

This form documents the artifacts associated with the article (i.e., the data and code supporting the computational findings) and describes how to reproduce the findings.

## Part 1: Data

- ☐ This paper does not involve analysis of external data (i.e., no data are used or the only data are generated by the authors via simulation in their code).
- ☒ I certify that the author(s) of the manuscript have legitimate access to and permission to use the data used in this manuscript.

## Abstract

The paper analyzes the Senegal Demographic and Health Survey (DHS) conducted between 2014 and 2018. The DHS is designed to capture essential monitoring and impact evaluation indicators at a national level. More information can be found at <https://dhsprogram.com/>

## Availability

- ☒ Data **are** publicly available.
- ☐ Data **cannot be made** publicly available.

If the data are publicly available, see the *Publicly available data* section. Otherwise, see the *Non-publicly available data* section, below.

### Publicly available data

- ☐ Data are available online at:
- ☐ Data are available as part of the paper's supplementary material.
- ☒ Data are publicly available by request, following the process described here:

The dataset can be downloaded by following the steps below:

- Request dataset access by following the instructions at <https://dhsprogram.com/data/Access-Instructions.cfm>.
- Download SNKR70FL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2014.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2014.cfm?flag=1).
- Download SNKR7HFL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2015.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2015.cfm?flag=1).
- Download SNKR7IFL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2016.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2016.cfm?flag=1).
- Download SNKR7ZFL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2017.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2017.cfm?flag=1).
- Download SNKR81FL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2018.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2018.cfm?flag=1).
- Download SNGE81FL.ZIP from [https://dhsprogram.com/data/dataset/Senegal\\_Continuous-DHS\\_2018.cfm?flag=1](https://dhsprogram.com/data/dataset/Senegal_Continuous-DHS_2018.cfm?flag=1).
- Unzip the above zip files, and obtain datasets used in the analysis

- ☐ Data are or will be made available through some other mechanism, described here:

## Non-publicly available data

### Description

#### File format(s)

- ☐ CSV or other plain text.
- ☒ Software-specific binary format (.Rda, Python pickle, etc.): dta
- ☐ Standardized binary format (e.g., netCDF, HDF5, etc.):
- ☐ Other (please specify):

#### Data dictionary

- ☐ Provided by authors in the following file(s):
- ☐ Data file(s) is(are) self-describing (e.g., netCDF files)
- ☒ Available at the following URL: <https://dhsprogram.com/publications/publication-dhsg4-dhs-questionnaires-and-manuals.cfm>

#### Additional Information (optional)

## Part 2: Code

### Abstract

The attached code files reproduce the simulation and data analysis described in the manuscript. Readme.md and Readme.html files provide the details of the workflow.

### Description

#### Code format(s)

- ☒ Script files
  - ☒ R
  - ☐ Python
  - ☐ Matlab
  - ☐ Other:
- ☐ Package
  - ☐ R
  - ☐ Python
  - ☐ MATLAB toolbox
  - ☐ Other:
- ☐ Reproducible report
  - ☐ R Markdown
  - ☐ Jupyter notebook
  - ☐ Other:
- ☐ Shell script
- ☐ Other (please specify):

## Supporting software requirements

**Version of primary software used** R version 4.2.1

**Libraries and dependencies used by the code** R packages: caret (version 6.0.93) dplyr (version 1.1.2) earth (version 5.3.1) GADMTTools (version 3.9.1) gam (version 1.22) gbm (version 2.1.8.1) ggplot2 (version 3.4.2) ggpubr (version 0.5.0) glmnet (version 4.1.6) grid (version 4.2.1) gridExtra (version 2.3) gtools (version 3.9.4) kernlab (version 0.9.32) KernSmooth (version 2.23.20) lattice (version 0.20.45) maps (version 3.4.1) MASS (version 7.3.58.2) nnet (version 7.3.18) np (version 0.60.16) polyspline (version 1.1.22) ranger (version 0.14.1) RcolorBrewer (version 1.1.3) rgdal (version 1.6.4) SuperLearner (version 2.0.28) xgboost (version 1.7.3.1) readstata13 (version 0.10.0)

## Supporting system/hardware requirements (optional)

### Parallelization used

- ☐ No parallel code used
- ☐ Multi-core parallelization on a single machine/node
  - Number of cores used:
- ☒ Multi-machine/multi-node parallelization
  - Number of nodes and cores used: 100

### License

- ☒ MIT License (default)
- ☐ BSD
- ☐ GPL v3.0
- ☐ Creative Commons
- ☐ Other: (please specify)

## Additional information (optional)

# Part 3: Reproducibility workflow

## Scope

The provided workflow reproduces:

- ☒ Any numbers provided in text in the paper
- ☒ The computational method(s) presented in the paper (i.e., code is provided that implements the method(s))
- ☒ All tables and figures in the paper
- ☐ Selected tables and figures in the paper, as explained and justified below:

## Workflow

### Location

The workflow is available:

- ☒ As part of the paper's supplementary material.
- ☐ In this Git repository:
- ☐ Other (please specify):

### Format(s)

- ☐ Single master code file
- ☐ Wrapper (shell) script(s)
- ☐ Self-contained R Markdown file, Jupyter notebook, or other literate programming approach
- ☒ Text file (e.g., a readme-style file) that documents workflow
- ☐ Makefile
- ☐ Other (more detail in *Instructions* below)

### Instructions

Readme.md and Readme.html files provide the details of the workflow.

### Expected run-time

Approximate time needed to reproduce the analyses on a standard desktop machine:

- ☐ < 1 minute
- ☐ 1-10 minutes
- ☐ 10-60 minutes
- ☐ 1-8 hours
- ☒ > 8 hours
- ☐ Not feasible to run on a desktop machine, as described here:

### Additional information (optional)

Reproducible files will be uploaded in a Github repository after the review process.

### Notes (optional)