Using Andersen’s model of health care utilization to assess factors associated with COVID-19 testing among adults in nine low-and middle-income countries: an online survey

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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.*

# 2 Introduction

## 2.1 General Background Information

This study aimed to investigate, using the Andersen’s model of health care utilization, factors associated with COVID-19 testing among adults in Bangladesh.

## 2.2 Description of data and data source

This will be a descriptive cross-sectional online study. To get data for this study, between 10 December 2020 and 9 February 2021 an online survey was organized in Bangladesh. In total 759 adults (median age 45 years, interquartile range 33-57 years, range 18-93 years), participated in the study. COVID-19 testing/infection status was assessed by self-report.

## 2.3 Questions/Hypotheses to be addressed

The main question is to find out the key factors associated with covid-19 testing

# 3 Methods and Results

*Study design, sample, and procedure*

This will be a descriptive cross-sectional online study conducted in Bangladesh between 10 December 2020 to 9 February 2021. Participant inclusion criteria were 18 years and older, any gender, and provision of electronic informed consent.

*Measures* Using Andersen’s model of health care utilization [Andersen 1995], study variables will be categorized into outcome variable, predisposing factors, enabling/disabling factors and need for care factors.

*Outcome variable* COVID-19 testing/infection status will be assessed with the question, “Since the beginning of the COVID-19 outbreak, do you have information on your infection status?” Response options were 1=not tested/does not know test results, 2=negative, and 3=positive.

*Predisposing factors* Sociodemographic factors included age, sex, country of residence, educational level, and the (estimated) age(s) of their housemate(s). Chronic/underlying diseases includs heart disease, hypertension, diabetes, cancer, HIV, tuberculosis, and chronic asthma; coded as “0” none and “1” at least presence of one clinically diagnosed condition.

*COVID-19 preventive measures* Participants were asked, “During the past 7 days, have you been observing any of the following preventive measures against COVID-19? 1) Social distancing of at least 1.5m, 2) Wearing a face mask, 3) Hand hygiene (regular handwashing with soap or using hand gel), and 4) Coughing hygiene (covering the mouth when coughing or sneezing). A composite non-adherence to all four COVID-19 preventive measure was calculated by coding each negative response with “1,” summing scores ranging from 0-4 (Cronbach’s alpha 0.7).

*Enabling/disabling factors* Enabling factors include self-perceived socio-economic status, self-perceived area of residence, being a student or worker in the health care sector, source of COVID-19 information/advice most trusted (coded as other, including family and friends, radio/TV, social media, religious authorities and health personnel.

*Disabling factors* include the assessment of psychological distress with the Patient Health Questionnaire (PHQ-4) for Depression and Anxiety symptoms [Kroenke/ Löwe]. The severity of psychological distress is categorized as normal (0-2), mild (3-5). moderate (6-8) and severe (9-12) based on the PHQ-4 scores.

*Need for care factors* include two questions on 1) the level of fear/worry of being infected with COVID-19 (ranging from 1=not at all worried to 5=extremely worried), and 2) having been quarantined (either at home or elsewhere) at any point in time during the COVID-19 epidemic.

*Data analysis*

Descriptive statistics will be used to describe the study population. Logistic regression will be used to assess associations between predisposing factors, enabling and disabling factors, need of care factors and COVID-19 testing status, COVID-19 positive versus negative status and COVID-19 positive versus negative and not tested status. Variables significant at <0.05 in univariate analyses were subsequently included in the multivariable logistic regression models. Statistical analyses will conducted using R.

## 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.*

## 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.*

## 3.3 Exploratory analysis

*Use a combination of text/tables/figures to explore and describe your data. You should produce plots or tables or other summary quantities for the most interesting/important quantities in your data. Depending on the total number of variables in your dataset, explore all or some of the others. FIgures produced here might be histograms or density plots, correlation plots, etc. Tables might summarize your data.*

*Continue by creating plots or tables of the outcome(s) of interest and the predictor/exposure/input variables you are most interested in. If your dataset is small, you can do that for all variables. Plots produced here can be scatterplots, boxplots, violinplots, etc. Tables can be simple 2x2 tables or larger ones.*

*To get some further insight into your data, if reasonable you could compute simple statistics (e.g. t-tests, simple regression model with 1 predictor, etc.) to look for associations between your outcome(s) and each individual predictor variable. Though note that unless you pre-specified the outcome and main exposure, any “p<0.05 means statistical significance” interpretation is not valid.*

Table ?? shows a table summarizing the data.

#{r summarytable, echo=FALSE} #resulttable=readRDS("../../results/summarytable.rds") #knitr::kable(resulttable, caption = 'Data summary table.') #

Figure ?? shows a scatterplot figure produced by one of the R scripts.

#{r resultfigure, fig.cap='Analysis figure.', echo=FALSE} #knitr::include\_graphics("../../results/resultfigure.png") #

## 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.*

Example table ?? shows a table summarizing a linear model fit.

###{r resulttable, echo=FALSE} ###resulttable=readRDS("../../results/resulttable.rds") ###knitr::kable(resulttable, caption = 'Linear model fit table.') #

# 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.

# References

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>