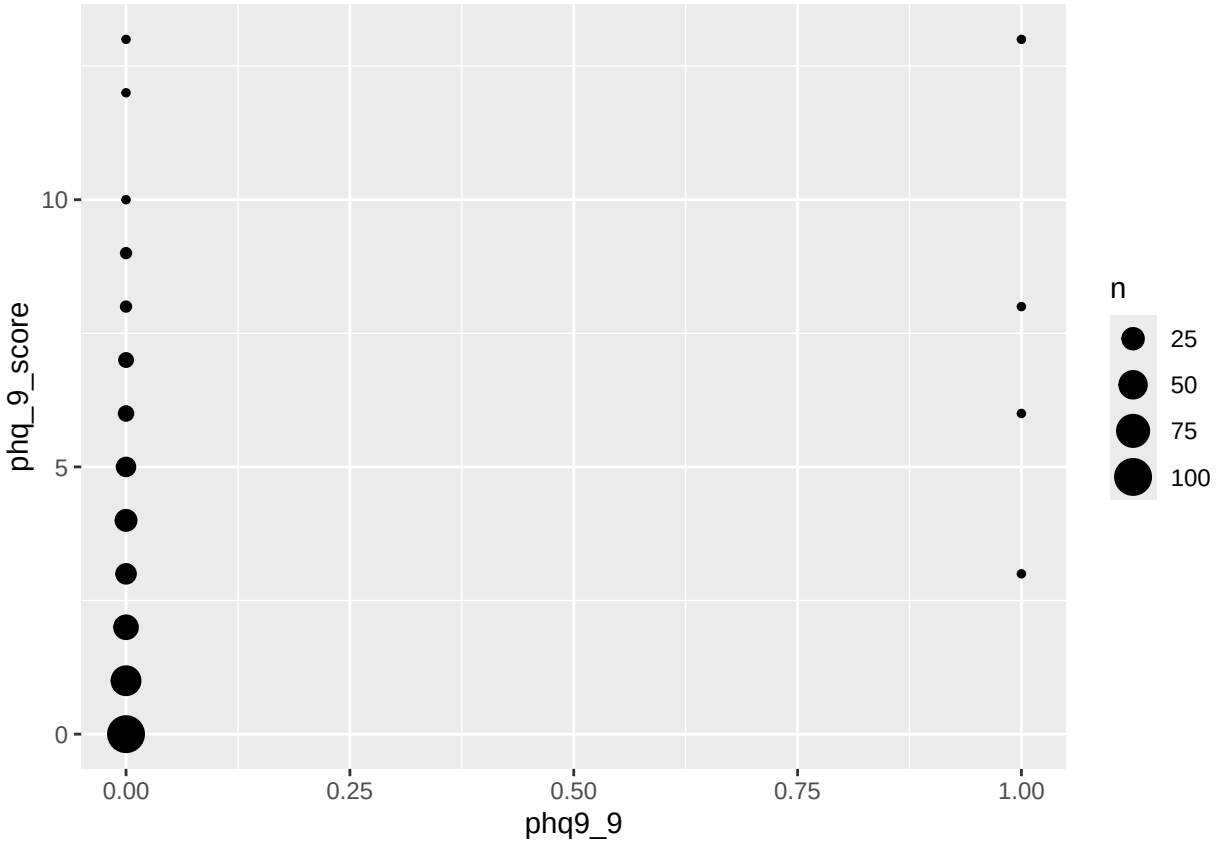
```
data_filter %>% ggplot(aes(x = phq9_9)) + geom_bar()
```




```
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 = phq_9_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_sc
```

```
##
##  Welch Two Sample t-test
##
## data:  data_filter[data_filter$phq9_9 == 1, ]$phq_9_score and data_filter[data_filter$phq9_9 == 0, ]$
## 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"
```

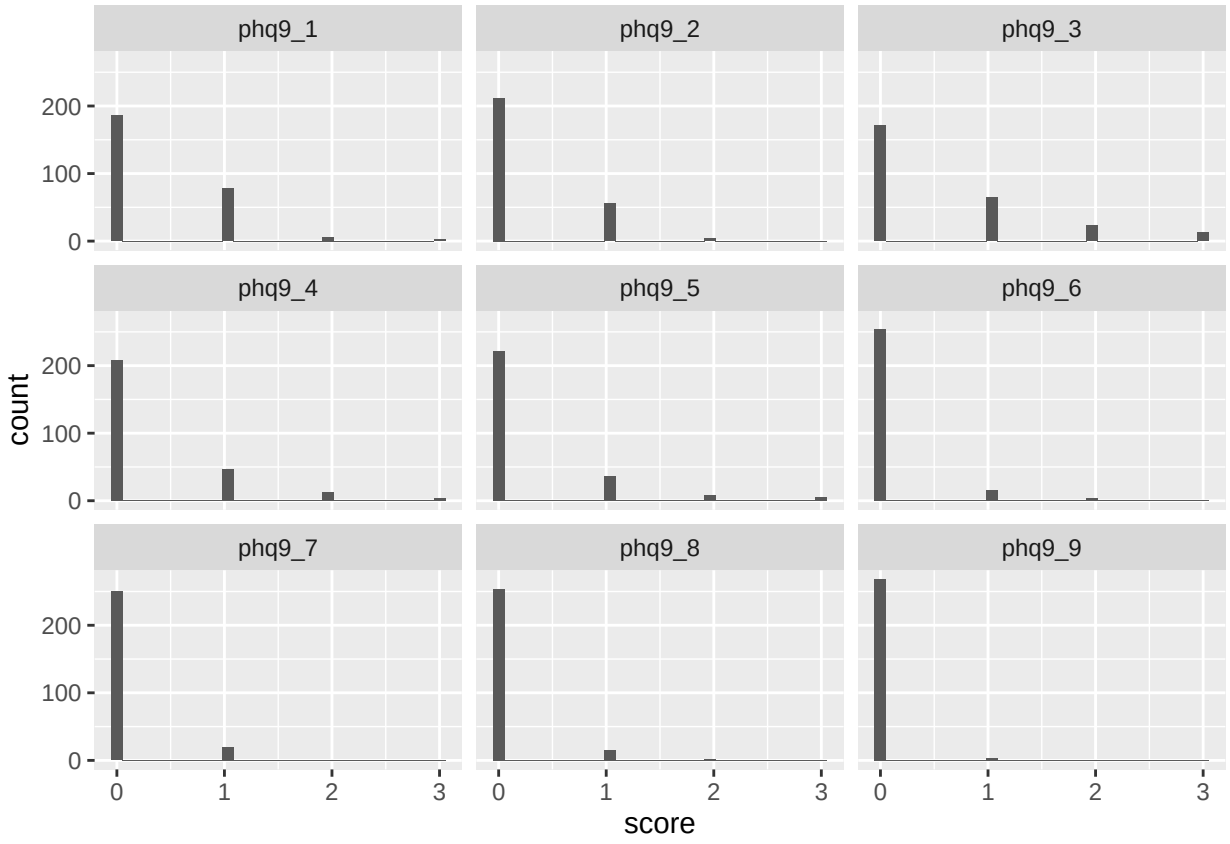
```
## [1] "PHQ9_3: Trouble falling or staying asleep, or sleeping too much"
## [1] "PHQ9_4: Feeling tired or having little energy"
## [1] "PHQ9_5: Poor appetite or overeating"
## [1] "PHQ9_6: Feeling bad about yourself - or that you are a failure or have let yourself or your fami
## [1] "PHQ9_7: Trouble 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 rest
## [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
```

```r
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
## -5.8317 -1.1838 -0.2285  0.9747  7.6393
##
## Coefficients:
##                                          Estimate Std. Error t value
## (Intercept)                              -0.58187    3.30078  -0.176
## Ageofpatient                              0.02613    0.02106   1.240
## Sexfemale                                 0.30977    0.44476   0.696
## BMI                                       0.02023    0.03861   0.524
## EthnicChinese                            -0.36044    0.80233  -0.449
## Maritalstatusmarried                      0.15813    0.38483   0.411
## Maritalstatusdivorced                     1.18937    0.75988   1.565
## Maritalstatuswidow                        0.48403    0.50294   0.962
## Addressothers                            -0.35825    0.29612  -1.210
## Educationelementary                       0.71462    1.33705   0.534
## Educationhigh school                      0.73580    1.33429   0.551
## Educationcollege degree                   0.73185    1.33269   0.549
## Employmentpart-time job                   0.25331    0.65998   0.384
## Employmentfull-time job                  -0.11914    0.59673  -0.200
## Employmentretired                         0.14449    0.33286   0.434
## income10,001 - 20,000                     0.10436    0.49651   0.210
## income20,001 - 30,000                    -0.30103    0.53946  -0.558
## income30,001 or more                     -0.23723    0.51504  -0.461
## incomeunknown                            -0.42512    0.47485  -0.895
## IncomeLossfromCOVIDOver 50% loss          0.79665    0.60912   1.308
## IncomeLossfromCOVIDNo income              0.38361    0.67131   0.571
## PatientAmbulationGait aid                -0.57456    0.68748  -0.836
## PatientHearingHearing impairment          0.70845    0.62640   1.131
## PatientVisualGlasses                     -0.16579    0.29815  -0.556
## SmokingCurrent smoking                   -0.36922    1.01542  -0.364
## SmokingPast smoking                       0.41141    0.55354   0.743
## AlcoholDrinkingSocial drinking            0.38547    0.56357   0.684
## AlcoholDrinkingRegular drinking           1.24351    1.31466   0.946
## DementiaDxYes                             0.49160    0.80682   0.609
## DementiaDxNot sure                        1.11032    0.91897   1.208
## SelfPerceptCognitionMinor cognitive problem  0.12809    0.29058   0.441
## SelfPerceptCognitionMajor cognitive problem  2.26178    1.74785   1.294
## NumberofHospitalization                   0.72230    0.29509   2.448
## SelfPerceptHealthBad                      1.88597    2.45820   0.767
## SelfPerceptHealthAverage                 -1.50211    2.17537  -0.691
## SelfPerceptHealthGood                    -2.22283    2.16673  -1.026
## SelfPerceptHealthBest                    -2.68883    2.21348  -1.215
```

```
## neuroNeurological disease                    0.62865    0.47088   1.335
## cvsCardiovascular disease                   -0.30549    0.36494  -0.837
## respiRespiratory disease                     0.39122    0.57072   0.685
## giGastrointestinal disease                   0.92777    0.35281   2.630
## renalRenal disease                           0.21677    0.53482   0.405
## endoEndocrine disease                        0.05700    0.33504   0.170
## mskMSK disease                               0.84647    0.30737   2.754
## cancerCancer                                 0.29931    0.51774   0.578
## allergyAllergy                               0.61355    0.32539   1.886
## psychiPsych disease                          1.66628    0.62480   2.667
##                                             Pr(>|t|)
## (Intercept)                                  0.86024
## Ageofpatient                                 0.21623
## Sexfemale                                    0.48690
## BMI                                          0.60084
## EthnicChinese                                0.65373
## Maritalstatusmarried                         0.68157
## Maritalstatusdivorced                        0.11906
## Maritalstatuswidow                           0.33697
## Addressothers                                0.22773
## Educationelementary                          0.59358
## Educationhigh school                         0.58192
## Educationcollege degree                      0.58350
## Employmentpart-time job                      0.70151
## Employmentfull-time job                      0.84194
## Employmentretired                            0.66468
## income10,001 - 20,000                        0.83373
## income20,001 - 30,000                        0.57743
## income30,001 or more                         0.64556
## incomeunknown                                0.37168
## IncomeLossfromCOVIDOver 50% loss             0.19237
## IncomeLossfromCOVIDNo income                 0.56833
## PatientAmbulationGait aid                    0.40426
## PatientHearingHearing impairment             0.25937
## PatientVisualGlasses                         0.57877
## SmokingCurrent smoking                       0.71652
## SmokingPast smoking                          0.45819
## AlcoholDrinkingSocial drinking               0.49476
## AlcoholDrinkingRegular drinking              0.34531
## DementiaDxYes                                0.54299
## DementiaDxNot sure                           0.22834
## SelfPerceptCognitionMinor cognitive problem  0.65982
## SelfPerceptCognitionMajor cognitive problem  0.19710
## NumberofHospitalization                      0.01521 *
## SelfPerceptHealthBad                         0.44383
## SelfPerceptHealthAverage                     0.49065
## SelfPerceptHealthGood                        0.30614
## SelfPerceptHealthBest                        0.22584
## neuroNeurological disease                    0.18332
## cvsCardiovascular disease                    0.40350
## respiRespiratory disease                     0.49381
## giGastrointestinal disease                   0.00919 **
## renalRenal disease                           0.68566
## endoEndocrine disease                        0.86508
```

```
## mskMSK disease                                0.00641 **
## cancerCancer                                  0.56381
## allergyAllergy                                0.06075 .
## psychiPsych disease                           0.00826 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.01 on 207 degrees of freedom
##   (18 observations deleted due to missingness)
## Multiple R-squared:  0.4366, Adjusted R-squared:  0.3114
## F-statistic: 3.488 on 46 and 207 DF,  p-value: 4.95e-10
```

```
lm_tbl <- lm_model %>% tbl_regression()
lm_tbl
```

Characteristic	Beta	95% CI	p-value
Age	0.03	-0.02, 0.07	0.2
Sex			
male	—	—	
female	0.31	-0.57, 1.2	0.5
BMI	0.02	-0.06, 0.10	0.6
Ethnic			
Thai	—	—	
Chinese	-0.36	-1.9, 1.2	0.7
Marital status			
single	—	—	
married	0.16	-0.60, 0.92	0.7
divorced	1.2	-0.31, 2.7	0.12
widow	0.48	-0.51, 1.5	0.3
Address			
Bangkok	—	—	
others	-0.36	-0.94, 0.23	0.2
Education			
not educate	—	—	
elementary	0.71	-1.9, 3.4	0.6
high school	0.74	-1.9, 3.4	0.6
college degree	0.73	-1.9, 3.4	0.6
Employment			
unemployed	—	—	
part-time job	0.25	-1.0, 1.6	0.7
full-time job	-0.12	-1.3, 1.1	0.8
retired	0.14	-0.51, 0.80	0.7
income			
10,000 or less	—	—	
10,001 - 20,000	0.10	-0.87, 1.1	0.8
20,001 - 30,000	-0.30	-1.4, 0.76	0.6
30,001 or more	-0.24	-1.3, 0.78	0.6
unknown	-0.43	-1.4, 0.51	0.4
IncomeLossfromCOVID			
Same	—	—	
Over 50% loss	0.80	-0.40, 2.0	0.2
No income	0.38	-0.94, 1.7	0.6

Characteristic	Beta	95% CI	p-value
PatientAmbulation			
Normal	—	—	
Gait aid	-0.57	-1.9, 0.78	0.4
PatientHearing			
Normal	—	—	
Hearing impairment	0.71	-0.53, 1.9	0.3
PatientVisual			
Normal	—	—	
Glasses	-0.17	-0.75, 0.42	0.6
Smoking			
Never smoking	—	—	
Current smoking	-0.37	-2.4, 1.6	0.7
Past smoking	0.41	-0.68, 1.5	0.5
Alcohol Drinking			
Never drinking	—	—	
Social drinking	0.39	-0.73, 1.5	0.5
Regular drinking	1.2	-1.3, 3.8	0.3
Dementia diagnosis			
No	—	—	
Yes	0.49	-1.1, 2.1	0.5
Not sure	1.1	-0.70, 2.9	0.2
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	0.13	-0.44, 0.70	0.7
Major cognitive problem	2.3	-1.2, 5.7	0.2
Number of Hospitalization	0.72	0.14, 1.3	0.015
Self Percept Health			
Worst	—	—	
Bad	1.9	-3.0, 6.7	0.4
Average	-1.5	-5.8, 2.8	0.5
Good	-2.2	-6.5, 2.0	0.3
Best	-2.7	-7.1, 1.7	0.2
neuro			
None	—	—	
Neurological disease	0.63	-0.30, 1.6	0.2
cvs			
None	—	—	
Cardiovascular disease	-0.31	-1.0, 0.41	0.4
respi			
None	—	—	
Respiratory disease	0.39	-0.73, 1.5	0.5
gi			
None	—	—	
Gastrointestinal disease	0.93	0.23, 1.6	0.009
renal			
None	—	—	
Renal disease	0.22	-0.84, 1.3	0.7
endo			
None	—	—	
Endocrine disease	0.06	-0.60, 0.72	0.9
msk			
None	—	—	

Characteristic	Beta	95% CI	p-value
MSK disease	0.85	0.24, 1.5	0.006
cancer			
None	—	—	
Cancer	0.30	-0.72, 1.3	0.6
allergy			
None	—	—	
Allergy	0.61	-0.03, 1.3	0.061
psychi			
None	—	—	
Psych disease	1.7	0.43, 2.9	0.008

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    22.3 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

# 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                            0.085856    0.04496  1.909657
## Sexfemale                               0.014891    0.98540  0.015111
## BMI                                     0.053189    0.07278  0.730785
## EthnicChinese                          -1.523609    1.36641 -1.115048
## Maritalstatusmarried                    0.021361    0.78975  0.027048
## Maritalstatusdivorced                   1.620350    1.30417  1.242439
## Maritalstatuswidow                      0.713480    0.89499  0.797189
## Addressothers                          -1.128177    0.69252 -1.629079
## Educationelementary                    -0.074243    1.78353 -0.041627
## Educationhigh school                   -0.357249    1.65900 -0.215341
## Educationcollege degree                -0.322457    1.66503 -0.193664
## Employmentpart-time job                -0.517008    1.15398 -0.448023
## Employmentfull-time job                 0.613698    1.21741  0.504103
## Employmentretired                      -0.133095    0.58850 -0.226158
## income10,001 - 20,000                   0.079426    0.84397  0.094109
## income20,001 - 30,000                  -0.373758    1.09882 -0.340145
## income30,001 or more                   -0.667742    1.03209 -0.646978
## incomeunknown                           0.268226    0.77116  0.347821
## IncomeLossfromCOVIDOver 50% loss        0.723751    0.93454  0.774447
## IncomeLossfromCOVIDNo income            1.166082    1.11729  1.043673
## PatientAmbulationGait aid              -1.467312    1.01848 -1.440694
## PatientHearingHearing impairment        1.399548    1.03943  1.346461
## PatientVisualGlasses                   -0.679960    0.59473 -1.143299
## SmokingCurrent smoking                 -0.094031    1.72008 -0.054666
## SmokingPast smoking                     1.041747    1.05474  0.987679
## AlcoholDrinkingSocial drinking          0.504057    1.00565  0.501223
## AlcoholDrinkingRegular drinking         1.826517    1.67556  1.090096
## DementiaDxYes                           0.335237    1.07541  0.311731
## DementiaDxNot sure                      2.175242    1.16191  1.872131
## SelfPerceptCognitionMinor cognitive problem  0.532312    0.62123  0.856870
## SelfPerceptCognitionMajor cognitive problem  2.144538    2.22680  0.963057
## NumberofHospitalization                 0.785384    0.40850  1.922590
## SelfPerceptHealthBad                   -2.419770    2.90486 -0.833009
## SelfPerceptHealthAverage               -3.790913    2.36140 -1.605368
## SelfPerceptHealthGood                  -4.798877    2.33847 -2.052147
## SelfPerceptHealthBest                  -5.047956    2.68484 -1.880168
## neuroNeurological disease               0.754083    0.71071  1.061022
## cvsCardiovascular disease               0.374549    0.79355  0.471995
## respiRespiratory disease                0.778316    0.95261  0.817031
## giGastrointestinal disease              0.690510    0.62134  1.111318
## renalRenal disease                     -0.181677    0.85577 -0.212297
## endoEndocrine disease                  -0.423649    0.62784 -0.674767
## mskMSK disease                          1.427601    0.59557  2.397016
## cancerCancer                            0.222128    0.88027  0.252342
## allergyAllergy                          0.004678    0.63336  0.007386
## psychiPsych disease                     2.194577    0.88766  2.472320
##
## Intercepts:
##                                    Value   Std. Error t value
## normal|mild depression              7.2128  5.1522     1.3999
## mild depression|moderate depression  9.8513  5.1802     1.9017
```

```
##
## Residual Deviance: 160.606
## AIC: 256.606
## (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	1.09	1.00, 1.19	0.058
Sex			
male	—	—	
female	1.02	0.15, 7.08	>0.9
BMI	1.05	0.91, 1.22	0.5
Ethnic			
Thai	—	—	
Chinese	0.22	0.01, 3.22	0.3
Marital status			
single	—	—	
married	1.02	0.22, 4.85	>0.9
divorced	5.05	0.39, 66.1	0.2
widow	2.04	0.35, 11.9	0.4
Address			
Bangkok	—	—	
others	0.32	0.08, 1.27	0.10
Education			
not educate	—	—	
elementary	0.93	0.03, 31.3	>0.9
high school	0.70	0.03, 18.4	0.8
college degree	0.72	0.03, 19.3	0.8
Employment			
unemployed	—	—	
part-time job	0.60	0.06, 5.80	0.7
full-time job	1.85	0.17, 20.4	0.6
retired	0.88	0.27, 2.79	0.8
income			
10,000 or less	—	—	
10,001 - 20,000	1.08	0.21, 5.72	>0.9
20,001 - 30,000	0.69	0.08, 6.01	0.7
30,001 or more	0.51	0.07, 3.92	0.5
unknown	1.31	0.29, 5.98	0.7
Income Loss from COVID-19			
Same	—	—	
Over 50% loss	2.06	0.33, 13.0	0.4
No income	3.21	0.35, 29.0	0.3
Ambulation			
Normal	—	—	
Gait aid	0.23	0.03, 1.72	0.2
PatientHearing			
Normal	—	—	
Hearing impairment	4.05	0.52, 31.5	0.2
Visual			

Characteristic	OR	95% CI	p-value
Normal	—	—	
Glasses	0.51	0.16, 1.64	0.3
Smoking			
Never smoking	—	—	
Current smoking	0.91	0.03, 27.0	>0.9
Past smoking	2.83	0.35, 22.7	0.3
Alcohol Drinking			
Never drinking	—	—	
Social drinking	1.66	0.23, 12.0	0.6
Regular drinking	6.21	0.23, 169	0.3
Dementia diagnosis			
No	—	—	
Yes	1.40	0.17, 11.7	0.8
Not sure	8.80	0.89, 87.0	0.063
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	1.70	0.50, 5.80	0.4
Major cognitive problem	8.54	0.11, 689	0.3
Number of Hospitalization	2.19	0.98, 4.91	0.056
Self Percept Health			
Worst	—	—	
Bad	0.09	0.00, 27.3	0.4
Average	0.02	0.00, 2.37	0.11
Good	0.01	0.00, 0.83	0.041
Best	0.01	0.00, 1.28	0.061
neuro			
None	—	—	
Neurological disease	2.13	0.52, 8.63	0.3
cvs			
None	—	—	
Cardiovascular disease	1.45	0.30, 6.95	0.6
respi			
None	—	—	
Respiratory disease	2.18	0.33, 14.2	0.4
gi			
None	—	—	
Gastrointestinal disease	1.99	0.59, 6.79	0.3
renal			
None	—	—	
Renal disease	0.83	0.15, 4.51	0.8
endo			
None	—	—	
Endocrine disease	0.65	0.19, 2.26	0.5
msk			
None	—	—	
MSK disease	4.17	1.29, 13.5	0.017
cancer			
None	—	—	
Cancer	1.25	0.22, 7.08	0.8
allergy			
None	—	—	
Allergy	1.00	0.29, 3.50	>0.9

Characteristic	OR	95% CI	p-value
psychi			
None	—	—	
Psych disease	8.98	1.56, 51.7	0.014

#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","phq_9_s

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)

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)                            -6.748e+01  8.530e+05       0
## Ageofpatient                            1.027e-01  7.305e+03       0
## Sexfemale                              -5.443e+00  1.585e+05       0
## BMI                                     2.139e-01  1.072e+04       0
## EthnicChinese                           6.136e+00  2.175e+05       0
## Maritalstatusmarried                   -4.949e+00  1.378e+05       0
## Maritalstatusdivorced                   7.495e+00  1.607e+05       0
## Maritalstatuswidow                     -2.947e+00  1.782e+05       0
## Addressothers                          -1.005e-01  1.217e+05       0
## Educationelementary                     3.202e+00  3.734e+05       0
## Educationhigh school                   -4.744e+00  3.242e+05       0
## Educationcollege degree                 2.986e+00  3.841e+05       0
## Employmentpart-time job                -9.592e+00  4.621e+05       0
## Employmentfull-time job                 1.019e+01  1.747e+05       0
## Employmentretired                       1.439e+00  1.295e+05       0
## income10,001 - 20,000                  -1.295e+00  1.320e+05       0
## income20,001 - 30,000                   5.359e+00  1.249e+05       0
## income30,001 or more                   -1.210e+00  1.660e+05       0
## incomeunknown                          -1.027e+00  1.618e+05       0
## IncomeLossfromCOVIDOver 50% loss       -2.069e+00  1.815e+05       0
## IncomeLossfromCOVIDNo income           -8.293e+00  3.796e+05       0
## PatientAmbulationGait aid              -1.403e+00  3.054e+05       0
## PatientHearingHearing impairment        1.118e+00  2.609e+05       0
## PatientVisualGlasses                    8.742e-01  1.013e+05       0
## SmokingCurrent smoking                  6.038e+00  2.333e+05       0
## SmokingPast smoking                    -1.414e+00  1.619e+05       0
## AlcoholDrinkingSocial drinking          3.850e+00  1.515e+05       0
## AlcoholDrinkingRegular drinking         3.094e+01  2.854e+05       0
```

```
## DementiaDxYes                                -2.480e+00  2.279e+05       0
## DementiaDxNot sure                           -1.118e+01  4.626e+05       0
## SelfPerceptCognitionMinor cognitive problem  3.062e+00  1.062e+05       0
## SelfPerceptCognitionMajor cognitive problem  1.747e+01  4.459e+05       0
## NumberofHospitalization                       3.593e+00  8.994e+04       0
## SelfPerceptHealthBad                          1.870e+01  8.130e+05       0
## SelfPerceptHealthAverage                      1.780e+01  5.922e+05       0
## SelfPerceptHealthGood                         1.737e+01  5.974e+05       0
## SelfPerceptHealthBest                         1.828e+01  6.100e+05       0
## neuroNeurological disease                    -6.665e-01  1.657e+05       0
## cvsCardiovascular disease                     3.835e+00  1.287e+05       0
## respiRespiratory disease                     -2.957e+00  2.321e+05       0
## giGastrointestinal disease                   -2.877e+00  1.164e+05       0
## renalRenal disease                           -5.074e+00  1.851e+05       0
## endoEndocrine disease                         4.004e+00  9.453e+04       0
## mskMSK disease                                9.844e-01  1.111e+05       0
## cancerCancer                                  6.211e-01  1.898e+05       0
## allergyAllergy                                3.046e+00  1.468e+05       0
## psychiPsych disease                          -1.064e+01  2.292e+05       0
## phq9_1                                       -8.216e-01  1.193e+05       0
## phq9_2                                        7.642e-01  1.235e+05       0
## phq9_3                                       -8.698e-01  7.825e+04       0
## phq9_4                                        4.362e+00  7.548e+04       0
## phq9_5                                        3.932e+00  6.725e+04       0
## phq9_6                                        3.207e+00  1.807e+05       0
## phq9_7                                       -7.454e+00  2.496e+05       0
## phq9_8                                        4.590e+00  1.938e+05       0
##                                              Pr(>|z|)
## (Intercept)                                         1
## Ageofpatient                                        1
## Sexfemale                                           1
## BMI                                                 1
## EthnicChinese                                       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 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: 2.5745e-09  on 199  degrees of freedom
##   (18 observations deleted due to missingness)
## AIC: 110
##
## Number of Fisher Scoring iterations: 25
```

```
binary_logistic_tbl <- binary_logistic_model %>% tbl_regression(exponentiate = TRUE)
binary_logistic_tbl
```

Characteristic	OR	95% CI	p-value
Age	1.11	0.00, Inf	>0.9
Sex			
male	—	—	
female	0.00	0.00, Inf	>0.9
BMI	1.24	0.00, Inf	>0.9

Characteristic	OR	95% CI	p-value
Ethnic			
Thai	—	—	
Chinese	462	0.00, Inf	>0.9
Marital status			
single	—	—	
married	0.01	0.00, Inf	>0.9
divorced	1,799	0.00, Inf	>0.9
widow	0.05	0.00, Inf	>0.9
Address			
Bangkok	—	—	
others	0.90	0.00, Inf	>0.9
Education			
not educate	—	—	
elementary	24.6	0.00, Inf	>0.9
high school	0.01	0.00, Inf	>0.9
college degree	19.8	0.00, Inf	>0.9
Employment			
unemployed	—	—	
part-time job	0.00	0.00, Inf	>0.9
full-time job	26,576	0.00, Inf	>0.9
retired	4.22	0.00, Inf	>0.9
income			
10,000 or less	—	—	
10,001 - 20,000	0.27	0.00, Inf	>0.9
20,001 - 30,000	212	0.00, Inf	>0.9
30,001 or more	0.30	0.00, Inf	>0.9
unknown	0.36	0.00, Inf	>0.9
IncomeLossfromCOVID			
Same	—	—	
Over 50% loss	0.13	0.00, Inf	>0.9
No income	0.00	0.00, Inf	>0.9
PatientAmbulation			
Normal	—	—	

Characteristic	OR	95% CI	p-value
Gait aid	0.25	0.00, Inf	>0.9
PatientHearing			
Normal	—	—	
Hearing impairment	3.06	0.00, Inf	>0.9
PatientVisual			
Normal	—	—	
Glasses	2.40	0.00, Inf	>0.9
Smoking			
Never smoking	—	—	
Current smoking	419	0.00, Inf	>0.9
Past smoking	0.24	0.00, Inf	>0.9
Alcohol Drinking			
Never drinking	—	—	
Social drinking	47.0	0.00, Inf	>0.9
Regular drinking	27,248,077,070,170	0.00, Inf	>0.9
Dementia diagnosis			
No	—	—	
Yes	0.08	0.00, Inf	>0.9
Not sure	0.00	0.00, Inf	>0.9
Self Percept Cognition			
Normal	—	—	
Minor cognitive problem	21.4	0.00, Inf	>0.9
Major cognitive problem	38,640,689	0.00, Inf	>0.9
Number of Hospitalization	36.3	0.00, Inf	>0.9
Self Percept Health			
Worst	—	—	
Bad	131,872,972	0.00, Inf	>0.9
Average	53,810,137	0.00, Inf	>0.9
Good	35,132,027	0.00, Inf	>0.9
Best	86,496,367	0.00, Inf	>0.9
neuro			
None	—	—	
Neurological disease	0.51	0.00, Inf	>0.9
cvs			

Characteristic	OR	95% CI	p-value
None	—	—	
Cardiovascular disease	46.3	0.00, Inf	>0.9
respi			
None	—	—	
Respiratory disease	0.05	0.00, Inf	>0.9
gi			
None	—	—	
Gastrointestinal disease	0.06	0.00, Inf	>0.9
renal			
None	—	—	
Renal disease	0.01	0.00, Inf	>0.9
endo			
None	—	—	
Endocrine disease	54.8	0.00, Inf	>0.9
msk			
None	—	—	
MSK disease	2.68	0.00, Inf	>0.9
cancer			
None	—	—	
Cancer	1.86	0.00, Inf	>0.9
allergy			
None	—	—	
Allergy	21.0	0.00, Inf	>0.9
psychi			
None	—	—	
Psych disease	0.00	0.00, Inf	>0.9
Little interest or pleasure in doing things	0.44	0.00, Inf	>0.9
Feeling down, depressed, or hopeless	2.15	0.00, Inf	>0.9
Trouble falling or staying asleep, or sleeping too much	0.42	0.00, Inf	>0.9
Feeling tired or having little energy	78.4	0.00, Inf	>0.9
Poor appetite or overeating	51.0	0.00, Inf	>0.9
Feeling bad about yourself — or that you are a failure or have let yourself or your family down	24.7	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	98.5	0.00, Inf	>0.9

#Export data

```
table1 %>% as_hux_xlsx("../output/table_1.xlsx")
table2 %>% as_hux_xlsx("../output/table_2.xlsx")

lm_tbl %>% as_hux_xlsx("../output/multivariated_linear.xlsx")
ordered_logistic_tbl %>% as_hux_xlsx("../output/phd9_cat_ordered_logistic.xlsx")
binary_logistic_tbl %>% as_hux_xlsx("../output/phq9_9th_logistic.xlsx")
```