Script 2a

Descriptive statistics at enrolment

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Contents

Objective

To describe the demographic characteristics and disease status of the analysis cohort at study enrolment (week 0, baseline).

Analysis notes

Definitions of missingness

Data were regarded as **missing** when *pain in the last week* data were not present for one or more of weeks 0, 12, 24, 36, 48. Data also were classified as **missing** when there were inconsistencies in the data across the variables collected within a week.

Definition of data inconsistencies

Pain was defined as *pain in the last week* being 'Yes', and *pain at its worst* being > 0. These two measurements were then the "gatekeeper" measurements, such that the two measurements both had to be positive ('Yes' and '> 0', respectively) in order for there to be any entries for *site of pain* and *site of worst pain*. Were the data were inconsistent (e.g., when there was no *pain in the last week* and *pain at its worst* $= 0$, but there were entries for *site of pain* and *site of worst pain*), then the *site of pain* and *site of worst pain* entries were marked as **inconsistent**.

Data also were considered **inconsistent** when *pain in the last week* = 'Yes', but *site of worst pain* = 'None'.

Lastly, data were considered **inconsistent** when *site of worst pain* was not listed as one of the pain locations for a given measurement week.

For analysis purposes, missing data in the *site of pain* columns were changed to **'No'** (pain not present in the site). This approach was conservative, but we believed that the approach would have the least effect on the outcome, while still retaining as many participants as possible.

Import data

```
df <- read_rds('data-cleaned/data-ADVANCE.rds')
```

Quick look

```
head(df)
```

```
## # A tibble: 6 x 32
##   ranid interval_name site_name pain_in_the_las~ where_does_it_h~ pain_worst
##   <chr> <ord>         <chr>     <chr>            <chr>                 <dbl>
## 1 01-0~ 0 weeks       Wits RHI~ No               <NA>                      0
## 2 01-0~ 12 weeks      Wits RHI~ No               <NA>                      0
## 3 01-0~ 24 weeks      Wits RHI~ No               <NA>                      0
## 4 01-0~ 36 weeks      Wits RHI~ No               <NA>                      0
## 5 01-0~ 48 weeks      Wits RHI~ No               <NA>                      0
## 6 01-0~ 0 weeks       Wits RHI~ No               <NA>                      0
## # ... with 26 more variables: pain_now <dbl>, head_pain <chr>,
## #   cervical_pain <chr>, shoulder_pain <chr>, arm_pain <chr>, hand_pain <chr>,
## #   chest_pain <chr>, abdominal_pain <chr>, low_back_pain <chr>,
## #   buttock_pain <chr>, hip_groin_pain <chr>, leg_pain <chr>,
## #   genital_pain <chr>, foot_pain <chr>, site_worst <chr>, age <dbl>,
## #   sex <chr>, ancestry <chr>, education <chr>, employment_status <chr>,
## #   group <chr>, cd4_cells.ul <dbl>, viral_load_cp.ml <dbl>,
## #   general_health <dbl>, interval_numeric <dbl>, any_missing <chr>
```

```
glimpse(df)
```

```
## Observations: 5,265
## Variables: 32
## $ ranid                   <chr> "01-0001", "01-0001", "01-0001", "01-0001",...
## $ interval_name           <ord> 0 weeks, 12 weeks, 24 weeks, 36 weeks, 48 w...
## $ site_name               <chr> "Wits RHI Yeoville Research Centre", "Wits ...
## $ pain_in_the_last_week   <chr> "No", "No", "No", "No", "No", "No", "Yes", ...
## $ where_does_it_hurt_most <chr> NA, NA, NA, NA, NA, NA, "Hip/groin left", "...
## $ pain_worst              <dbl> 0, 0, 0, 0, 0, 0, 3, 3, 5, 0, 0, 0, 0, 0, 0...
## $ pain_now                <dbl> NA, 0, NA, 0, NA, NA, 0, 2, 4, NA, NA, 0, N...
## $ head_pain               <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ cervical_pain           <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ shoulder_pain           <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ arm_pain                <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ hand_pain               <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ chest_pain              <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ abdominal_pain          <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ low_back_pain           <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ buttock_pain            <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ hip_groin_pain          <chr> "No", "No", "No", "No", "No", "No", "Yes", ...
## $ leg_pain                <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ genital_pain            <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ foot_pain               <chr> "No", "No", "No", "No", "No", "No", "No", "...
## $ site_worst              <chr> "None", "None", "None", "None", "None", "No...
## $ age                     <dbl> 30, 30, 30, 30, 30, 34, 34, 34, 34, 34, 25,...
## $ sex                     <chr> "Male", "Male", "Male", "Male", "Male", "Ma...
## $ ancestry                <chr> "Black", "Black", "Black", "Black", "Black"...
## $ education               <chr> "Secondary", "Secondary", "Secondary", "Sec...
## $ employment_status       <chr> "Employed", "Employed", "Employed", "Employ...
## $ group                   <chr> "DTG + TAF + FTC", "DTG + TAF + FTC", "DTG ...
## $ cd4_cells.ul            <dbl> 642, NA, 525, NA, 668, 241, NA, 364, NA, 49...
## $ viral_load_cp.ml        <dbl> 641, 50, 50, 50, 50, 3851, 50, 50, 50, 50, ...
## $ general_health          <dbl> 4, 4, 5, 5, 4, 3, 5, 3, 3, 3, 4, 5, 5, 5, 5...
## $ interval_numeric        <dbl> 0, 12, 24, 36, 48, 0, 12, 24, 36, 48, 0, 12...
## $ any_missing             <chr> "No", "No", "No", "No", "No", "No", "No", "...
```

Basic clean

```
# Remove missing data
df %<>%
    filter(any_missing == 'No')

# Extract enrolment data
df %<>%
    filter(interval_name == '0 weeks')
```

Quick tabulation

Analysis data set for the period 0 to 48 weeks

```
# Tabulate data
xtabs(~interval_name, data = df)
```

```
## interval_name
##  0 weeks 12 weeks 24 weeks 36 weeks 48 weeks
##      787        0        0        0        0
```

Basic summary

```
skim(df) %>%
    select(-numeric.hist, -complete_rate,
           -character.min, -character.max, -character.whitespace)
```

Table 1: Data summary

Name	df
Number of rows	787
Number of columns	32
Column type frequency:	
character	24
factor	1
numeric	7
Group variables	None

Variable type: character

skim_variable	n_missing	empty	n_unique
ranid	0	0	787
site_name	0	0	2
pain_in_the_last_week	0	0	2
where_does_it_hurt_most	636	0	25
head_pain	0	0	2
cervical_pain	0	0	2
shoulder_pain	0	0	2
arm_pain	0	0	2
hand_pain	0	0	2
chest_pain	0	0	2
abdominal_pain	0	0	2
low_back_pain	0	0	2
buttock_pain	0	0	2
hip_groin_pain	0	0	2
leg_pain	0	0	2
genital_pain	0	0	2
foot_pain	0	0	2
site_worst	0	0	14
sex	0	0	2
ancestry	0	0	2
education	4	0	4
employment_status	10	0	4
group	0	0	3
any_missing	0	0	1

Variable type: factor

skim_variable	n_missing	ordered	n_unique	top_counts
interval_name	0	TRUE	1	0 w: 787, 12 : 0, 24 : 0, 36 : 0

Variable type: numeric

skim_variable	n_missing	mean	sd	p0	p25	p50	p75	p100
pain_worst	0	0.88	2.08	0	0.0	0	0.0	10
pain_now	629	2.00	2.13	0	0.0	2	3.0	9
age	0	32.77	7.65	14	27.0	32	38.0	62
cd4_cells.ul	0	333.25	224.05	1	173.5	290	441.5	1721
viral_load_cp.ml	0	98611.60	386719.99	50	5704.5	25853	85574.0	9475772
general_health	4	3.45	0.82	1	3.0	3	4.0	5
interval_numeric	0	0.00	0.00	0	0.0	0	0.0	0

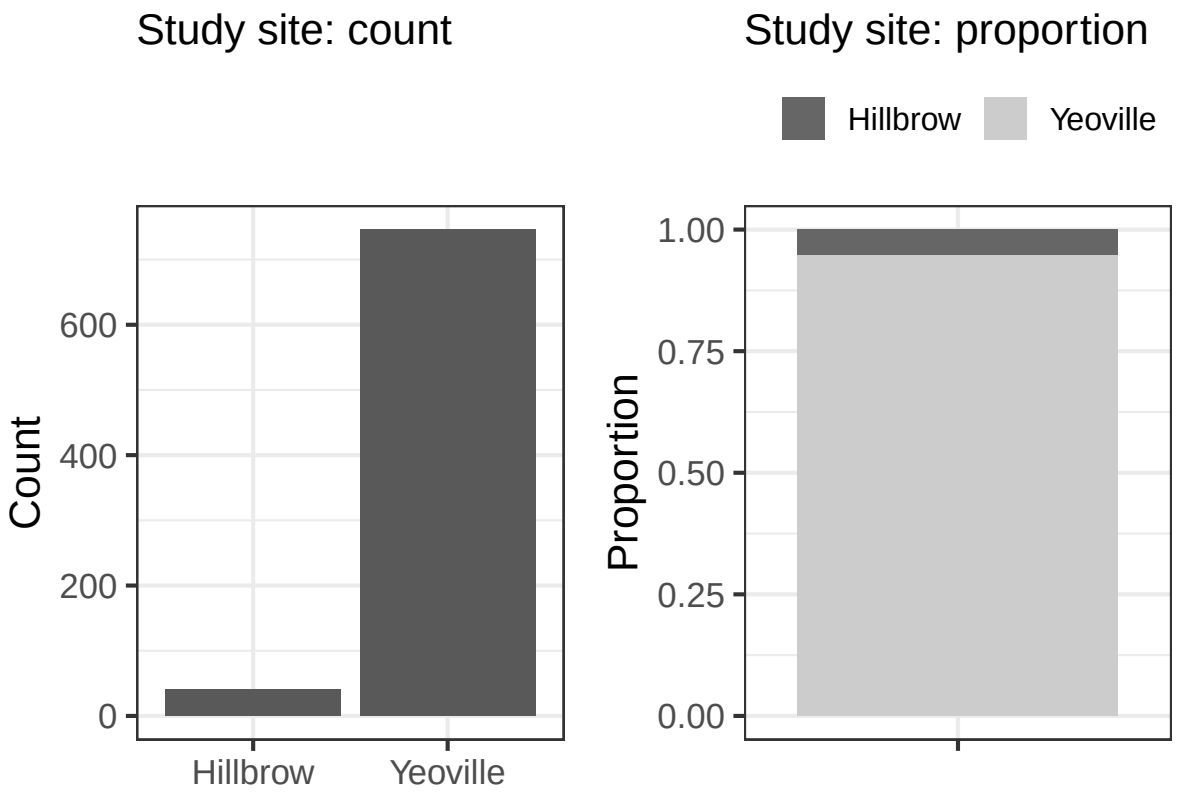
Study characteristics

Study site

```
# Plot
site_count <- ggplot(data = df) +
    aes(x = site_name) +
    geom_bar() +
    labs(subtitle = 'Study site: count',
         y = 'Count') +
    scale_x_discrete(labels = c('Hillbrow', 'Yeoville')) +
    theme(axis.title.x = element_blank())

site_prop <- df %>%
    group_by(site_name) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = '',
        y = count,
        fill = site_name) +
    geom_col(position = position_fill()) +
    labs(subtitle = 'Study site: proportion',
         y = 'Proportion') +
    scale_fill_manual(values = c('#666666', '#CCCCCC'),
                      labels = c('Hillbrow', 'Yeoville')) +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank())

site_count + site_prop
```




```
# Numeric summary
df %>%
    mutate(site_name = factor(site_name,
                              labels = c('Hillbrow', 'Yeoville'))) %>%
    group_by(site_name) %>%
    summarise(count = n()) %>%
    mutate(n = sum(count),
           missing = sum(is.na(df$site_name))) %>%
    mutate(proportion = round(count / n, 3)) %>%
    select(site_name, count, n, missing, proportion) %>%
    kable(caption = 'Study site: summary statistics')
```

Table 5: Study site: summary statistics

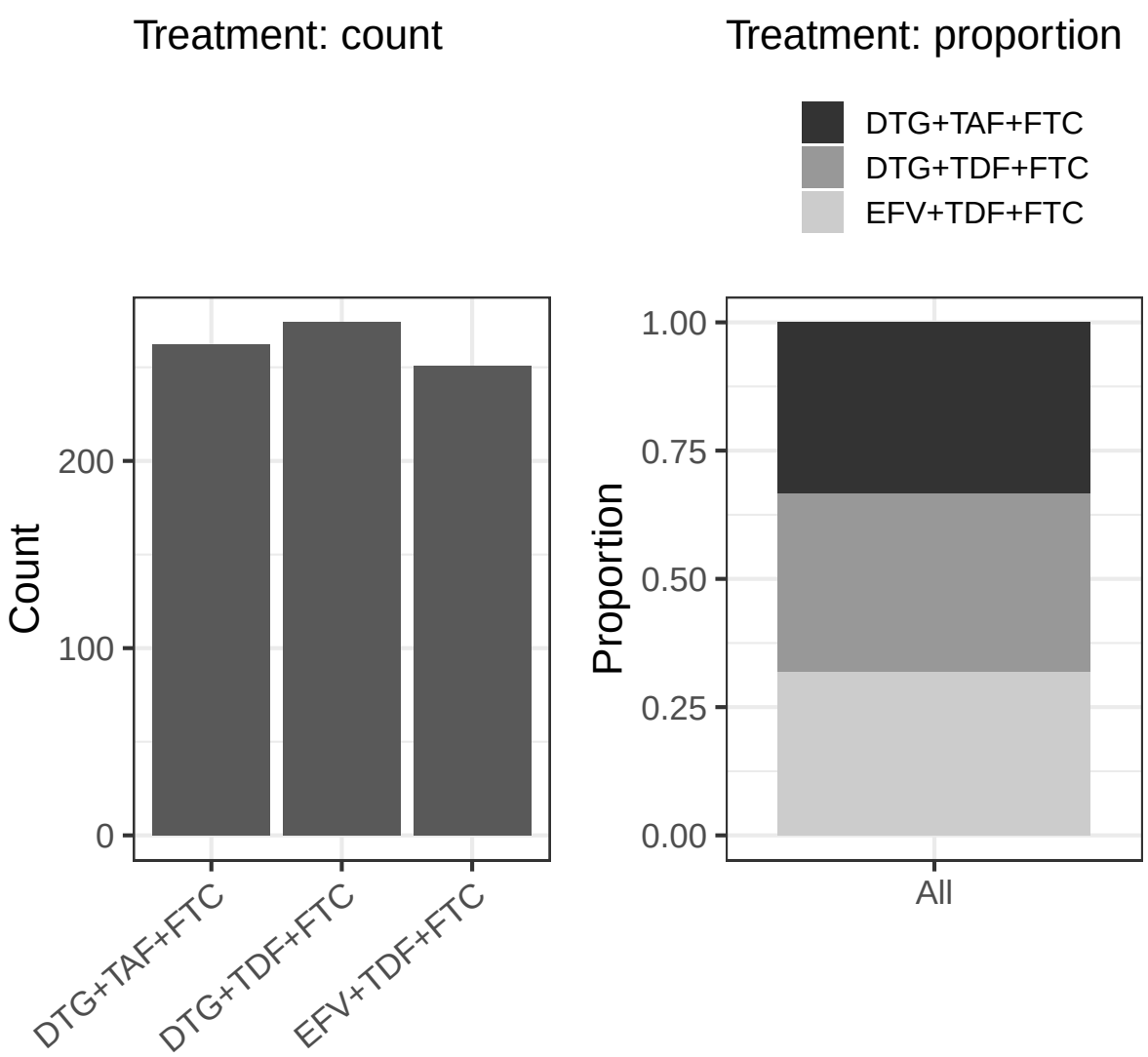
site_name	count	n	missing	proportion
Hillbrow	41	787	0	0.052
Yeoville	746	787	0	0.948

Treatment group allocation

```
# Plot
group_count <- ggplot(data = df) +
    aes(x = group) +
    geom_bar() +
    labs(subtitle = 'Treatment: count',
         y = 'Count') +
    scale_x_discrete(labels = c('DTG+TAF+FTC',
                                'DTG+TDF+FTC',
                                'EFV+TDF+FTC')) +
    theme(axis.title.x = element_blank(),
          axis.text.x = element_text(angle = 40, hjust = 1))
```

```
group_prop <- df %>%
    group_by(group) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = 'All',
        y = count,
        fill = group) +
    geom_col(position = position_fill()) +
    labs(subtitle = 'Treatment: proportion',
         y = 'Proportion') +
    scale_fill_grey(guide = guide_legend(ncol = 1),
                    labels = c('DTG+TAF+FTC',
                               'DTG+TDF+FTC',
                               'EFV+TDF+FTC')) +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank())

group_count + group_prop
```




```
# Numeric summary
df %>%
    select(group) %>%
```

```
    group_by(group) %>%
    summarise(count = n(),
              missing = sum(is.na(group))) %>%
    mutate(n = sum(count),
           proportion = round(count / n, 3)) %>%
    select(group, count, proportion, missing, n) %>%
    kable(caption = 'Study group allocation: summary statistics')
```

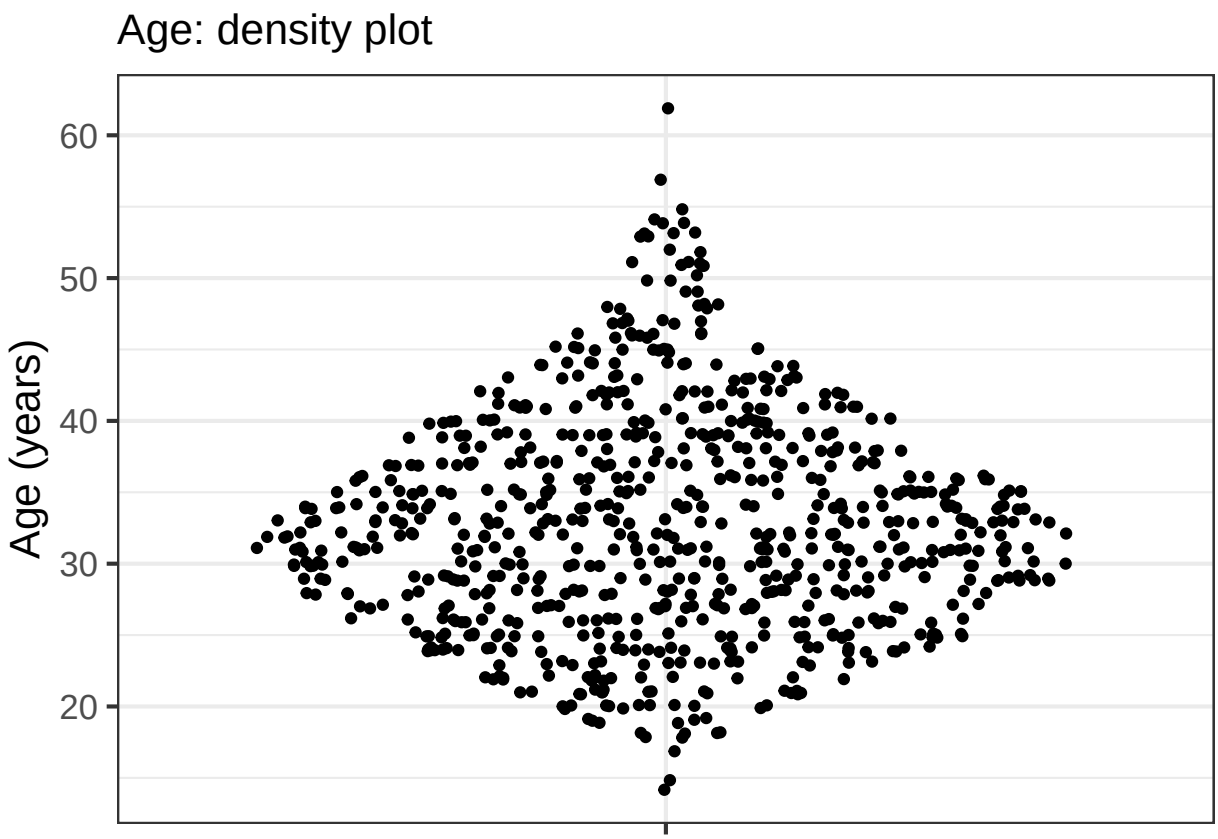
Table 6: Study group allocation: summary statistics

group	count	proportion	missing	n
DTG + TAF + FTC	262	0.333	0	787
DTG + TDF + FTC	274	0.348	0	787
EFV + TDF + FTC	251	0.319	0	787

Demographics

Age

```
# Plot
ggplot(data = df) +
    aes(x = 'Data',
        y = age) +
    geom_sina() +
    labs(subtitle = 'Age: density plot',
         y = 'Age (years)') +
    theme(axis.title.x = element_blank(),
          axis.text.x = element_blank())
```




```
# Numeric summary
df %>%
    select(age) %>%
    skim() %>%
    yank('numeric') %>%
    select(-hist, -complete_rate) %>%
    kable(caption = 'Age: summary statistics')
```

Table 7: Age: summary statistics

skim_variable	n_missing	mean	sd	p0	p25	p50	p75	p100
age	0	32.76747	7.654469	14	27	32	38	62

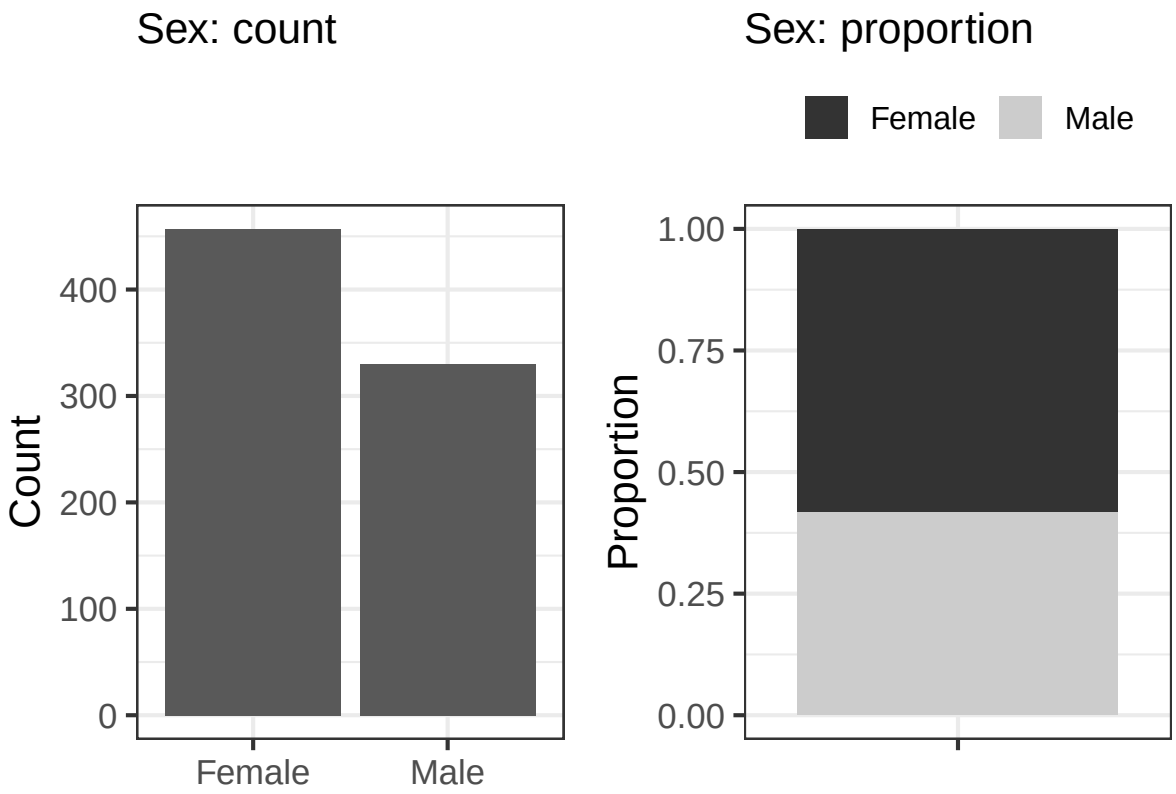
Sex

```
# Plot
sex_count <- ggplot(data = df) +
    aes(x = sex) +
    geom_bar() +
    labs(subtitle = 'Sex: count',
         y = 'Count') +
    theme(axis.title.x = element_blank())

sex_prop <- df %>%
    group_by(sex) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = 'Data',
        y = count,
        fill = sex) +
```

```
    geom_col(position = position_fill()) +
    labs(subtitle = 'Sex: proportion',
         y = 'Proportion') +
    scale_fill_grey() +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank(),
          axis.text.x = element_blank())

sex_count + sex_prop
```




```
# Numeric summary
df %>%
    select(sex) %>%
    mutate(sex = factor(sex)) %>%
    skim() %>%
    yank('factor') %>%
    select(-complete_rate) %>%
    kable(caption = 'Sex: summary statistics')
```

Table 8: Sex: summary statistics

skim_variable	n_missing	ordered	n_unique	top_counts
sex	0	FALSE	2	Fem: 457, Mal: 330

```
df %>%
    group_by(sex) %>%
    summarise(count = n()) %>%
    mutate(n = sum(count),
           missing = sum(is.na(df$sex))) %>%
    mutate(proportion = round(count / n, 3)) %>%
```

```
    select(sex, count, n, missing, proportion) %>%
    kable(caption = 'Sex: summary statistics 2')
```

Table 9: Sex: summary statistics 2

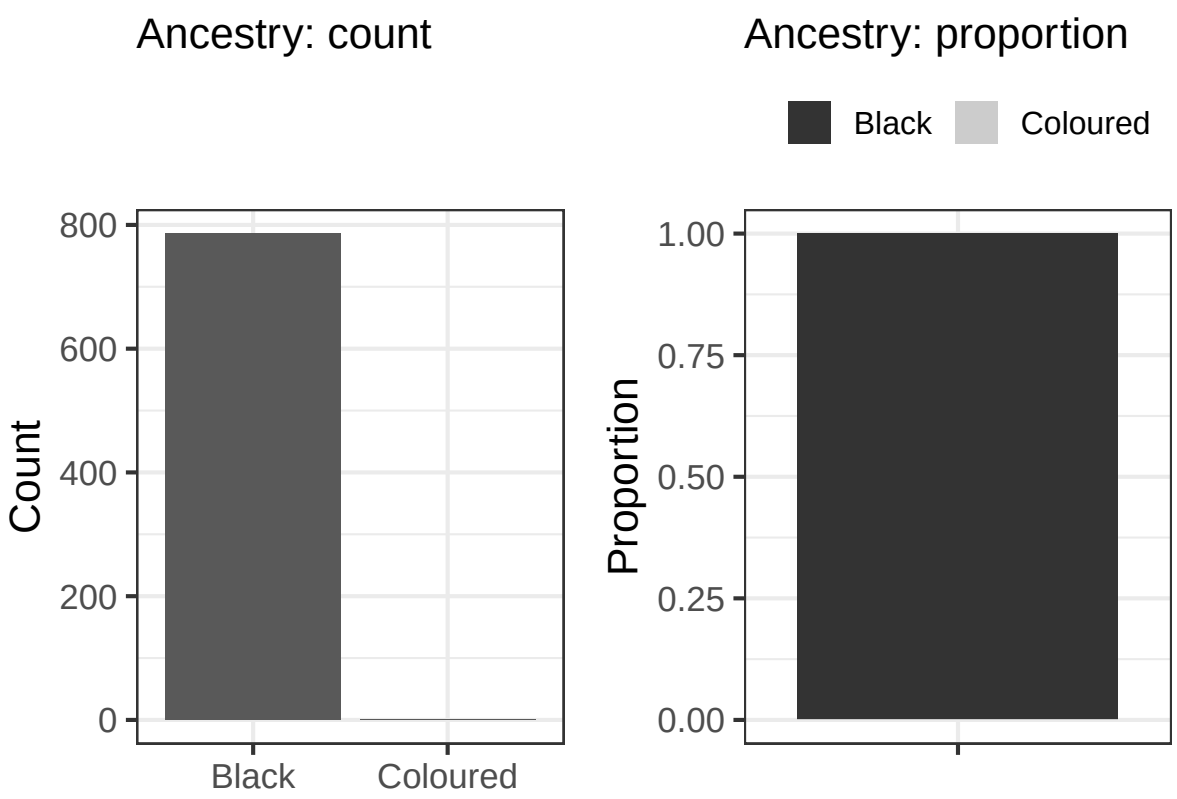
sex	count	n	missing	proportion
Female	457	787	0	0.581
Male	330	787	0	0.419

Ancestry

```
# Plot
anc_count <- ggplot(data = df) +
    aes(x = ancestry) +
    geom_bar() +
    labs(subtitle = 'Ancestry: count',
         y = 'Count') +
    theme(axis.title.x = element_blank())

anc_prop <- df %>%
    group_by(ancestry) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = 'Data',
        y = count,
        fill = ancestry) +
    geom_col(position = position_fill()) +
    labs(subtitle = 'Ancestry: proportion',
         y = 'Proportion') +
    scale_fill_grey() +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank(),
          axis.text.x = element_blank())

anc_count + anc_prop
```




```
# Numeric summary
df %>%
    select(ancestry) %>%
    mutate(ancestry= factor(ancestry)) %>%
    skim() %>%
    yank('factor') %>%
    select(-complete_rate) %>%
    kable(caption = 'Ancestry: summary statistics')
```

Table 10: Ancestry: summary statistics

skim_variable	n_missing	ordered	n_unique	top_counts
ancestry	0	FALSE	2	Bla: 786, Col: 1

```
df %>%
    group_by(ancestry) %>%
    summarise(count = n()) %>%
    mutate(n = sum(count),
           missing = sum(is.na(df$ancestry))) %>%
    mutate(proportion = round(count / n, 3)) %>%
    select(ancestry, count, n, missing, proportion) %>%
    kable(caption = 'Ancestry: summary statistics 2')
```

Table 11: Ancestry: summary statistics 2

ancestry	count	n	missing	proportion
Black	786	787	0	0.999
Coloured	1	787	0	0.001

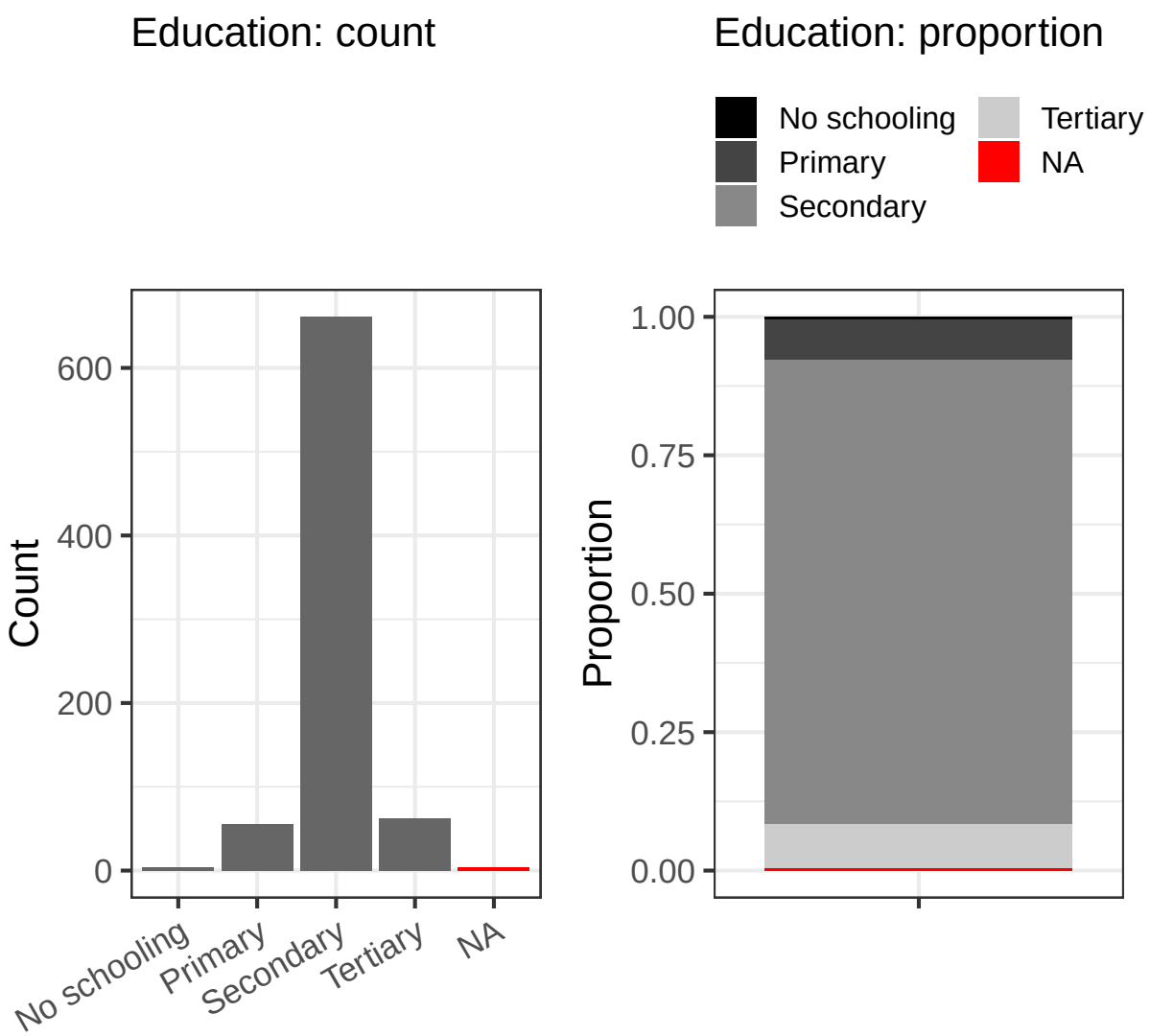
Education

```
# Plot
edu_count <- df %>%
    mutate(education = str_replace_na(education)) %>%
    mutate(education = factor(education,
                              levels = c('No schooling', 'Primary',
                                         'Secondary', 'Tertiary',
                                         'NA'),
                              ordered = TRUE)) %>%
    ggplot(data = .) +
    aes(x = education,
        fill = education) +
    geom_bar() +
    labs(subtitle = 'Education: count',
         y = 'Count') +
        scale_fill_manual(values = c(rep('#666666', 4), '#FF0000')) +
    theme(legend.position = 'none',
          axis.title.x = element_blank(),
          axis.text.x = element_text(angle = 30, hjust = 1))

grey_pal <- colorRampPalette(colors = c('#CCCCCC', '#000000'),
                             interpolate = 'linear')
grey_red <- c(rev(grey_pal(4)), '#FF0000')

edu_prop <- df %>%
    mutate(education = str_replace_na(education)) %>%
    mutate(education = factor(education,
                              levels = c('No schooling', 'Primary',
                                         'Secondary', 'Tertiary',
                                         'NA'),
                              ordered = TRUE)) %>%
    group_by(education) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = 'Data',
        y = count,
        fill = education) +
    geom_col(position = position_fill()) +
    labs(subtitle = 'Education: proportion',
         y = 'Proportion') +
    scale_fill_manual(values = grey_red,
                      guide = guide_legend(ncol = 2)) +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank(),
          axis.text.x = element_blank())

edu_count + edu_prop
```




```
# Numeric summary
df %>%
    select(education) %>%
    mutate(education = factor(education)) %>%
    skim() %>%
    yank('factor') %>%
    select(-complete_rate) %>%
    kable(caption = 'Education: summary statistics')
```

Table 12: Education: summary statistics

skim_variable	n_missing	ordered	n_unique	top_counts
education	4	FALSE	4	Sec: 661, Ter: 62, Pri: 56, No : 4

```
df %>%
    group_by(education) %>%
    summarise(count = n()) %>%
    mutate(n = sum(count),
           missing = sum(is.na(df$education)),
           n = n - missing) %>%
    mutate(proportion = round(count / n, 3)) %>%
    select(education, count, n, missing, proportion) %>%
    filter(education != 'NA') %>%
```

```
    kable(caption = 'Education: summary statistics 2')
```

Table 13: Education: summary statistics 2

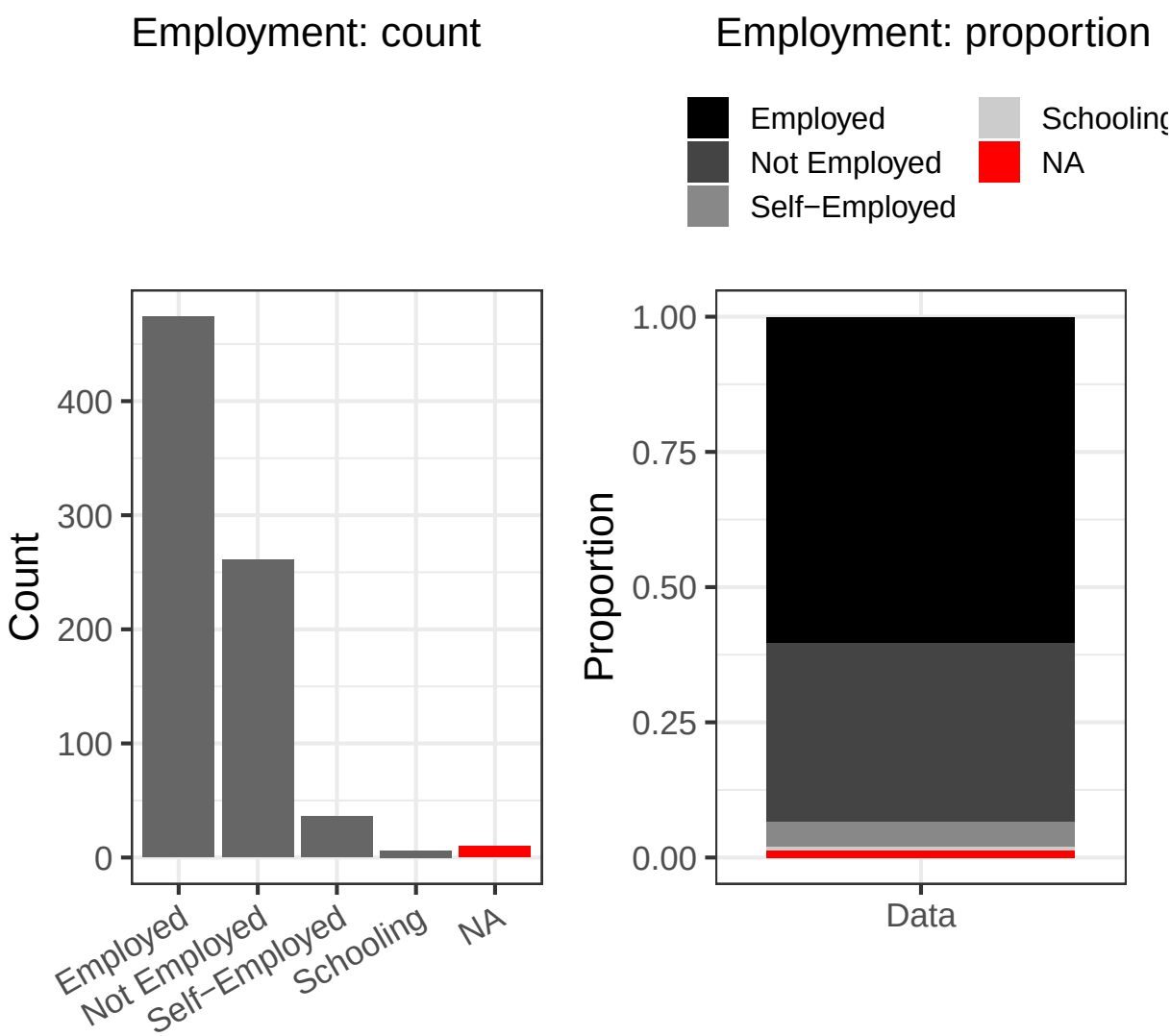
education	count	n	missing	proportion
No schooling	4	783	4	0.005
Primary	56	783	4	0.072
Secondary	661	783	4	0.844
Tertiary	62	783	4	0.079

Employment

```
# Plot
emp_count <- df %>%
    mutate(employment_status = str_replace_na(employment_status)) %>%
    mutate(employment_status = factor(employment_status,
                                      levels = c('Employed', 'Not Employed',
                                                 'Self-Employed', 'Schooling',
                                                 'NA'),
                                      ordered = TRUE)) %>%
    ggplot(data = .) +
    aes(x = employment_status,
        fill = employment_status) +
    geom_bar() +
    labs(subtitle = 'Employment: count',
         y = 'Count') +
    scale_fill_manual(values = c(rep('#666666', 4), '#FF0000')) +
    theme(legend.position = 'none',
          axis.title.x = element_blank(),
          axis.text.x = element_text(angle = 30, hjust = 1))

emp_prop <- df %>%
    mutate(employment_status = str_replace_na(employment_status)) %>%
    mutate(employment_status = factor(employment_status,
                                      levels = c('Employed', 'Not Employed',
                                                 'Self-Employed', 'Schooling',
                                                 'NA'),
                                      ordered = TRUE)) %>%
    group_by(employment_status) %>%
    summarise(count = n()) %>%
    ggplot(data = .) +
    aes(x = 'Data',
        y = count,
        fill = employment_status) +
    geom_col(position = position_fill()) +
    labs(subtitle = 'Employment: proportion',
         y = 'Proportion') +
    scale_fill_manual(values = grey_red,
                      guide = guide_legend(ncol = 2)) +
    theme(legend.title = element_blank(),
          legend.text = element_text(size = 12),
          legend.position = 'top',
          axis.title.x = element_blank())

emp_count + emp_prop
```




```
# Numeric summary
df %>%
    select(employment_status) %>%
    mutate(employment_status = factor(employment_status)) %>%
    skim() %>%
    yank('factor') %>%
    select(-complete_rate) %>%
    kable(caption = 'Employment status: summary statistics')
```

Table 14: Employment status: summary statistics

skim_variable	n_missing	ordered	n_unique	top_counts
employment_status	10	FALSE	4	Emp: 474, Not: 261, Sel: 36, Sch: 6

```
df %>%
    group_by(employment_status) %>%
    summarise(count = n()) %>%
    mutate(n = sum(count),
           missing = sum(is.na(df$employment_status)),
           n = n - missing) %>%
    mutate(proportion = round(count / n, 3)) %>%
    select(employment_status, count, n, missing, proportion) %>%
    filter(employment_status != 'NA') %>%
    kable(caption = 'Employment status: summary statistics 2')
```

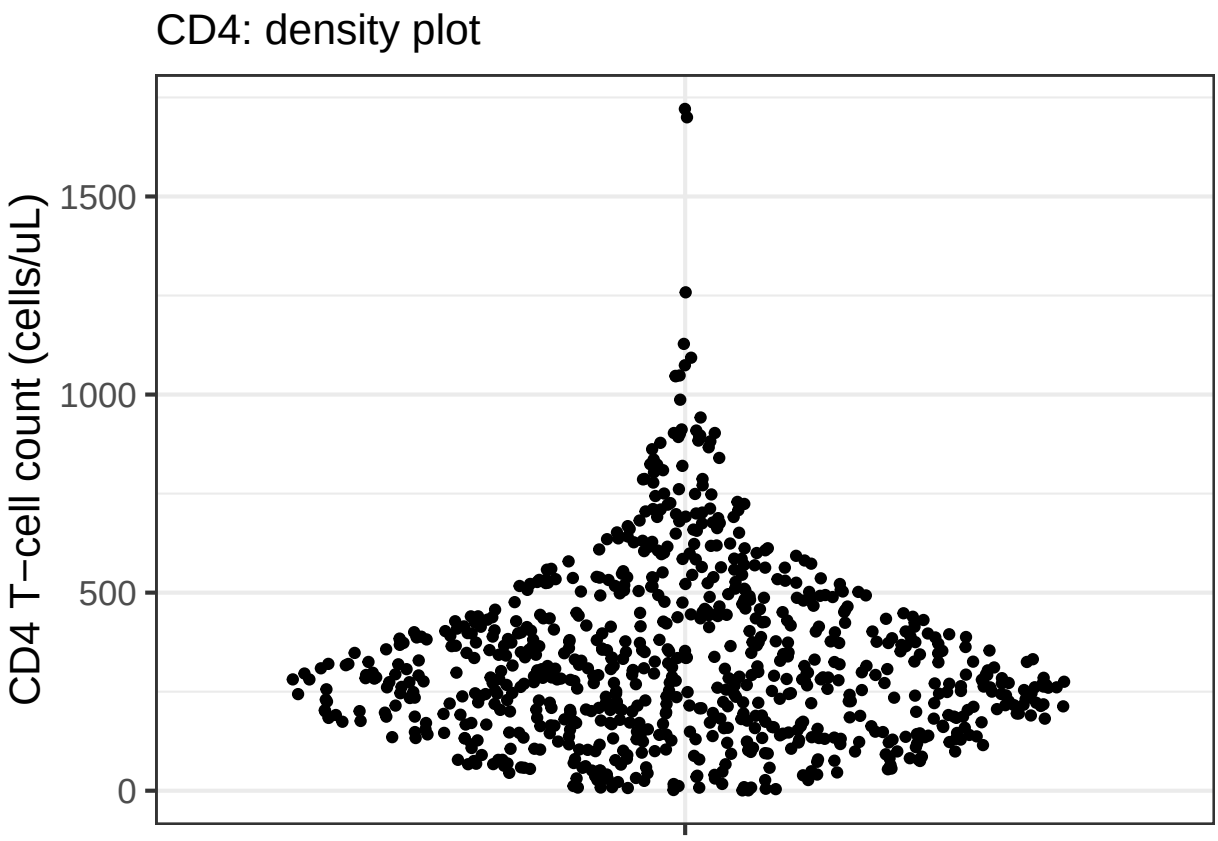
Table 15: Employment status: summary statistics 2

employment_status	count	n	missing	proportion
Employed	474	777	10	0.610
Not Employed	261	777	10	0.336
Schooling	6	777	10	0.008
Self-Employed	36	777	10	0.046

Clinical

CD4 T-cell count

```
# Plot
ggplot(data = df) +
    aes(x = 'Data',
        y = cd4_cells.ul) +
    geom_sina() +
    labs(subtitle = 'CD4: density plot',
         y = 'CD4 T-cell count (cells/uL)') +
    theme(axis.title.x = element_blank(),
          axis.text.x = element_blank())
```




```
# Numeric summary
df %>%
    select(cd4_cells.ul) %>%
    skim() %>%
```

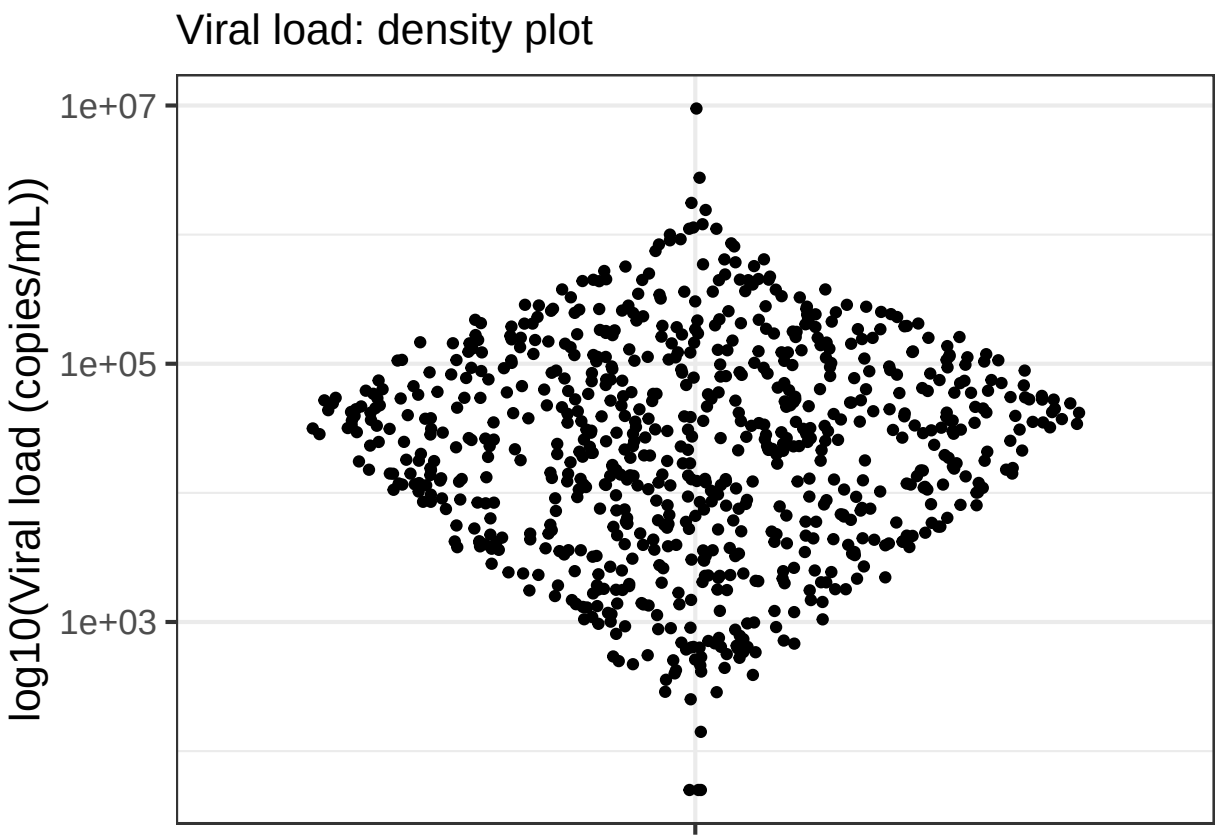
```
    yank('numeric') %>%
    select(-hist, -complete_rate) %>%
    kable(caption = 'CD4 T-cell count: summary statistics')
```

Table 16: CD4 T-cell count: summary statistics

skim_variable	n_missing	mean	sd	p0	p25	p50	p75	p100
cd4_cells.ul	0	333.2516	224.0549	1	173.5	290	441.5	1721

Viral load

```
# Plot
ggplot(data = df) +
    aes(x = 'Data',
        y = viral_load_cp.ml) +
    geom_sina() +
    scale_y_log10() +
    labs(subtitle = 'Viral load: density plot',
         y = 'log10(Viral load (copies/mL))') +
    theme(axis.title.x = element_blank(),
          axis.text.x = element_blank())
```



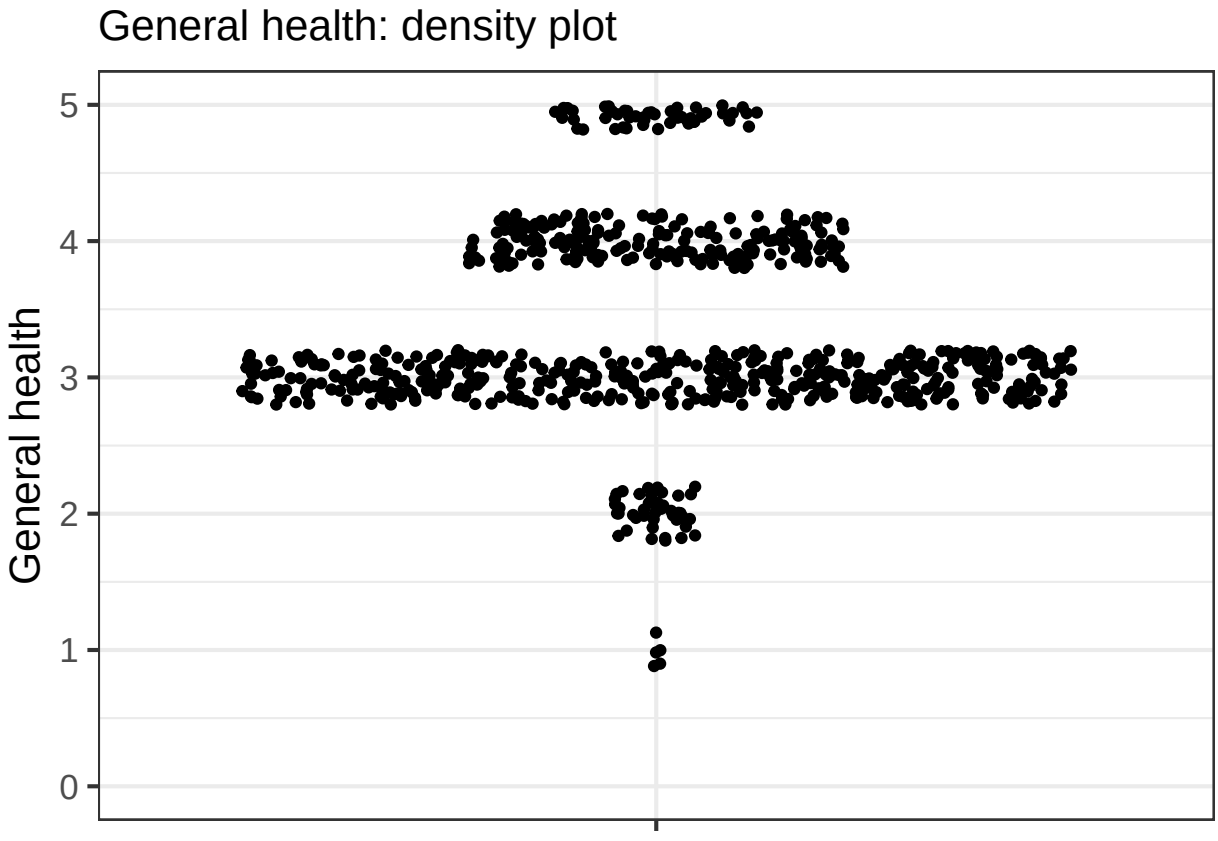

```
# Numeric summary
df %>%
    select(viral_load_cp.ml) %>%
    skim() %>%
    yank('numeric') %>%
    select(-hist, -complete_rate) %>%
    kable(caption = 'Viral load: summary statistics')
```

Table 17: Viral load: summary statistics

skim_variable	n_missing	mean	sd	p0	p25	p50	p75	p100
viral_load_cp.ml	0	98611.6	386720	50	5704.5	25853	85574	9475772

Perception of health (baseline)

```
# Plot
ggplot(data = df) +
    aes(x = 'Data',
        y = general_health) +
    geom_sina() +
    scale_y_continuous(limits = c(0, 5)) +
    labs(subtitle = 'General health: density plot',
         y = 'General health') +
    theme(axis.title.x = element_blank(),
          axis.text.x = element_blank())
```




```
# Numeric summary
df %>%
    select(general_health) %>%
    skim() %>%
    yank('numeric') %>%
    select(-hist, -complete_rate) %>%
    kable(caption = 'General health: summary statistics')
```

Table 18: General health: summary statistics

skim_variable	n_missing	mean	sd	p0	p25	p50	p75	p100
general_health	4	3.449553	0.8152615	1	3	3	4	5

```r
# Mode
xtabs(~general_health, data = df) %>%
    kable(caption = 'General health: modal distribution')
```

Table 19: General health: modal distribution

general_health	Freq
1	5
2	43
3	435
4	195
5	105

Session information

```r
sessionInfo()
```

```
## R version 3.6.1 (2019-07-05)
## Platform: x86_64-apple-darwin15.6.0 (64-bit)
## Running under: macOS Mojave 10.14.6
##
## Matrix products: default
## BLAS:   /Library/Frameworks/R.framework/Versions/3.6/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/3.6/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] patchwork_1.0.0 knitr_1.27      skimr_2.0.2     ggforce_0.3.1
##  [5] magrittr_1.5    forcats_0.4.0   stringr_1.4.0   dplyr_0.8.3
##  [9] purrr_0.3.3     readr_1.3.1     tidyr_1.0.0     tibble_2.1.3
## [13] ggplot2_3.2.1   tidyverse_1.3.0
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_1.0.3       lubridate_1.7.4  lattice_0.20-38  assertthat_0.2.1
##  [5] zeallot_0.1.0    digest_0.6.23    utf8_1.1.4       R6_2.4.1
##  [9] cellranger_1.1.0 repr_1.0.2       backports_1.1.5  reprex_0.3.0
## [13] evaluate_0.14    httr_1.4.1       highr_0.8        pillar_1.4.3
## [17] rlang_0.4.2      lazyeval_0.2.2   readxl_1.3.1     rstudioapi_0.10
## [21] rmarkdown_2.1    labeling_0.3     polyclip_1.10-0  munsell_0.5.0
## [25] broom_0.5.3      compiler_3.6.1   modelr_0.1.5     xfun_0.12
## [29] pkgconfig_2.0.3  base64enc_0.1-3  htmltools_0.4.0  tidyselect_0.2.5
## [33] fansi_0.4.1      crayon_1.3.4     dbplyr_1.4.2     withr_2.1.2
## [37] MASS_7.3-51.5    grid_3.6.1       nlme_3.1-143     jsonlite_1.6
## [41] gtable_0.3.0     lifecycle_0.1.0  DBI_1.1.0        scales_1.1.0
## [45] cli_2.0.1        stringi_1.4.5    farver_2.0.3     fs_1.3.1
## [49] xml2_1.2.2       generics_0.0.2   vctrs_0.2.1      tools_3.6.1
## [53] glue_1.3.1       tweenr_1.0.1     hms_0.5.3        yaml_2.2.0
## [57] colorspace_1.4-1 rvest_0.3.5      haven_2.2.0
```