

Gov 51: Missing Data

Matthew Blackwell

Harvard University

Civilian attitudes and war against insurgency

- War in Afghanistan: counter-insurgency war

Civilian attitudes and war against insurgency

- War in Afghanistan: counter-insurgency war
 - Military against insurgents

Civilian attitudes and war against insurgency

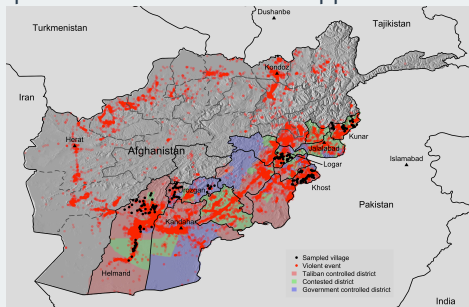
- War in Afghanistan: counter-insurgency war
 - Military against insurgents
 - Key to victory: winning hearts and minds of civilians

Civilian attitudes and war against insurgency

- War in Afghanistan: counter-insurgency war
 - Military against insurgents
 - Key to victory: winning hearts and minds of civilians
 - Aid provision, information campaign, minimizing civilian casualties

Civilian attitudes and war against insurgency

- War in Afghanistan: counter-insurgency war
 - Military against insurgents
 - Key to victory: winning hearts and minds of civilians
 - Aid provision, information campaign, minimizing civilian casualties
- How does exposure to violence affect support for Taliban, coalition?



Afghan study

```
afghan <- read.csv("data/afghan.csv")
head(afghan[, 1:8])
```

```
##   province      district village.id age educ.years
## 1   Logar Baraki Barak      80  26      10
## 2   Logar Baraki Barak      80  49       3
## 3   Logar Baraki Barak      80  60       0
## 4   Logar Baraki Barak      80  34      14
## 5   Logar Baraki Barak      80  21      12
## 6   Logar Baraki Barak      80  18      10
##   employed      income violent.exp.ISAF
## 1         0 2,001-10,000              0
## 2         1 2,001-10,000              0
## 3         1 2,001-10,000              1
## 4         1 2,001-10,000              0
## 5         1 2,001-10,000              0
## 6         1      <NA>                0
```

Missing data

- **Nonresponse:** respondent can't or won't answer question.

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.
 - Leads to missing data.

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.
 - Leads to missing data.
- Missing data in R: a special value **NA**

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.
 - Leads to missing data.
- Missing data in R: a special value **NA**
- Causes problems with calculating statistics:

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.
 - Leads to missing data.
- Missing data in R: a special value **NA**
- Causes problems with calculating statistics:

```
## prop. of those who got hurt by ISAF  
mean(afghan$violent.exp.ISAF)
```

Missing data

- **Nonresponse:** respondent can't or won't answer question.
 - Sensitive questions \rightsquigarrow **social desirability bias**
 - Some countries lack official statistics like unemployment.
 - Leads to missing data.
- Missing data in R: a special value **NA**
- Causes problems with calculating statistics:

```
## prop. of those who got hurt by ISAF  
mean(afghan$violent.exp.ISAF)
```

```
## [1] NA
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

```
mean(na.omit(afghan$violent.exp.ISAF))
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

```
mean(na.omit(afghan$violent.exp.ISAF))
```

```
## [1] 0.375
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

```
mean(na.omit(afghan$violent.exp.ISAF))
```

```
## [1] 0.375
```

- Add `NA` to `table()` with `exclude = NULL`:

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

```
mean(na.omit(afghan$violent.exp.ISAF))
```

```
## [1] 0.375
```

- Add `NA` to `table()` with `exclude = NULL`:

```
table(ISAF = afghan$violent.exp.ISAF, exclude = NULL)
```

Handling missing data in R

- Adding `na.rm = TRUE` to some functions removes missing data.

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- Or, you can explicitly remove missing values using `na.omit()` function:

```
mean(na.omit(afghan$violent.exp.ISAF))
```

```
## [1] 0.375
```

- Add `NA` to `table()` with `exclude = NULL`:

```
table(ISAF = afghan$violent.exp.ISAF, exclude = NULL)
```

```
## ISAF
```

```
##      0      1 <NA>
```

```
## 1706 1023    25
```


Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables
 - Also called **listwise deletion**

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables
 - Also called **listwise deletion**

```
dim(na.omit(afghan))
```


Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables
 - Also called **listwise deletion**

```
dim(na.omit(afghan))
```

```
## [1] 2554 11
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables
 - Also called **listwise deletion**

```
dim(na.omit(afghan))
```

```
## [1] 2554 11
```

```
mean(na.omit(afghan)$violent.exp.ISAF)
```

Available-case vs complete-case analysis

- **Available-case analysis:** use the data you have for that variable:

```
sum(!is.na(afghan$violent.exp.ISAF))
```

```
## [1] 2729
```

```
mean(afghan$violent.exp.ISAF, na.rm = TRUE)
```

```
## [1] 0.375
```

- **Complete-case analysis:** only use units that have data on all variables
 - Also called **listwise deletion**

```
dim(na.omit(afghan))
```

```
## [1] 2554 11
```

```
mean(na.omit(afghan)$violent.exp.ISAF)
```

```
## [1] 0.372
```

Non-response and other biases

- Nonresponse can create bias.

Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

```
tapply(is.na(afghan$violent.exp.taliban), afghan$province,  
       mean)
```

Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

```
tapply(is.na(afghan$violent.exp.taliban), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.03041 0.00635 0.00000 0.00000 0.06202
```

Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

```
tapply(is.na(afghan$violent.exp.taliban), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.03041 0.00635 0.00000 0.00000 0.06202
```

```
tapply(is.na(afghan$violent.exp.ISAF), afghan$province,  
       mean)
```


Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

```
tapply(is.na(afghan$violent.exp.taliban), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.03041 0.00635 0.00000 0.00000 0.06202
```

```
tapply(is.na(afghan$violent.exp.ISAF), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.01637 0.00476 0.00000 0.00000 0.02067
```

Non-response and other biases

- Nonresponse can create bias.
- More violent areas \rightsquigarrow more non-response:

```
tapply(is.na(afghan$violent.exp.taliban), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.03041 0.00635 0.00000 0.00000 0.06202
```

```
tapply(is.na(afghan$violent.exp.ISAF), afghan$province,  
       mean)
```

```
## Helmand    Khost    Kunar    Logar Uruzgan  
## 0.01637 0.00476 0.00000 0.00000 0.02067
```

- \rightsquigarrow oversampling citizens with less exposure to violence.